National Parks Service

Mallee Parks

Management Plan

September 1996

NATURAL RESOURCES
AND ENVIRONMENT

This Management Plan for the Mallee Parks is approved for implementation. Its purpose is to direct all aspects of Management of the Parks until the Plan is reviewed. A Draft Management Plan was published in July 1995. A total of 259 submissions were received. Copies of this Plan can be purchased from:

Outdoors Information Centre
Department of Natural Resources and Environment
240 Victoria Parade
EAST MELBOURNE 3002

Manager, Parks and Reserves, North West Region
Department of Natural Resources and Environment
253 Eleventh Street
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MALLEE PARKS

Hattah-Kulkyne National Park
Murray-Sunset National Park
Wyperfeld National Park
Lake Albacutya Park
Murray-Kulkyne Park

MANAGEMENT PLAN

National Parks Service

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

Victoria

SEPTEMBER 1996

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FOREWORD

The Mallee Parks, comprising Hattah-Kulkyne, Murray-Sunset and Wyperfeld National Parks, Big Desert Wilderness Park and Lake Albacutya and Murray-Kulkyne Parks, are some of south-eastern Australia's most outstanding Parks. They are highly valued for their complex and subtle semi-arid landscape, diverse environments, wilderness areas, remoteness and important archaeological values.

There are many opportunities for visitors to enjoy the Parks. Scenic driving or exploring the remoter and more rugged areas by 4WD, camping, walking, horse riding, fishing, bird watching or nature study, and enjoying the solitude in some of Victoria's best wilderness areas, are among the experiences on offer.

This Approved Plan has been finalised following careful consideration of the 259 submissions received on the Draft Plan. I thank all those who wrote submissions. The Approved Plan establishes the long-term management framework to protect the important conservation and recreation values of the Parks while ensuring that they play an important role in nature-based tourism in the Mallee.

As a result of the Plan's implementation I am confident that the Parks' diverse environments, fragile semi-arid landscape and remote character will be protected at the same time as visitors' enjoyment is enhanced.

I look forward with confidence to the community's support for these very important Parks, which are such a significant part of Victoria's Parks system.

Hon Marie Tehan MP
MINISTER FOR CONSERVATION
and LAND MANAGEMENT

APPROVED MANAGEMENT PLAN

This Approved Management Plan has been prepared in accordance with Sections 17, 17B and 18 of the *National Parks Act 1975* (Vic.) and is approved for implementation.

The Plan provides the basis for future management of the Mallee Parks. It was finalised following consideration of the 259 submissions received on the Draft Plan.

Mark Stone
Director, National Parks Service

Trevor Miles
Regional Manager, North West

SUMMARY

The Mallee Parks comprise Hattah-Kulkyne, Murray-Sunset and Wyperfeld National Parks, Big Desert Wilderness Park and Lake Albacutya and Murray-Kulkyne Parks. These Parks represent 40 per cent of the total area of Victoria's Park system and contain highly significant landscape, flora, fauna, and cultural values. This Plan is an integrated plan which sets broad directions for the future management of these Parks[1] and states management objectives and strategies (for all parks and where relevant for specific parks) which are necessary to achieve a high standard of conservation and recreation management.

Park management will aim to protect the Parks' wilderness and conservation values, and to optimise visitor opportunities and experiences consistent with these values.

Major management directions for the Parks include:

- Conserving the outstanding natural condition of much of the Mallee Parks, their highly significant flora and fauna, and wilderness and landscape values, by controlling rabbits and goats, reducing the impacts of other pest animals and plants, and managing fire to create a greater diversity of vegetation age classes.
- Restoring disturbed areas by reducing the impact of introduced and native herbivores and pest plants, restoring more natural water regimes, and by active regeneration.
- Protecting Aboriginal and European heritage cultural sites from accelerated processes of decay, and promoting an understanding of the Parks' Aboriginal and pastoral heritage.
- Enhancing visitor enjoyment by providing year-round access for conventional vehicles, particularly between the main points of visitor interest and activities, and extending the range of opportunities available by developing long-distance walking trails and self-guided walks, and improving information and interpretation.
- Developing a co-operative approach to the development of sustainable tourism to help boost local economies.
- Implementing a co-operative approach to boundary management issues to protect Park and freehold land values on the fringes of the Mallee Parks. This will include the integration of Landcare initiatives with Park management.
- Maintaining or enhancing habitat corridors between the Mallee Parks.

[1]This plan does not cover the Big Desert Wilderness Park, which has a separate management plan to direct its management.

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1 INTRODUCTION

1.1 Location and planning area

The Victorian Mallee Parks are within the Big Desert and Sunset Country of north-western Victoria, about 450 km from Melbourne. On the south-eastern margin of the arid and semi-arid regions of Australia, the Parks encompass a range of environments including Mallee dunefields, woodlands and riverine plains.

The area covered by this Management Plan comprises approximately 10 500 km^2 of public land and includes the following Parks:

- Murray-Sunset National Park (6330 km^2);
- Wyperfeld National Park (3568 km^2);
- Hattah-Kulkyne National Park (480 km^2);
- Lake Albacutya Park (83 km^2);
- Murray-Kulkyne Park (35.3 km^2).

These areas include 21 reference areas, 7 wilderness zones, 2 remote and natural areas and approximately 90 km of the Wimmera Heritage River (table 1).

These Parks, together with the Big Desert Wilderness Park, are collectively called the Mallee Parks. Management of the Big Desert Wilderness Park (1423 km^2) is addressed in a separate Management Plan (CNR 1994).

Murray-Sunset, Hattah-Kulkyne and Murray-Kulkyne all have frontages to the Murray River, while Wyperfeld and Lake Albacutya contain the Outlet Creek system and the terminal lakes of the Wimmera River. The western boundary of Murray-Sunset abuts the South Australian border. All the Mallee Parks fall within the Murray-Darling drainage basin (figure 1).

1.2 Regional context

The area of Victoria commonly known as the Mallee encompasses almost 20 per cent of the State. The region supports a population of some 70 000 people, most of whom live in the townships of Robinvale, Swan Hill and Mildura and their immediate surrounds. Agriculture, in the form of dryland cropping, stock grazing and irrigated horticulture along the Murray River, is the main economic base.

Tourism has been an important industry in Mildura and Swan Hill for some time, but to date has had little impact on the economies of smaller communities (CNR 1993a). Although there is currently a low level of awareness of the existence of the Mallee Parks and their attractions among local communities and the tourism industry in general, the Parks present outstanding opportunities for visitors attracted by their remote location and subtle and complex environments (section 5.1). The development of sustainable tourism in the Mallee Parks will enable visitors to enjoy the Parks' natural and cultural values, foster a better appreciation of Park values and generate economic benefits for the region.

The Parks complement other popular visitor destinations in the area including River Murray based recreation and sporting activities, the Willandra Lakes World Heritage areas and National Parks of western and south-western New South Wales, and Conservation Parks along the eastern border of South Australia.

1.3 Significance of the Parks

The Mallee Parks make a valuable contribution to Victoria's parks system, which aims to protect viable, representative samples of the State's natural environments occurring on public land. Parks also provide opportunities for visitors to enjoy and appreciate natural and cultural values, and many make important contributions to tourism.

The Murray-Sunset, Hattah-Kulkyne and Wyperfeld National Parks are listed in Category II (National Parks) of the IUCN United Nations' List of National Parks and Protected Areas. Category II areas are managed primarily for ecosystem conservation and appropriate recreation. Murray-Kulkyne Park is listed in Category III (Protected area managed mainly for conservation of specific natural features).

Lake Albacutya did not meet the IUCN definition of a protected area and was not assigned an IUCN category.

Hattah-Kulkyne National Park was designated as a Biosphere Reserve in 1981 under the UNESCO Man and Biosphere Program in recognition of its outstanding natural values. Lakes in Hattah-Kulkyne National Park and Lake Albacutya Park were also designated under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) in 1982.

Traditionally the level of reservation in Australia's semi-arid lands has been low, and relatively few areas remain undisturbed. Because of the drought of 1913-29, the Depression of the 1930s and unsuitable conditions for agriculture, large areas of the Victorian Mallee remained unsettled. The Mallee Parks are thus of great significance in that they now protect the least disturbed mallee ecosystems in Australia. The Parks contain outstanding areas of semi-arid wilderness, and the largest areas of highest quality wilderness in south-eastern mainland Australia. Together, they represent 40 per cent of the total area of the Victorian National Parks system.

The Parks' diverse natural values complement those protected in other large conservation reserves in north-western Victoria, including Wathe, Wandown, Annuello and Bronzewing Flora and Fauna Reserves.

Significant features of the Parks include:

Natural values

- A large diversity of biota, including many species that are significant at a national level.
- A diverse range of ecosystems and landscapes unique in Victoria, including dunefields, heathlands, woodlands, grasslands, rivers, lakes, boinkas and wetlands.
- Large areas of essentially undisturbed vegetation, comprising approximately 1000 species of native plants from more than 100 distinct sub-communities.
- Many significant fauna species, including 11 Flora and Fauna Guarantee listed species (one mammal, seven bird, and three reptile and amphibian species).
- Over 300 species of birds, including 22 species of parrots, among them the vulnerable Regent Parrot and Malleefowl, and the endangered Black-eared Miner and Western Whipbird.
- A greater diversity of reptiles than any other region in Victoria.
- Seven wilderness zones within Murray-Sunset and Wyperfeld National Parks, including areas as remote from settlement as any area in the State.

Cultural values

- Over 3800 sites listed on the Aboriginal Affairs Victoria (AAV) Register, some (e.g. burial sites) of great archaeological significance.
- Many significant European historic sites, including relics of early pastoral development, settlement and salt mining.
- Many opportunities for on-site interpretation of the Parks' Aboriginal and European cultural heritage.

Tourism and recreation values

- Opportunities to experience a broad range of recreational activities in a variety of settings.
- Exceptional opportunities for experiencing solitude and self-reliant recreation in remote, semi-arid areas.
- Great potential for motorised recreation, including 2WD scenic driving and extensive 4WD touring in remote and rugged terrain.
- Outstanding opportunities for high quality interpretation of one of Victoria's most subtle and least well understood natural environments.

1.4 Creation of the Parks

The history of national park reservation in the Mallee dates back to 20 October 1909, when the first part of Wyperfeld (38.9 km^2) was temporarily reserved as a site for a national park.

Although several additional areas at Wyperfeld and Hattah Lakes were reserved over the next 70 years, by far the largest park reservations have occurred since 1979, following LCC studies (LCC 1977; LCC 1989; LCC 1991b). Over 1000 km^2 was reserved under the National Parks Act in 1979 and 1980 as a result of the *National Parks Act 1978* (Vic.), over 10 000 km^2 in 1990 and 1991 as a result of the *National Parks (Amendment) Act 1990* (Vic.), and a further 331 km^2 in 1992 as a result of the *National Parks (Wilderness) Act 1992* (Vic.). Including the Big Desert Wilderness Park, they now cover nearly
12 000 km^2.

Hattah-Kulkyne National Park

On 7 June 1960, an area of 178 km^2 including the Hattah Lakes was reserved as Hattah Lakes National Park as a result of the *National Parks (Amendment) Act 1960* (Vic.). The adjacent State forest was added on 26 April 1980 to form Hattah-Kulkyne National Park (480 km^2).

Murray-Sunset National Park

Murray-Sunset National Park (6330 km^2) was proclaimed on 5 June 1991, incorporating Pink Lakes State Park (507 km^2) which had been proclaimed on 26 April 1979.

Wyperfeld National Park

Following the initial reservation in 1909, permanent reservation and subsequent additions were made in the 1920s, 30s and 40s. The Park increased from 565 km^2 to 1000 km^2 in 1979, to 3237 km^2 in 1991 and to 3568 km^2 in 1992.

Lake Albacutya Park

Lake Albacutya Park (107 km^2) was proclaimed in 1980. In 1991, Lake Werrebean was transferred to Wyperfeld, and Ross Lakes was added to Lake Albacutya Park, which now covers 83 km^2.

Murray-Kulkyne Park

Murray-Kulkyne Park (15.5 km^2) was proclaimed on 26 April 1980. In 1990, it was increased to 35.3 km^2 with the addition of the Liparoo block.

Other designations

Seven wilderness zones covering 4138 km^2 and two remote and natural areas covering 561 km^2 were established in Murray-Sunset and Wyperfeld in 1992 as a result of the National Parks (Wilderness) Act. This followed the LCC's Wilderness Special Investigation (LCC 1991b).

The Wimmera Heritage River, which includes parts of Wyperfeld National Park and Lake Albacutya Park, was proclaimed under the *Heritage Rivers Act 1992* (Vic.) on 22 August 1992, following the LCC's Rivers and Streams Special Investigation (LCC 1991a).

1.5 Legislation, LCC recommendations and guidelines

The Mallee Parks are reserved and managed under the provisions of the National Parks Act. The Act requires the Director to preserve and protect the natural condition of the Parks and their natural and other features, and to provide for the use of the Parks by the public for enjoyment, recreation and education, and for research.

Table 1 summarises the other land use categories within each National Park approved by Government following acceptance of the relevant LCC final recommendations.

The four wilderness zones in Murray-Sunset and three in Wyperfeld, are managed under the wilderness provisions of the National Parks Act and the relevant LCC recommendations, particularly those relating to management principles for wilderness areas (LCC 1991b).

Sections 21B, 21C and 21D of the National Parks Act provide for the management of the two remote and natural areas within Murray-Sunset and Wyperfeld.

Twenty-one Reference Areas in the Parks (13 in Murray-Sunset, five in Wyperfeld, three in

TABLE 1 LAND USE CATEGORIES

REFERENCE AREAS	WILDERNESS ZONES	REMOTE & NATURAL AREAS	EDUCATION AREAS
Murray-Sunset National Park			
Millewa (630 ha)	Sunset (126 900 ha)	South Sunset (24 000 ha)	
Lake Wallawalla (1060 ha)	Minook (38 700 ha)		
Sunset (8650 ha)*	Galpunga (35 700 ha)		
Toupnein Creek (1660 ha)	Mt Cowra (23 500 ha)		
Morkalla (990 ha)			
Settlement Road (2580 ha)			
Millewa South (2400 ha)*			
Berrook (2580 ha)*			
Danyo (1600 ha)*			
Rocket Lake (2090 ha)			
Raak Plain (1480 ha)			
Mt Crozier (2010 ha)			
Purnya (1090 ha)			
(Total 28 820 ha)	(Total 224 800 ha)	(Total 24 000 ha)	
Wyperfeld National Park			
Broombush (1600 ha)	North Wyperfeld (97 900 ha)	Hopping Mouse Hill (32 100 ha)	Outlet Ck (710 ha)
Rudd Rocks (3750 ha)	South Wyperfeld (61 300 ha)		
O'Sullivan's Lookout (1910 ha)	Chinaman Flat (29 800 ha)		
Lake Jerriwirrup (290 ha)			
Dattuck (1 640 ha)			
(Total 9160 ha)	(Total 189 000 ha)	(Total 32 100 ha)	(Total 710 ha)
Hattah-Kulkyne National Park			
Kia (990 ha)			Wemen (470 ha)
Chalka Creek (400 ha)			
Tarpaulin Island (440 ha)			
(Total 1830 ha)			(Total 470 ha)

* Reference Area wholly or partly overlays a Wilderness Zone or Remote and Natural Area.

Hattah-Kulkyne), proclaimed or to be proclaimed under the *Reference Areas Act 1978* (Vic.), are managed in accordance with Ministerial directives detailed in NPS guideline 12.1W. In accordance with the Reference Areas Act, a management statement is required for each reference area. Interim management statements have been prepared for the following reference areas within the Mallee Parks:

- Toupnein Creek Reference Area
- Settlement Road Reference Area
- Millewa South Reference Area

- Berrook Reference Area
- Danyo Reference Area
- Morkalla Reference Area.

Following the 1991 Rivers and Streams Special Investigation (LCC 1991a), the Wimmera River, from Polkemmet to the terminal lakes in Wyperfeld National Park, was designated as a Heritage River under the Heritage Rivers Act and proclaimed as such on 22 August 1992. This Act provides for the protection of Heritage Rivers and indicates particular uses which are or are not permitted in these areas.

Lakes in Hattah-Kulkyne National Park and Lake Albacutya Park were designated under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) in 1982. Signatories to the Convention are obligated to protect designated wetlands and manage for their wise use. Under the Japanese Australian Migratory Bird Agreement (JAMBA) and the Chinese Australian Migratory Bird Agreement (CAMBA), Australia has agreed to conserve the habitat of species listed in the agreements. Eleven listed species of waterbird are found in Hattah-Kulkyne National Park.

The LCC has also made particular recommendations relating to the phase-out of grazing, appropriate uses, and the management of certain tracks in the Mallee Parks (LCC 1989, 1991a, 1991b). The Parks are managed in accordance with Department of Natural Resources and Environment (NRE) guidelines for the management of parks (NPS 1995) and LCC recommendations, and with other Acts, Departmental plans and guidelines, including:

- the *Catchment and Land Protection Act 1995* (Vic.), which states that park management should consider any Regional Catchment Management Strategy or Special Area Plans applying to the Parks. The Parks lie within the region of the Mallee Regional Catchment and Land Protection Board, except for Lake Albacutya Park which lies within the region of the Wimmera Regional Catchment and Land Protection Board;
- the Mildura Region Fire Protection Plan (CNR 1992);
- the Natural Resource Protection Guidelines (CNR 1993b);
- Native Vegetation Conservation Strategy (DCE 1990a);
- Restoring the Balance. The Kangaroo Control Program to save Hattah-Kulkyne National Park (DCE 1990b);
- the Mallee Tourism and Recreation Strategy (CNR 1993a);
- the Mallee Interpretation and Community Education Plan (CNR 1993d);
- grazing management plans on other public land.

1.6 Park management aims

Sections 4, 17, 17A and 17B of the National Parks Act provide the main basis for management of the Parks. The following management aims are derived from those sections, and as such broadly govern all aspects of park management.

Resource conservation

- Preserve and protect the natural environment.
- Maintain, or where possible enhance, wilderness values.
- Allow natural environmental processes to continue with the minimum of disturbance, and maintain biodiversity.
- Conserve features of archaeological, historical and cultural significance.

Park protection

- Protect water catchments and stream systems.
- Protect human life, the Parks and adjacent land from injury by fire.
- Eradicate or otherwise control introduced plants, animals and diseases.

The Park visit

- Provide a range of opportunities for suitable recreation and tourism.
- Promote and encourage an appreciation, understanding and enjoyment of the Parks' natural and cultural values and their recreational opportunities.
- Encourage appropriate Park use and visitor behaviour and foster a conservation ethic in visitors.
- Take reasonable steps to ensure the safety of visitors.

Other

- Provide for and encourage scientific research, surveys and monitoring that will contribute to a better understanding and management of the Parks.
- Co-operate with local, State and interstate government authorities, the community and other interested organisations to assist in the management of the Parks.

2 STRATEGIC DIRECTIONS

2.1 Park vision

A future visitor to the Mallee Parks finds world-class Parks renowned for their semi-arid landscapes, diverse environments, and the opportunity to experience a sense of remoteness away from an increasingly developed world. The Parks are being managed with an increased understanding of their complex and subtle natural environments. Their many significant species and communities, landscape qualities and archaeological and cultural sites are well protected, and disturbance to their wilderness and other remote and natural areas is minimal. Areas of the Parks that have been degraded through past land management activities have been or are being restored to their natural condition.

Visitor facilities are in keeping with the remote and essentially undeveloped character of the Parks. These facilities, and accompanying high quality interpretation, assist car-based visitors and campers to enjoy and better understand the Parks' splendid environments. In the more remote areas, visitors enjoy walking in the wilderness zones and elsewhere, or four-wheel driving on the Parks' more remote tracks.

The Parks are being increasingly managed as important parts of north-west Victoria's natural tourism attractions, and they attract visitors from interstate and overseas. Sensitive management by NRE, assisted by strong Friends Groups and supported by the local community, ensures that increased visitor use is accommodated without compromising the Parks' key attributes. The interests of future generations are assured.

2.2 Management directions

Major management directions for the Parks are outlined below:

Resource conservation

- Most of the Parks' area will be maintained in an essentially undeveloped condition, especially Wilderness Zones and Remote and Natural Areas.
- In those areas of the Parks that remain in an outstanding natural condition, the existing diversity of native flora and fauna will be maintained, and a management regime of minimal disturbance adopted. Significant natural and cultural features will be given special protection.
- Wildlife corridors between the Parks and other major blocks of public land in the region will be established.
- A long-term research and environmental monitoring program will be established to provide a sound scientific basis for future management strategies.

Park protection

- As far as is practicable, areas of the Parks that have been degraded through past land management activities will be rehabilitated by:
  - reducing the impact of pest animals and plants on native species and communities;
  - addressing the current imbalance of kangaroo populations;
  - restoring a more natural hydrological regime within all Parks;
  - active revegetation in areas of localised extinction and rarity;
  - adopting manipulative fire regimes where they can be demonstrated to be of value to the Parks' environments and ecosystems.

The Park visit

- Park visitors will continue to enjoy a range of activities (e.g. bushwalking, horse riding, canoeing, 4WD touring) in remote settings without undue disturbance from other visitors. Opportunities for 2WD and 4WD touring will be extended through the linking of points of visitor interest.
- Existing basic camping facilities will be enhanced through the provision of drinking water and appropriate low maintenance amenities (e.g. toilets) at strategic points.

All visitor developments will be low-key and unobtrusive, in keeping with the Parks' remoteness and natural values.

- Visitor enjoyment of the Parks will be enhanced by the development and implementation of an integrated information, interpretation and environmental education program.
- Sustainable tourism and recreation opportunities will be developed in accordance with the Mallee Tourism and Recreation Strategy (CNR 1993a). Most tourism infrastructure will be provided in and from Mallee townships or public land in close proximity to the Parks.

Community awareness and involvement

- A co-operative approach to the management of Park fringes will be adopted through involvement with community Landcare and Rabbit Action Groups.

2.3 Zoning

A Park management zoning scheme has been developed to:

- provide a geographic framework in which to manage the Mallee Parks;
- indicate which management aims have priority in different parts of the Parks;
- indicate the types and levels of use appropriate throughout the Parks;
- assist in minimising existing and potential conflicts between uses and activities, or between these and the protection of park values;
- provide a basis for assessing the suitability of future activities and development proposals.

Five management zones apply to the Parks - Reference Area, Wilderness, Conservation and Recreation, Recreation Development and Education.

In addition, Special Protection Areas, a Special Management Area - Public Utility, and two Land Use Designations - Heritage River and Remote and Natural Area - are used to summarise requirements additional to those of the underlying primary management zones.

Table 2 describes the characteristics of the zones and overlays. Their location is shown on figure 2. Where possible, boundaries have been defined by roads or tracks or other readily identifiable features.

TABLE 2 MANAGEMENT ZONES AND OVERLAYS

	ZONES				
	REFERENCE AREA	WILDERNESS	CONSERVATION & RECREATION	RECREATION DEVELOPMENT	EDUCATION
AREA/ LOCATION	21 Reference Areas (table 1).	Sunset, Minook, Galpunga, Mt Cowra, Chinaman Flat, North Wyperfeld, South Wyperfeld Wilderness Zones.	Most of the Park outside wilderness zones.	Main visitor destinations.	Outlet Creek and Wemen Education Areas (table 1).
VALUES	Relatively undisturbed representative land types and associated vegetation.	Large, essentially undisturbed areas.	Important natural values and scope for recreation opportunities.	Sites with facility development in a natural setting.	Area for education purposes.
GENERAL MANAGEMENT AIM	Protect viable samples of one or more land types that are relatively undisturbed for comparative study with similar land types elsewhere, by keeping all human interference to the minimum essential and ensuring as far as practicable that the only long-term change results from natural processes.	Protect or enhance the essentially unmodified natural condition of the area and, subject to that protection and minimal interference to natural processes, provide opportunities for solitude, inspiration and appropriate self-reliant recreation.	Protect less sensitive natural environments and provide for sustainable dispersed recreation activities and small-scale recreation facilities without significant impact on natural processes.	Provide primarily for high-use visitor nodes with a concentration of recreation and/or interpretation facilities.	Provide primarily for environmental education in a relatively undisturbed area.

Table 2 (cont.)

	OVERLAY			
	SPECIAL PROTECTION AREAS	SPECIAL MANAGEMENT AREA - PUBLIC UTILITY	LAND USE DESIGNATION	
			REMOTE AND NATURAL AREA	HERITAGE RIVER
AREA/ LOCATION	Areas detailed in table 3 and figure 2.	Power line easements.	Hopping Mouse Hill and South Sunset Remote and Natural Areas.	Part of Wimmera Heritage River Area (figure 3).
VALUES	Discrete significant areas requiring special attention.		Significant remote and natural area. Opportunities for self-reliant recreation.	Rivers significant for nature conservation, recreation, scenic or cultural heritage.
GENERAL MANAGEMENT AIM	Protect specific natural or cultural values in specific areas and sites where a special management focus is required.	Highlight areas or sites where special management provisions are needed to provide for a particular non-standard use or activity.	Protect the area's remote and natural attributes; prevent new and incremental developments, including the construction and upgrading of vehicular tracks and construction of new structures.	Protect the heritage values of the area.

TABLE 3 SPECIAL PROTECTION AREAS

LOCATION	VALUES	PROTECTION REQUIREMENTS
Outlet Creek floodplain (Wyperfeld NP)	Wildlife corridor; habitat for significant species.	Management vehicle only access; dispersed camping permitted only where values not threatened.
Eastern Pine Plains (Wyperfeld NP)	Largest area of Pine-Buloke Woodland in the Mallee Parks; habitat for significant species such as Pink Cockatoo.	Reduce grazing pressure to permit regeneration; increase staff presence to reduce poaching of significant species.
Lindsay Island (Murray-Sunset NP)	Large number of archaeological sites.	Reduce erosion of sites by reduction of grazing pressure and protection works; maintain confidentiality of sites.
Black-eared Miner sites* (Wyperfeld NP, Hattah-Kulkyne NP and Murray-Sunset NP)	Endangered species.	Maintain confidentiality of sites; maintain favourable habitat by excluding fire; no disturbance.

*Sites not identified on zoning map for protection purposes.

3 RESOURCE CONSERVATION

3.1 Geological and landform features

The Mallee Parks, located in the Murray Basin plains, contain an outstanding array of semi-arid and riverine landforms of relatively young geological origin. These are of considerable conservation and scientific significance, and contribute to the distinctiveness of the Mallee Parks within the Parks system, and to the Mallee generally.

The landscape is one of low relief, gently sloping towards the Murray River to the north. However, this low relief belies the landform diversity that exists and its influence on the biota.

Most of the area has a mantle of sands of marine origin and alluvium over an older land surface, but with occasional outcrops of the latter as lateritised sediments. The sands were sculpted into dunes by wind action during the Quaternary period.

The landforms of the area belong to two main geomorphic types (LCC 1987):

- the Mallee Dunefields, which covers most of the Big Desert (Wyperfeld) and the Sunset Country (Murray-Sunset and part of Hattah-Kulkyne), and is taken to include the complex groundwater discharge areas such as the Raak Plains and Pink Lakes;
- the Riverine Plain, which occurs along the Murray River at Lindsay Island (Murray-Sunset) and Hattah Lakes (Hattah-Kulkyne), and along the Outlet Creek system (Wyperfeld and Lake Albacutya).

The landforms are predominantly the result of three main factors:

- the inundation of the area by the sea, most recently about 4 million years ago, which on retreat deposited a large sheet of sand (Parilla Sand), forming a stage for subsequent landforms and providing sand for some of the later dune formations;
- past climates which were considerably drier or wetter than today, leaving a legacy of landforms such as lunettes and dunes of different types;
- the presence of a shallow saline groundwater table existing in a delicate hydrological balance, which has responded to different climates to produce a range of landforms.

Landforms

Dunefields

These are the most extensive feature and are found in all the Parks, but particularly in Wyperfeld, Murray-Sunset and Hattah-Kulkyne. They include:

- occasional outcrops in Murray-Sunset and Wyperfeld (e.g. at Majorlock Soak) of the lateritised north-south trending ridges which mark stages in the retreat of the ancient sea;
- extensive examples of a variety of dune types, including:
  - the long, low, asymmetrical, east-west linear dunes of the Woorinen Formation, which occur mainly in the northern Sunset Country and consist of reddish-brown calcareous sand with some clay;
  - the parabolic, jumbled and irregular dunes of the pale siliceous Lowan Sand, which occur in the Big Desert and southern Sunset Country;
  - the east-west longitudinal dunes of the Lowan Sand, which occur in the Big Desert and southern Sunset Country;
- broad sand plains such as Sunset, Mopoke and Last Hope in Murray-Sunset, possibly formed over the top of saline depressions, and in the central Big Desert;
- several natural water soaks along the northern fringe of the Big Desert (e.g. Majorlock Soak in Wyperfeld).

Groundwater discharge complexes

The striking landscape feature are found in three main areas of Murray-Sunset, where saline groundwater has intersected the surface in broad depressions, resulting through

evaporation in the deposition of minerals such as gypsum and salt.

Features include:

- outstanding examples of State significance, at Raak Plains and Pink Lakes, of the boinka landform complex, consisting of a variety of features including sandplains, gypsum flats, gypsite hills, salinas and source-bordering dunes;
- Rocket Lake, the largest salt-crusted ephemeral lake (salina) in the Parks;
- smaller saline areas and gypseous dunes in the north-west of the Park, south of the Sturt Highway.

Riverine landforms

These occur in parts of Murray-Sunset (Lindsay Island), Hattah-Kulkyne (Hattah Lakes) and Murray-Kulkyne in relation to the Murray River, and in Wyperfeld and Lake Albacutya in relation to Outlet Creek. They include:

- remnants of an elevated clay floodplain near Neds Corner in Murray-Sunset, formed when the Murray River flowed in earlier times into a large lake further downstream;
- anabranches of the Murray River, at Hattah Lakes and Lindsay Island (one of the largest for the Murray in Victoria), including an array of geomorphic features such as billabongs, wetlands, meanders, terraces and natural levees;
- Outlet Creek, which flows from Lake Albacutya and links 17 terminal lakes in Wyperfeld before ending in Wirrengren Plain, the end of the largest internal drainage system in the State;
- significant crescent-shaped lunettes on the eastern side of depressions, such as Lake Albacutya (partly in the Park), Wirrengren Plain (Wyperfeld) and Lake Wallawalla (Murray-Sunset), some of only a few such features on public land in Victoria. They contain a record of past water levels and climates.

Soils

The soils associated with the different landforms reflect the age of the landform as well as its geological composition. They include the highly infertile sands of the Lowan Sand, calcareous soils of the Woorinen formation, and clays associated with the riverine plains and lunettes. Soils in the groundwater discharge areas in particular contain a high percentage of salts.

Much of the landscape is susceptible to erosion following disturbance. Dunes may become remobilised following vegetation removal (e.g. after fire). This is particularly the case for the infertile Lowan Sand, but also the Woorinen formation where 'blowouts' may occur after the removal of ground cover. Lunettes are prone to wind and water erosion following disturbance. Scalded clay pans occur along the higher alluvial terraces of the Murray River where the loamy topsoil has been eroded.

From an interpretation viewpoint, the landforms of the Park offer excellent opportunities to interpret the fascinating history of the landscape evolution of this part of Victoria.

Aims

- Protect areas of geological and geomorphological interest.
- Provide opportunities for appropriate research into, appreciation of and education about geological and geomorphological sites and processes.

Management strategies - all Parks

- *Revegetate scalded areas on floodplains by controlling grazing pressure, and where necessary create surface roughness and add seed of regenerates.*
- *Reshape eroded sand dunes to ensure a smooth profile. Revegetate with a non-regenerating cover crop and undersow with indigenous vegetation.*
- *Reduce the impact of soil disturbance in the dunefields by creating surface roughness, and maintain an adequate ground cover to prevent erosion.*

- *Rehabilitate eroded lunettes, particularly in areas where further disturbance could impact on cultural values.*

3.2 Hydrology

3.2.1 Outlet Creek system

The Outlet Creek system within Lake Albacutya Park and Wyperfeld National Park (figure 3) supports extensive areas of flood-dependent River Red Gum and Black Box Woodlands. These communities provide important habitat for a range of species, including the nationally vulnerable Regent Parrot. When flooded, the terminal lakes of the Wimmera River provide important habitat for waterbirds and other fauna. Lake Albacutya is designated as a wetland of international significance under the Ramsar Convention (section 1.3).

The Outlet Creek system, the terminal lakes and Lake Albacutya form part of the Wimmera Heritage River which extends upstream to Polkemmet (LCC 1991b) (figure 3).

Regulation of the Wimmera River since late last century has resulted in a drastic reduction of the frequency of flows within the Outlet Creek system (Binnie & Partners 1993; RWC 1993). Outlet Creek has not flowed downstream from Lake Brambruk since 1920.

Rising regional water tables due to vegetation clearing could impact upon both Lake Hindmarsh and Lake Albacutya within the next 10 years (WRCCG 1992a; Beovich 1993a), transforming them from recharge to discharge lakes.

Saline groundwater discharge into the Wimmera River occurs naturally during periods of low river flow (Strudwick 1992). The rising watertable and reduced stream flows are both likely to be contributing to salinity within the lower Wimmera River and the terminal lakes. The current extent and rate of salinisation is unknown although the areas at greatest risk are the lower sections of the river.

Severe dieback is now apparent in the River Red Gum and Black Box communities of Lake Albacutya and Wyperfeld, particularly in the lower parts of the Outlet Creek system. Dieback is most severe below Wonga Lake. This section of Outlet Creek has not flooded since 1920.

Wyperfeld's Black Box Woodland shows negligible regeneration of any woody species, while the lakebed herbfields are now comprised mainly of annual weeds (LCC 1987).

The LCC (1991b) and the Wimmera River Integrated Catchment Management Strategy (WRCCG 1992b) have recommended that:

- the Wimmera Heritage River corridor be kept free from impoundments or structures that impede stream flow;
- a water entitlement be allocated for environmental purposes;
- investigations be conducted to determine how the current system of regulation might be modified to restore a flooding regime similar to that which occurred prior to catchment and river modification.

Options for restoring a more natural flood regime

Pipelining the Wimmera Mallee Stock and Domestic System (WMSDS), bypassing Lake Hindmarsh, and special environmental flow releases from storages, have been identified as the best hydrological options for promoting more frequent flooding of Wyperfeld (Binnie & Partners 1993). Stage 1 of pipelining (northern Mallee) was completed in early 1993 and Stage 2 was completed in 1995. Completion will result in an environmental allocation of approximately 33 000 ML.

The former RWC (1993) found that the release of 20 000 ML from storage at times of flood would, under certain circumstances, cause a flood to be promoted beyond Lake Albacutya into the Park and/or prolong the duration of a flood within the Park. This assessment assumes that an annual environmental entitlement of 20 000 ML will be available for release at a time when Lake Hindmarsh is spilling and Lake Albacutya has more than 60 000 ML in store.

Two options are available for the use of an environmental water entitlement:

(1) *Sustaining flows*. At times of low river, a sustaining flow of 40–50 ML per day could be released from storage to maintain the in-stream environment at least as far as Dimboola (Anderson & Morrison 1989). Sustaining flows would not be of direct benefit to Wyperfeld (Binnie & Partners 1993).

(2) *Managed floods*. At times of high river, special releases from storages could be used to promote a managed flood into the Park. Wyperfeld would potentially benefit from special releases of an environmental entitlement of the order of 20 000 ML (RWC 1993).

The two options could both be employed as flow conditions require. Consideration also needs to be given to the accumulation of unused environmental entitlements in storage.

Temporarily lowering the outlet sill at Lake Hindmarsh by means of a regulatory structure would generate greater flood flows within Wyperfeld but with a likely loss of environmental and recreational values at Lake Hindmarsh.

Aims

- Restore a more natural flooding regime to the terminal lakes of Outlet Creek in co-operation with relevant agencies and community-based groups.
- Achieve a more natural flooding regime without undue detriment to the natural values of Lake Hindmarsh, and without jeopardising the supply of existing water users.

Management strategies

- *Implement the relevant actions of the Wimmera River Integrated Catchment Management Strategy (WRCCG 1992b).*
- *Seek agreement from Wimmera–Mallee Water to the release of an environmental entitlement for the purposes of managed floods in the event that Lake Albacutya fills or nearly fills.*
- *Investigate the option of temporarily lowering the sill level of the Lake Hindmarsh outlet in consultation with Wimmera-Mallee Water and the Wimmera Catchment and Land Protection Board.*
- *In conjunction with relevant agencies, conduct monitoring studies along the Outlet Creek system of:*
  - *watertable levels;*
  - *surface flows;*
  - *flood-dependent flora and fauna.*
- *Prepare a separate management plan for the Wimmera Heritage River by 1997.*

3.2.2 Hattah Lakes system

The Hattah Lakes system is a series of perennial and intermittent freshwater lakes fed mainly from the Murray River via Chalka Creek (figure 4). Hattah-Kulkyne has been declared a wetland of international significance under the Ramsar convention, and is a designated Biosphere Reserve under the UNESCO Man and the Biosphere program (section 1.3).

All the lakes in the system, and Chalka Creek, are used for recreational purposes such as canoeing, swimming and fishing.

Substantial changes to the hydrological regime of the Hattah Lakes system, following modification of both the Murray River and the Hattah Lakes system (Cumming & Lloyd 1991a) have resulted in a general reduction in the winter/spring flood peaks, and significant reductions in the flooding and inflow frequency of the Lakes. Flood initiation has been delayed and the duration of flooding reduced.

Internal modifications to the Hattah Lakes system itself include the construction of a channel between Lockie and Hattah Lakes, and the installation of an earthen bank and regulator between Lakes Hattah and Little Hattah.

Modifications to Chalka Creek include deepening and regrading of the channel and the installation of a regulator at Messengers to prevent floodwaters from receding.

These internal modifications have meant that since 1970 Lake Hattah has been dry on one occasion only for a short period in 1989. The

natural frequency of drying for Lake Hattah was once every seven years.

Rising groundwater levels within the Murray trench may eventually lead to salinisation of Chalka Creek and the Hattah Lakes system. Bitterang, Konardin, Yelwell and Hattah Lakes are all at risk of becoming salt-affected within the next ten years (Beovich 1993a).

There is no evidence of widespread dieback of flood-dependent vegetation within Hattah-Kulkyne, although pockets of dieback, possibly due to length of inundation and water stress between floods, have been recorded. The distribution of flood-dependent woody vegetation may also be changing. There is ample evidence of regeneration of both River Red Gum and Black Box.

The changed hydrological regime is likely to have caused lower recruitment rates within some bird and fish populations. Permanent inundation may favour the proliferation of European Carp, which are thought to degrade waterbird habitat by muddying water and preventing the growth of aquatic plants.

Regulation of the Hattah Lakes System may have caused changes to the grazing regime of native species within the southern half of Mournpall Block (section 4.4).

Toxic algal blooms are now relatively frequent within the Hattah Lakes system, necessitating the closure of the Lakes to recreational use for extended periods in each of the past three summers. The worst blooms appear to occur after the Lakes are recharged with river water.

Options for restoring a more natural hydrological regime

Management options include removal of the Lake Hattah regulator to lower the retention level, and enlargement of the Messengers regulator to increase rate of inflow into Chalka Creek (Cumming & Lloyd 1991b; Atkins 1993).

Amendment of the current system of lake regulation could cause more frequent drying of Lake Hattah, reducing recreational opportunities at times. However, alternative recreational opportunities will still be available at Lake Mournpall and along the Murray River frontage. The occurrence of toxic algal blooms poses a greater threat to recreational use of the Lakes than does infrequent drying.

Aim

- Restore, as far as possible, a more natural hydrological regime to the Hattah Lakes system within the guidelines of the Integrated Watering Strategy for Murray Wetlands (Cumming & Lloyd 1991b).

Management strategies

- *Deregulate flows between Lake Hattah and Lake Little Hattah by the removal of the boards which serve to retard backflow from Hattah to Little Hattah.*

- *Implement changes to the operation of the regulator at Messengers such that the retention level at Lake Hattah is returned to its natural level. Increase the capacity of the regulator to allow more rapid inflow to Chalka Creek in the event of a low level flood.*

- *Support any initiatives of the Integrated Watering Strategy for Murray Wetland (Cumming & Lloyd 1991b) which aim to restore a more natural flood regime to the Hattah Lakes.*

- *Continue to make the water from Lake Hattah available as an emergency supply for the Mournpall Water Users Association and the Hattah Residents Water Users Association.*

- *Prohibit recreational use of lakes which have been confirmed by testing to contain levels of toxic algae which could pose a risk to users. Advertise closures at all road entrances and on the shores of each affected lake.*

- *Investigate options for the long-term management of toxic algal blooms.*

- *Investigate the control of European Carp within the Hattah Lakes.*

3.2.3 Lindsay Island

Lindsay Island is on the riverine plain of the Murray River near the SA border and is bounded by the Lindsay River anabranch (figure 5). Numerous lignum swamps are inter-connected by a system of streams and surrounded by Black Box Woodland (Beovich 1993b).

The Island and its waterways have significant natural and cultural heritage values and provide important habitat for native fish, waterbirds and restricted species such as the Paucident Planigale.

The regulation of the Murray/Darling system has had significant impacts on the flow regime associated with Lindsay Island, including a reduction in winter/spring flood peaks, a reduction in duration and frequency of flooding, and the development of a steep east-west groundwater gradient and increased saline groundwater discharges into the Lindsay River upstream of Lake Wallawalla (Dudding, Oakes & Thorne 1989; Beovich 1993b).

Various alterations have modified the natural inflows and outflows of the system. These include restrictive off-take structures on the Lindsay River and Mullaroo Creek, and inadequate culverts on the inflows and outflows and possible sill erosion at Lake Wallawalla.

Black Box dieback is now widespread on Lindsay Island and on the Lake Wallawalla floodplain. There is increased salinity in the Lindsay River which is affecting downstream water quality. Prolonged inundation is likely to be affecting flood-dependent vegetation and habitats along Mullaroo Creek and the lower sections of Toupnein Creek and the Lindsay River.

Options for restoring more natural flow regimes

Management options would require both structural and operational changes (e.g. an increase in Murray River flows at times of high river – spring peak – using releases from Menindie Lakes and Lake Victoria to benefit Lindsay Island). Options for structural changes include manipulation of the Lock 6 and 7 weir pools, removal of the obstructive stone crossing at the Lindsay River off-take and removal of obstructions to Lake Wallawalla inlets (Beovich 1993b; Atkins 1993).

Options to reduce saline groundwater inputs from the Lindsay into the Murray include amended or new structures on the Lindsay River, a groundwater interception scheme and the relocation of Lock 7.

Aim

- Restore, as far as possible, a more natural flow regime to Lindsay Island within the guidelines of the Integrated Watering Strategy for Murray Wetlands (Cumming & Lloyd 1991b).

Management strategies

- *Survey the condition of flood-dependent vegetation and habitats on Lindsay Island as a basis for restoring degraded vegetation and habitats, and for establishing a longer-term monitoring program.*

- *Negotiate flow management arrangements with the SA Department of Engineering and Water Supply and the Murray-Darling Basin Commission to achieve higher spring flood peaks on Lindsay Island.*

- *Negotiate with Murray Sunraysia Water, and Nyah to South Australian Border Salinity Implementation Committee, to achieve those salinity mitigation options which are least damaging to the ecology of Lindsay Island and Lake Wallawalla.*

- *Investigate and implement structural changes (e.g. culverts under the Mail Route where it crosses eastern inlet) where a net*

conservation benefit can be demonstrated. Monitor the environmental effects of these changes and implement any further structural alterations that may be required.

3.3 Vegetation

Thirty major vegetation communities, forming six regional assemblages and supporting approximately 1000 native plants, have been identified in the Mallee Parks (LCC 1987). Most of these communities are restricted to the Mallee.

Of particular note is the large area of essentially undisturbed vegetation in the dunefields of all Parks. These communities, variously comprising mallee and heath on nutrient-deficient sandy soils, support the continued conservation of both plant and animal species with minimal management input.

Twelve significant vegetation communities and the threatening processes affecting them have been identified for the Mallee Parks (Cheal et al. 1992, see appendix I). Three significant communities (Gypseous Rise Woodland, Pine-Buloke Woodland and Sandplain Grassland) have been identified as being particularly threatened. These communities support relatively few significant flora or fauna species, their habitat value having been largely destroyed by long-term grazing pressure. In contrast, heathland communities remain relatively undisturbed and support over 30 significant flora and fauna species (see appendix II and III).

There is a high number of significant plant species associated with the saline groundwater discharge complexes at Pink Lakes and Raak Plain, the latter being described by the LCC (1989) as the most diverse saline and gypseous environment in the State.

Substantial areas of the Mallee Parks (largely correlating with the threatened communities listed in appendix I) are now severely degraded. Management strategies to deal with degradation through alteration to flooding and fire regimes are outlined in sections 3.2 and 4.1, respectively. For areas degraded through grazing or timber harvesting, there are basically three means available to aid regeneration:

(a) *natural regeneration*: relies principally on significant management input from NRE in terms of reducing grazing pressure (section 4.2).

(b) *hand planting of seedlings*: where a severe lack of seed trees prevents natural regeneration, especially in north-west Murray-Sunset, alternative regeneration techniques such as hand planting or direct seeding must be used. Hand planting is relatively expensive and labour intensive but may be the only option where grazing pressure is high. Tree guards are necessary, and an ongoing watering commitment required to ensure a high survival rate. Volunteer labour can reduce costs.

(c) *direct seeding*: by far the most economical means of broad-scale revegetation in the Mallee Parks. Successful establishment of seedlings requires reduced grazing pressure and weed control.

Further research is needed to establish the best strategy to conserve threatened Mallee vegetation communities and their associated fauna.

Aims

- Protect native plant communities in their natural condition, and maintain genetic diversity.
- Enhance the long-term survival prospects of threatened or significant plant species or communities.
- Encourage degraded communities to rehabilitate by natural means.
- Actively rehabilitate degraded communities to a level approaching pre-European settlement conditions where lack of seed trees prevents natural regeneration.

Management strategies - all Parks

- *Manage Flora and Fauna Guarantee listed species and communities according to approved action statements.*
- *Ensure the protection and enhancement of those communities identified in appendix I by controlling threatening processes, including:*
  - *overgrazing by rabbits (section 4.2.2), goats (section 4.2.3), kangaroos (section 4.2.4) and stock (section 4.2.5);*
  - *competition by weeds (section 4.3);*
  - *altered fire regimes (section 4.1);*
  - *altered hydrological regimes (section 3.2);*
  - *introduced predators (section 4.3).*
- *Rehabilitate those communities identified in appendix I as a matter of highest priority using rehabilitation methods based upon:*
  - *reducing or manipulating grazing pressure;*
  - *determining density and viability of potential seed trees*
  - *the size of the area to be rehabilitated.*
- *Ensure that local seed provenances are used in rehabilitation programs.*
- *Monitor the effectiveness of control and rehabilitation programs. Monitor the wilderness condition of wilderness zones, in particular the restoration of disturbed areas and the presence of non-indigenous plants and animals.*
- *Encourage further research into the ecological processes within Mallee ecosystems, and the ecological requirements of individual communities and species. In wilderness zones, allow research where it is not destructive and cannot be carried out elsewhere.*

3.4 Fauna

The diversity of the Mallee Parks fauna reflects the wide range of habitats available, the relative lack of disturbance and low numbers of introduced predators, and the overlapping of two biogeographic regions (the mesic Bassian region to the south and the arid Eyrean region to the north).

Species restricted to the area include those that are specifically adapted to the semi-arid mallee vegetation, such as the Mallee Ningaui, Silky Mouse and Mitchell's Hopping Mouse (Robertson et al. 1989). Typical Eyrean species with distributions that overlap into north-west Victoria include the Red Kangaroo, Paucident Planigale and Greater Long-eared Bat.

Significant fauna species and the threatening processes affecting them have been identified by Baker-Gabb et al. (1992), Bennet, Lumsden & Menkhorst (1992) and Yen (1992) (see appendix III).

The composition of small to medium sized mammalian fauna in the Mallee has altered dramatically since European settlement, with 12 species now locally extinct (LCC 1987; Menkhorst & Bennett 1990). Mammals of a similar size have largely disappeared from semi-arid and arid habitats across Australia.

Over 300 species of birds have been recorded in the Mallee, and more than three-quarters of these breed there. Species of particular significance include the Regent Parrot, Malleefowl, Black-eared Miner and Western Whipbird. The abundance of bird species appears much higher in mallee-shrublands and woodlands than in heaths (Emison & Bren 1989). However, the heathland is particularly attractive to honeyeaters. Other well represented groups include the parrots and raptors. Twenty-two species of parrots have been recorded in the Mallee Region within the past 20 years, the largest assemblage of species of parrots in Victoria (Emison 1991).

The Mallee supports a greater diversity of reptiles than any other region in Victoria (LCC 1987). Porcupine Grass, a major understorey species in Sand-plain Heath and Mallee Heath, provides an important micro-environment for reptiles.

Three of the ten frog species recorded in the Mallee have adapted to the arid environment by burrowing below the ground during drier

periods, emerging to feed and breed only after heavy rain. Other species are restricted to more mesic environments along watercourses.

The Lindsay River system has been identified as having high conservation value as a breeding ground for native fish.

The invertebrate fauna of the area is still largely undescribed, except for butterflies (Douglas 1993).

Aims

- Protect native animal communities and maintain genetic diversity.
- Enhance the long-term survival prospects of threatened or significant fauna.

Management strategies - all Parks

- *Manage Flora and Fauna Guarantee listed fauna (appendix III) according to approved action statements.*
- *Encourage further research into the ecological requirements of individual species.*
- *Encourage further survey work to better define the distribution of threatened species.*
- *Actively ensure that the ecological requirements of fauna are taken into account in fire control strategies, controlled burning programs and rabbit control programs.*

3.5 Landscape

The Mallee Parks lie within the Murray Basin Plains Landscape Type as identified by Leonard and Hammond (1983), much of which is characterised by broad NNW-SSE trending ridges and relatively low east-west or jumbled sand dunes largely dominated by mallee vegetation.

Special features of the landscape include distinctive dune formations (including lunettes) in contrast to the more common flat landform patterns; the Murray River and Outlet Creek and their associated woodland communities of River Red Gum and Black Box; relatively intact examples of Pine-Buloke and Belah Woodlands; lakebed herbfields, especially where surrounded by forest; and the saline discharge complexes (boinkas) of the Raak Plain and Pink Lakes.

Due to the visual uniformity of the Mallee landscape, there is a high level of public sensitivity to the presence of unnatural elements. Potential causes of damage to the Parks' landscape qualities include management activities and structures, power lines, vehicle tracks left by off-road vehicles, and trespassing stock.

Aim

- Protect or enhance landscape values.

Management strategies - all Parks

- *Prepare site development plans for all camping and day visitor areas to ensure that any adverse impacts to the landscape are minimal and temporary.*
- *Avoid constructing long stretches of straight road, which are visible over long distances, when realigning any roads.*
- *Reduce the impact of tracks that are visible over long distances by realigning short sections.*
- *Minimise the impact of signs by appropriate location and number, and by using less visually intrusive totems where possible.*
- *Maintain vegetation of high scenic quality by ensuring appropriate fire and hydrological regimes, and pest plant and animal control.*
- *Ensure compliance with Recreation Facilities Manual (CFL 1987b), the Signs Manual (CNR 1993c), and the NPS Guidelines and Procedures Manual (NPS 1995).*

3.6 Cultural heritage

3.6.1 Aboriginal history

The Mallee was widely occupied by Aboriginal people, primarily along the major water corridors through the dune country, but also at lower densities throughout the more marginal dryland areas (LCC 1987). Over 3800 archaeological sites have been recorded on the Aboriginal Affairs Victoria (AAV) Site Register for the Mallee Parks region, primarily along the Murray River, where the use of sites is generally less than 3000 years before present (BP). The earliest known occupation along the River is from near Merbein and has been dated at 15 250 years BP. Fewer sites have been recorded from the semi-arid areas; these are generally associated with recent (up to 6000 years BP) sources of water, soaks or rock outcrops.

Surveys have been carried out for much of Hattah-Kulkyne and Murray-Kulkyne (Thompson 1983a), at Lake Wallawalla and parts of Lindsay Island (Luebbers & Ellender 1994), and most of the main water resource areas in the deserts (Ross 1986). Some preliminary surveys have also been conducted by NRE in north-west Murray-Sunset. All these surveys cover only a low proportion of the total area of the Parks, and most current archaeological works are associated with preservation of degraded sites.

Many Aboriginal burial sites in dunes and lunettes have been exposed as a result of overgrazing by rabbits and stock, and are further threatened by soil erosion. Other sites (e.g. scarred trees) are threatened by a variety of natural and human impacts such as fire and increased recreational activity.

The size and number of sites make it impractical to carry out expensive protection works, such as fencing, on all sites. In the past, protection works have often been carried out on an ad hoc basis, and not necessarily on the most archaeologically or culturally significant sites.

Traditional hunting and gathering activities are an integral part of Aboriginal culture. At present, collection of plants for traditional purposes is permitted in some areas managed under the National Parks Act.

Aims

- Identify, protect and where appropriate, interpret, Aboriginal sites.
- Improve knowledge and understanding of the Parks' Aboriginal history.
- Encourage Aboriginal involvement in the management of the Parks' cultural heritage by consulting with the Mildura Aboriginal Corporation, the Murray Valley Aboriginal Co-operative and the Goolum Goolum Aboriginal Co-operative.

Management strategies - all Parks

- *Liaise with local Aboriginal communities and AAV regarding the development and implementation of management and protection strategies for known sites and all new sites as they are discovered in the Parks. In wilderness zones, management will focus on identification of sites and their protection as necessary in accordance with LCC management principles.*
- *Maintain an inventory of archaeological sites for the Mallee Parks. Maintain confidentiality of significant sites in consultation with AAV and the relevant Aboriginal community.*
- *Ensure adherence to the Natural Resource Protection Guidelines (CNR 1993b) in relation to archaeological sites when undertaking rabbit control programs.*
- *Ensure that at least one example of each site type is preserved per landform.*
- *Encourage further research into Aboriginal history in the Mallee Parks, especially:*
  - *characterising representative cross-sections for the full period of occupation, particularly on the Murray River floodplain;*
  - *burial sites;*
  - *occupation of the freshwater systems of the arid zones; and*
  - *microlithic technology in the semi-arid zones.*
- *Develop interpretive material on Aboriginal history in consultation with*

AAV and the relevant Aboriginal communities.

3.6.2 European settlement

Early European occupation of the Mallee Parks was largely associated with the pastoral industry. Pastoral occupation peaked in the late 1860s, although in many cases the grazing runs were speculative and little evidence of early occupation remains (LCC 1987).

Significant historic sites do remain, however, from the subsequent period of grazing, mining and attempted closer settlement. Relics of pastoral development remain in the form of buildings, fences, yards, tanks and water supply systems. Such structures are generally in remote situations with relatively low levels of visitation. Some sites are in a fragile condition and require urgent conservation works to maintain their integrity. Nevertheless these sites have great interpretive potential (Freeman Collett & Partners 1993).

In some cases the continued use of some outbuildings (e.g. shearers' quarters and huts) may be a cost-effective means of managing and interpreting remaining structures. In other cases the reconstruction of structures or site stabilisation may be warranted to facilitate site interpretation.

Mining (mainly salt extraction) was a secondary use of the Sunset Country. The Millewa South railway line was constructed in 1929 for the purpose of closer settlement of the Sunset Country but was later abandoned. The line was used for transporting salt and gypsum. The Nowingi Line Track now follows the alignment of the original railway line.

The Australian ICOMOS Charter for the Conservation of Places of Cultural Significance (ICOMOS 1988), known as the Burra Charter, provides the basis for the management by NRE of places of cultural significance.

Aims

- Conserve and interpret sites of European historical interest and significance.
- Improve knowledge and understanding of European history in the Parks and the effects of past land use activities.

Management strategies - all Parks

- *Prepare an inventory of European historic places, in accordance with NPS guideline 23.1PL and in consultation with historical groups and others.*
- *Manage individual sites in accordance with the principles of the Burra Charter and the recommendations of recognised authorities in conservation architecture and archaeology. In wilderness zones, remove existing structures or minimise their impact (in cases where removal may create further disturbance), following an assessment of their cultural significance and appropriate recording.*
- *Develop and implement a program of on-site interpretation and education to foster an understanding of the pioneering era, and minimise vandalism and other visitor impacts (section 5.3).*
- *Establish historical tour routes in co-operation with local historical groups (section 5.2.1).*
- *Implement fire protection and weed control as interim protective measures at significant sites as required.*

Management strategies - Murray-Sunset National Park

- *Modify catchment dams to prevent them from holding water for prolonged periods (section 4.4). Minimise damage and retain as much as possible of the original fabric of the dam walls.*
- *Maintain the Nowingi Line Track as a minor park access route while the track remains on its current alignment. Maintain the original surface level of the Millewa South railway line embankment between the Park boundary and Rocket Lake.*

4 PARK PROTECTION

4.1 Fire management

The National Parks Act requires the Director of National Parks to ensure that appropriate and sufficient measures are taken to protect Parks from injury by fire.

Current fire protection measures are in accordance with the Mildura Region Fire Protection Plan (CNR 1992). This plan includes provision for the maintenance of the Parks' system of fire access tracks, water points, air support facilities and fuel-reduced buffers; liaison with private landholders for the common purpose of fire management within the Park and on adjacent land; information on Park assets, including the location of reference areas and areas of ecological and cultural significance; and community education on the responsible use of fire (campfires) in Parks. Fire protection for the Parks will be reviewed in association with reviews of the Mildura Region Fire Protection Plan, or as new information becomes available.

Many Mallee species dependent on fire for their regeneration (Cheal, Day & Meredith 1979). Changes to the natural fire regime of the region since European settlement may be adversely affecting the diversity of flora and its dependent fauna. Fire intensity and frequency is a major influence on the floristic composition of heathland vegetation, predominant in the Big Desert, whereas the season of fires appears to be an important factor in the regeneration of mallee and grassland communities in Murray-Sunset. Further research is needed into the use of fire as an aid to rehabilitating degraded communities.

Fuel reduction burning in the form of strategic corridors has been planned for approximately 89 000 ha (five per cent) of the public land in the Mallee. Only a small proportion will be burnt each year.

As far as possible, least-disturbance suppression techniques will be adhered to in wilderness zones, reference areas and other areas of high conservation significance. Phosphate-based retardants may also adversely affect native vegetation on nutrient-deficient soils, predominant in the Big Desert and the southern part of Murray-Sunset, and will be phased out in favour of sulphate-based retardants.

Ashwell (1993) has identified the requirements of a monitoring program for Mallee vegetation in relation to fire.

Aims

- Protect life, property and Park values from injury by fire.
- Minimise the adverse effects of fires and fire suppression methods.
- Maintain fire regimes appropriate to the conservation of native flora and fauna.
- Increase knowledge of the effects of fire frequency, season and intensity on Mallee ecosystems.

Management strategies - all Parks

- *Ensure compliance with the Mildura Region Fire Protection Plan, including the maintenance of fuel-reduced strategic corridors.*
- *Publicise and enforce fire regulations and restrictions on the use of fire and role of fire within the Parks.*
- *Identify significant biota and other assets to be protected from fire.*
- *Further investigate the use of controlled burning as a means of rehabilitation. Allow burning for ecological purposes only where it can be established that such action is deemed necessary for the conservation of a significant population or community. In wilderness zones, burning for ecological purposes will be subject to the preparation of an approved species or community management plan.*
- *In wilderness zones and reference areas, restrict suppression to the margins of the areas; otherwise restrict control methods to*

(i) backburning, (ii) aerial techniques, and (iii) ground crews with hand tools, as described in NPS guidelines (NPS 1995).

- *Use sulphate-based fire retardants on heathland fires.*
- *Continue to monitor the effects of fire on native species in accordance with recommendations by Ashwell (1993) and CNR (1992).*

4.2 Grazers

4.2.1 Total grazing pressure

For the purposes of this Plan the expression 'total grazing pressure' is defined as the combined effects of all grazers (both native and introduced) on native vegetation communities and habitats within the Mallee Parks. The LCC (1989) found that the combined influence of domestic and feral stock, rabbits, goats, Western Grey Kangaroos and Red Kangaroos was having a detrimental effect upon native vegetation, and hence faunal habitat. Even after the removal of stock grazing, there remain areas in all of the Mallee Parks where total grazing pressure is high enough to prevent the regeneration of woody native vegetation.

The most severe grazing impacts are within woodland, grassland and shrubland communities; that is, vegetation types growing on soils of relatively high fertility. The relatively infertile deep sand mallee communities appear to be less influenced by grazing pressure. Communities of intermediate fertility (e.g. chenopod mallee and shallow sand mallee) are at moderate risk, depending on the availability of water.

The most obvious impact of grazing has been an absence of regeneration of woody species and a loss of perennial taxa from the shrub and ground layers. Soil disturbance, and changes in soil nutrient status caused by intensive grazing, favour some introduced species over their native counterparts and help to perpetuate weediness (Westbrooke 1990; Cheal et al. 1992; Cheal 1993). Other impacts include trampling, damage to the soil lichen crust and increased soil erosion.

The impacts of total grazing activity upon vegetation are now being monitored within all Mallee Parks. Kangaroo and rabbit populations are currently being monitored by direct counts. Goat numbers are not monitored in any systematic way although they are recorded during the kangaroo surveys. At Hattah-Kulkyne both biomass and floristic analyses are employed to measure the effects of kangaroo grazing under differing population densities and to determine the appropriate ecological carrying capacities.

A network of grazing exclosures has been established within intensively grazed communities of Murray-Sunset and Wyperfeld. Floristic monitoring methods are being used to assess the long-term impacts of the total grazing activity within representative communities. The interactions between different grazers are being monitored only at Hattah-Kulkyne, where rabbits have been selectively excluded from some grazing exclosures.

To be most effective and cost-efficient, control measures are required relatively early in the cycle of population increase for those species with high reproductive capability, e.g. rabbits and goats.

Management strategies dealing specifically with rabbits, goats, kangaroos, and domestic and feral stock are outlined in sections 4.2.2, 4.2.3, 4.2.4 and 4.2.5 respectively. It has been assumed that intensive management of goats, rabbits and kangaroos will only be needed within the areas defined by the LCC as having a history of disturbance. However, further research is needed to confirm the validity of this assumption.

Aim

- Reduce the total grazing pressure to a level which allows the native perennial species to regenerate and Park landscapes generally to recover.

Management strategies - all Parks

- *Assign the highest priority in the overall management of grazing pressure to rabbit control. Reduce rabbit populations to, and keep them (within the limits of resources) at low levels.*
- *Control goats as a second priority and maintain populations at low levels.*
- *Control Western Grey Kangaroos and Red Kangaroos where their combined grazing pressure is threatening the long-term recovery of native vegetation.*
- *Liaise with adjoining landowners to reduce access to water by kangaroos and goats.*
- *Continue to monitor grazing impacts within all Mallee Parks as the basis for long-term management of total grazing pressure.*
- *Abide by the Natural Resource Protection Guidelines (CNR 1993b), the Code of Practice for the Humane Shooting of Kangaroos (CONCOM 1985) and other relevant guidelines in the management of total grazing pressure.*

4.2.2 Rabbit control

Rabbits are the most significant short to medium-term threat to native vegetation conservation in the Mallee Parks. Even relatively low numbers can prevent regeneration of woody perennial plants.

Rabbit populations vary throughout the Parks. Woodland or grassland communities restricted to relatively fertile soils typically support high rabbit numbers and are under particular threat from grazing (Cheal et al. 1992). In contrast, communities growing on deep infertile sands (i.e. much of the Big Desert) support relatively few rabbits.

Estimates of rabbit numbers are conducted using spotlight transect direct counts and monitoring of the densities of active warrens.

Control methods to reduce and maintain rabbit numbers at levels whereby regeneration can occur include poisoning, ripping, fumigation, shooting and biological control, with ripping the key component of long-term control (Williams & Moore 1991; Wood 1985). Controlling rabbit populations at the initial phase of their growth curve is critical if regeneration of woody vegetation is to occur (Braysher 1993).

NRE has developed a decision model for the Mallee to determine the most effective control method(s) for any given rabbit density (Cooke, Walters & Sluiter 1991). Improvements to and adaptations of the model continue to be made.

A general improvement in rabbit control by Mallee farmers in recent years is due in part to co-operation between farmers and NRE; 20 Rabbit Action Groups now co-ordinate rabbit control (section 6.2).

Biological control agents being investigated by the CSIRO include immunosterilisation and the rabbit calicivirus disease (RCD). RCD has been recorded in the Mallee Parks and is expected to have significant impacts, both for rabbit numbers and possibly some native fauna as a result of prey-switching by foxes (section 4.3).

Aims

- Minimise damage caused to native vegetation, and in particular those significant communities identified in appendix I, from overgrazing by rabbits.
- Co-ordinate rabbit control in conjunction with Park neighbours.

Management strategies - all Parks

- *Prepare rabbit control plans for susceptible areas within the Mallee Parks, based on distinct geographic areas or land systems, so that:*
  - *rabbit abundance is reduced to less than 5/km (spotlight transect) or 25 active entrances per km^2 (warren count);*
  - *rabbit abundance is effectively monitored using the most reliable methods, including spotlight transects and warren counts;*
  - *significant communities and other assets are protected during the course of rabbit control in accordance with the*

Natural Resource Protection Guidelines (CNR 1993b).

- *Investigate the feasibility of using contract shooters at the time that other control measures (ripping and fumigation) are being conducted.*
- *Review control programs at two-year intervals and make the results of reviews available to the public.*
- *Co-ordinate rabbit control activities with Park neighbours in accordance with the guidelines established in the Mallee Regional Landcare Plan (Landcare 1993), the Regional Catchment Management Strategy to be developed by the Mallee Regional Catchment and Land Protection Board, and the Good Neighbour Policy.*
- *Investigate the feasibility of improving the reliability of existing monitoring methods.*
- *Seek advice from CSIRO and other relevant authorities on how the benefits of the introduction/spread of RCD can be optimised. Implements such control measures (e.g. warren destruction) as are required to ensure that the benefits of RCD persist after resistance to the virus has evolved.*
- *Seek to establish a program for monitoring the spread, persistence, and impact of RCD. This program will also investigate the extent of prey-switching by foxes and cats and the resulting impacts upon native fauna.*

4.2.3 Goat control

Goats are most commonly recorded in the mallee and woodland communities of Murray-Sunset and Hattah-Kulkyne. Observations in the Big Desert are rare. The total population is estimated to be around 2000 (LCC 1987).

Feral goat populations have the potential to increase up to 75 per cent per year under favourable conditions. Freely available water is vital to maintenance of populations (Henzell 1992; Henzell & McCloud 1984). Some ten dams within Murray-Sunset are estimated to be capable of holding water through an average summer; these water points may be critical in sustaining high numbers of goats and other mammalian grazers over summer (section 4.4).

Goats appear to prefer grasses and herbage to woody shrubs. Although goat numbers in the Mallee Parks may not be high, their preferential grazing habit may remove those plants critical to the survival of some native animal species such as Malleefowl (Priddel 1989). The social nature of goats can also lead to localised impacts on vegetation, especially near frequently used night camps.

Goat control in the Mallee Parks is restricted to trapping around selected water points and opportunistic shooting. It is unlikely that opportunistic shooting will have any long-term effect on the population. The efficiency of trapping, in Murray-Sunset at least, will be aided by fencing those waters required for management purposes, and closure of the remainder (section 4.4).

The Judas goat method (radio-collared goats that are released back into the wild population) may be useful in the eradication of small isolated populations.

Total eradication of goat populations is not seen as being economically feasible in the Mallee Parks.

Aims

- Minimise damage caused to native vegetation by feral goats.
- Establish a system to monitor trends in the goat population, and determine acceptable population levels.

Management strategies - all Parks

- *Prepare area-based goat control plans, including:*
  - *monitoring requirements;*
  - *fencing of artificial waters required for management purposes and closure of all others;*
  - *installing traps on designated fenced water points, with priority given to*

water points in areas of highest conservation value;
- *mustering around water points to eliminate trap-shy animals, possibly by authorised groups under the supervision of Park staff.*

- *Discourage goat farming on land immediately adjacent to Park boundaries unless farms are adequately fenced.*

4.2.4 Kangaroo management

The dominant species of kangaroos in the Mallee Parks are the Western Grey Kangaroo and the Red Kangaroo, with Western Grey Kangaroos predominating. Only the Western Grey Kangaroo occurs regularly within Wyperfeld. Eastern Grey Kangaroos have also been recorded, in very low numbers, in Hattah-Kulkyne (Morgan 1992, 1994a; Coulson 1992).

Changes to Mallee Parks habitats as a result of the introduction of artificial waters, removal of the shrub understorey by stock, a reduced level of predation and periods of intense rabbit control have favoured kangaroo populations. The availability of water allows populations to be sustained at artificially high densities during dry periods.

The density of Western Grey Kangaroos at Hattah-Kulkyne increased from an estimated Park average of 25/km^2 in 1983 to approximately 46/km^2 in 1990 (Coulson 1990), preventing the regeneration of native perennial plants except in areas enclosed by kangaroo-proof fencing (DCE 1990b). The habitat has become simplified at the expense of other native fauna.

The population dynamics of kangaroos in other Mallee Parks needs further investigation. A similar rate of increase in kangaroo densities to that experienced at Hattah-Kulkyne would severely threaten the conservation status of woodland communities, such as Pine-Buloke, in those areas.

A mean Western Grey Kangaroo density of 47/km^2 was recorded for the Sunset Plains area of Murray-Sunset in 1994 (Morgan 1994b).

The densities of Western Grey Kangaroos in the vicinity of Outlet Creek and the terminal lakes at Wyperfeld have remained sufficiently high to prevent regeneration of woody perennials such as Slender Cypress-pine. A mean density of 46/km^2 recorded in this area in 1993 was the highest since counting began in 1972 (Morgan 1994c).

Relatively high kangaroo densities occur on some fringes of the Mallee Parks, leading to crop and fence damage, loss of revenue and incurred costs on neighbouring farms. Grazing by kangaroos is probably preventing the regeneration of woodland communities in these fringe areas.

Culling of kangaroos was first attempted at Hattah-Kulkyne in 1984, but was discontinued the same year as a result of animal welfare concerns expressed by some interest groups.

A program of culling of kangaroos was initiated within the Mournpall Block of Hattah-Kulkyne in October 1990 in response to specific recommendations by the LCC (1989). Shooting was in accordance with a management plan, *Restoring the Balance* (DCE 1990b) and the CONCOM Code of Practice for the Humane Shooting of Kangaroos (CONCOM 1985).

The density of kangaroos within Mournpall block has now been reduced to an estimated 5/km^2 (Morgan 1995). At this lower density, the rate of repopulation is likely to increase.

Regeneration of some woody species and a suite of perennial sub-shrubs and herbs, including some rare or threatened plants, has been recorded within Mournpall Block since culling began (Sluiter et al. 1992). Vegetation recovery has been most noticeable in non-mallee dunefield areas, with only moderate improvement in riverine woodland areas.

An independent Technical Steering Committee reviews the results of each culling program and considers further management options. Culling is an expensive means of managing kangaroos because it must be continued for many years to ensure lasting benefits of vegetation restoration. Some public opposition remains on animal welfare grounds to the shooting of kangaroos within national parks.

Limiting access to water and pasture on adjoining farmland could reduce the habitat suitability for kangaroos and therefore reduce grazing pressure. Fences have already been successfully employed for this purpose at Hattah-Kulkyne and in the Wimmera. A trial kangaroo fence was constructed in 1993 along 29 km of the northern boundary of Murray-Sunset in a co-operative project between NRE and Millewa-Carwarp Landcare. A further fence is being constructed along this boundary on the western end, on the basis that the fence has proved successful in reducing farm losses.

The closure of artificial waters within Murray-Sunset also has the potential to be a cost-effective means of preventing kangaroo populations from reaching abnormally high densities (section 4.4).

Wildlife destruction permits have been issued for a number of years to those farmers who border Mallee public lands and who have a demonstrated kangaroo problem. Permits for the shooting of Western Grey Kangaroos are issued subject to NRE guidelines.

It is envisaged that kangaroo management will no longer be necessary once the structures of the woodland vegetation communities have been restored.

Aims

- Maintain viable populations of both Western Grey and Red Kangaroos.
- Ensure that kangaroo densities do not increase beyond the threshold at which they threaten the long-term recovery of Park landscapes and native perennial vegetation.

Management strategies - all Parks

- *Maintain kangaroo populations for previously grazed areas within limits which will allow the progressive long-term recovery of key woody perennials while still preserving viable kangaroo populations. These limits will vary spatially and will be based upon the results of kangaroo and vegetation monitoring.*
- *Use non-lethal methods of control (e.g. habitat manipulation and fencing) in preference to lethal methods (e.g. culling). Where culling cannot be avoided, NRE will abide by the CONCOM Code of Practice for the Humane Shooting of Kangaroos.*
- *Continue to issue wildlife destruction permits to Park neighbours in accordance with current guidelines.*

Management strategy - Hattah-Kulkyne National Park

- *Maintain kangaroo populations for Hattah-Kulkyne within the limits prescribed in 'Restoring the Balance' or as otherwise recommended by the Kangaroo Technical Steering Committee.*

Management strategies - Murray-Sunset National Park

- *Prepare a kangaroo management plan.*
- *Monitor the Millewa trial kangaroo fence for a period of five years after construction, and conduct a cost/benefit assessment at the end of that period.*
- *Improve standards of monitoring for those areas that have identified high densities of kangaroos.*

Management strategies - Wyperfeld National Park

- *Prepare a kangaroo management plan.*
- *Improve standards of monitoring for those areas that have identified high densities of kangaroos.*

4.2.5 Stock grazing

The LCC recommended that stock grazing be phased out of Wyperfeld and Murray-Sunset National Parks by July 1996. The only areas where the LCC recommended that stock grazing be permitted are in Lake Albacutya Park and the Liparoo Block of Murray-Kulkyne Park, at the discretion of the management authority (LCC 1989). Stock grazing on the Liparoo Block of Murray-Kulkyne is combined with high numbers of Western Grey Kangaroos.

Total grazing pressure clearly exceeds that which will allow vegetation and habitat recovery. De-stocking should be undertaken as a first step in the reduction of pressure, prior to any kangaroo control measures.

Stock grazing in Lake Albacutya Park is currently restricted to the lakebed herbfield. Most examples of this community in the Mallee have been significantly disturbed by grazing. It is possible that this community could be restored by maintaining a low grazing pressure immediately following flooding.

Stock trespass will continue to occur in other areas of the Mallee Parks during the phase-out period because of the fact that fences may not previously have been required between freehold or leasehold land and adjoining former grazing areas now within the Parks. A considerable proportion of the boundaries of both Murray-Sunset and Wyperfeld are unfenced. Much of the existing boundary fencing is in a sub-standard condition.

The impact of trespassing stock can be expected to be greatest at times of drought when feed on adjoining land is severely limited. Even after the phase-out is completed, stock trespass is likely to continue in those areas of Park where the boundary remains unfenced.

The construction of electric fences which limit kangaroo movement onto farmland is likely to reduce the overall suitability of Park fringes as kangaroo habitat (section 4.2.4).

Fencing responsibilities are detailed in the *Fences Act* 1968 (Vic.).

Aim

- Manage stock grazing in accordance with the LCC Mallee Area Review Final Recommendations.

Management strategies - all Parks

- *Monitor and manage stock trespass in consultation with Park neighbours.*
- *Where boundaries abut State forest, negotiate with licensees for the construction of stock-proof fences in priority areas, subject to the completion of grazing management plans by licensees.*

Management strategy - Murray-Kulkyne Park

- *Remove stock grazing from the Liparoo Block as part of a program to reduce total grazing pressure.*

Management strategies - Lake Albacutya Park

- *Remove stock grazing from the lakebed of Lake Albacutya (and exclude other grazers for an extended period). Monitor the pattern of vegetation re-establishment.*
- *Determine and implement appropriate strategies for the long-term restoration of the lake-bed herbfield.*

4.3 Pest plants and animals

Pest plants in the Mallee Parks can be divided into three categories:

- *Agricultural weeds* such as Silver-leaf Nightshade, Wild Garlic, Prairie Ground-cherry, Camelthorn and Hardheads;
- *Weeds that interfere with recreation* such as Bathurst Burr, Spiny Rush and the various spined weeds;
- *Environmental weeds* (in priority order): Bridal Creeper, African Box-thorn, Cactus species, Golden Dodder, Horehound, Peppercorn/ Weeping Willow, and exotic annual grasses.

Environmental weeds are of most concern because of their potential to spread and threaten the integrity of indigenous flora and fauna communities and the survival of particular species. Vegetation communities at greatest risk of weed invasion include those of highest conservation significance, such as Pine-Buloke

Woodland, Gypseous-Rise Woodland and Belah Woodland.

In some formerly degraded landscapes where the source of disturbance has been removed (e.g. north-west Murray-Sunset), native species are slowly recovering at the expense of introduced weeds.

Plant-specific control plans have been prepared, or are in the process of being prepared, for all priority pest plants.

A number of introduced animals occur in the Parks. Problem species include rabbits, goats, foxes, feral cats and pigs. Management strategies to deal with feral rabbits and goats are outlined in sections 4.2.2 and 4.2.3 respectively. Predation of native species by foxes and feral cats is of particular concern. Foxes prey upon a wide variety of native animals (Kinnear et al. 1984; Thompson 1983b). Malleefowl chicks and eggs are particularly vulnerable; foxes are implicated in reducing the reproductive potential of Malleefowl populations by up to 75 per cent (Priddel 1990).

Rabbits are the most important prey item for both foxes and cats (Catling 1988; Coman 1973; Jones & Coman 1981). This has important implications when implementing control programs for both foxes and cats; without concurrent rabbit control, rabbit numbers could increase rapidly. Conversely, the collapse of rabbit populations could lead to increased levels of predation upon native animals by foxes and cats (Newsome & Coman 1990).

Poisoning with 1080 is the most cost effective means of reducing fox numbers. Burying baits increases the rate of acceptability, as well as reducing the likelihood of attracting non-target species. Cats are also highly susceptible to 1080; however, baits must be left on the surface, thereby increasing the risk of poisoning non-target species.

Shooting is of limited effectiveness in reducing either fox or cat populations. Immunosterilisation and biological control methods are being investigated for both species.

Populations of feral pigs exist in the riverine areas of Murray-Kulkyne and Lindsay Island, and adjoining areas in NSW. Numbers are extremely difficult to estimate.

Feral pigs can cause minor damage to native vegetation. However, lamb predation and damage to agricultural crops is of far greater concern, as is their potential role in the spread of diseases known to affect both livestock and humans.

Trapping is the main method for controlling pigs in the Mallee Parks. Shooting may be effective on isolated populations (e.g. Lindsay Island) if the shooting effort is intensive (Hone 1984).

Feral Honey Bee colonies are now widespread throughout the Mallee Parks in vegetation communities containing large, hollow-forming trees such as River Red Gum, Black Box or old mallee. Hives have also been recorded in the Big Desert in rock crevices.

There has been considerable debate over the possible effects of Honey Bees on native flora and fauna. Research to date has not been conclusive in this regard.

Interference with recreation around sources of water is a major problem associated with feral bees.

Commercial apiculture is discussed in section 7.1.1. Commercial hives are generally placed well away from visitor focal points.

Aims

- Control, and where possible eradicate, non-indigenous plants and animals.
- Minimise the impact of control programs on native flora and fauna.

Management strategies - all Parks

- *Prepare and implement plant-specific control plans for all priority pest plants.*
- *Control environmental weeds according to the weed control priorities listed above and the conservation significance of infested vegetation communities.*

- *Eradicate or control weeds interfering with recreation areas according to site popularity.*
- *Co-ordinate agricultural weed control efforts with adjacent landholders.*
- *Monitor the occurrence of foxes and feral cats in different communities throughout the Mallee Parks.*
- *Determine priorities for fox control programs based on:*
  - *the conservation status and susceptibility to predation of native species;*
  - *season of greatest risk to native animals;*
  - *efficiency (measured in terms of resource protection success rather than the number of foxes killed);*
  - *cost-effectiveness.*
- *Determine priorities for cat control programs based on:*
  - *the conservation status and susceptibility to predation of native species;*
  - *periods when juvenile rabbit numbers are low and the threat to native wildlife is greatest;*
  - *efficiency and cost effectiveness.*
- *Encourage further research into fox and cat ecology and improved control methods in the Mallee Parks.*
- *Continue trapping of pigs on Park boundaries as necessary.*
- *Investigate the feasibility of using authorised volunteer groups to conduct intensive shooting programs targeted at pigs during periods of high water.*
- *Liaise with the apiary industry on the preparation of an apiary management plan for each Park that includes:*
  - *improved management of commercial hives to prevent swarming events;*
  - *control of feral Honey Bees (prioritised according to the conservation significance of the vegetation community or potential effects on individual species) (see also section 7.1.1).*

4.4 Artificial waters

It is estimated that there are more than 100 catchment dams in Murray-Sunset, mainly in the eastern section. There are very few dams within other areas of the Mallee Parks. Dams were preferentially sited in Pine-Buloke Woodland, Belah Woodland and Savanna Mallee vegetation communities, all of which are at most risk from continuing high grazing pressure.

The role of catchment dams in maintaining artificially high kangaroo numbers over dry periods is not fully understood. Western Grey Kangaroos have a significant water requirement; however, high kangaroo numbers have been recorded at Wyperfeld despite the general absence of surface water within the Park.

In summer, feral goats need free water almost daily. Rabbits can live without free water, but have been found to occur in higher densities close to dams during hot weather (Newsome 1989). The influence of artificial waters on fox populations is not known. Feral Honey Bees can only thrive where they have access to water during summer.

The LCC (1989) recommended that dams not required for community use (principally fire suppression) should be closed because they support feral animals and artificially high numbers of native herbivores.

Dam closure is likely to lead to a decline in both the goat population and the relative abundance of Western Grey Kangaroos. It is unlikely that Western Grey Kangaroos would migrate to adjoining farmland, but goats may rely more heavily upon water sources on adjacent farmland.

Dam closure cannot generally be considered as a threatening process to other native species, since these species survived independent of

artificial waters prior to European settlement. Water availability may, however, have led to greater species richness of birds. Species that appear to have been favoured by reliable water supplies include the Galah, Little Raven, White-plumed Honeyeater, Brush Bronzewing, Crested Pigeon and Red-rumped Parrot (Favaloro 1966).

High numbers of bats currently occur in the vicinity of catchment dams within Murray-Sunset. However, bats can travel long distances to alternative water sources.

A number of existing dam sites have been identified in the Mildura Region Fire Protection Plan (CNR 1992) as being suitable for fire protection purposes. Supplies in concrete tanks at these points would be a more reliable source of water for fire protection than catchment dams.

In August 1991 trial fences were constructed around two dams in Murray-Sunset to prevent use of water by kangaroos and goats but allow continued access for birds and for fire protection. The fences have been successful in preventing access to water by the large numbers of goats and kangaroos attracted to the dams. Monitoring has not recorded any visible signs of distress on the part of the affected animals but animal welfare remains a consideration. Fences are visually intrusive and would partly destroy the historical integrity of the dams.

The historic value of individual catchment dams is a consideration in their future management. Most dams can be made inoperative without destroying their historical integrity e.g. by filling their drains with soil.

Aims

- Reduce grazing and pest animal impacts caused by artificial waters within Murray-Sunset.
- Retain the historical value of dams as far as possible, consistent with the need to reduce grazing and pest impacts.

Management strategies - Murray-Sunset National Park

- *Progressively render catchment dams inoperative without undue loss of cultural values (section 3.6.2).*
- *Close those dams first which are:*
  - *remote from other artificial water sources;*
  - *within a wilderness zone;*
  - *within an area of particular conservation significance.*
- *Install alternative water storages (sealed concrete tanks) where dams have been identified as having value for fire suppression or for visitor use (e.g. for bush walkers' use and watering horses). Do not close the relevant dams until alternative water storages have been installed.*
- *Retain existing concrete tanks in the western Sunset in their current form for fire suppression.*
- *Monitor the impacts of the dam closure program review two years after commencement to assess any impacts on native fauna and Park neighbours.*

5 THE PARK VISIT

5.1 The Park visitor

The Mallee Parks offer three distinctive visitor experiences, each enabling visitors to enjoy the key attributes of the Parks – their subtle semi-arid landscapes, diverse environments and sense of remoteness.

- For those in two wheel drive vehicles, to enjoy at key sites the Parks' natural and cultural values without undue disturbance from other visitors.
- For self-reliant recreationists, to experience solitude in the more remote areas of the Parks, through bushwalking, canoeing, nature study, or horse or camel riding.
- For four wheel drivers to enjoy other relatively remote areas of the Parks.

In Hattah-Kulkyne and along the Murray River, water-based activities are also popular during the warmer months.

Current access limitations restrict many activities to relatively small areas of the Mallee Parks (section 5.2.1). Existing nodes of visitor activity in the Mallee Parks are:

- Lake Hattah and Lake Mournpall in Hattah-Kulkyne;
- river frontage in Hattah-Kulkyne and Murray-Kulkyne;
- Wonga Campground in southern Wyperfeld and Casaurina Campground in central Wyperfeld;
- Pink Lakes in the Murray-Sunset;
- Western and Yaapeet beaches at Lake Albacutya (when the Lake holds water).

The remainder of the Parks generally receive low visitor use.

Over the past eight years there has been a significant increase in visitor numbers to the Parks, especially to Hattah-Kulkyne, Wyperfeld and Pink Lakes. These visitors are predominantly from Melbourne and elsewhere in Victoria, although a significant number visit from interstate. They are mainly family groups with an interest in camping, bushwalking and the natural environment, and many visit more than once. A significant number also include other Victorian and interstate parks in their itinerary. Peak periods of visitor use tend to be school holidays in the cooler months.

Locally, the Hattah-Kulkyne river frontage is a popular destination for many campers (from Ouyen, Mildura, and Horsham regions) particularly over the Christmas and Easter breaks. Many of these visitors have a long history of attachment to particular locations.

Market research indicates that the Mallee Parks will attract increasing numbers of visitors in the future. The Mallee Tourism and Recreation Strategy (CNR 1993a) has identified ecotourism, cultural tourism and special-interest niche markets (such as those interested in bird watching or nature study) as the most appropriate directions for this projected growth. There is also potential to attract less adventurous visitors and stop-over traffic en route to other destinations. Domestic tourism will remain the area's main source of visitors for the foreseeable future, with some international visitors from the special-interest and backpacking markets.

The fragile semi-arid ecosystems of the Mallee Parks, especially the woodlands and grasslands, are particularly vulnerable to visitor pressure. The dispersed and seasonal use of the Parks creates additional problems for management. Sustainable tourism, however, is in the long-term interests of the Mallee Parks as it enables visitors to continue to enjoy the Parks, generates economic benefits and fosters a better appreciation of the need to protect Park values.

Providing for the visitor

The Mallee Parks will remain available for ecologically sustainable tourism and recreation activities in accordance with the principles outlined in the Mallee Tourism and Recreation Strategy (CNR 1993a). The main challenge for management will be to provide visitors with opportunities for experiencing the Parks'

TABLE 4 SUMMARY OF RECREATION ACTIVITIES

ACTIVITY	MANAGEMENT ZONES - OVERLAY 1	2	3	4
Picnicking	Yes	Yes	Yes	Yes
Camping				
Land-based, designated sites, limited facilities	No	Yes	Yes	No
Land-based, dispersed, no facilities	YC	Yes	Yes	YC
Boat-based, no facilities	N/A	Yes	Yes	YC
Walking	YC	YC	YC	YC
Bicycle riding	No	YC	YC	No
Horse riding	No	YC	YC	No
Camel riding	No	YC	YC	No
Orienteering	Yes	Yes	Yes	Yes
Fishing	N/A	Yes	Yes	Yes
Motor boating (inc. launch & mooring)	No	YC	No	No
Canoeing/kayaking	N/A	Yes	Yes	YC
Water skiing	N/A	No	YC	No
Hunting (Lake Albacutya Park only)	No	Yes	No	No
Dogs (under control, in Murray-Kulkyne Park and Lake Albacutya Park only)	No	Yes	Yes	No

1 Wilderness Zone
2 Conservation & Recreation Zone
3 Recreation Development Zone
4 Special Protection Areas

Yes Appropriate
No Not appropriate
YC Conditional, refer to relevant section for details
N/A Not applicable

special qualities, including their remote and largely undeveloped nature, without impacting on them.

The Parks will continue to offer visitors a range of activities in remote settings. Those who are prepared to walk, or who enjoy other self-reliant activities such as canoeing, will be rewarded by a wilderness experience that is available in few other areas of Victoria. Those who prefer more comfort and convenience, but still a high degree of interaction with the natural environment, will have the opportunity to camp in formal campgrounds with limited facilities.

It is proposed that the Shearer's Quarters, and a cottage at Berribee, be restored to offer basic accommodation for Park visitors. This accommodation could be managed under a commercial licence/lease.

There are currently extensive opportunities for four-wheel driving and bushwalking in the Mallee Parks. However, 2WD access opportunities are more limited. Management will maintain a range of access opportunities including walking only, horse and camel riding, and where possible extend 4WD touring and increase 2WD routes to link points of interest and visitor nodes.

A higher level of interpretation and community education services is planned for the Parks. These services will include self-guided walks, tour drives and a range of other activities and information services. Park facilities, however, will remain low key and unobtrusive, in keeping with the remoteness and natural values of the Parks.

A close working relationship will be maintained with the regional tourism industry. It is envisaged that most tourism infrastructure development and services will be provided from Mallee townships or from private or public land

in close proximity to the Parks. Preference will be given to recreation and tourism opportunities which have low environmental and social impacts and high economic yields, primarily to local Mallee communities.

The promotion of minimum impact techniques and safe practices will be important in ensuring the long-term sustainability of recreational use of the Parks, as well as in enhancing the enjoyment of visitors generally.

Existing and future visitor needs will be evaluated to identify trends as a basis for determining appropriate future visitor services.

Aim

- Provide visitors with opportunities to experience the Parks' special qualities, including their remote and largely undeveloped nature, without impacting on them.

Management strategies - all Parks

- *Provide and maintain facilities and services which highlight, but are in keeping with, the Parks' distinctive character (sections 5.2.1 – 5.2.8, 5.3, tables 4 & 5).*
- *Permit a range of recreation activities as described in table 4.*
- *Encourage tourism in the Mallee Parks, where consistent with the protection of park values.*
- *Implement the relevant strategies and initiatives of the Mallee Tourism and Recreation Strategy (CNR 1993a) in order of priority as designated.*
- *Minimise potential conflicts between recreational and commercial tourism users.*
- *Conduct visitor surveys to assess visitor profiles, patterns of behaviour, expectations and preferences, and satisfaction levels.*
- *Encourage all visitors to practise minimal impact techniques, to adhere to codes of conduct appropriate to their activity and to consult with Park staff on activities that they intend to undertake in the Parks.*
- *Monitor visitor use to ensure adequate provision of facilities consistent with appropriate types and levels of use.*

5.2 Visitor recreation activities and facilities

5.2.1 Vehicle access

Current access in the Mallee Parks is based on a track network initially established for fire protection purposes or to service past land uses. This network is inadequate for the present needs of the Parks and their users.

Public vehicle track classification is detailed in figure 2. Access to the river on Lindsay Island and within Murray-Kulkyne is detailed in figures 5 and 6 respectively.

Current access limitations restrict many visitor activities to relatively small areas of the Parks (section 5.2.1). Preferred travel routes link points of interest, such as Wonga Campground at Wyperfeld, the lakes in Hattah-Kulkyne, and Pink Lakes, Mopoke, Rocket Lake and Last Hope in Murray-Sunset. Currently these links are made predominantly via 4WD tracks and sealed shire roads. Other popular four-wheel driving routes are Milmed Rock and Chinaman Well tracks in Wyperfeld and various tracks throughout Murray-Sunset.

Touring visitors could benefit from increased access and the development of improved through-routes in each Park. Public access through-routes of varying quality already exist in Hattah-Kulkyne and Murray-Sunset, but not in Wyperfeld.

The LCC (1989) recommended that the Mallee Parks system should continue to contain a series of linked roads, utilising those tracks traversing rough terrain in relatively isolated areas as well as the system of formed roads.

Minimally upgrading certain tracks to and between visitor nodes could improve links and

TABLE 5 MANAGEMENT OF TRACKS

TRACK NAME	CLASS	CURRENT STATUS	FUTURE MANAGEMENT (No change unless indicated below)
Murray-Sunset National Park			
Renmark Mail Route Road	2	O	
Wallawalla Track	2	O	
Berribee Tank Track	2	O	
Bennets Hut Track	2	O	
Border Track	2	O	
Taparoo Track	2	O	
Lindsay Island Track	3	O	
Sanford Track	3	O	
North South Settlement Road	2	O	
Carwarp Road	2	O	
Settlement Road	2	O	
Millewa South Bore Track	3	O	
Pheeneys Track	3	O	
Bambill South Track	3	O	
Sunset Track	3	O	
Underbool Track	2/3	O	Upgrade section between Last Hope Track and Grub Track to 2WD
Grub Track	3	O	Upgrade to 2WD
Honeymoon Hut Track	3	O	
Clay Lake Track	3	O	
Mt Crozier Track	3	O	
Last Hope Track	3	O	Upgrade to 2WD
Nowingi Line Track	2/3	O	
Midnight Tank Track	2	O	
Meridian Road	2/3	O	
Henschke Track	2	O	
Rocket Lake Track	2	O	
Mopoke Track	3	O	
Mt Jess Track	3	O	
Nulty's Boundary Track	3	O	
Double Tank Track	3	O	
Pink Lakes Entrance Road	1	O	
Ring Road	1	O	
Hattah-Kulkyne National Park & Murray-Kulkyne Park			
Nowingi Track	3	O	
Mallee Track	3	O	
Old Calder Highway	1	O	
Dumosa Track	3	MVO	
Red Ochre Track	3	MVO	
Konardin Track	3	O	
Boolca Track	3	MVO	
Raak Track	2	O	

Table 5 (cont.)

TRACK NAME	CLASS	CURRENT STATUS	FUTURE MANAGEMENT (No change unless indicated below)
Eagles Nest Track	3	MVO	
Mournpall Track	1	O	
Buloke Track	2	MVO	
Yerang Track	2	O	
Boolungal Track	2	O	
Bitterang Track	2	O	
Moonah Track	2	MVO	
Red Gum Track	2	MVO	
Island Track	2	O	
Lockie Track	2	O	
Roonki Track	2	MVO	
Bungle Ridge Walking Track	3	MVO	
Brockie Track	3	MVO	
Nip Nip Track	3	MVO	
Noonflower Track	3	MVO	
Jasmine Track	3	MVO	
Lake Hattah Nature Drive	1	O	
Stockyard Track	2	O	
Chalka Creek Track	2	O	
Cantala Track	2	O	
Kulkyne Track	3	MVO	
Florence Annie Track	2	MVO	
River Track	2	O	
Messenger's Mailbox Track	2	MVO	
Shorts Pipeline Track	2	MVO	
Kramen Track	2	MVO	
Lake Albacutya Park			
Purra Track	3	O	
Wembulin Track	2	O (As far as Outlet Creek)	
Western Beach Rd	2	O	
Bluff Track	2	O	
Boat Ramp Track	2	O	
Outlet Creek Track	2	2WD	
Ross Lakes Track	2	2WD	
Wyperfeld National Park			
Underbool (Tritter) Track	3	MVO	
Nine Mile Square Track	3	MVO	
Meridian Track	2	O (as far as Nine Mile Square Track)	
Archbold Track	3	MVO	
Moonah Track	3	O	Upgrade to 2WD
Eagle Track	3	MVO	Open to public and upgrade to 2WD

Table 5 (cont.)

TRACK NAME	CLASS	CURRENT STATUS	FUTURE MANAGEMENT (No change unless indicated below)
North South Track	3	MVO	Open to public and upgrade to 2WD
Dattuck Track	3	MVO	Open to public and upgrade to 2WD
Freeway Track	3	MVO	Emergency use only
Milmed Rock Track	3	O	
Chinaman Well Track	3	O	
Pella Track	3	O	
Gunners Track	3	O	Upgrade to 2WD
Outlet Creek Track	3	O (Dry weather only)	
Lowan Track	3	MVO	
Cambacanya Track	3	MVO	
Ginap Track	3	MVO	
Ring Road	2	O	
Black Flat Track	2	O	

NB Many tracks are subject to seasonal closure after wet weather

Key:

Class
1 = all weather road
2 = dry weather 2WD road
3 = 4WD track

Status
O = Open to all public vehicles
MVO = management vehicles, walkers and cyclists only

allow greater year-round access with minimal environmental impact. A Mallee Parks touring route utilising already existing tracks will provide a link between all the Mallee Parks from Pine Plains to Hattah via the main visitor nodes of Pink Lakes and Mopoke Hut (figure 2). Tracks that will need some level of upgrading to establish this route for 2WD vehicles include:

- Gunners Track (northern Wyperfeld);
- Grub Track (Pink Lakes area);
- Underbool Track (southern section in Murray-Sunset);
- Last Hope Track (eastern section of Murray-Sunset to Hattah).

These tracks become impassable to 2WD vehicles during wetter periods or in summer. Progressive upgrading will consist primarily of drainage works or consolidation of sandier sections.

As part of the Mallee Parks touring route the Draft Management Plan canvassed three alternative routes allowing north south access through Wyperfeld National Park - via Freeway Track; via Meridian Track; or via Dattack/North-South/Eagle Tracks. Factors considered in assessing their suitability were:

- environmental concerns, especially those associated with an access route centred along the floodplain of Outlet Creek;
- recreation opportunities
- tourism benefits;
- tracks required for fire protection and other management purposes;
- costs.

Of the three options, the Dattuck/North-South/Eagle Tracks route best satisfies these criteria. Opening this route to public vehicles will have minimal environmental impact, while

increasing visitor opportunities as well as benefiting the tourism industry by providing a link between all the Mallee Parks from southern Wyperfeld to Hattah via the main visitor nodes of Pine Plains, Pink Lakes and Mopoke Hut. This route also passes through a variety of vegetation communities, incorporates many areas of cultural and scenic interest, and requires least upgrading.

The Wyperfeld leg of the touring route will be developed through allowing access on what were previously Management Vehicles Only tracks.

Legislation precludes public vehicular access to wilderness zones. Roads are not permitted, nor is any form of mechanised or animal transport, except where they are deemed to be essential for the responsible management of the Park, e.g. for fire protection.

Certain tracks may be closed for Park management purposes, for instance where a track traverses a wilderness zone or reference area, or where weather conditions necessitate seasonal closure. Major tracks will only be closed following consultation with the public and the Victorian Association of Four-Wheel Drive Clubs, except where closures are required by legislation.

In the past, tracks generally followed the shortest possible route between two points. This has led to tracks being visible from dune tops over extremely long distances. Such tracks may be realigned or closed in places in order to be more sympathetic to landscape values.

Signposting within the Mallee Parks is currently inadequate. An integrated Signs Plan that is sensitive to the local character of the natural environment will be developed.

Aims

- Provide and maintain an access network for visitor enjoyment, management purposes and private property access.
- Minimise the impact of vehicle and track management on the Parks' natural and cultural values.

Management strategies - all Parks

- *Manage and permit use of roads and tracks in the Parks in accordance with table 5, figure 2 and NRE guidelines.*
- *Operate a track closure system during wet weather to prevent damage to road surfaces.*
- *Close all vehicular tracks in wilderness zones and reference areas.*
- *In accordance with the NRE Signs Manual and other relevant guidelines, develop a Signs Plan for the Mallee Parks that*
  - *identifies and names tourist routes/trails through and to the Parks, and from the highways and other direct access roads;*
  - *encourages a distinctive local identity and is in accordance with local environmental and visual influences (section 5.3).*
- *Identify and promote specific routes of scenic, cultural and historic interest (sections 3.5 and 3.6).*

Management strategies - Wyperfeld National Park

- *Develop the Wyperfeld leg of the Mallee Parks touring route by:*
  - *progressively upgrading southern Ring Road, Dattuck Track, North South Track, Eagle Track and Moonah Track to 2WD all weather standard;*
  - *progressively upgrading Gunners Track from 4WD to 2WD standard.*
- *Maintain Tritter Track, Archbold Track and Nine Mile Square Track for management vehicles and walkers only.*
- *Use Freeway Track for emergencies and walkers only.*

Management strategy - Murray-Sunset National Park

- *Develop the Murray-Sunset leg of the Mallee Parks touring route by upgrading the following tracks to 2WD standard:*
  - *Last Hope Track, Underbool Track between Last Hope and Grub Tracks, and Grub Track.*

5.2.2 Camping and day visitor facilities

Existing camping and day visitor facilities are basic, in keeping with the remote nature of the Mallee Parks. The main visitor areas have toilets, information shelters, fireplaces, picnic tables, litter bins and limited drinking water. Wonga Campground at Wyperfeld also contains a picnic shelter, and a gas barbecue has been installed at Pink Lakes. Remote camping sites generally contain a fireplace and picnic table and several also have an information shelter. Current and proposed facilities are detailed in figure 2 and table 6.

In Hattah-Kulkyne, eastern Wyperfeld and the Pink Lakes area of Murray-Sunset, vehicle-based camping is permitted only in the major campgrounds. Within western Wyperfeld, Murray-Kulkyne and the remainder of Murray-Sunset, dispersed vehicle-based camping is allowed within 50 metres of a road or track providing the vehicle remains on the track allowing sufficient room for other vehicles to pass. Vehicle-based camping is also permitted outside the main camping areas at Lake Albacutya (Western Beach, O.T.I.T. and Yaapeet Beach), but permission must first be obtained from the Ranger.

Facilities are generally adequate for current Park visitor numbers although increasing visitor numbers will place considerable pressure on existing facilities, especially during peak periods, and create new demand.

The lack of toilet amenity and drinking water is a concern for many visitors to existing camp grounds. The need to carry water is also a limiting factor for many walkers in the Mallee. While it may be possible to provide water, it is extremely difficult to guarantee supply. Reliance on supplies which could be vandalised or depleted would compromise visitor safety, particularly during summer.

Consistency in the design of new facilities will emphasise the management responsibilities of NRE and the collective nature of the Mallee Parks, and be in keeping with the characteristics of the Mallee landscape.

Aims

- Establish and maintain day visitor and camping facilities which enhance visitor enjoyment of the Parks and are consistent with protection of Park values.
- As far as practicable, provide facilities with access for a range of groups.

Management strategies - all Parks

- *Provide additional basic picnic and camping facilities as identified in figure 2 and table 6.*
- *Where possible, separate facilities for day-visitors, independent campers, and large groups of campers.*
- *Develop and maintain walkers-only camp sites with basic facilities in the Mallee Parks.*
- *Develop a consistent and distinctive facilities architecture for the Mallee Parks, subject to NRE guidelines. Design and place facilities so that they are appropriate to the cultural, landscape and recreational setting of the site.*
- *Continue to investigate alternative technology such as solar-powered facilities and improved low-maintenance facility designs, e.g. of toilets.*
- *Provide a supply of drinking water for walkers and campers at strategic points where regular patrols and maintenance are possible.*
- *Encourage minimum impact use of wilderness zones, including use by small groups and the use of portable liquid fuel stoves wherever possible. Avoid promoting*

TABLE 6 EXISTING AND PROPOSED RECREATION FACILITIES

SITE	DEFINED CAMPING	TOILETS	PICNIC TABLES	FIRE PLACES	WATER AVAIL.	WALK TRACK	LOOKOUT	PARK INFO.	MANAGEMENT ACTIONS AND COMMENTS
Murray-Sunset National Park									
Pink Lakes	E	E	E	E	E	E		E	Nature drive proposed. Gas BBQ to be installed.
Mopoke Hut	E	E	E	E	E	P			
Mt Crozier	E	E	E	E		P	E		
Rocket Lake	E	E	E	E				E	
Lake Wallawalla								E	No motorised boats.
Tower paddock (Wallawalla tk)								E	
Noora Gate								E	
Shearers Quarters	E	E	E	E	E				Accommodation available.
Pheenys Tk (end of)	E		E	E					
Pheenys Tk (Millewa S. RA)	E	E	E						
Rock Holes								E	
Sunset Tank	E	P	E	E					
Mt Jess							E		
Ochre Pit	E	P	E	E					

Table 6 (cont.)

SITE	DEFINED CAMPING	TOILETS	PICNIC TABLES	FIRE PLACES	WATER AVAIL.	WALK TRACK	LOOKOUT	PARK INFO.	MANAGEMENT ACTIONS AND COMMENTS
Raak Plain north end (Meridian Track)								E	
Gypsum Mound								P	
Adelaide Hills								P	
Large Tank	E		E	E					
Hattah-Kulkyne National Park									
Lake Hattah	E	E	E	E*	E	E		E	Also nature drive. Gas barbecue to be installed. No generators or motorised boats.
Lake Mournpall	E	E	E	E*	E	E		E	Gas barbecue to be installed. No generators or motorised boats.
Murray-Kulkyne Park									
Emmerts Bend								E	
River Track/ Robinvale Rd								P	
Lake Albacutya Park									
Western Beach	E	E	E	E*	E			E	Also boat ramp. Generators at specified times.
Yaapeet Beach	E	E	E	E*	E				Generators at specified times.
O.T.I.T.	E	E	E	E*					No generators
Outlet Ck/Ross Lake			E	E*				E	Generators at specified times.

Table 6 (cont.)

SITE	DEFINED CAMPING	TOILETS	PICNIC TABLES	FIRE PLACES	WATER AVAIL.	WALK TRACK	LOOKOUT	PARK INFO.	MANAGEMENT ACTIONS AND COMMENTS
Dorrington Point		E							
Wyperfeld National Park									
Wonga Campground	E	E	E	E*	E	E		E	Gas barbecue to be installed.
Casuarina Campground	E	E	E	E	E				
Nine Mile Square track					E	E			Walkers only permitted
Rudd Rocks					E	E			Walkers only permitted
Pine Plains	E	P	P	P	P			P	
Broken Bucket	E	E	E	E	E			E	
The Springs			E	E					
Round Swamp	E	P	E	E					
Booligal								E	
O'Sullivan Lookout						E	E		
Eastern Lookout							E		

E – Existing P – Proposed * Conditions apply to use of firewood.

particular destinations so as to avoid placing undue pressure on significant conservation features.

- *Promote low impact camping techniques in interpretation media such as signs, publications, displays and interpretation and education programs.*

- *Promote the existence of powered and serviced camping facilities in camping grounds outside the Parks.*

5.2.3 Campfires

Firewood collection can cause significant environmental damage through the destruction of habitat of many small ground-dwelling animals. Fallen timber available for use as firewood is becoming increasingly rare around the major camping areas in Hattah-Kulkyne, Wyperfeld and Lake Albacutya. Even within Murray-Kulkyne, with its extensive riverine forests, the amount of fallen timber has declined markedly in many of the popular river bends.

Options to reduce the environmental damage caused by firewood collection, yet still enable visitors to enjoy campfires, will vary according to existing and future natural supply, conservation value and the level of visitor use. In large areas of the Mallee Parks, visitor use is low enough for firewood supply to be self-sustaining.

Aim

- Reduce environmental damage caused by the collection and use of firewood.

Management strategies - all Parks

- *Permit firewood collection and maintain the opportunity for the use of campfires in the Mallee Parks by implementing the following site-specific actions:*
  - *Within the recreation development zones (which includes the major campgrounds) campfires will only be permitted in fireplaces provided.*
  - *The lighting of campfires in other areas will be permitted subject to Fire Regulations.*
  - *Install gas barbecues at major day visitor areas such as Lake Hattah, the Wonga Campground at Wyperfeld and Lake Crosbie;*
  - *Prohibit the use of campfires over the summer months in the campgrounds at Hattah-Kulkyne, Wyperfeld and Lake Crosbie, and at Lake Albacutya.*

- *Prohibit the use of chainsaws within the Mallee Parks.*

- *Encourage the use of gas barbecues and liquid fuel portable stoves in other areas, especially Wilderness Zones.*

- *Develop a public education plan which promotes minimal use of firewood.*

- *Regularly assess the impacts of firewood collection and restrict collection in specified areas as appropriate.*

5.2.4 Generators

Generators are currently permitted within sections of Murray-Kulkyne, Hattah-Kulkyne and Lake Albacutya, and on sections of Lindsay Island in Murray-Sunset under interim management plans.

The two categories of Park status (National Park and Other Park) along the river at Hattah, and different regulations in regard to generators even within each Park, have led to past confusion and difficulties in enforcement (figure 6).

At Lake Albacutya, the previous widespread use of generators led to conflicts between users and non-users, and disturbed nesting birds. Generators are now permitted only within the Western Beach and Yaapeet Beach campgrounds, and in the Outlet Creek/Ross Lake area.

Generator use on Lindsay Island (figure 5) will now be prohibited in accordance with the *Park Regulations* 1992.

Aim

- Provide for the use of generators, where consistent with the protection of Park values.

Management strategies - all Parks

- *Permit the use of generators between 8.00 am and 10.00 pm:*
  - *within Murray-Kulkyne Park;*
  - *within Hattah-Kulkyne National Park in the area bounded by the River Track, Firemen's Bend and Jinker's Bend inclusive;*
  - *at Western Beach campground and Yaapeet Beach campground at Lake Albacutya Park;*
  - *on Outlet Creek/Ross Lakes within Lake Albacutya Park dependent upon the potential disturbance to wildlife.*
- *Do not permit the use of generators within Murray-Sunset National Park, Wyperfeld National Park and the remainder of Hattah-Kulkyne National Park.*
- *Use signposting and other print media to publicise conditions of use.*

5.2.5 Built accommodation

The range, quality and style of accommodation (other than camping) currently available in the Mallee region is limited. A significant number of visitors to the natural environment prefer to stay in more comfortable accommodation than camping. In some cases, long distances may make town-based accommodation impractical for visitors.

In these cases, development of higher standard accommodation on private or public land adjacent to, or within, a Park may be appropriate. Cabins and wilderness lodges are popular forms of accommodation in natural areas in other parts of Victoria and interstate.

The development of accommodation facilities within the Mallee Parks will need to be weighed against the potential damage to the Parks' fragile natural environments, the possible disturbance to the Parks' remote and undeveloped character, and the possible implications for private sector tourism services in the region.

A further opportunity that has been identified is the existing Berribee Homestead and Woolshed, located on Crown land on the edge of Murray-Sunset National Park.

Accommodation facilities will generally be restricted to the Recreation Development Zone and will not be permitted in Wilderness or Reference Area Zones or Special Protection Areas.

Aim

- Provide built accommodation for visitors, where consistent with the protection of Park values.

Management strategy - all Parks

- *Encourage the construction of accommodation on private land or Crown land adjacent to the Mallee Parks while ensuring that Park values are not adversely affected by inappropriate development.*

5.2.6 Bushwalking and cycling

Opportunities for bushwalking range from short self-guided walks to wilderness hiking. Long distance hiking and cycling, based on Management Vehicles Only tracks, are particularly popular at Wyperfeld. A long distance trail linking the main points of visitor interest in each Park will be established, similar to the Mallee Parks touring route (section 5.2.1), but utilising different tracks or alignments. This will necessitate the provision of drinking water at key locations.

Aim

- Increase the range of bushwalking and cycling opportunities, consistent with the protection of Park values.

Management strategies - all Parks

- *Develop a long distance trail for walkers and/or cyclists to category D standard (NPS 1995) between the southern campground at Wyperfeld (Wonga), through Murray-Sunset and on to Hattah-Kulkyne incorporating:*

  - *Casuarina Campground and Pine Plains in Wyperfeld;*
  - *Pink Lakes, Mt Crozier and Mopoke Hut in Murray-Sunset.*

- *Maintain self-guided trails at Category C standard at locations of high visitor use.*

- *Develop and maintain walking tracks listed in table 6 to at least Category D standard.*

- *Avoid promoting particular routes or destinations in Wilderness Zones, to avoid placing undue pressure on significant conservation features.*

- *Publish a Wilderness Walkers Code: Desert Parks, which will include safety information.*

5.2.7 Boating

Prohibition of motorised boats on the Hattah Lakes system, including Chalka Creek (figure 4), is currently enforced under Schedule 80 of the *Marine Act 1988* (Vic.). The lakes and waterways are important habitat for large numbers of waterfowl and wading birds listed under the JAMBA and CAMBA agreements (section 3.2.2). The relatively small size of most of the lakes and Chalka Creek makes them easily accessible by canoeists and kayakers.

There has been some public pressure to ease the restrictions on powered boats on the Lakes. Yabbying and fishing from canoes are popular pastimes and, on the larger lakes, this can involve a great deal of paddling.

Lake Wallawalla has similar high conservation values to the Hattah Lakes system. Motorised boats were permitted prior to its inclusion in Murray-Sunset, and this has continued. The intermittent water supply and its extremely shallow nature, however, reduce motor boating to relatively infrequent occasions after major floods. This is generally also the time of highest waterbird concentrations.

Because of its high conservation value and the recent phasing out of commercial fishing, only vessels with electric motors, canoes, kayaks and row boats will be permitted on Lake Wallawalla.

Aim

- Provide boating opportunities while minimising conflict with Park conservation values.

Management strategy - Hattah-Kulkyne and Murray-Sunset National Parks

- *Provide for only non-motorised or electric-powered boats to be used on the Hattah Lakes system and Lake Wallawalla.*

5.2.8 Horse and camel riding

Overnight trail horse and camel riding activities in the Parks require water, and are hence restricted primarily to those parts of Murray-Sunset where former stock water points have been retained for fire protection purposes. Routes specifically restricted for trail horse riding are not considered necessary by horse riding groups. Continuing controls on feed are necessary to prevent weed dispersal.

There is also potential for camel riding in the Parks. Camels have large soft feet which cause minimal soil disturbance, and they require less water than horses. Standards for management of weed dispersal associated with camel riding would need to be consistent with those that apply to horse riding. Both activities will be managed in accordance with guideline 6.2.7P.

Horse and camel-riding will not be permitted in Hattah-Kulkyne National Park.

Aim

- Provide opportunities for horse riding and camel riding, consistent with protection of Park values.

Management strategies - Wyperfeld National Park and Murray-Sunset National Park

- *Investigate the development of overnight trail-riding routes for horses and camels:*
  - *along existing roads and tracks*
  - *in areas that will minimise conflict with other users*
  - *away from areas of biological or cultural significance*
  - *in consultation with interested parties.*
- *Establish a monitoring program to regularly monitor the impacts of horse and camel-riding and provide alternative routes or restrict activity as necessary.*

Management strategy - Lake Albacutya Park and Murray-Kulkyne Park

- *Assess the suitability of these Parks for horse and camel riding if there is a demand for this activity.*

5.3 Visitor information, interpretation and education

The provision of a comprehensive system of information, interpretation and environmental education in the Mallee Parks will help orientate visitors, foster an appreciation of the Parks' natural and cultural values, reduce visitor impacts, and encourage co-operation between Park management and the local community. These services are particularly important in the Mallee environment where many features are not readily perceived by visitors, many of whom have little knowledge of semi-arid environments.

The principles of an integrated system of information, interpretation and environmental education for the Parks will be developed on regional, unit and site-specific themes. These will convey the subtle and diverse nature of the semi-arid Mallee ecosystems as well as historical and cultural values (table 7).

The program will employ a variety of interpretation media appropriate to the target audience, the theme presented and the nature of the site. The Mallee's cultural and natural heritage will be presented in ways that are acceptable to, and which actively involve, local people and those with particular ties to this heritage (e.g. the Aboriginal community). Services will be co-ordinated throughout the Mallee and linked to other programs statewide.

Personal interpretation and education will be delivered and supervised in a systematic and professional way by relevant NRE staff who are trained for the task. Interpretation and education services will be given adequate time and priority in work schedules.

Aims

- Assist visitors to discover, enjoy and appreciate the natural and cultural features of the Mallee Parks, and the value of National Parks and their management.
- Encourage all visitors to adopt minimum impact techniques and safe practices appropriate to their activity.

Management strategies - all Parks

- *Provide adequate visitor orientation and safety messages at key visitor nodes.*
- *Develop interpretive and visitor plans which provide a framework for interpretive facilities and programs.*
- *Improve and promote links between visitor nodes and develop interpretation accordingly.*
- *Maintain high quality publications for the Mallee Parks, including at least one A4 or A3 leaflet for each Park and specialist information sheets.*
- *Produce the Mallee Parks Newsletter for landholders adjacent to the Parks and others.*
- *Develop a hierarchy of strategically located on-site information facilities in the Mallee Parks and nearby towns that take into account:*
  - *the appropriate level of facilities and services in each management zone;*

TABLE 7 INTERPRETATION THEMES

The vastness of the Mallee's dry country is uniquely outback in an otherwise essentially green and densely populated State.

The Mallee Parks preserve some of the last remaining tracts of undisturbed semi-arid vegetation in the world, including the largest area of high quality wilderness in south-east mainland Australia.

The apparent uniformity of the Mallee landscape hides rich, complex and varied ecosystems.

Ancient inland seas and wind blown sands have shaped the landforms and landscapes of the Mallee.

Mallee ecosystems are well adapted to extremes of climate, and to natural phenomena such as fire, flood and drought.

Aboriginal occupation of the dryland areas of the Mallee depended on obtaining water from soaks and plants.

The installation of water supply and collection systems was central to European occupation and settlement of the Mallee.

Park management is actively restoring Mallee ecosystems which, although adapted to harsh conditions, are susceptible to human influences.

SOURCE: Draft Mallee Interpretation and Community Education Plan (CNR 1993d).

  - *the cultural, landscape and recreational setting of the site.*

- *Investigate the development of education material for primary and secondary schools that addresses the Mallee Parks themes. Continue to support curriculum development initiatives.*

- *Seek opportunities to develop interpretation and education in conjunction with the general community and the tourism industry.*

- *Co-operate with local and regional tourism associations, and the private sector, in developing orientation centres in strategic towns/locations such as Mildura, Swan Hill, Ouyen, Hopetoun, Cullulleraine, Robinvale and Murrayville.*

- *Further develop the distribution network in local business, motoring association outlets, visitor information centres and NRE work centres within the Mallee, at key entry points to the Mallee, in adjacent regions, and in State and interstate tourism and conservation agencies.*

- *Develop, link and promote special events or theme weeks for the Mallee Parks.*

- *Continue to utilise electronic or print media to increase awareness of specific events, issues such as blue-green algae and lake levels, and the Parks generally.*

- *Develop and implement a maintenance schedule for all interpretive facilities.*

- *Regularly evaluate the effectiveness of the Parks' information and interpretative services.*

5.4 Tourism and commercial tourism operations

The Mallee Parks and their associated natural, cultural and aesthetic values are one of the

major tourist attractions of the region, consequently making a significant contribution to the economic well-being of local communities. To optimise tourism opportunities and to protect the conservation values of the Parks, it is important that close working relationships are maintained with local government and the tourism industry. This liaison also ensures effective use of resources through co-ordinated planning, development and marketing.

The Mallee Tourism and Recreation Strategy (CNR 1993a) defines various target markets for the Mallee Parks and makes recommendations on a number of issues including signposting, training, commercial operations, product development, promotion, planning and monitoring.

Other strategies such as the Mildura Regional Tourism Board Business Plan (MRTB 1996) and the Oasis Country Marketing Plan (CVTV 1996) highlight the significance of the Mallee Parks for tourism in the region. They use Tourism Victoria's research to identify potential visitors and make recommendations on marketing and development that are relevant to NRE.

Commercial operators can play an important role in introducing visitors to Parks and interpreting them to their clients. There are currently a small number of commercial tour operators who use the Mallee Parks. Activities offered include four-wheel driving, nature study, canoeing, bushwalking, and vehicle-based camping. Potential activities include cultural heritage tours, wilderness walking, guided horse and camel rides, and a greater diversity of special interest and study tours.

Currently there are few restrictions on tour operations in the Mallee Parks, although as the number of independent visitors and tour operations increase, this may become necessary. Ongoing monitoring should ensure that changes due to increasing use are kept within acceptable limits.

Aims

- Become more customer-oriented and provide quality services and experiences to visitors and clients.
- Optimise sustainable tourism opportunities for current and potential visitors.
- Develop a constructive and prosperous partnership with local government and the tourism industry.
- Integrate the Mallee Parks with other tourism attractions and services in the region.

Management strategies - all Parks

- *Contribute to the ongoing development, review and implementation of regional tourism development strategies, business plans and marketing plans.*
- *Continue to identify and facilitate ecologically sustainable tourism opportunities within and related to the Mallee Parks.*
- *Actively seek opportunities to promote the Mallee Parks in co-operation with industry and in accordance with the principles and recommendations outlined in the Mallee Tourism and Recreation Strategy (CNR 1993a).*
- *Review current levels of service for visitors and initiate a continuous improvement program.*
- *Conduct or facilitate familiarisation tours and workshops for commercial tour operators, the broader tourism industry and relevant boards and organisations, to develop a greater understanding of the Mallee Parks' values, opportunities and management issues.*
- *Conduct or facilitate training for NRE staff in relation to tourism and tourism operations.*
- *Fully implement the NRE commercial tour permit system in the Mallee Parks and maintain regular contact with operators.*

5.5 Public safety

Factors that can affect visitor safety in the Mallee Parks include:

- variable road conditions which vary markedly according to the weather, especially in clayey areas;
- poor visibility on tracks across dune crests (can result in car collisions);
- lack of water in many areas, especially in the semi-arid areas;
- high summer temperatures;
- inadequate maps;
- lack of distinguishing features;
- feral Honey Bees;
- wildfire.

Responsibility for search and rescue operations rests with the Victoria Police, although NRE may play a supporting role through DISPLAN, the State's Disaster Plan. NRE also has a Search and Rescue Plan for the former Mildura Region.

Aim

- Promote and encourage safe practices among visitors and staff.

Management strategies - all Parks

- *Increase public awareness of the potential dangers involved in recreation in the Mallee Parks, especially in the semi-arid areas, by:*
  - *including appropriate information on information boards at key locations throughout the Parks;*
  - *including relevant information on Park brochures;*
  - *publishing a Wilderness Walkers Code: Desert Parks, which will include safety information.*
- *Encourage overnight walkers to notify the nearest NRE office of their intentions.*
- *Carry out search and rescue operations in accordance with NPS guideline 22.5PL, and co-operate with authorities if and when DISPLAN is effected.*
- *Train Park staff in first aid and search and rescue techniques and ensure qualifications are kept up to date.*
- *Consult with the Victoria Police and VicRoads regarding the introduction of park speed limits in areas where visibility over dunes presents a risk to motorists.*
- *Through appropriate media encourage safe driving and awareness of hazards.*

6 COMMUNITY AWARENESS AND INVOLVEMENT

6.1 Friends and volunteers

NRE encourages and greatly values the input of volunteer groups in park management activities. Friends Groups currently operate in Wyperfeld and Hattah-Kulkyne National Parks in activities such as revegetation, interpretation, track work and fencing. Australian Trust for Conservation Volunteers and Campus Conservation Groups regularly participate in similar projects.

Aim

- Encourage volunteer involvement in managing the Parks.

Management strategies

- *Encourage the formation of, and support, a Friends group for the Murray-Sunset National Park, and support the existing groups.*
- *Develop and evaluate a long-term volunteer strategy which incorporates the skills and interests of volunteer groups in Park management e.g. in volunteer guide programs.*

6.2 Community awareness and Park neighbours

Park Advisory Committees exist for Wyperfeld National Park/Lake Albacutya Park and Hattah-Kulkyne National Park/Murray-Kulkyne Park. They were established as a formal means of providing community input into the management of these park areas.

The majority of the Mallee Parks' neighbours are involved in the agricultural industry. A number of factors affecting the Park/freehold interface have the potential to impact on the Parks' ecological processes and landscapes:

- the relatively high number of weed species on the Park/freehold interface;
- the need for co-operative approaches to rabbit control;
- the relative abundance of kangaroos, emus and rabbits on the Park fringes;
- stock trespass from neighbouring freehold or licensed land into the Parks;
- the need for buffers to prevent fire escapes from (or into) the Parks.

Management of these issues requires a co-operative approach between NRE and Mallee farmers (sections 4.1, 4.2.1– 4.2.5, 4.3, 4.4).

Twenty Rabbit Action Groups have now been established to co-ordinate rabbit control.

Aims

- Increase public awareness of management activities including fuel reduction burning, grazer control, pest plant and animal control, and the conservation of threatened species.
- Encourage conservation and sound land management practices on private land adjoining the Parks.

Management strategies - all Parks

- *Liaise with local community groups and land holders, and as appropriate involve them in relevant aspects of planning and managing the Parks.*
- *Apply, and encourage the application of, the Good Neighbour Policy to management issues on or near the boundary of the Parks.*

6.3 Man and the Biosphere Program

Hattah-Kulkyne and Murray-Kulkyne were designated as a Biosphere Reserve in 1981 under the 'Man and the Biosphere Program' of the United Nations Educational Scientific and Cultural Organisation (UNESCO) - one of only three such Reserves in Victoria.

Biosphere reserves are areas significant on a world scale for their characteristic landforms, plants and animals, and the way they have been used by people. Since 1971 the designation of

Biosphere Reserves has been a world-wide program of international scientific co-operation dealing with people-environment interactions in the globe's range of bioclimatic and geographic situations. Research under the program is designed to produce the information needed to solve practical problems of resource management.

Key ingredients are the involvement of decision-makers and local people in research projects, training and demonstration in the field, and the pooling of disciplines from the social, biological and physical sciences in addressing complex environmental problems (ANCA 1993).

Programs for the Parks are yet to be developed.

Aim

- Promote and adopt the principles of the 'Man and the Biosphere Program.'

Management strategy - Hattah-Kulkyne National Park

- *Identify management requirements of the Hattah-Kulkyne National Park Biosphere Reserve.*

7 OTHER ISSUES

7.1 Authorised uses

7.1.1 Apiculture

The Mallee is popular with apiarists for overwintering hives, being River Red Gum and Black Box communities the main honey-producers. There is considerable debate over the possible effects of Honey Bees on native flora (section 4.3); however, in the Mallee at least they are of great economic value as pollinators of commercial crops such as almonds and stone fruits.

The LCC (1989) recommended that the number of apiary sites in the Mallee Parks be maintained at the current level and that no new sites be issued pending the resolution of environmental concerns. Access to existing apiary sites is to be rationalised to reduce the disturbance associated with the transporting of hives. Where located on public land, apiary sites are not permitted within 1.6 km of wilderness zones in the case of permanent sites, or within 0.8 km in the case of a temporary permit. Apiary sites are not permitted within 2 km of a reference area.

Control of feral Honey Bees is discussed in section 4.3.

Aims

- Minimise the effects of commercial Honey Bees on recreation and native flora and fauna.
- Increase knowledge of the possible effects of Honey Bees on native flora and fauna.

Management strategies - all Parks

- *In conjunction with the apiary industry, prepare an apiary management plan for each Park that includes:*
  - *access arrangements;*
  - *definition of sites using an agreed standard;*
  - *incorporation of those elements of the proposed Code of Practice for Beekeeping relating to improved hive management practices in order to minimise the possible environmental impacts of beekeeping.*
- *Investigate the feasibility of field assessment of floral resources to determine the appropriate number of hives permitted per site at any given time.*
- *In consultation with the apiary industry and individual beekeepers, remove or relocate all apiary sites near popular recreation sites.*
- *Encourage continued research into the effects of Honey Bees on native flora and fauna.*

7.1.2 Gravel extraction

Gravel and stone resources within the Mallee Parks are occasionally required for park road maintenance and construction. Material is sought from sources in the immediate vicinity of the point of use.

There are several unused gravel pits within the Parks. One of these is adjacent to the Sunraysia Highway within Hattah-Kulkyne National Park, and is clearly visible to large volumes of traffic from the highway.

Extraction of gravel and stone is governed by the *Extractive Industries Development Act 1995* (Vic.). NRE is exempted from some responsibilities under the Act under certain circumstances (e.g. extraction for use within a park).

Aims

- Provide material for Departmental use where it is not cost-effective to import it from other areas.
- Minimise the environmental effects of any extraction operation.

Management strategies - all Parks

- *Use gravel and stone deposits only for roads within the parks.*

- *Minimise the environmental and aesthetic impacts of extraction sites.*
- *Liaise with local shires and VicRoads to minimise the aesthetic impacts of extraction or stack sites adjacent to Parks entrance points, and encourage rehabilitation as soon as pits are no longer needed.*
- *Rehabilitate unused pits.*

7.1.3 Mineral and petroleum exploration and mining

Mineral exploration and mining are administered by NRE under the *Mineral Resources Development Act 1995* (Vic.) and Section 40 of the National Parks Act. Mineral exploration and mining may be approved in Lake Albacutya and Murray-Kulkyne Parks but only with the consent of the Minister after receiving advice from the National Parks Advisory Council.

Petroleum exploration is not permitted in any wilderness parks or zones, but operations under the *Petroleum Act 1958* (Vic.) may be approved in other areas or Parks with the consent of the Minister after receiving advice from the National Parks Advisory Council. There is one Petroleum Exploration Licence valid for the Mallee Parks (PEP 121) which includes large sections of both Wyperfeld and Murray-Sunset.

Aim

- Protect environmental, cultural and historic values where any exploration or mining is undertaken.

Management strategy - all Parks

- *Ensure that any exploration or mining permitted is conducted in accordance with the relevant legislation. Protection of environmental and historic values, and rehabilitation, will be given a high priority in determining appropriate conditions and licences.*

7.1.4 Commercial fishing

Under the *Fishing (Amendment) Regulations 1992*, fishing with mesh nets in Murray-Sunset is no longer permitted except for one pre-existing commercial licence to fish the Lindsay and Mullaroo Creeks. The licence will not be renewed after its termination date in 1997. Commercial fishing of the above waters, and Potterwalkagee Creek to the immediate east of the Lindsay Island, has been removed to protect their value as habitat for a number of threatened species.

Commercial fishing for yabbies is permitted in Lake Albacutya, but is no longer allowed in Lake Wallawalla. There is no limit on the number of commercial permits that can be issued to fish for yabbies on Lake Albacutya. This could potentially lead to overfishing, affecting the recreational appeal of the lake as an amateur fishery. Amateur fishermen are permitted to use three yabby pots each in the Lake. Commercial fishing on other waters in the Mallee Parks is not permitted.

Aim

- Maintain viable populations of all fish species, including yabbies.

Management strategy - Lake Albacutya Park

- *Determine appropriate limits for the number of commercial permits for yabbying on Lake Albacutya.*

7.1.5 Commercial use of flora and fauna

At present the only commercial utilisation of flora or fauna within the Parks is the collection of seed from the Lake Albacutya provenance of River Red Gum. Propagates of this seed are frequently used to lower saline watertables or as an ornamental in saline areas. Although commercial quantities of Lake Albacutya provenance seed are now available from plantation sources, it is necessary to return to the original source to maintain genetic vigour. Seed has not been commercially collected since 1991 because of the low quantity available.

It is possible that other Mallee Park species may become valuable for land protection, research or horticultural purposes.

Aim

- Minimise the environmental impacts of commercial flora and fauna utilisation.

Management strategies - all Parks

- *Ensure that any utilisation does not endanger or deleteriously affect natural populations.*
- *Encourage commercial utilisation on Crown land other than the Mallee Parks wherever possible.*

7.1.6 Military training

Minimum impact Defence Force activities are permitted in National Parks under NPS guideline 21.1PL. The LCC (1989) recommended that military training exercises in the Mallee Parks should be excluded from reference areas and, except where it does not conflict with the purpose of the reserve, from Parks and other areas of recreation and conservation significance. Any training exercises in wilderness zones should be consistent with the protection of wilderness values and be subject to the same restrictions as other users.

Aim

- Protect conservation and recreation values from damage by military training where it is permitted in the Mallee Parks.

Management strategy - all Parks

- *Permit Defence Force exercises in accordance with NPS guideline 21.1PL.*

7.1.7 Local transportation routes

A number of tracks and roads through or on park margins are important as local access routes, especially to the neighbouring farming community. Interim guidelines were developed for Murray-Sunset National Park and extensions to Wyperfeld in June 1991, enabling the carriage of firearms, pets and livestock along designated routes as follows:

- Underbool Track;
- Settlement Road;
- Carwarp Road;
- North-South Settlement Road;
- the Mail Route;
- Pine Plains Track;
- Gunners Track;
- access to Booligal in Wyperfeld National Park.

These designated routes are intended to be retained as carriageways, with the exception of Underbool Track and North-South Settlement Road south of Carwarp Road. These tracks have limited value as carriageways in relation to farming enterprises.

Aim

- Provide for the carriage of firearms, pets and livestock by Park neighbours along designated routes where use of routes outside the Parks is not practical.

Management strategies - all Parks

- *Permit the carriage of firearms and pets within vehicles and the trucking of stock along the above tracks within the Mallee Parks, except Underbool Track and North-South Settlement Road south of Carwarp Road.*
- *Ensure that the public are made aware of these routes by adequate signposting and the distribution of written material.*

7.1.8 Other uses

Public utilities located within the Mallee Parks include:

- a radio communications station;
- trig points (used only irregularly, but may require selective tree clearing at the time to re-establish sight lines);
- electricity supply lines (220 kV power lines traverse both Hattah-Kulkyne and Murray-

Sunset; the easements are occasionally cleared for fire protection purposes);

- a Telecom fibre-optic cable (follows the 220 kV SEC easement through Murray-Sunset).

Aims

- Ensure the appropriate use and maintenance of the existing public utilities in the Mallee Parks.
- Minimise the impact of existing and any future utilities in the Mallee Parks.

Management strategies - all Parks

- *Authorise existing public utilities under Section 27 of the National Parks Act.*
- *Remove installations from wilderness zones in accordance with Section 17 of the National Parks Act. This precludes the installation of new utilities, and prohibits existing installations that are not considered necessary for the responsible management of the Parks or were erected after 23 August 1989.*

7.2 Boundaries and adjacent lands

A number of management problems are associated with the precise locations of sections of the boundaries of parts of the Mallee Parks declared in 1991.

Although the Mallee Parks comprise large blocks of mostly undisturbed land, further conservation benefits could be obtained by establishing habitat corridors between them and other smaller blocks of public land (Bennett 1990; Saunders et al. 1987).

Major habitat corridors established in the Mallee include the Annuello Corridor, which links the Annuello Flora and Fauna Reserve and Murray-Sunset National Park, and the Wathe Corridor, which links Wathe Flora and Fauna Reserve with the eastern edge of Wyperfeld.

Vegetated roadsides also play an important role as habitat corridors between blocks of public land in the Mallee. There are numerous 5 chain (99 m) and 3 chain (66 m) road reserves throughout the Mallee which would form an ideal framework for the establishment of a habitat corridor network linking the Mallee Parks, particularly Wyperfeld and Murray-Sunset, and other reserves. In many instances, however, there is little remnant vegetation. Channel reserves also offer possibilities to enhance the corridor network.

Aims

- Where necessary, rationalise boundaries of the new Mallee Parks in consultation with all interested parties.
- Maintain or enhance the extent of habitat corridors between the Mallee Parks and other reserves.

Management strategies - all Parks

- *Review the apparently anomalous sections of new Mallee Parks boundaries in consultation with interested parties.*
- *Identify and protect remnant vegetation along roadsides and other linear reserves that link areas of conservation value.*
- *Re-establish native vegetation along 3 and 5 chain road reserves between Wyperfeld and Murray-Sunset, incorporating other public land reserves wherever possible.*
- *Liaise with Local Government Authorities on planning matters that may affect the Parks.*

8 IMPLEMENTATION

A three year rolling implementation program will be prepared for the Mallee Parks to ensure efficient implementation of this Plan. Priorities for management are identified in table 8 as an initial step in this process.

TABLE 8 PRIORITY MANAGEMENT STRATEGIES

MANAGEMENT STRATEGY	SECTION IN PLAN
Resource conservation	
Develop and implement active management strategies for the protection of key species and communities by controlling the following threatening processes:	
• overgrazing by rabbits, goats, kangaroos and stock	3.3, 4.2.2, 4.2.3, 4.2.4,4.2.5
• competition by weeds	3.3, 4.3
• altered fire regimes	3.3, 3.4, 4.1
• altered hydrological regimes	3.2, 3.3
• introduced predators.	3.4, 4.3
Negotiate more natural flow regimes to:	
• Outlet Creek system	3.2.1
• Hattah Lakes system	3.2.2
• Lindsay Island.	3.2.3
Rehabilitate degraded areas	3.1, 3.3, 4.2
Maintain habitat corridors between Mallee Parks	7.2
Survey and protect Aboriginal and European cultural sites	3.6.1, 3.6.2
Rationalise Park boundaries	7.2
Park protection	
Ensure compliance with the Regional Fire Protection Plan	4.1
Develop and implement control plans for rabbits and goats	4.2.2, 4.2.3
Maintain sustainable kangaroo populations	4.2.4
Phase out stock grazing from all Parks	4.2.5
Close artificial waters in Murray-Sunset	4.4
Develop and implement pest plant and animal control strategies	4.3
Close tracks in wilderness zones	5.2.1
The Park visit	
Develop and maintain visitor facilities	5.2.2 – 5.2.8
Develop the Mallee Parks touring route	5.2.1
Implement initiatives of the Mallee Tourism and Recreation Strategy	5.1
Regulate firewood collection	5.2.3
Regulate generator use	5.2.4
Develop long-distance walking and cycling routes	5.2.6
Develop overnight trail riding routes for horses and camels	5.2.8
Implement relevant initiatives of the Mallee Interpretation and Community Education Plan	5.3
Standardise the permit system for commercial tour operators	5.4

Table 8 (cont.)

MANAGEMENT STRATEGY	SECTION IN PLAN
Community awareness and involvement	
Co-operate with local land owners on management issues affecting Park fringes, particularly rabbit and goat control, stock trespass and pest plants	4.2.2, 4.2.3, 4.2.5, 4.3
Continue to issue wildlife destruction permits to Park neighbours	4.2.4
Liaise with Park users, user groups, tourism industry and local community	5.2, 5.4, 6.1. 6.2
Monitoring and research	
Encourage research on Mallee ecosystems, vegetation communities, and significant flora and fauna species	3.2.1, 3.3, 3.4
Monitor control and rehabilitation programs	3.3
Survey and monitor vegetation and habitats on Lindsay Island	3.2.3
Monitor flow regime and vegetation along Outlet Creek system	3.2.1
Investigate and monitor effects of fire and fire ecology	4.1
Monitor grazing impacts on all Parks	4.2.1
Review rabbit control program on two-year basis	4.2.2
Monitor Millewa kangaroo trial fence	4.2.4
Review dam closure program on a two-year basis	4.4
Encourage research and monitor foxes, feral cats and Honey Bees	4.3, 7.1.1
Monitor Aboriginal history of Parks	3.6.1
Monitor visitor use and requirements, and impacts on Park values	5.1, 5.4

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APPENDIX I SIGNIFICANT VEGETATION COMMUNITIES AND THREATENING PROCESSES

COMMUNITY (PARK* AND AREA#)	DESCRIPTION	THREATENING PROCESS
Gypseous Rise Woodland (M-S 210 ha)	Gypseous rises or dunes characterised by a grassy ground layer with scattered Sugarwood in tree form.	Overgrazing (rabbits), competition from weeds
Pine-Buloke Woodland (W 5 070 ha; H-K 3 025 ha M-S 4 830 ha)	Woodlands comprising Slender Cypress-pine and/or Buloke as the canopy dominants.	Overgrazing (rabbits, kangaroos), fire, competition from weeds
Sandplain Grassland (M-S 1 380 ha)	Grasslands on sandy plains dominated by Desert Spear Grass and Bearded Kerosene Grass.	Overgrazing (rabbits, kangaroos)
Belah Woodland (M-S 1 490 ha)	Woodland dominated by Belah and containing a diverse understorey of shrubs and, in some cases, grasses.	Overgrazing (rabbits)
Floodplain Grassland (M-S 6 030 ha)	Occurring on frequently flooded sites and usually dominated by River Couch.	Altered hydrological regimes, overgrazing (stock), rising groundwater
Black Box Woodland (H-K 8 950 ha; W 4 590 ha)	Not common along the Murray River, but characteristic community of less-frequently flooded sites along other streams, e.g. Chalka Creek.	Altered hydrological regimes, overgrazing (kangaroos, rabbits), rising groundwater, competition from weeds
Alluvial-rise Shrubland (M-S 6 220 ha)	Restricted to elevated river terraces characteristic of former river courses and levels. Typically dominated by Black Bluebush and Pearl Bluebush.	Overgrazing (rabbits, kangaroos)
Big Mallee (W 40 ha)	Mallee woodland containing either Black Mallee Box or Bull Mallee as the canopy dominant.	Competition from weeds, rising groundwater
Savannah Mallee (M-S 41 380 ha; W 500 ha; H-K 400 ha)	Canopy dominated by Dumosa Mallee, White Mallee and/or Acorn Mallee, with understorey of grasses and chenopod shrubs	Competition from weeds, rising groundwater
Lakebed Herbfield (W 10 230 ha; H-K 860 ha; M-S 550 ha)	Native vegetation in the form of tall herbs dominates following the recession of lake waters.	Altered hydrological regimes, overgrazing (stock, rabbits, kangaroos)
'Heathland' communities (W/BD 150 000 ha)	Mallee and shrubland communities growing on highly infertile Lowan Sands of the Big Desert.	Altered fire regimes, Banksia dieback
'Evaporative Basin' communities (M-S 11 760 ha; H-K 245 ha)	Mixture of saline shrublands dominated by glassworts growing on saline discharge pans, and other chenopod shrubs growing on associated gypseous copi rises.	Rising groundwater, overgrazing (rabbits)

*BD Big Desert WP, H-K Hattah-Kulkyne NP and Murray-Kulkyne Park, M-S Murray-Sunset NP, W Wyperfeld NP and Lake Albacutya Park
#Approximate area based on 1:100 000 Floristic Vegetation maps (CFL 1987a).

APPENDIX II SIGNIFICANT FLORA SPECIES AND THREATENING PROCESSES

SPECIES	HOST COMMUNITY	PERCEIVED THREATS
Daviesia pectinata	R-SM	Altered fire regimes
Echinochloa lacunaria	*RA**	Altered hydrological regimes, overgrazing (rabbits, kangaroos, stock)
Elachanthus glaber	S-SM, E-WDM	Rising groundwater
Haegiela tatei	SS	Rising groundwater
Halosarcia flabelliformis	SS	Altered hydrological regimes, salinity
Lepidium monoplocoides#	PBW	Overgrazing (rabbits)
Phebalium lowanense	SPH, MH	Altered fire regimes, earthworks
Phlegmatospermum eremaeum	CM	Altered fire regimes, overgrazing(rabbits)
Pterostylis arenicola	BW, CM	Unknown
Spyridium spathulatum	SPH, MH	Altered fire regimes, earthworks
Stipa nullanulla	GPW	Overgrazing (rabbits)
Swainsona pyrophila	D-SM, S-SM	Overgrazing (rabbits, kangaroos)
Swainsona sericea		Overgrazing (rabbits, kangaroos)
Swainsona purpurea#		Rising groundwater

Source: Cheal et al. (1992)

Listed under the *Flora and Fauna Guarantee Act 1988*.

*D-BD** Dunefield - Big Desert
- D-CTH Dune - Crest Tree - Heath
- SH Sandplain Heath
- MH Mallee Heath
- BM

*D-SC** Dunefield - Sunset Country
- E-WDM East - West Dune Mallee
- CM Chenopod Mallee
- S-SM Shallow - Sand Mallee
- D-SM Deep - Sand Mallee

*D-USR** Dunefield - Underlying Sandstone Ridge
- BBM Broombush Mallee
- HW Heath Woodland
- R-SM Red - Swale Mallee
- Big Mallee/Yellow Gum

*EB** Evaporative Basin
- SG Sandplain Grassland
- GPG Gypseous - Plains Grassland
- SS Saline Shrubland

*LR** Lunettes and Ridges
- PBW Pine - Buloke Woodland
- BW Belah woodland
- SM Savannah Mallee
- G Grassland

*RA** Riverine and Alluvial Terraces
- A-PS Alluvial - Plain Shrubland
- A-RS Alluvial - Rise Shrubland
- BB-CW Black Box - Chenopod Woodland
- BBW Black Box Woodland
- RRGF River Red Gum Forest

APPENDIX III SIGNIFICANT FAUNA SPECIES AND THREATENING PROCESSES

SPECIES	HOST COMMUNITY	PERCEIVED THREATS
Mammals		
Platypus	*RA**	Salinity, altered hydrological regimes, illegal net fishing
Mallee Ningaui	E-WDM, S-SM, D-SM, SH, MH, R-SM	Altered fire regimes
Paucident Planigale #	A-PS, BB-CW	Altered hydrological regimes, overgrazing (rabbits and stock), recreational activities
Common Dunnart	E-WDM, CM, D-SM, MH, BM, R-SM	Altered fire regimes
Western Pygmy-possum	D-CTH, SH, MH, BM, R-SM	Altered fire regimes
Little Pygmy-possum	S-SM, SH, MH, BM, R-SM	Altered fire regimes
Inland Eptesicus	*D-SC**, *LR**	Competition for tree hollows
Greater Long-eared Bat	PBW	Competition for tree hollows
Mitchell's Hopping Mouse	E-WDM, S-SM, D-SM, D-CTH, MH, BM	Altered fire regimes, introduced predators
Silky Mouse	D-CTH, SH, MH, BM, HW	Altered fire regimes, introduced predators
Birds		
Malleefowl #	S-SM, D-SM, R-SM	Altered fire regimes, introduced predators
Regent Parrot	E-WDM, CM, S-SM, D-SM, MH, SM, SS, BBW, RRGF	Competition for nest hollows, clearance of mallee on freehold land, introduced predators, altered hydrological regimes, destruction as pest species, road kills
Freckled Duck #	*RA**	Hunting, altered hydrological regimes, salinity
Red-lored Whistler	*D-SC**, *D-BD**, BM	Altered fire regimes, small population size
Western Whipbird #	*D-USR**,	Altered fire regimes
Mallee Emu-wren	E-WDM, D-SM	Altered fire regimes, small population size
Slender-billed Thornbill	SH	Altered fire regimes
Black-eared Miner #	*D-SC**	Altered fire regimes, hybridisation, small population size
White-browed Treecreeper	PBW, BW	Lack of habitat regeneration
Striated Grasswren	E-WDM, MH,	Altered fire regimes
Australian Bustard #	SH	Introduced predators, hunting
Redthroat	*RA**, MH, R-SM	Altered fire regimes, small population size
White-bellied Sea-Eagle #	A-RS, RRGF	Bird poaching (eggs)
Spotted Bowerbird	*RA**	Habitat degradation, lack of habitat regeneration, introduced predators, destruction as pest species
Pink Cockatoo	E-WDM, CM, S-SM, D-SM, MH, PBW, BW, GPG	Habitat degradation, lack of habitat regeneration, bird poaching
Bush Thick-knee	*RA**	Introduced predators, overgrazing (rabbits, kangaroos, stock)
Ground Cuckoo-shrike	*RA**	Overgrazing (stock, rabbits, kangaroos)
Grey Falcon #	CM, A-RS, *RA**	Bird poaching (eggs)
Square-tailed Kite	*RA**, *D-SC**, *D-BD***D-USR**, *LR**	Lack of habitat regeneration, bird poaching

Appendix III (cont.)

SPECIES	HOST COMMUNITY	PERCEIVED THREATS
Fish		
Agassiz's Charda Perch	rivers/lakes	Altered hydrological regimes, salinity
Murray Cod	rivers/lakes	Altered hydrological regimes, salinity
Reptiles and amphibians		
Aprasia aurita #	MH, BM	Altered fire regimes
Ctenotus brachyonyx	E-WDM, S-SM, D-SM, MH, R-SM	Altered fire regimes
Hemiergis millewae	D-SM,	Altered fire regimes
Long-thumbed Frog	RRGF	Salinity, altered hydrological regimes
Broad-shelled Tortoise	rivers/lakes	Introduced predators (eggs), salinity, altered hydrological regimes
Tessellated Gecko	A-PS, A-RS, BB-CW, BBW	Altered hydrological regimes, overgrazing (rabbits, stock)
Tympanocryptis lineata lineata #	MH, SG, GPG	Overgrazing (stock)
Varanus rosenbergi	MH, BM,	Introduced predators, accidental or secondary poisoning
Tree Goanna	BB-CW, BBW, RRGF	Introduced predators, accidental or secondary poisoning, loss of tree hollows
Ctenotus brooksi iridis	E-WDM, S-SM, D-SM, D-CTH, SH, MH, BM,	Altered fire regimes
Egernia multiscutata	*D-BD**	Altered fire regimes, recreational activities
Carpet Python #	RA*	Collection, habitat degradation, indiscriminate killing by humans
Morethia adelaidensis	SS	Overgrazing (rabbits)
Yellow-faced Whip Snake	D-SM, *D-USR**	Altered fire regimes
Bardick	*D-SC**, MH, BM,	Altered fire regimes
Red-naped Snake	*RA**	Overgrazing (stock, rabbits)
Curl Snake	A-RS	Overgrazing (rabbits)
Western Blue-tongued Lizard	E-WDM, S-SM, D-SM, MH, BM, R-SM	Altered fire regimes
Eastern Water Skink	RRGF	Altered hydrological regimes, salinity
Unechis spectabilis	MH, BM, PBW	Unknown
Bandy Bandy	CM	Altered fire regimes
Invertebrates †		
Antipodia atralba atralba.	*D-SC**	Large frequent fires
Candalides cyprotus cyprotus	MH, D-CTH, *D-BD**	Large frequent fires, altered fire regimes
Candalides hyacinthinus simplex	*D-SC**, *D-BD**	Large frequent fires
Hypochrysops ignitus ignitus	SH	Large frequent fires
Ogyris genoveva araxes	BM	Large frequent fires, earthworks (firebreak construction)
Ogyris idmo halmturia	MH, SH	Large frequent fires
Ogyris otanes	MH	Large frequent fires
Motasingha trimaculata trimaculata	MH, D-CTH, SH	Large frequent fires

Appendix III (cont.)

SPECIES	HOST COMMUNITY	PERCEIVED THREATS
Synemon jcaria	*D-BD**	Large frequent fires
Synemon nais	G	Overgrazing (rabbits), earthworks, habitat degradation
Theclinesthes albocincta	*D-BD**	Large frequent fires, overgrazing (rabbits)
Themognatha congener	*D-BD**	Large frequent fires
Themognatha pascoei	PBW	Large frequent fires, earthworks (firebreak construction), overgrazing (rabbits)
Trapezites sciron eremicola	MH, D-CTH, *D-BD**	Large frequent fires

Source: Mammals: Bennett, Lumsden & Menkhorst (1992); birds: Baker-Gabb et al. (1992). Knowledge of invertebrates is limited. This list consists mainly of species from the Order Lepidoptera and is based on Douglas (1993) and Yen (1992).

Listed under the *Flora and Fauna Guarantee Act 1988*.

*D-BD** Dunefield - Big Desert
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- MH Mallee Heath

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- S-SM Shallow - Sand Mallee
- D-SM Deep - Sand Mallee

*D-USR** Dunefield - Underlying Sandstone Ridge
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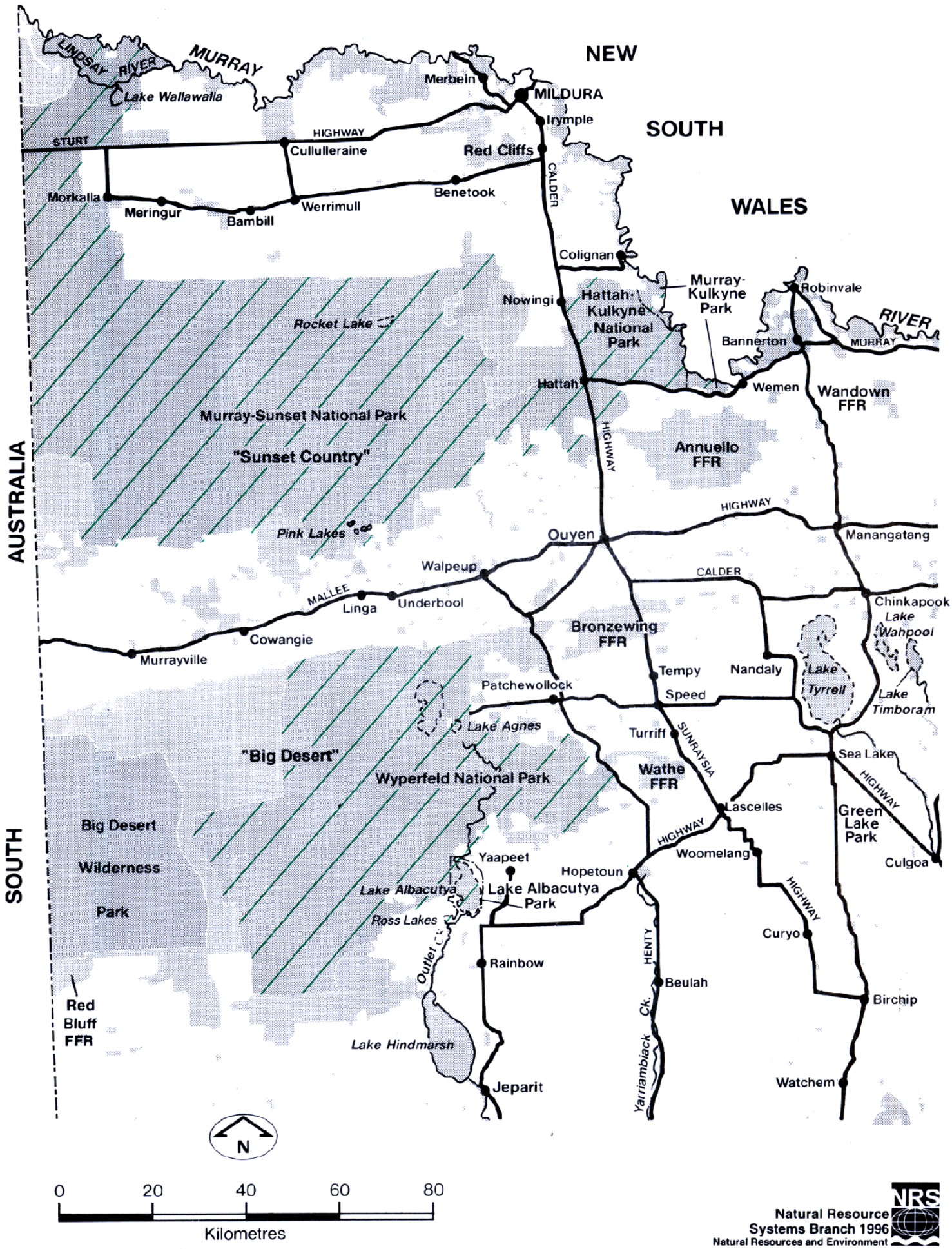
- G Grassland

*RA** Riverine and Alluvial Terraces
- A-PS Alluvial - Plain Shrubland
- A-RS Alluvial - Rise Shrubland
- BB-CW Black Box - Chenopod Woodland
- BBW Black Box Woodland
- RRGF River Red Gum Forest

Fig. 1 Planning Area



VICTORIAN MALLEE PARKS : NORTH WEST AREA

MANAGEMENT ZONES AND VISITOR OPPORTUNITIES

FIG. 2

SEALED UNSEALED

HIGHWAY
MAJOR ROAD
MINOR ROAD
4WD TRACK
ROUTE MARKER
HISTORIC ROUTE (No Through Route)

0 5 10 20 30
KILOMETRES
G/2159

ABBREVIATIONS USED
FFR FLORA & FAUNA RESERVE
FR FLORA RESERVE
BR BUSHLAND RESERVE
RA REFERENCE AREA

EVAPORATIVE BASIN
LAKE (MAINLY DRY)
LAKE (PERIODICALLY DRY)
LAKE

Zone boundaries shown on this map are indicative only.

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ZONES
WILDERNESS
REFERENCE
CONSERVATION AND RECREATION
RECREATION DEVELOPMENT
EDUCATION

OVERLAYS
SPECIAL PROTECTION
REMOTE & NATURAL

WILDERNESS PARK
OTHER PUBLIC LAND
SOUTH AUSTRALIAN CONSERVATION PARK
TOILETS *
CAMPING *
PICNIC AREA
DRINKING WATER
LOOKOUT
NATURE WALK
FAMILY WALKS
NATURE DRIVE
BOAT RAMP
ACCOMMODATION
INFORMATION
TOILETS (PROPOSED)
ACCOMMODATION (PROPOSED)
INFORMATION (PROPOSED)
* (no water unless indicated)

Fig. 3 Lower Wimmera River & Outlet Creek System

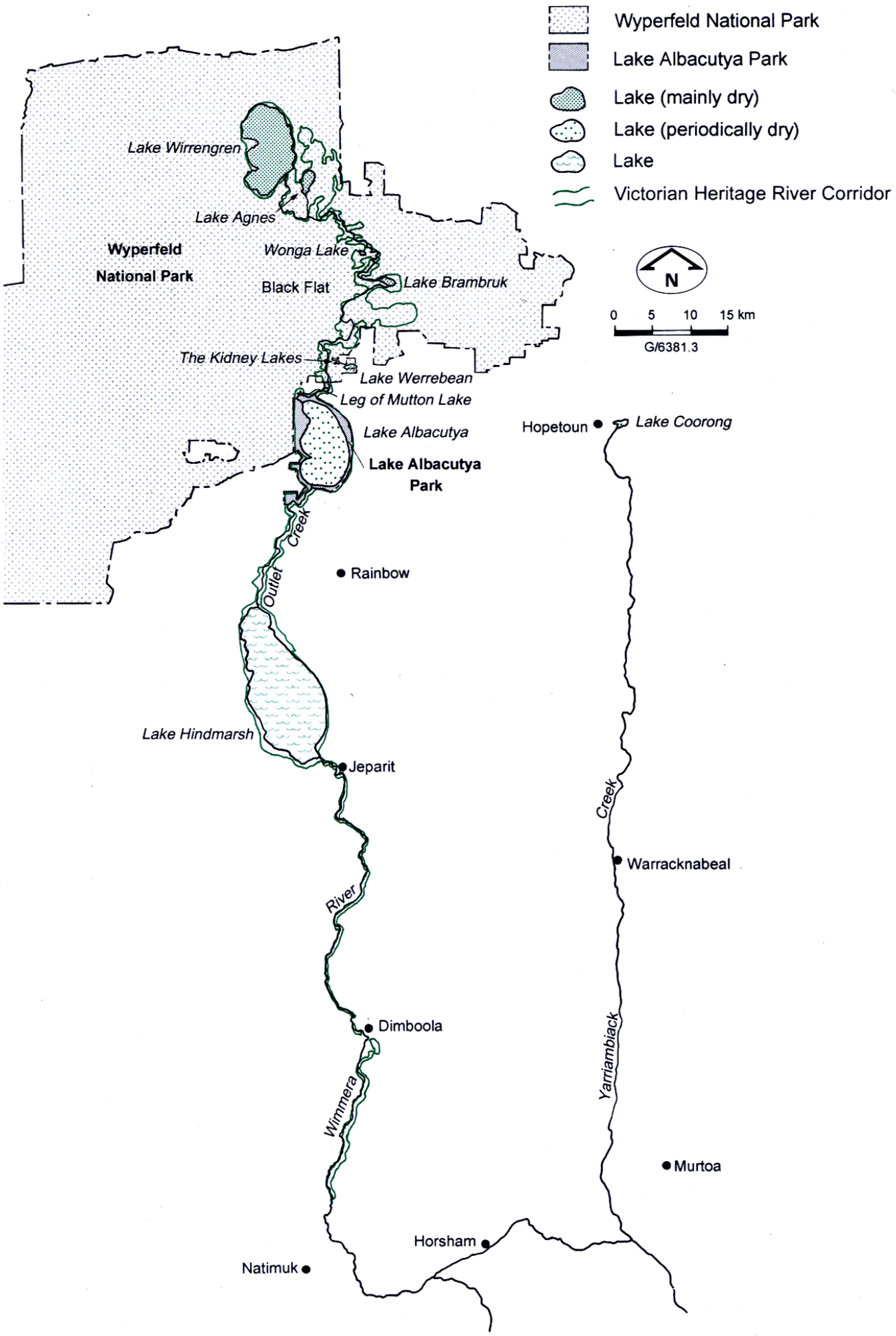

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Fig. 4 Hattah Lakes System

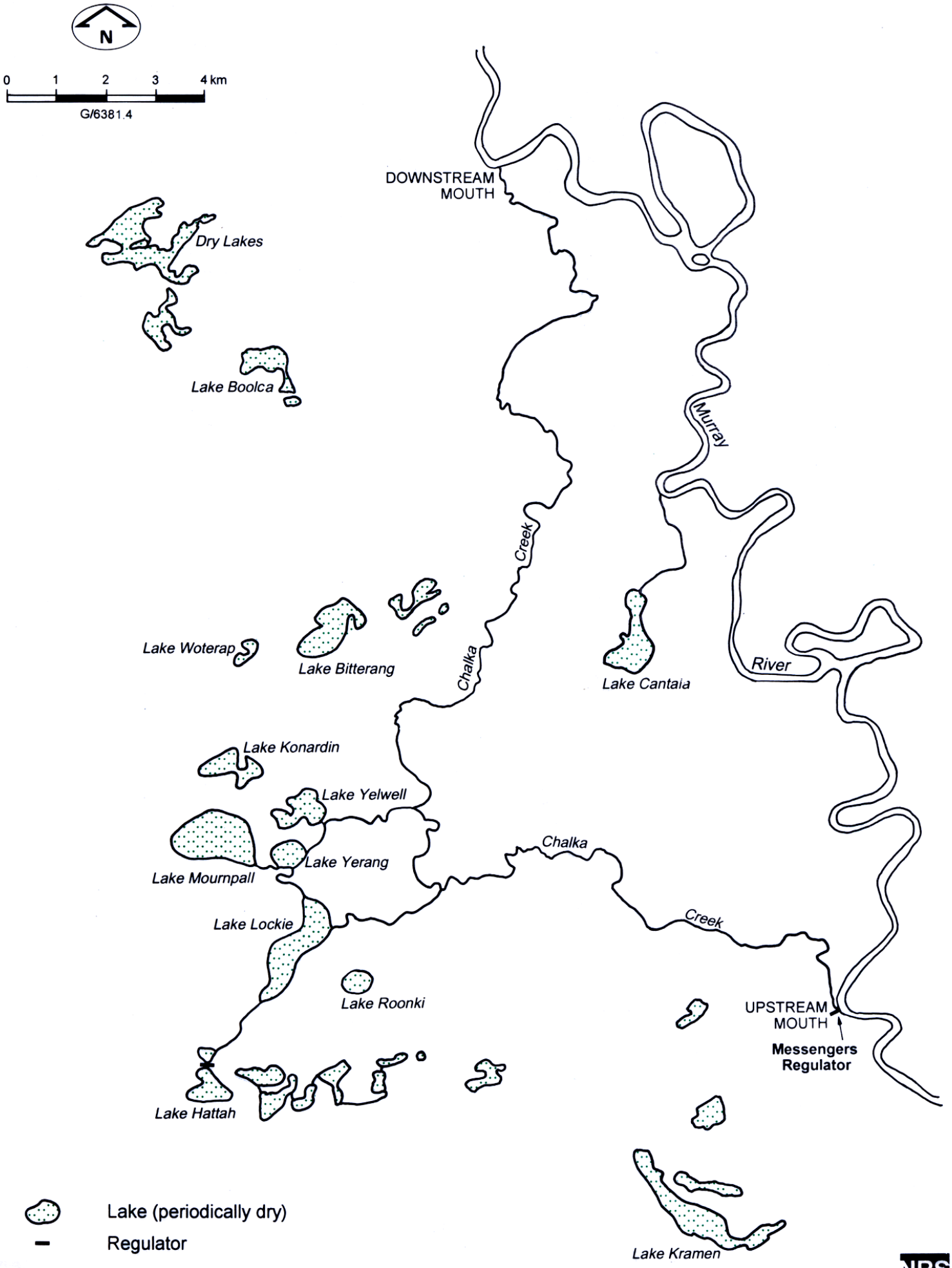
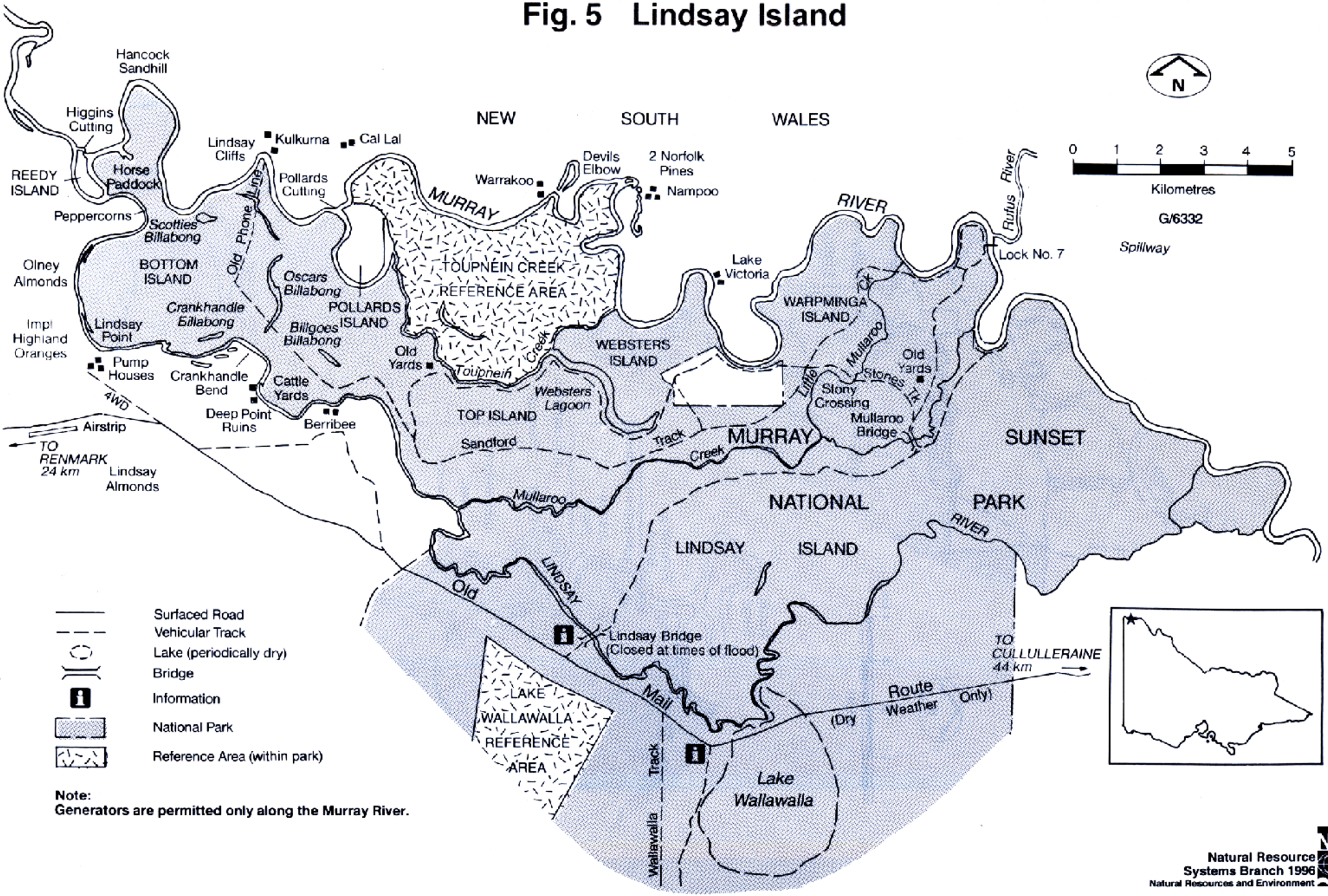


Fig. 5 Lindsay Island



Note:
Generators are permitted only along the Murray River.

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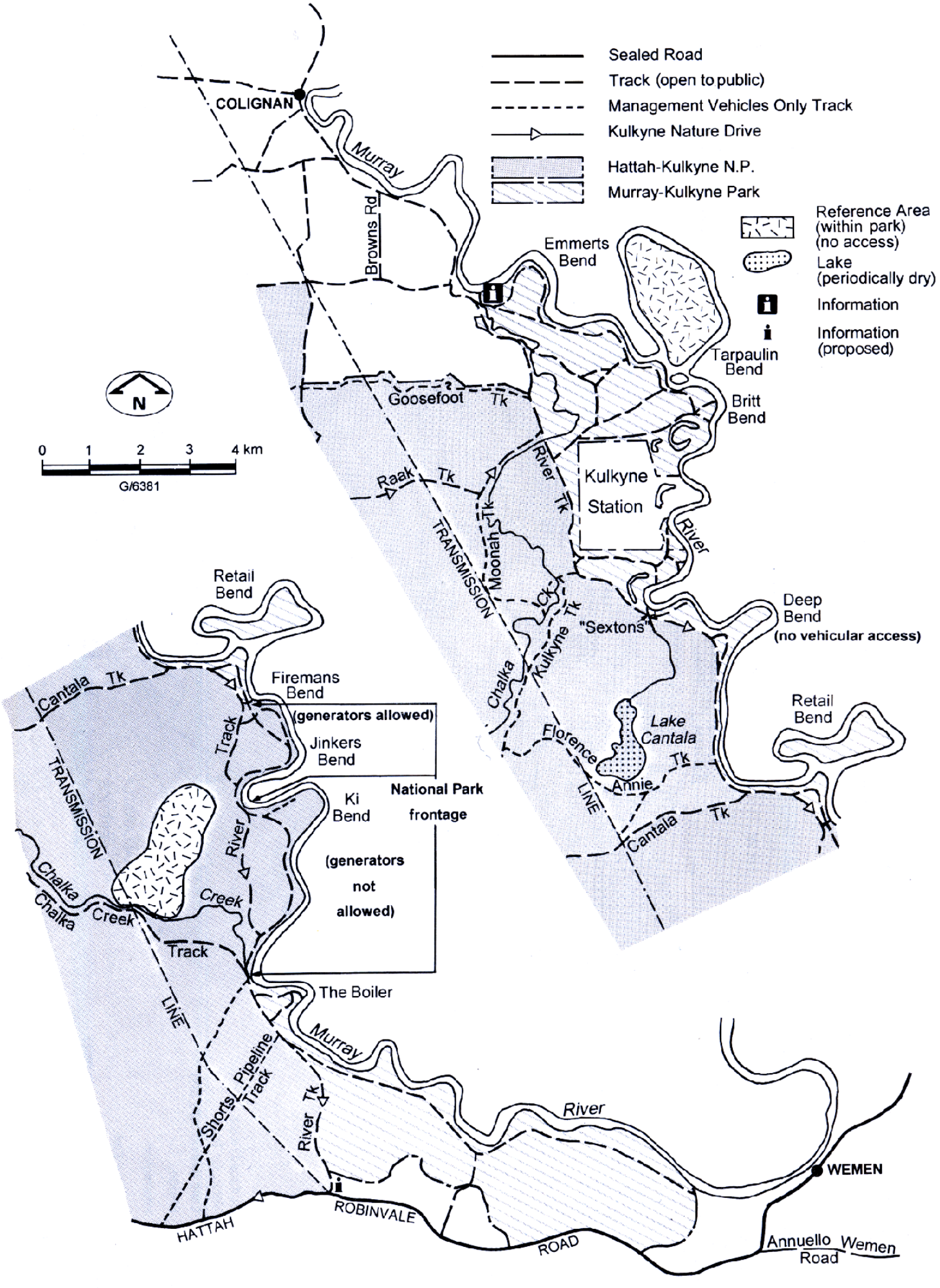
Fig. 6 Murray-Kulkyne Park



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