



Plan of Management



Paroo-Darling National Park and State Conservation Area

**PAROO-DARLING NATIONAL PARK
AND STATE CONSERVATION AREA
PLAN OF MANAGEMENT**

NSW National Parks and Wildlife Service

April 2012

This plan of management was adopted by the Minister for the Environment on 17th April 2012.

Acknowledgments

This plan of management is based on a draft plan prepared by the staff of the Far West Region of the NSW National Parks and Wildlife Service (NPWS), part of the Office of Environment and Heritage, Department of Premier and Cabinet.

Valuable information and comments were provided by the Paroo-Darling National Park Plan of Management Working Group, comprising Diana Hoffman, Dick Kelly, Joanne Pedler, Virginia Angell, Marie Russell and Bill O'Brien; the Far West Region Advisory Committee; and members of the Paakantyi and Ngijeempaa Aboriginal communities.

The NPWS acknowledges that these lands are in the traditional country of the Paakantyi people.

FRONT COVER: Peery Lake and the mound springs, by Alison Ramsay, NPWS.

For additional information or any inquiries about this park or this plan of management contact the NPWS Broken Hill Area Manager, PO BOX 788, Broken Hill, NSW 2880, or by telephone on (08) 8080 3200; or the Paroo Darling National Park Visitor Centre, Keraro Road, White Cliffs, or by telephone on (08) 8083 7900.

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FOREWORD

Paroo-Darling National Park and State Conservation Area are located in far western New South Wales, near the towns of Wilcannia and White Cliffs. They cover a combined area of 219,574 hectares.

Paroo-Darling National Park contains the wetlands of the Paroo River overflow, including semi-permanent freshwater lakes, which are listed as Ramsar Wetlands under the Convention on Wetlands of International Importance. These wetlands support an abundant and diverse waterbird community. They also contain artesian mound springs. These are a highly restricted landform in Australia and listed as an endangered ecological community. They form the largest active spring complex in NSW, are the only known springs in NSW that are on a lakebed, and are the only examples protected within the NSW reserve system. A number of other threatened plant species and communities are also present in the park and state conservation area, as well as a range of threatened animal species.

Paroo-Darling National Park and State Conservation Area contain examples of the area's pastoral history, such as homesteads and shearing sheds, and of its long history of use by Aboriginal people. Sites of cultural importance to the local Aboriginal communities include rock engraving and painting sites, and many of the features of the park which are included in creation stories. The park is managed co-operatively with the Paroo-Darling National Park Elders Council which comprises representatives of both the Paakantyi and the Ngiyeempaa people.

The New South Wales *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each national park and state conservation area. A draft plan of management for Paroo-Darling National Park and State Conservation Area was placed on public exhibition from 6 February to 11 May 2009. The submissions received were carefully considered before adopting this plan.

The plan contains a number of actions to achieve the NSW 2021 goal to protect our natural environment, including updating of the fire management strategies covering the park, undertaking pest control programs, undertaking trials to investigate impacts of grazing animals on the mound springs, and developing a ground tank management plan. It also contains actions to enhance recreation opportunities, including development of an interpretation plan for the park, providing interpretive and directional signs at key locations, extension of the existing campground to provide additional sites, and investigation of a new campground in the north of the park.

This plan of management establishes the scheme of operations for Paroo-Darling National Park and State Conservation Area. In accordance with section 73B of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.



Robyn Parker MP
Minister for the Environment

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1. MANAGEMENT CONTEXT

1.1 LEGISLATIVE AND POLICY FRAMEWORK

The management of national parks in NSW is in the context of a legislative and policy framework, primarily the *National Parks and Wildlife Act 1974* (NPW Act), the National Parks and Wildlife Regulation, the *Threatened Species Conservation Act 1995* (TSC Act) and the policies of the National Parks and Wildlife Service (NPWS). Section 72AA of the NPW Act lists the matters to be considered in the preparation of a plan of management. The policies arise from the legislative background and internationally accepted principles of park management. They relate to nature conservation, Aboriginal and historic heritage conservation, recreation, commercial use, research and communication.

Other legislation, international agreements and charters also apply to management of the area. In particular:

- the *Environmental Planning and Assessment Act 1979* (EPA Act) requires the assessment and mitigation of the environmental impacts of any works proposed in this plan;
- the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires that actions that may impact on matters of national significance listed under the Act or International treaties to which Australia is a signatory are assessed and mitigated;
- the Ramsar Convention on Wetlands of International Importance provides guidelines for management planning for Ramsar sites and other wetlands. The principal expectation is that listed sites will be managed to protect the ecological character for which they are recognised.

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted a plan, no operations may be undertaken within Paroo-Darling National Park or State Conservation Area except in accordance with the plan. This plan will also apply to any future additions to Paroo-Darling National Park and Paroo-Darling State Conservation Area. Where management strategies or works are proposed for the national park, state conservation area or any additions that are not consistent with this plan, an amendment to the plan will be required.

Delegate plans for Paroo-Darling National Park and State Conservation Area will include (but are not limited to):

- fire management strategies
- interpretation plan
- heritage actions statements
- facility development plans
- pest management plan
- ground tank management plan

Delegate plans must comply with the provisions of this plan.

1.2 MANAGEMENT PURPOSES AND PRINCIPLES

National Parks

National parks are reserved under the NPW Act to protect and conserve areas containing outstanding or representative ecosystems, natural or cultural features or landscapes or phenomena that provide opportunities for public appreciation and inspiration and sustainable visitor use.

Under the Act, national parks are managed to:

- conserve biodiversity, maintain ecosystem functions, protect geological and geomorphological features and natural phenomena and maintain natural landscapes;
- conserve places, objects, features and landscapes of cultural value;
- protect the ecological integrity of one or more ecosystems for present and future generations;
- promote public appreciation and understanding of the park's natural and cultural values;
- provide for sustainable visitor use and enjoyment that is compatible with conservation of natural and cultural values;
- provide for sustainable use (including adaptive reuse) of any buildings or structures or modified natural areas having regard to conservation of natural and cultural values; and
- provide for appropriate research and monitoring.

State Conservation Areas

State conservation areas are reserved under the NPW Act to protect and conserve areas that contain significant or representative ecosystems, landforms or natural phenomena or places of cultural significance; that are capable of providing opportunities for sustainable visitor use and enjoyment, the sustainable use of buildings and structures or research; and that are capable of providing opportunities for uses permitted under other provisions of the Act.

Under the Act, state conservation areas (SCAs) are managed to:

- conserve biodiversity, maintain ecosystem functions, protect natural phenomena and maintain natural landscapes;
- conserve places, objects and features of cultural value;
- provide for the undertaking of uses permitted under other provisions of the NPW Act (including uses permitted under section 47J such as mineral exploration and mining), having regard to the conservation of the natural and cultural values of the state conservation area;
- provide for sustainable visitor use and enjoyment that is compatible with conservation of the area's natural and cultural values and with uses permitted in the area;
- provide for sustainable use (including adaptive reuse) of any buildings or structures or modified natural areas having regard to conservation of the area's natural and cultural values and with other uses permitted in the area; and
- provide for appropriate research and monitoring.

The NPW Act also requires review of the classification of SCAs every 5 years to determine whether they should receive either a national park or nature reserve classification. The classification review for SCAs is described in section 47M of the NPW Act and is undertaken in consultation with the Minister administering the *Mining Act 1992*. It is proposed that this will eventually result in Paroo-Darling State Conservation Area becoming part of Paroo-Darling National Park.

Ramsar wetlands

Part of Paroo-Darling National Park (including Peery and Poloko Lakes) (refer Figure 2) along with Nocolche Nature Reserve has been listed as the Paroo River Wetlands Ramsar site under the Convention on Wetlands of International Importance (the Ramsar Convention). The Ramsar Convention was adopted in 1971 and signed by Australia in 1974. Countries which are parties to this convention undertake to implement policies that guarantee the wise and sustainable use of wetlands.

The Ramsar Convention defines wise use as ‘utilisation for the benefit of humans in a way compatible with the maintenance of natural properties of the ecosystem’ whilst sustainable use is that which ‘yields greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations’.

The Convention also outlines the following management requirements for an internationally important wetland:

- that the essential character of the wetland be recognised and that measures (notably inclusion of wetland concerns in land use and water management planning, adoption of a whole catchment approach and/or creation of buffer zones) be taken to ensure that the ecological character of Ramsar sites and wetland reserves is not placed at risk; and
- in order to maintain their biological diversity and productivity and to allow the wise use of their resources by human beings, some overall agreement (such as a management plan) is prepared between the various owners, occupiers and interested parties in the wetland.

Schedule 6 of the Commonwealth *Environment Protection and Biodiversity Conservation Regulations 2000* prescribes the requirements for managing wetlands of international importance within Australia, which include:

- describing and maintaining the ecological character of the wetland;
- implementing a planning process that promotes conservation of the wetland and wise and sustainable use;
- providing for public consultation regarding decisions and actions that may impact upon the wetland;
- making special provisions for the involvement of people who have a particular interest in the wetland or may be affected by the management of the wetland
- preparing a management plan for the wetland; and
- making provision for the assessment of any action that may impact upon the wetland, including the assessment process, approvals process, monitoring and compliance.

The Paroo River Wetlands were designated a Ramsar site because they meet Ramsar criterion 1, 2, 3, 4, 5, and 7, these being:

- Criterion 1: Representative, rare or unique wetland types;
- Criterion 2: Threatened species and threatened ecological communities
- Criterion 3: Supports high level of biodiversity
- Criterion 4: Supports plant and/or animal species at a critical stage in the their life cycles, or provides refuge during adverse conditions
- Criterion 5: Regularly supports 20,000 or more birds
- Criterion 7: Supports a significant proportion of indigenous fish species, species or families, history stages, species interactions and/ or populations that are representative of wetlands benefits and/or values and thereby contribute to global biological diversity.

An ecological character description for the Paroo River Wetlands Ramsar site was prepared by Richard Kingsford and Enhua Lee (Kingsford & Lee, 2007).

The management requirements for the Paroo River Wetlands Ramsar site are provided for within this plan.

FIGURE 1: MAP OF PAROO-DARLING NATIONAL PARK AND STATE CONSERVATION AREA

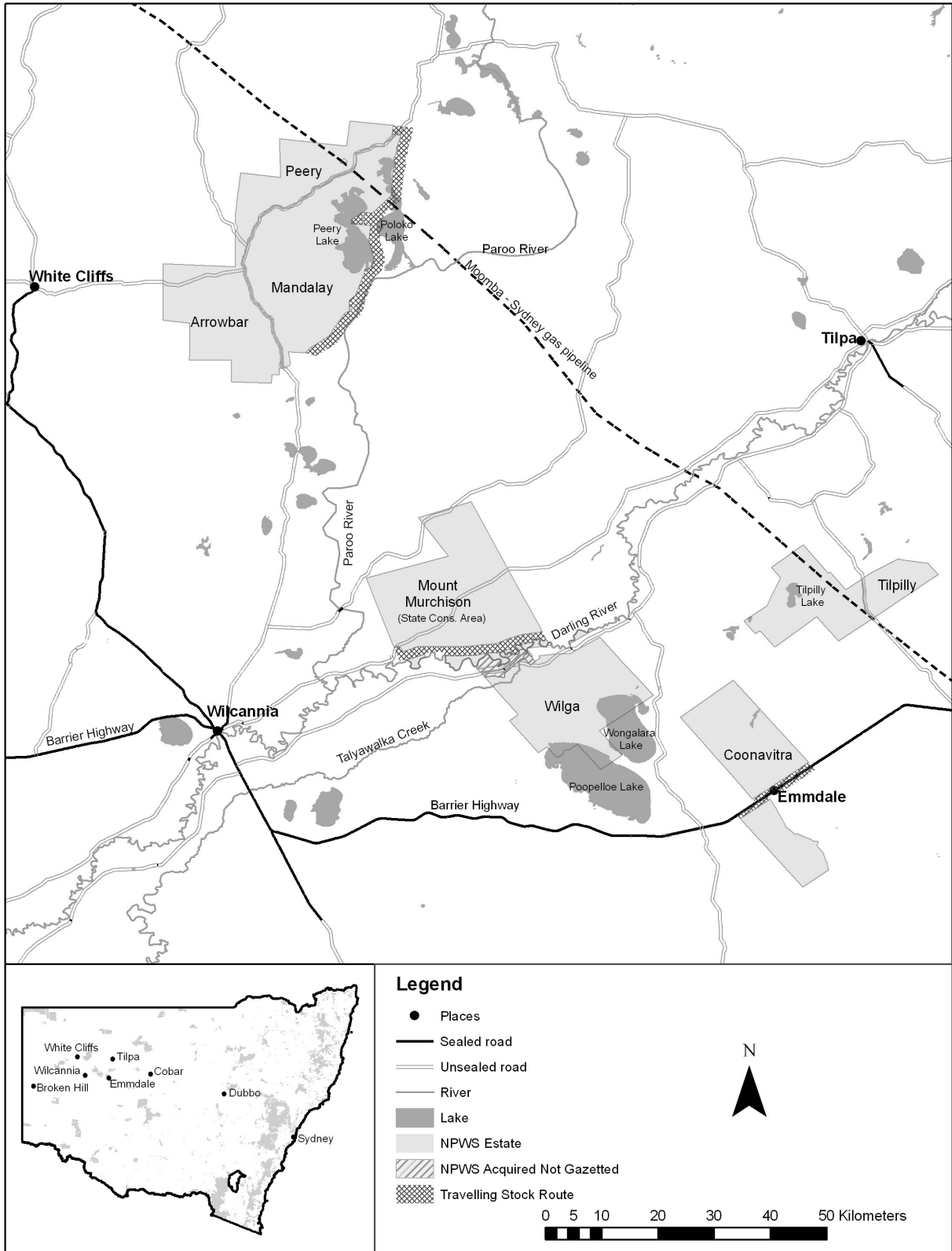
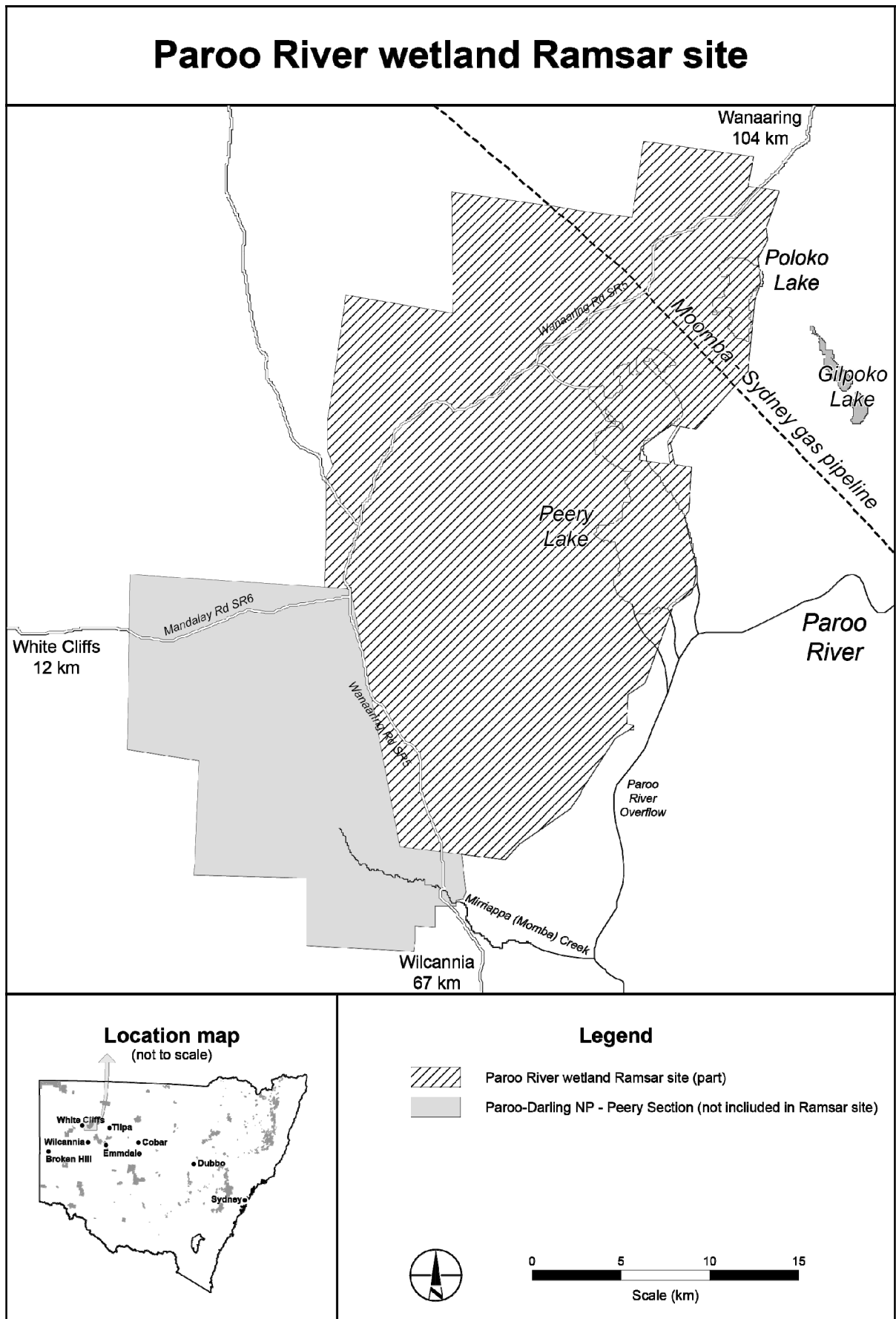


FIGURE 2: MAP OF PAROO RIVER WETLAND RAMSAR SITE



2. THE PLANNING AREA

2.1 LOCATION, GAZETTAL AND REGIONAL SETTING

Paroo-Darling National Park and State Conservation Area (collectively referred to as 'the park' in this plan) are located in far western New South Wales, near the towns of Wilcannia and White Cliffs (see Figure 1). The park comprises seven former pastoral properties, totalling 219,574 hectares. There are four separate sections of the park:

- the Paroo River Overflow section (comprising the former properties of Peery, Arrowbar and Mandalay), situated 30 kilometres east of White Cliffs and 80 kilometres north of Wilcannia;
- the Darling River section (comprising the former properties of Mount Murchison and Wilga), situated either side of the Darling River 40 kilometres north east of Wilcannia;
- the former Coonavitra property, located approximately 110 kilometres east of Wilcannia; and
- the former Tilpilly property, located approximately 130 kilometres east of Wilcannia.

The former Peery property (41,680 hectares) was the first to be acquired, and was gazetted as Peery National Park on 31 March 2000. Following further property acquisitions, the park was re-gazetted as Paroo-Darling National Park on 25 October 2002.

The former Mount Murchison property (41,521 hectares) was gazetted as Paroo-Darling State Conservation Area on 25 October 2002. It was reserved under the National Parks and Wildlife Act as a SCA due to its geological and potential mineral values. The area is underlain by surficial sediments of Cainozoic age overlying sediments of the Murray Basin Sequence, which in turn overlie a thick sequence of sedimentary rocks that were deposited within the Darling Basin in a geological structure called the Pondie Range Trough. Traces of oil have been found at the surface within rocks of the adjacent Koonenbery Belt to the west (DECC, 2008).

All properties were offered for sale to NPWS, and an assessment of their natural and cultural values was undertaken prior to purchase.

The main land use of adjoining lands is pastoralism. All adjoining properties are leases in perpetuity under the *Western Lands Act 1901*.

Paroo-Darling National Park/SCA is one of three reserves on the Paroo River system. The others are Currawinya National Park in south-western Queensland and Nocolche Nature Reserve on the Paroo River south of Wanaaring. There is increasing evidence that these wetland reserves, particularly Currawinya Lakes, are boosting local business as tourist numbers increase (Kingsford & Halse 1998). Currawinya lakes within Currawinya National Park (150,000 hectares) in Queensland and Nocolche wetlands are listed as Ramsar sites in recognition of their international importance. These three reserves cover a small part of the Paroo River floodplain which, together with the Warrego covered 686,000 hectares during the 1990 flood (Kingsford & Porter 1999). Wetlands within the park also depend on floods that originate in the Warrego River system and pass into Cuttaburra Creek that flows

into the Paroo (Kingsford & Porter 1999). Many different types of wetlands exist in the reserve (overflow lakes, floodplain, river channels, claypans) and on the Paroo and Warrego River systems (Kingsford & Porter 1999).

The Paroo River and to a lesser degree the Warrego are not yet affected by river regulation and diversions (Kingsford 1999), making the Paroo River the last major free-flowing river in the Murray-Darling Basin (Kingsford 1999). Both rivers have extremely high conservation value. Other protected areas that contain important wetlands in western NSW include Macquarie Marshes Nature Reserve, Narran Lake Nature Reserve, Sturt National Park, Culgoa National Park and Kinchega National Park. Of these, only the Paroo River and wetlands in Sturt National Park have not been affected by water resource development. The continued protection of the Paroo and Warrego Rivers as the only major unregulated watercourses in the whole Murray-Darling Basin is essential for the conservation of wetlands of arid NSW and the plants and animals which depend upon them.

The park lies within the traditional lands of the Paakantyi¹ people of the Paroo and Darling Rivers. The former Coonavitra and Tilpilly properties lie within an area that was also used by the Ngiyeempaa² people.

The park is wholly located within the Wilcannia Local Aboriginal Land Council boundary.

Paroo-Darling National Park is predominantly located within the Central Darling Shire, with the exception of the former Tilpilly property, which is located in the Cobar Shire.

2.2 LANDSCAPE CONTEXT

The local climate is classified as hot desert (Stern et al. 2003). Desert climates in this system are those where evaporation exceeds precipitation (determined from the mean annual temperature and the mean annual rainfall). Variability of rainfall in the Australian arid zone is higher than world averages for similar climates (Williams 1979; Smith 1998). Occasional heavy rainfall events occur at unpredictable intervals, and play a major role in the patterning of physical and biotic environments (Stafford-Smith & Morton 1990). Mean annual evaporation rates are high (2,400-2,800 mm), greatly reducing water available as runoff. Annual average surface runoff in the Paroo-Warrego drainage division is extremely low compared to annual average rainfall (Smith 1998).

Other longer-term climate fluctuations may also occur, the best recognised being from global warming and the greenhouse effect that have resulted in rising temperatures over past decades (Dixon et al. 1996; Chambers et al. 2005). Global

¹ Aboriginal languages were not written, so the spelling of Aboriginal words is often a phonetic interpretation made by non-Aboriginal people. Paakantyi is the preferred spelling within the Paroo-Darling area. Alternative spellings include Paakantji, Baakantji, Barkandji, Barkindji and Bagandji.

² Similarly, Ngiyeempaa is the preferred spelling within the Paroo-Darling area. Alternative spellings include Ngiyampaa, Nyiampaa and Ngemba.

climate change is likely to impact most inland aquatic ecosystems because of its potential to alter rainfall patterns and river flows (see section 5.3).

Wetlands in the Park may fill from river flooding or local rain or both. Highly erratic inter-annual flooding patterns are directly related to the variability of rainfall. Flooding is more common in the summer months, reflecting the incidence of heavy rainfall from northern monsoon influences and el Nino–southern oscillation events. Shallow wetlands (<2 metres) seldom hold water for more than a year but deeper (>2 metres) wetlands (e.g. Peery Lake) may persist for several years. Severe dry periods occurred throughout the area in 1972, 1982, 1994 and 2002 while floods took place in 1974, 1976, 1984, 1990, 1997, 2000 (Nicholls 2004; Bureau of Meteorology 2004).

Natural and cultural heritage and on-going use are strongly inter-related and together form the landscape of an area. Much of the Australian environment has been influenced by past Aboriginal and non-Aboriginal land use practices, and modern day activities continue to influence the environment through recreational use, cultural practices, the presence of introduced plants and animals and in some cases air and water pollution.

The geology, landform, climate and plant and animal communities of the reserve, plus its location, have determined how it has been used by humans. The park is located in an arid environment, which has shaped the patterns of Aboriginal subsistence and land use practices in the past, and the pastoral industry that followed.

Pastoralism has been the predominant land use in the area for the past 170 years. This resulted in a major shift in the Aboriginal economy, involving employment and the development of skills relating to the pastoral industry. In 1966, the Commonwealth Conciliation and Arbitration Commission granted equal wages to Aboriginal workers in the pastoral industry. In some areas this resulted in Aboriginal employment being phased out, and the subsequent movement of Aboriginal workers from pastoral properties to regional towns.

Some traditional Paakantyi land use economy is still practiced within the region in the form of acquiring 'bush foods' (Bates and Martin 2000).

Both Aboriginal and non-Aboriginal people place cultural values on natural areas, including aesthetic, social, spiritual, recreational and other values. Cultural values may be attached to the landscape as a whole or to individual components, for example to places used by Aboriginal and/or non-Aboriginal people. This plan of management aims to guide conservation of both natural and cultural values. For clarity natural and cultural heritage, non-human threats and on-going use are dealt with individually, but their inter-relationships are recognised.

3. VALUES AND MANAGEMENT DIRECTIONS

3.1 VALUES OF THE AREA

Paroo-Darling National Park protects areas of outstanding international and national significance for its landscape, biodiversity and cultural heritage values. The area is of state and regional significance for its socio-economic and recreational values.

Paroo-Darling National Park contains extensive wetlands of the Paroo River Overflow (including Peery and Poloko Lakes) and the Darling River floodplains (including numerous billabongs and the top of the Talyawalka Creek system). The Paroo River is the last major unregulated river system within the Murray-Darling Basin.

The Paroo River flows from a catchment that extends to the north into Queensland before moving through a complex system of channels, overflow swamps and basins to the terminal lakes of the Paroo overflow. The Paroo reaches the Darling River near Wilcannia only in extreme floods (Maher 1991). Minor floods in the Paroo occur several times a year, with moderate floods every 2-3 years and major floods about every 5 years (Maher 1991, Kingsford *et al.* 1994). Median annual flow in the Paroo River at Caiwarro from 1968 to 1998 was 412,379 megalitres; zero monthly flows occurred in 24% of months.

The Darling River itself flows between the Mount Murchison and Wilga sections of the park.

The key values of Paroo-Darling National Park are summarised below.

Natural values

- the Paroo River Overflow wetlands are nationally (DEH 2003) and internationally significant and listed as Ramsar Wetlands under the Convention on Wetlands of International Importance;
- large terminal wetlands of the last free flowing river in the Murray-Darling Basin, including semi-permanent freshwater lakes;
- support an abundant and diverse waterbirds community (up to 39,500 birds and 42 species);
- the Darling River and floodplains, the second-largest river system in NSW;
- the artesian mound springs at Peery Lake, which are a highly restricted landform in Australia. These springs are natural discharge points from the Great Artesian Basin and are characterised by mounds of mud and evaporite deposits (mineral sediments resulting from evaporation). They have significant conservation value because they form the largest active spring complex in NSW and are the only known springs in NSW that are on a lakebed;
- the mound springs support a unique ecosystem, described as 'the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin' which is listed as an endangered ecological community under the Environment Protection and Biodiversity Conservation Act;
- the Artesian Springs Ecological Community is also listed as an endangered ecological community under the Threatened Species Conservation Act;
- the nelia (*Acacia loderi*) woodland, which is an endangered ecological community under the Threatened Species Conservation Act;

- endangered species under the Threatened Species Conservation Act, including the salt pipewort (*Eriocaulon carsonii*), Australian bustard (*Ardeotis australis*) and fat-tailed diplodactylus or gecko (*Diplodactylus conspicillatus*);
- vulnerable species under the Threatened Species Conservation Act, including the pink cockatoo (*Cacatua leadbeateri*), red-tailed black-cockatoo (*Calyptorhynchus banksii*), brolga (*Grus rubicundus*), freckled duck (*Stictonetta naevosa*) and slender Darling pea (*Swainsona murrayana*);
- the Aquatic Ecological Community in the natural drainage system of the lowland catchment of the Darling River is listed as endangered in the NSW *Fisheries Management Act 1994*.

Landscape values

- the Paroo River Overflow, including Peery and Poloko Lakes and the associated artesian mound springs;
- the Darling River;
- rugged gorges and low escarpments of the Peery Hills;
- the “wide open spaces” of the gibber plains and Darling River floodplain.

Aboriginal cultural heritage values

- continuous Aboriginal occupation, from at least 8,000 years before present (note: this date is based on the limited research undertaken to date, the true period of occupation is likely to be much greater);
- sites of cultural importance, including rock engraving and painting sites;
- other evidence of traditional Aboriginal culture, including stone tools and other artefacts;
- creation stories, including the formation of the Darling River, Peery Lake and the mound springs;
- contemporary involvement of Aboriginal communities in park management, including cooperative management arrangements and the Paroo River Ramsar Working Group.

Historic heritage values

- examples of pastoral heritage, including homesteads, shearing sheds, shearers quarters, tanks, bores and other infrastructure;
- cultural plantings, including an orchard adjacent to the Wilga homestead which supplied food for the property and to the Wilcannia community;
- documentary and photographic evidence of settlement and pastoralism, including the riverboat trade along the Darling River;
- strong links from the pioneering pastoral era to some of the present day lessees of neighbouring properties;
- contemporary involvement of neighbours and community members in park management, including the Far West Region Advisory Committee and Paroo-Darling National Park Plan of Management Working Group.

Recreation and tourism opportunities

- park visitors can experience the wide diversity of semi-arid landscapes and ecosystems conserved within the park;
- visitors can experience the solitude and tranquillity of the “wide open spaces”;
- a bush campground is located on the banks of the Darling River at Wilga;
- further recreational facilities are planned, including a day use area at Peery Lake, walking tracks, and a bush campground in the north of the park;
- nature-based tourism opportunities for commercial operators;
- links to local government and existing tourism organisations, including the White Cliffs Opal Fields Tourist Association and the Central Darling Shire Tourism and Economic Development Advisory Group;
- significant contributions to the local and regional economy.

Research and educational values

- Aboriginal cultural heritage, including investigations into the history of land use and the relationship between the physical environment and the archaeological record;
- Historic heritage, including settlement, the riverboat trade and pastoralism;
- biodiversity, including the Paroo River Overflow wetlands, threatened species and ecological communities;
- the spectacular landscapes, rich cultural heritage, and diverse fauna, flora and ecosystems provide outstanding opportunities for community education.

3.2 MANAGEMENT DIRECTIONS

The primary emphasis of this plan is the conservation of the natural and cultural heritage values of the park. Visitor opportunities that are compatible with and promote the understanding and enjoyment of these values will also be developed.

This will be achieved through:

- protection of park ecosystems (including wetlands, threatened species and ecological communities), by managing introduced species, access, visitor use, fire and other processes;
- protection of Aboriginal cultural heritage and historic heritage;
- development of recreational opportunities, including day use areas, walking tracks, bush campgrounds and other appropriate visitor facilities;
- control of introduced species, and protection and rehabilitation of areas degraded by erosion and past land uses;
- development of co-operative management arrangements with Aboriginal people associated with the park area;
- development of co-operative programs with neighbours, to improve the effectiveness of park management (e.g. pest control, park boundary fencing);
- provision of interpretive and educational opportunities through signage, park brochures and activities to assist visitor understanding and enjoyment of park values;

- improvement of natural and cultural heritage knowledge, corresponding threats and the evaluation of management programs through research and monitoring; and
- development and/or support of socio-economic opportunities for Wilcannia, White Cliffs and the broader community.

Management zones

To assist with recreation planning and management, a zoning plan has been developed for the park. This provides for the protection of natural and cultural heritage values, whilst offering a range of compatible visitor experiences.

The zoning plan allows for the recreational developments contained within this plan, as well as providing for the future development of recreational opportunities in key areas of the park. Zoning does not remove the need for planning approval for recreational and other developments. A Review of Environmental Factors (REF) must be undertaken and approved prior to any development taking place. Amendments to this plan must also be adopted before the development of major recreation facilities, e.g. camping areas, picnic areas and walking tracks, and before the opening or closing of public access roads.

The zoning plan also provides for socio-economic opportunities for Wilcannia, White Cliffs and the broader community, through the Gateway Concept. The Gateway Concept is an initiative aimed at fostering private sector partnerships in the provision of services for national parks (both on and off park). For Paroo-Darling National Park, this could include the management of facilities such as campgrounds and amenities, information centres and the provision of interpretive and educational services and materials.

The following zones have been identified, and are shown in Figures 2 and 3:

- Natural Heritage Zone
- Cultural Heritage Zone
- Recreation Zone
- Asset Management Zone

The Cultural Heritage Zone identifies areas of particular Aboriginal heritage or historic heritage value. The emphasis in these areas is the protection of specific heritage values (e.g. rock engravings, rock art, historic stone water tanks). Access to these areas will be limited, and will only be approved if supervised by an appropriate staff member, traditional owner or approved commercial tour operator.

The Recreation Zone identifies areas where development of visitor facilities may occur. This may include car parks, walking trails, campgrounds, day visit areas, interpretation shelters/bays and park entry signage. Recreation zones for the purpose of park entry signage and possible interpretation shelters/bays are located at the major park entrances and the Mandalay Road-Wanaaring Road intersection (refer to Figures 2 and 3). Other Recreation Zones have been identified for walks and a possible campground adjacent to the Peery Hills, a walking trail at Mirriappa Creek, a walking trail at Momba Creek (refer to Figure 2), and the Wilga campground precinct (refer to Figure 4).

The Asset Management Zone identifies precincts where adaptive reuse of buildings or infrastructure will occur. This includes the use of homesteads and shearers quarters for staff accommodation. Asset Management Zones include the homestead precincts at Peery, Arrowbar, Wilga and Tilpilly, shearers quarters precincts at Mandalay and Tilpilly, and the old homestead precinct at Coonavitra.

The Natural Heritage Zone covers the remainder of the park. The purpose of this zone is the conservation of flora and fauna, as well as Aboriginal and historic heritage not identified in a Cultural Heritage Zone. Low impact recreational activities not requiring the provision of facilities will be allowed in the Natural Heritage Zone (e.g. bushwalking, bird watching, canoeing).

FIGURE 3: ZONING PLAN – PEERY/ARROWBAR/MANDALAY

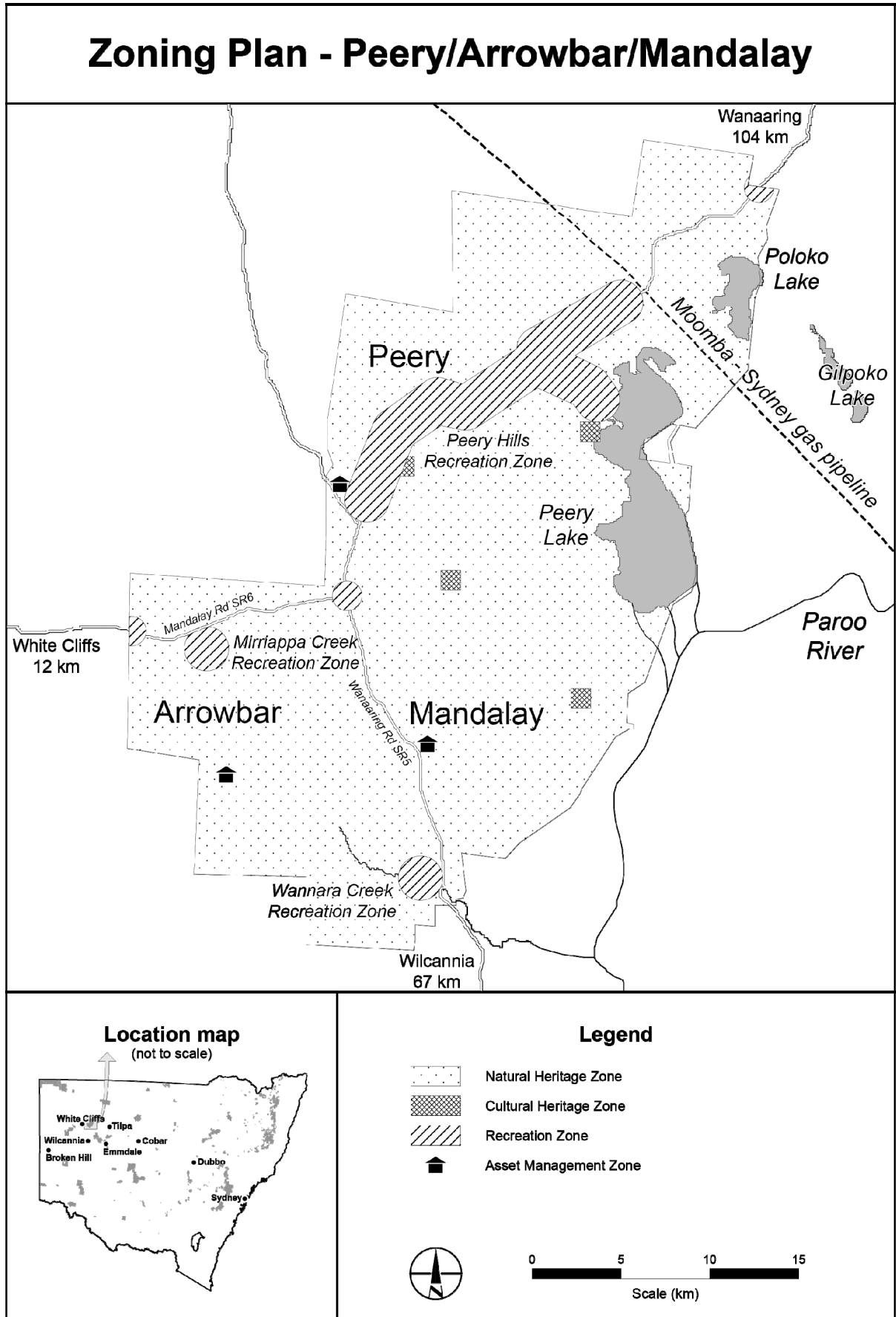
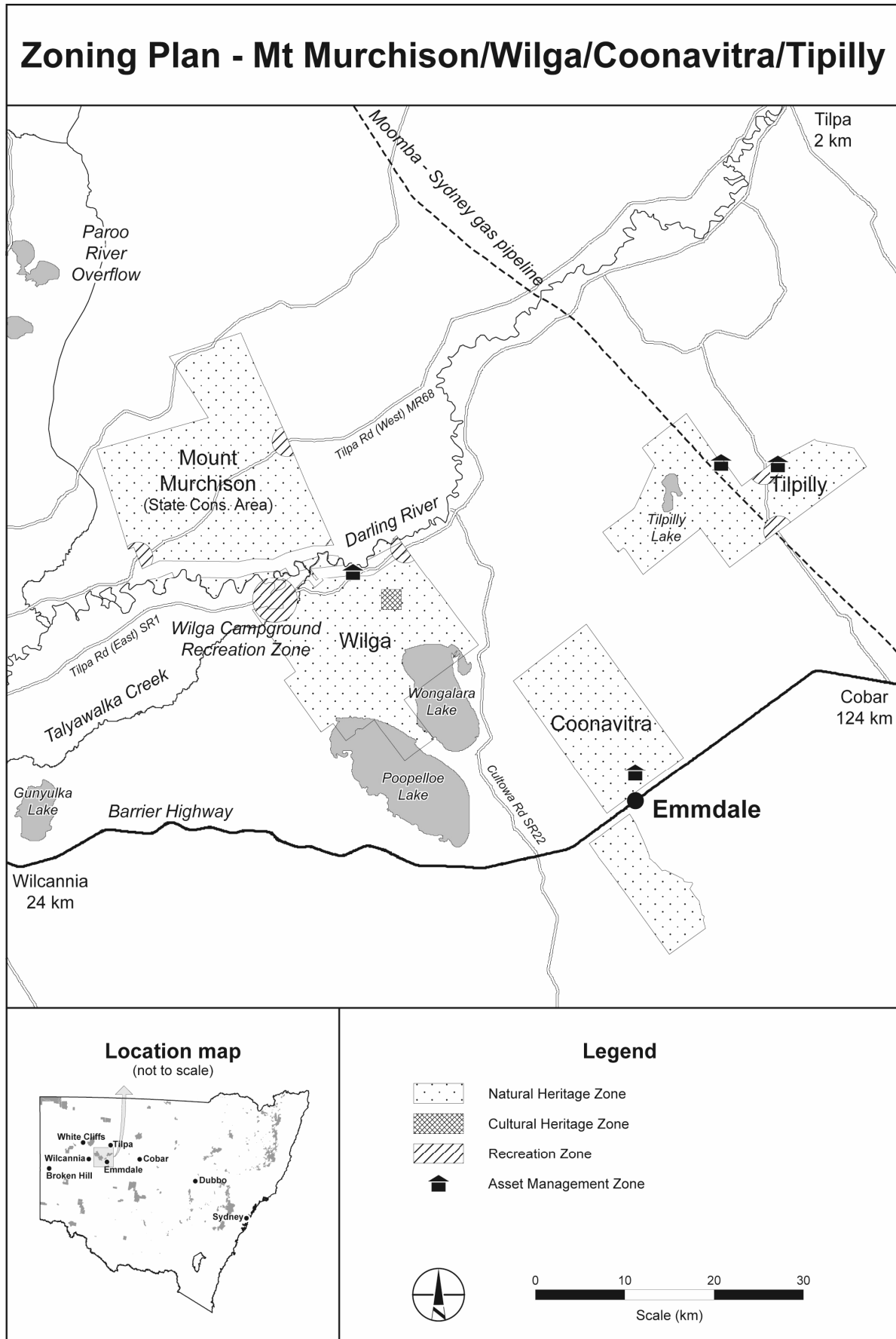


FIGURE 4: ZONING PLAN – MT MURCHISON/WILGA/COONAVITRA/TILPILLY



4. CONSERVATION OF NATURAL AND CULTURAL HERITAGE

4.1 GEOLOGY AND LANDFORM

The landscape variation within the park offers a suite of landforms, each with unique vegetation communities and ecosystems. The park conserves unique wetland areas associated with the Paroo River Overflow and Darling River systems. The mound springs at Peery Lake, which are natural discharge points from the Great Artesian Basin, are the largest active spring complex in NSW and are the only known springs in NSW that are on a lakebed. The Peery Hills offer rugged gorges and low escarpments. The lunettes associated with Peery and Poloko Lakes are similar to the significant lunettes of Mungo, Lake Menindee and Lake Victoria. The broad gibber plains, the Darling River floodplain and the gently undulating sandplains of Coonavitra and Tilpilly offer the “wide open spaces” for which outback NSW is renowned.

Many of these landforms also have great Aboriginal cultural significance, and are linked to creation stories that detail the origins and formation of landscape features.

The park covers three biogeographic regions, which classify landscape according to climate, landforms, geology, and characteristic fauna and flora. These are:

- the Mulga Lands biogeographic region, which includes Peery, Arrowbar, Mandalay and the north-western portion of Mount Murchison;
- the Darling Riverine Plains biogeographic region, which includes Wilga and the south-eastern portion of Mount Murchison;
- the Murray Darling Depression biogeographic region, which includes Coonavitra and Tilpilly.

The Mulga Lands biogeographic region

The Mulga Lands biogeographic region comprises undulating plains and low hills on Cainozoic (approximately 60 million years old) sediments of red earths and lithosols (shallow soils dominated by the presence of weathering rock and rock fragments). The sands that dominate this region are residual deposits formed by deep weathering of sediments of the Great Artesian Basin (NPWS 2003c).

The park provides for the only reservation of lands within the Paroo Darling Province, which is typified by Quaternary aeolian (deposited by wind) sands (approximately 2 million years of age) and Paleozoic bedrock (between 250 and 550 million years of age) bordering Quaternary alluvials (deposited by water)(NPWS, 2003c).

Primary landforms and features of the Mulga Lands part of the park are the Peery and Poloko lakes and their associated wetlands, and the unique and rare artesian mound springs situated on Peery Lake. Water enters the lake system primarily from the Paroo River Overflow, however local rainfall also supplements the volume of the lakes considerably. Water can remain in Peery Lake for up to three years. Poloko Lake is generally much shallower – retaining water for up to two years. Both are fresh water lakes, but become brackish as the water recedes.

The Peery/Arrowbar/Mandalay section of the park contains a diverse range of landforms and soil groups. Landforms and associated soils include:

- lake basin with aggrading fine cracking grey sediments;
- artesian mound spring with fine aeolian sandy sediments over Cretaceous (between 50 and 150 million year old) sediments;
- red desert loams and red clays in gilgai depressions;
- ancient lunettes on the north eastern margins of the lakes;
- small swamps with grey and brown cracking clays;
- claypans;
- undulating sandplains of Quaternary age with dune formation;
- rounded quartzite hills and ranges; and
- freshwater and saline lakes.

The artesian mound springs at Peery Lake are the only examples protected within the reserve system in NSW. Evaporation from the artesian mound springs creates deposits of calcium carbonate and other water borne minerals (evaporite) over many millennia. These rocky mound springs build from the top, often forming pools (Keane 2003). The springs support unique micro ecosystems, which in turn support rare plants and fauna that are thought to be surviving remnants of an earlier period when the area was part of a tropical environment. The mound springs are of great cultural and spiritual significance to Aboriginal people throughout the semi arid and arid zone of Australia (Mudd 2003).

Two groups of mound springs (active and extinct) occur at Peery Lake on the western and eastern shorelines (Pickard 1992b). The western group consists of more than 20 individual springs, some of which are no longer flowing. The extinct springs are by far the larger structures, reaching 100 metres in diameter and 2 metres in height (Pickard 1992b). Mounds of active springs vary in size from 3 metres to 15 metres in diameter and reach up to 2 metres in height (Pickard 1992b). The eastern group is made up of more than ten mostly extinct spring outlets. Plants recorded on and around the mound springs include *Cyperus gymnocaulos*, *Cyperus laevigatus*, *Scheonoplectus pungens*, *Halosarcia* sp., *Utricularia* sp., *Eriocaulon carsonii* and *Heliotropium curassavicum* (Pickard 1992b).

The mound springs ecosystem, described as 'the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin', is listed as a threatened ecological community under the Environment Protection and Biodiversity Conservation Act. The Artesian Springs Ecological Community is also listed as an endangered ecological community under the Threatened Species Conservation Act.

The Mulga Lands biogeographic region is widely recognised as a fragile landscape, potentially affected by the impacts of grazing, changes of fire regime and soil erosion.

The Darling Riverine Plains biogeographic region

The geology of the Darling Riverine Plains biogeographic region is dominated by Quaternary alluvial deposits associated with the Darling River, which form extensive flood plains. The park provides the only reserved lands within the Menindee Province (Walker 1991; NPWS 2003c).

Wilga and Mount Murchison are situated either side of the Darling River above Wilcannia. During periods of heavy rain or flooding, a series of wetlands become inundated on the adjoining floodplains. One example is Jamiesons Billabong on Mount Murchison, which is 5 kilometre long and retains water for over twelve months. A distinguishing landform feature of the Darling River is the natural levee banks, consisting of texture-contrast soils (sand over clay). Floodplain landforms represented on Wilga and Mount Murchison include small intermittent lakes, swamps, billabongs, flood channels and natural levees.

Two land systems previously unreserved in NSW are also found on Wilga. These are the Budda Land system, consisting of aeolian dunes with coolabahs and the Popelloe Land system, consisting of scalded Quaternary alluvium plains adjoining the two lakes.

The Murray Darling Depression biogeographic region

The Murray Darling Depression biogeographic region is represented within the park by the former properties of Coonavitra and Tilpilly. They are part of the Darling Depression Province, which is made up of Quaternary alluvials with some minor aeolian sheeting (Morgan and Terry 1992). Recently exposed bedrock in the form of silcrete (a hard silica crust on or near the surface of a soil formed in a semi-arid climate) gravels have been reported for Coonavitra and Tilpilly (Hesse 2004).

Tilpilly has been mapped for landforms (Hesse 2004), and a variety of significant landscape features have been identified. Situated on Tilpilly are 22 landforms that make up four main landscape terrains, including:

- a sand dune field;
- low bedrock of Devonian hills (approximately 360 to 400 million years of age), and colluvial apron (sediment layer formed by downslope action);
- a plain formed of ancient sediments of the Darling River, associated paleochannels, lakes and dunes in the centre and west (red soil country);
- overflow basins and ephemeral lakes of the marginal Darling River floodplain (associated with the lakes are lunettes similar to the well known geomorphological and archaeological sites in the Murray Darling Depression including Lake Mungo, Lake Victoria, and the Menindee Lakes).

Landform and soil information for the former pastoral property Coonavitra is currently limited.

Ecological character – Darling and Paroo Rivers

The Darling River is the longest river in the Murray-Darling Basin. Its major tributaries include the Border Rivers, Gwydir, Namoi and Macquarie Rivers, with a number of smaller tributaries including the Bogan, Culgoa, Warrego and Paroo Rivers (MDBC 2004). The Darling River is characterised by a deep, steep-sided channel lined with river red gums (*Eucalyptus camaldulensis*). The adjacent floodplains are dominated by black box (*Eucalyptus largiflorens*), which form extensive woodlands to the outer margins of the floodplain. The sparse understorey is usually dominated by chenopods, with wetter areas supporting dense thickets of lignum (*Muehlenbeckia florulenta*) (Keith 2004). Floods are vital to the regeneration of these vegetation communities, bringing nutrient-rich silt and stimulating seed germination (Keith 2004).

The Paroo River is the last free-flowing river in the Murray-Darling Basin and hence is a unique example of a near natural arid inland river system. It flows across two states, NSW and Queensland, who have agreed to the river's long term protection. There is a range of different wetland types in the catchment including claypans and canegrass swamps, river channels and waterholes, black box swamps, *Eleocharis* swamps, Lignum swamps and overflow plains, freshwater lakes, salt lakes and mound springs. The Paroo-Darling National Park component includes freshwater lakes (Peery and Poloko Lakes) and intermittent river channels and swamps. Peery Lake also contains several examples of active mound springs (natural discharge points from the Great Artesian Basin), the rarest landform in Australia, and these have significant conservation value due to their being the largest active spring complex in New South Wales on a lakebed (Kingsford 1999).

Peery Lake and other associated overflow lakes depend predominantly on river flows from the Paroo River. Flooding and drying cycles of the Paroo River, which are driven by climate and affected by geomorphology, are critical for supporting the flora and fauna of the Paroo (Kingsford 1999).

Desired outcomes

- An improved understanding of the geomorphic (landform) history of the region will form the basis of management actions, and also be presented to the wider community for education and interpretive purposes.
- Areas of special geomorphic significance will be protected from inappropriate access and use.
- The scenic values of the park will be protected.

Strategies and actions

- Appropriate archaeological, palaeontological and geomorphological research will be encouraged and promoted for management decision making and broader education and interpretive purposes.

- Management and construction of all roads, tracks and facilities will be undertaken so as to minimise impacts on the geomorphology and landscape features of the park.
- Reduce the rate of soil erosion by controlling unnatural impacting factors (e.g. control of feral animals, reduction of large-scale intense fires) and monitor trends over time.
- Investigate impacts on the mound springs at Peery Lake through an enclosure trial. Monitor the impacts on both fenced and unfenced mound springs, to determine appropriate future management (also refer to section 4.3 Native Plants and section 5.1 Introduced Species).

4.2 WATER REGIME

Variable flooding (depth, frequency, duration, timing, extent of flooding) and drying events are key ecological processes in the park that create high spatial and temporal heterogeneity and a complex array of habitats with high biodiversity (Ward 1998). Erratic flood pulses transport sediment, nutrients, organic matter, propagules and other resources, creating a 'boom and bust' ecology that is well documented for arid zone fauna (Maher & Braithwaite 1992, Kingsford et al 1999, Jenkins & Boulton 2003).

The Paroo River is covered by the Water Sharing Plan for the Intersecting Streams Unregulated and Alluvial Water Sources (Office of Water 2011) which commenced on the 14 November 2011. A draft Water Sharing Plan for the Barwon-Darling Unregulated and Alluvial Water Sources has been prepared, with a anticipated commencement date of mid 2012 (Office of Water, 2011).

Desired outcomes

- Flooding and drying events are allowed to occur to maintain key ecological processes.

Strategies and actions

- Develop cooperative relationships with water management authorities, neighbours and stakeholders, and promote the importance of flooding and drying events to maintain key ecological processes of the Ramsar wetland.
- Provide input into water management planning and strategies.

4.3 NATIVE PLANTS

Vegetation surveys have been carried out for Peery, Mandalay, and Arrowbar (Westbrooke et al 2003), Tilpilly (Hunter and Fallavollita 2003) and Wilga, Coonavitra and Mount Murchison (Westbrooke et al 2006a, Westbrooke et al 2006b).

Vegetation communities throughout the region were affected by the introduction of stock (for example sheep and cattle) during the 1850's. This was greatly exacerbated by the subsequent impact of rabbits, following their arrival in the 1880's. More recently feral goats and pigs have impacted on the integrity of vegetation communities.

A wide range of vegetation communities with diverse understorey species occur across the park. Major vegetation communities include:

- river red gum (*Eucalyptus camaldulensis*) open woodland – occurs along river corridors, intermittent creek lines and on mound springs;
- black box (*Eucalyptus largiflorens*) open woodland – occurs on intermittently flooded areas of major river floodplains, around Peery and Poloko Lakes, and fringing smaller swamps subject to occasional inundation;
- yapunyah (*Eucalyptus ochrophloia*) open woodland – occurs along the channels of the Paroo overflow;
- bimple box (*Eucalyptus populnea*) open woodland – occurs on upper floodplain areas and in drier depressions;
- red box or gum coolibah (*Eucalyptus intertexta*) open woodland – occurs on the sandy lower slopes of the Peery hills;
- belah (*Casuarina pauper*)/rosewood (*Alectryon oleifolius*) open woodland – widespread on undulating sandplains;
- mulga (*Acacia aneura*) tall shrubland/tall open shrubland – widespread on undulating sandplains and rocky hills;
- leopardwood (*Flindersia maculosa*) low open woodland – occurs on scattered localities on low hills and sandplains;
- mallee (*Eucalyptus socialis*/*Eucalyptus dumosa*) woodlands – occurs at the southern end of Coonavitra. Associated with porcupine grass (*Triodia scariosa*) on sand dunes;
- lignum (*Muehlenbeckia florulenta*) open shrub land – occurs in open low-lying areas, particularly on river floodplains and around Peery and Poloko Lakes;
- canegrass (*Eragrostis australasica*) grassland – occurs along the edge of Peery and Poloko Lakes and other low-lying depressions;
- Mitchell grass (*Astrebla* spp) grassland – occurs on the gibber plains on Peery, Arrowbar and Mandalay;
- chenopod shrublands, with dominant species including old man saltbush (*Atriplex nummularia*) and black bluebush (*Maireana pyramidata*);
- hopbush (*Dodonaea viscosa*), emu bush (*Eremophila* spp) and senna (*Senna* spp) shrublands;
- mound spring sedgeland, with dominant species including *Cyperus gymnocaulos* and *Cyperus laevigatus*;
- samphire (*Halosarcia* spp) low open shrubland – occurs on low-lying sites adjacent to Peery and Poloko Lakes;

- lake bed herbland – as the lakes dry out after flooding, an annual herbland dominated by pop saltbush (*Atriplex spongiosa*) and rats-tail couch (*Sporobolus mitchelli*) develops;
- ephemeral grasslands – following greater than average spring rainfall in two successive years, extensive growth of ephemeral grasses including speargrass (*Austrostipa* spp), woollybutt (*Eragrostis eriopoda*) and bottlewashers (*Enneapogon* spp) may occur. This is generally restricted to the sandier soils of Coonavitra and Tilpilly. Large fires have occurred as a result of subsequent increases in fuel loadings, most recently in 1974-75 and 1984-85.

Threatened species

Several native plants and vegetation communities occurring within the park are listed as endangered under State and Commonwealth legislation. They include:

- the artesian mound springs at Peery Lake are listed as an endangered ecological community under the *Threatened Species Conservation Act 1995* (NSW), and are part of a community described as ‘the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin’, which is listed as a threatened ecological community under the Environment Protection and Biodiversity Conservation Act and the Threatened Species Conservation Act;
- nelia (*Acacia loderi*) woodland, which occurs as the major canopy species in sand plain areas and is listed as an endangered ecological community under the Threatened Species Conservation Act;
- salt pipewort (*Eriocaulon carsonii*), a small herb that occurs on the artesian mound springs and which is listed as an endangered species under the Threatened Species Conservation Act and the Environment Protection and Biodiversity Conservation Act. A recovery plan has been prepared for this species (NPWS 2003);
- undescribed species of *Utricularia*, which is likely to be highly restricted and vulnerable to grazing disturbance.

Desired Outcomes

- Increased understanding of the vegetation communities and of community dynamics, particularly in relation to fire regime requirements.
- The vegetation communities within the park are allowed to be shaped by the natural ecological processes (e.g. flooding and drying) as far as is practicable (although in the short to medium term it may be necessary to manipulate habitats to assist the recovery of several species).
- No native species will have its status diminished, and rare and threatened species will have their status improved through active management programs.

Strategies and actions

- Complete the vegetation mapping of the park, and ensure transfer of vegetation data to the NPWS Geographic Information System (GIS).

- Encourage vegetation community and community dynamics research, particularly in relation to fire regimes, to identify specific needs of native plant populations that may require habitat manipulation for their survival/recovery (e.g. revegetation programs, fencing or fire regime manipulation).
- Establish reference areas within the park specifically for baseline data collection and ongoing monitoring programs, to measure the effectiveness of management regimes. This will include monitoring of the mound springs community to investigate any potential impacts of increased visitation rates through development of visitor facilities.
- Implement measures included in threatened species Priority Action Statements and recovery plans, including for the salt pipewort (*Eriocaulon carsonii*).
- Investigate impacts on the mound springs at Peery Lake through enclosure trials of introduced grazers, for example goats, rabbits and pigs. Monitor the impacts on both fenced and unfenced mound springs, to determine appropriate future management (also refer to section 4.1 Geology and Landform and section 5.1 Introduced Species).
- Undertake measures to protect the nelia (*Acacia loderi*) woodland community, including control of rabbits and goats and protection from inappropriate fire regimes (also refer to section 5.1 Introduced Species and section 5.2 Fire Management).

4.4 NATIVE ANIMALS

No comprehensive fauna surveys have been carried out across all sections of the park. Aerial surveys of waterbirds on Peery and Poloko Lakes were undertaken from 1987-1990 (Kingsford et al. 1994). Reptile surveys of Peery, Arrowbar, Mandalay and Wilga were undertaken by the Australian Museum and Australian Herpetological Society in 2001 and 2002 (unpublished data).

Mammals

The most prominent native animals on the park are the large macropods: red kangaroo (*Macropus rufus*), western grey kangaroo (*Macropus fuliginosus*), eastern grey kangaroo (*Macropus giganteus*) and euro (*Macropus robustus*). Other mammal species recorded on the park include:

- echidna (*Tachyglossus aculeatus*)
- fat-tailed dunnart (*Sminthopsis crassicaudata*)
- stripe-faced dunnart (*Sminthopsis macroura*) – listed as threatened under the *Threatened Species Conservation Act 1995* (NSW)
- Giles planigale (*Planigale gilesi*)
- lesser long-eared bat (*Nyctophilus geoffroyi*)
- Gould's wattled bat (*Chalinolobus gouldii*)
- little broad-nosed bat (*Scotorepens greyii*)
- inland broad-nosed bat (*Scotorepens balstoni*)
- little forest bat (*Vespadelus vulturnus*)

Birds

Bird species can be grouped into three broad categories: resident, seasonal migratory species and migratory waterbirds. Resident species include: emu (*Dromaius novaehollandiae*), wedge-tailed eagle (*Aquila audax*), Australian ringneck parrot (*Barnardius zonarius*), bluebonnet parrot (*Northiella haematogaster*), fairy wrens (*Malurus* spp), pied butcherbird (*Cracticus nigrogularis*) and apostle bird (*Struthidea cinerea*).

Seasonal migratory species include: brolga (*Grus rubicunda*), Australian bustard (*Ardeotis australis*), cockatiel (*Nymphicus hollandicus*), budgerigar (*Melopsittacus undulatus*), red-backed kingfisher (*Todiramphus pyrrhopygia*), rainbow bee-eater (*Merops ornatus*), crimson and orange chats (*Epthianura tricolor* and *E. aurifrons*) and woodswallows (*Artamus* spp).

Migratory waterbird species are particularly drawn to the shallow ephemeral wetlands of the Paroo River Overflow (including Peery and Poloko Lakes) and the Darling River floodplain (Poopelloe and Wongalara Lakes). The importance of the habitat value of these wetlands is reflected in the tens of thousands of waterbirds that congregate in times of flood. Up to 39,500 waterbirds and 42 species have been recorded on these wetlands (Kingsford et al. 1994), including: pink-eared duck (*Malacorhynchus membranaceus*), grey teal (*Anas castanea*), hardhead (*Aythya australis*), Australasian grebe (*Tachybaptus novaehollandiae*), black-tailed native hen (*Gallinula ventralis*), Eurasian coot (*Fulica atra*), sharp-tailed sandpiper (*Calidris acuminata*), red-necked avocet (*Recurvirostra novaehollandiae*), Caspian and gull-billed terns (*Sterna caspia* and *S. nilotica*) and whiskered tern (*Chlidonias hybridus*). Breeding records from Peery Lake include Australian pelican (*Pelecanus conspicillatus*) and Australian white ibis (*Threskiornis molucca*).

Reptiles and amphibians

Surveys undertaken by the Australian Museum and Australian Herpetological Society in 2001 and 2002 yielded 44 reptile species and 8 amphibians. Species recorded include:

- fat-tailed gecko (*Diplodactylus conspicillatus*)
- three-lined knob-tail (gecko) (*Nephrurus levis*)
- eastern hooded scaly-foot (*Pygopus schraderi*)
- lace goanna (*Varanus varius*)
- sand (or Gould's) monitor (*Varanus gouldii*)
- central netted ground-dragon (*Ctenophorus nuchalis*)
- Eyrean earless dragon (*Tympanocryptis tetraporophora*)
- wedgesnout Ctenotus (*Ctenotus brooksi*)
- eastern water skink (*Eulamprus quoyii*)
- broad-banded sand-swimmer (*Eremiascincus richardsonii*)
- shingleback (*Tiliqua rugosa*)
- eastern bluetongue (*Tiliqua scincoides scincoides*)
- carpet python (*Morelia spilota metcalfei*)
- prong-snouted blind snake (*Ramphotyphlops bituberculatus*)
- mulga (or king brown) snake (*Pseudechis australis*)
- western brown snake (*Pseudonaja nuchalis*)
- eastern brown snake (*Pseudonaja textilis*)

- Sudell's frog (*Neobatrachus sudelli*)
- green tree-frog (*Litoria caerulea*)
- Gunther's frog (*Litoria latopalmata*)
- desert tree-frog (*Litoria rubella*)

Threatened species

Several native animals occurring within the park are listed as vulnerable or endangered under the Threatened Species Conservation Act. They include:

- Australian bustard (*Ardeotis australis*) – endangered
- fat-tailed diplodactylus or gecko (*Diplodactylus conspicillatus*) – endangered
- stripe-faced dunnart (*Sminthopsis macroura*) – vulnerable
- little pied bat (*Chalinolobus picatus*) – vulnerable
- blue-billed duck (*Oxyura australis*) – vulnerable
- freckled duck (*Stictonetta naevosa*) – vulnerable
- brolga (*Grus rubicunda*) – vulnerable
- red-tailed black-cockatoo (*Calyptorhynchus banksii*) – vulnerable
- pink cockatoo (*Cacatua leadbeateri*) – vulnerable
- wedgesnout ctenotus (*Ctenotus brooksi*) – vulnerable
- spotted harrier (*Circus assimilis*) – vulnerable
- black-breasted buzzard (*Hamirostra melanosternon*) – vulnerable
- brown treecreeper (*Climacteris picumnus*) – vulnerable
- pied honeyeater (*Certhionyx variegates*) – vulnerable
- hooded robin (*Melanodryas cucullata*) – vulnerable
- grey-crowned babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*) – vulnerable
- crowned gecko (*Diplodactylus stenodactylus*) – vulnerable

Desired Outcomes

- Increased understanding of fauna species and their habitat requirements.
- The fauna within the park is allowed to be shaped by the natural ecological processes as far as is practicable. However, some processes shaped by pre-European Aboriginal land use may need to be reapplied.
- No native species will have its status diminished, and rare and threatened species will have their status improved through active management programs.

Strategies and actions

- Undertake fauna surveys of the park to build upon existing data, with regard to varying seasonal changes and flood regimes. In particular, undertake surveys of water birds on Peery and Poloko Lakes (Paroo River Overflow) and Poopelloe and Wongalara Lakes (Darling River floodplain) during times when the lakes are flooded.
- Encourage research into fauna distribution, abundance and interactions, to identify specific needs of native fauna populations that may require habitat manipulation for their survival/recovery (e.g. understorey vegetation or predator control) and monitor the effectiveness of any such programs.

- Identify specific needs of native fauna populations that may require habitat manipulation for their survival/recovery (e.g. understorey revegetation, fire regimes, herbivore or predator control) and monitor the effectiveness of any such programs.
- Implement measures included in threatened species Priority Action Statements and recovery plans.
- Ensure that fauna records are entered into the Atlas of NSW Wildlife database.

4.5 ABORIGINAL HERITAGE

Aboriginal communities have a cultural connection to the land, which is central to Aboriginal spirituality and which contributes to Aboriginal identity. Aboriginal communities associate natural resources with the use and enjoyment of foods and medicines, caring for the land, passing on cultural knowledge and strengthening social bonds. Aboriginal heritage and nature are inseparable from each other and need to be managed in an integrated manner across the landscape.

The Paroo River Overflow and Darling River sections of the park lie within the traditional lands of the Paakantyi people of the Paroo and Darling Rivers. The former Coonavitra and Tilpilly properties lie within an area also used by the Ngiyeempaa people.

Historical documentation (Bonney 1885) and more recent publications (Bates and Martin 2000, Martin 2003) describe the ongoing connection of the local Aboriginal community to the lands that now lie within the park. This takes the form of places within the park that have cultural significance, places where foods were hunted and gathered, places that confirmed continuity of culture and stories and explanations that were passed down and formed part of the Dreaming.

Peery Lake is one such area that has great cultural significance. It features in stories such as Kuluwirru Dreaming, which tells of the creation of the Peery landscape and Darling River, describing the reasons for the lake being emptied at various times.

The park supports a diverse variety of plants of Aboriginal significance – plants that have either traditional food or medicinal value. Examples are documented in oral history accounts (Bates and Martin 2000) for two species, wild banana vine (*Marsdenia australis*) and the yam known as *ngarnti*.

Another important cultural asset of the park is the rich evidence of traditional Aboriginal occupation. Despite only limited investigations to date, archaeological research has highlighted a diverse range of Aboriginal sites, including middens, hearths, stone tools, rock engravings, art sites and stone arrangements.

The significant cultural and spiritual values of the Paroo River country have been recognised as part of the Ramsar site listing. The NPWS is working with the

Paakantyi people for the co-operative management of these wetlands and the park in general (and also with the Budjiti people with regard to Nocolèche Nature Reserve). The negotiations between the NSW NPWS and the Paroo-Darling National Park Elders Council for co-operative management was formalised with a Memorandum of Understanding (MOU) signed on 25 November 2010. The purpose of this MOU is to formally acknowledge the NPWS commitment to working co-operatively with the Paroo-Darling National Park Elders Council in the management of the natural and Aboriginal cultural heritage in Paroo-Darling National Park and the surrounding area.

Desired outcomes

- The conservation, protection and appropriate presentation of Aboriginal heritage within the park involves members of the Paakantyi and Ngiyeempaa Aboriginal communities.
- Visitors to the park are made aware of the Aboriginal cultural significance of the area.
- Aboriginal cultural material is repatriated in accordance with the NPWS Repatriation of Aboriginal Cultural Material Policy.
- Paakantyi and Ngiyeempaa Aboriginal people maintain their cultural links to the lands that now lie within the park.

Strategies and actions

- Investigate options for cooperative park management with the Paakantyi and Ngiyeempaa Aboriginal communities.
- Involve members of the Paakantyi and Ngiyeempaa communities in the conservation and protection of Aboriginal heritage within the park.
- Promote the Aboriginal cultural significance of the area to park visitors, through interpretive signage, park publications and guided tours.
- Undertake an inventory of Aboriginal knowledge of bush foods medicines and other resources, for information and interpretation purposes.
- Ensure the safe keeping of any Aboriginal cultural material held by NPWS, and consult with members of the Paakantyi and Ngiyeempaa communities to ensure appropriate use/presentation. Where possible, repatriate this material in accordance with the NPWS Repatriation of Aboriginal Cultural Material Policy.
- Pursue opportunities for Paakantyi and Ngiyeempaa Aboriginal people to maintain their cultural links with the park.
- Ensure that Aboriginal cultural site information is entered into the NPWS Aboriginal Heritage Information Management System (AHIMS) database.

- Encourage research into the archaeology of the park, for management decision making and broader education/interpretation purposes. Ensure that Paakantyi and Ngiyeempaa Aboriginal people are involved in any such research.

4.6 HISTORIC HERITAGE

Documentation of the historical heritage of the park is linked to the 19th century explorers Captain Charles Sturt and Major Thomas Mitchell. In 1828 Sturt lead an expedition to determine the directions of flow of the New South Wales western rivers. His expedition explored the Macquarie River and ultimately succeeded in discovering another major river, which he named the Darling (after Governor Ralph Darling).

Mitchell passed through the region in 1835, during one of his expeditions down the Darling River. He named Mount Murchison (north-east of Wilcannia), after which a property that is now part of the park is currently known. Mount Murchison was also the original name of Wilcannia. The Mount Murchison property was one of the major pastoral outposts in the region in the mid to late 1800's.

The Darling River was particularly important to pastoral settlers in the region, as it provided the major transport corridor for the supply of stores and the export of wool. Riverboats pioneered the navigation the Darling River in the 1850's, with the first load of wool taken from Mount Murchison on the *Albury* in January 1859.

Due to the limited access to overland transport and the high cost of what was available, many properties on the Darling River had been taken up, but few of them had been occupied. Although dependant upon river levels for access, the arrival of the riverboats greatly changed the local economy. The value of pastoral properties fronting the Darling doubled within months, and by the end of 1859 virtually all properties were occupied.

Besides encouraging pastoral settlement of western New South Wales, the navigation of the inland waterways encouraged the growth of river towns. The township of Wilcannia was surveyed in 1865, and the first land sales took place the following year.

The pastoral leases that were acquired to form the park were first established in the 1870's. Peery, Arrowbar, Mandalay and Mount Murchison originally formed part of the vast Momba Station, which was initially owned by the Momba Pastoral Company and later, in a much-reduced form, by Sir Sidney Kidman. Momba Station was once the largest grazing property in NSW, at around 2 million acres (800,000 hectares). It has since been sub-divided into about 28 separate leases.

Evidence of the pastoral history of the park includes homesteads, shearing sheds, shearers quarters, stone tanks and mulga-post fences. These are of historic importance, due to their age, their representation of pastoral infrastructure and in some cases their unique design.

Travelling stock routes were proclaimed along the Darling River, on the eastern side in 1879 and on the western side in 1882. These became general inland transport routes for travellers, with facilities being provided at regular intervals. In 1883 a small hotel, named Coach and Horses, was built on the southern side of the Talyawalka Creek near the site of the current campground at Wilga.

The Cobb and Co stagecoach also had several coach routes through the district, including the eastern side of Peery Lake and along both sides of the Darling River through Mount Murchison and Wilga.

Heritage sites around Peery Lake demonstrate the importance of water management in semi-arid landscapes, and include a rare stone and cement water trough system supplied from one of the mound springs.

The park is rich with examples of pastoral heritage. These include:

- Peery, Arrowbar and Wilga homesteads
- Peery, Arrowbar, Mandalay, Wilga and Coonavitra shearing sheds
- Peery, Mandalay, Wilga and Coonavitra shearers quarters
- the stone tank and trough at Morrisons Bore, on the former Mandalay property
- a variety of fences that document technological change (Pickard 1992a)
- the orchard and irrigation area adjacent to the Wilga homestead, which supported the property and supplied food such as citrus fruits to the Wilcannia community
- the remnants of brush stock yards

The Paroo-Darling National Park Heritage Action Statements identify heritage sites for adaptive reuse (e.g. homesteads), maintenance (e.g. Morrisons Bore), and those that are recommended to allow to “age gracefully” (i.e. not be maintained).

The pastoral history is interwoven with contemporary Aboriginal history. Many of the older Aboriginal people living in regional towns today were employed in or associated with the pastoral industry.

Desired outcomes

- The conservation, protection and appropriate presentation of historic heritage within the park.
- Visitors to the park gain an understanding of historic land use, lifestyle and society through the presentation and interpretation of the historic heritage of the area.
- Management of historic heritage will be consistent with the Far West Region Cultural Heritage Management Strategy (NPWS 2003a).
- Adaptive reuse of buildings for staff accommodation, public visitation or other purposes, where this is compatible with the protection of heritage values.

Strategies and actions

- Conservation management plans will be prepared and implemented for all historic buildings. Strategies for the protection of other heritage assets will be developed.
- Promote the historic heritage significance of the area to park visitors, through interpretive signage, park publications and where consistent with heritage values, allow access to heritage sites.
- Develop and implement a maintenance program for significant historic buildings and other heritage assets. This will include a bi-annual condition inspection.
- Ensure that historic heritage site information is entered into the NPWS Historic Heritage Information Management System (HHIMS) database.
- If an historic place or historic item is considered to be of State significance, it will be nominated for inclusion on the State Heritage Register.

5. PARK PROTECTION

5.1 INTRODUCED SPECIES

Pest plant species primarily occur in highly disturbed areas, such as around ground tanks, homesteads, shearing sheds, and alongside roads and tracks. Fifty-five weed species were recorded during a vegetation survey of the Peery Section of the park (Westbrooke et al. 2002). Weeds are also common along watercourses due to water transportation and bank disturbance (Westbrooke et al. 2002).

The current weed control priorities for the park are:

- Bathurst burr (*Xanthium spinosum*)
- Noogoora burr (*Xanthium occidentale*)
- African boxthorn (*Lycium ferocissimum*)

Introduced animals that occur in the park include cattle (*Bos taurus*), sheep (*Ovis aries*), rabbits (*Oryctolagus cuniculus*), pigs (*Sus scrofa*), goats (*Capra hircus*), foxes (*Vulpes vulpes*) and cats (*Felis catus*). The grazing impact of rabbits and goats is evident across the park. Feral pig impacts are generally concentrated along watercourses and wetlands. Foxes and cats directly prey upon the smaller fauna, including mammals, reptiles, birds and insects, and have been responsible for the elimination of some species that previously occurred on the park.

The introduction of rabbit calicivirus disease has resulted in a significant reduction in the number of rabbits across the park. The identification and destruction of warrens is undertaken to limit the potential for rabbit reinfestation. Feral goats are currently controlled through mustering contracts, which are filled through an open tender process. Pigs are controlled through an approved aerial shooting program undertaken by specialist NPWS staff. Foxes are controlled through an extensive baiting program conducted by NPWS staff.

Control of introduced species is undertaken in accordance with the Far West Region Pest Management Strategy.

Climate change is expected to exacerbate other threatening processes (Pittock 2003). It may enable invasive species to expand into new areas, or increase in abundance. Species already affected by reduced water flows in regulated river systems are likely to be worse off due to declining water quality and the effects of climate change. Also, effects of widespread fragmentation and degradation of habitat, changed fire regimes and competition from invasive species are likely to reduce the options for native species to adapt to climate change (refer section 5.3).

Desired outcomes

- Priority species of introduced plants and animals will be controlled and where possible eliminated.
- Where possible, control programs will be carried out in conjunction with adjoining landholders and other agencies.

- No new species are introduced into the park.

Strategies and actions

- Pest control programs will continue to target priority species of introduced plants and animals, in accordance with the Far West Region Pest Management Strategy.
- Priority for control will be as follows:
 - species that are declared noxious or for which a national emergency control program has been declared or are known to be an important problem in other parks or states;
 - species that have a significant environmental impact, including damage to threatened species, catchment values and recreation values;
 - species that may affect neighbouring lands or are considered of high priority by the community;
 - where benefits gained from previous control programs need to be maintained; or
 - where a particular window of opportunity exists (e.g. controlling feral goats during extended hot periods when water sources are limited).
- Investigate impacts on the mound springs at Peery Lake through an enclosure trial. Monitor the impacts on both fenced and unfenced mound springs, to determine appropriate future management (also refer to section 4.1 Geology and Landform and section 4.2 Native Plants).
- Seek the cooperation of adjoining landholders and other agencies in pest control programs.
- Seek cooperation from adjoining landholders to remove their stock from the park as soon as possible when the stock incursions occur.
- Develop and implement an integrated goat management plan.

5.2 FIRE MANAGEMENT

Fire is a natural ecological process. It plays a major role in determining vegetation structure and species composition, and is essential for the survival of fire-dependant flora and fauna, even in arid and semi-arid ecosystems. However changes in fire regimes (the sequence of successive fires), can have significant negative impacts on biodiversity values. In particular, large and/or frequent fires may interrupt breeding cycles and seed production, or remove resources from the environment upon which some species depend. Unmanaged fire can also have negative impacts on cultural values, park neighbours and the broader community.

Fire history

The frequency of fire in the Paroo-Darling National Park area is low. No fires have occurred on the park since 1985. Historically, large grass fires have occurred in the Emmdale district, following two consecutive years of above average spring rainfall.

These conditions promote extensive growth of annual grasses, which may create a continuous fuel load on non-clay soils throughout the landscape. Landscape-scale fires have occurred as a result of these conditions, in the early 1950's, mid 1970's and mid 1980's. In years of above average rainfall, which may cause the growth of ephemeral fuel loads (e.g. grass, forbs and herbs), fuel loads will need to be monitored and managed according to the reserve fire management strategies. This may include hazard reduction, maintenance of fire control lines and actions identified in the fire management strategies for the park.

A small area of mallee-spinifex occurs at the southern end of the former Coonavitra property, south of Emmdale. Although spinifex is highly flammable, it is generally restricted to sand dune crests and its discontinuous nature reduces the likelihood of large scale fires. In an average or below average rainfall year, there is not usually sufficient fuel for a fire to develop to the extent where life or property are endangered or where plant and animal communities are significantly at risk.

Strategies and cooperative arrangements

Under the *Rural Fires Act 1997*, the NPWS is a fire authority. Consequently, the Service is responsible for controlling fires on the park and ensuring that they do not cause damage to other land or property. An important part of the NPWS role is participation in local cooperative fire management arrangements, including membership of the Central Darling District Bush Fire Management Committee. This committee is responsible for Shire-wide bush fire management planning under the Rural Fires Act. As part of these responsibilities, a Bush Fire Risk Management Plan and an Operations Plan are prepared. These plans are important for fire suppression in and around the park, as they detail notification, first response and other operational arrangements between the Rural Fire Service, NPWS and support agencies.

Four map-based fire management strategies have been prepared for the park (NPWS 2006, NPWS 2009a, NPWS 2009b, NPWS 2009c). The fire management strategies detail measures for protecting life and property, including the park management access track network which will also be used for fire management purposes. An important element of this network is the upgrade, development and maintenance of specific boundary access tracks.

The strategies also describe the ecologically desirable fire regimes for the major vegetation communities within the park. If desirable fire frequencies, extent, intensity, seasonality and patchiness are exceeded, the decline and even local extinction of plant species is possible. Fire management will aim to maintain biodiversity by restricting fires to only part of the distribution of a vegetation community at any one time (to promote a diversity of vegetation age classes), and ensuring that the fire frequency thresholds are not exceeded.

Desired outcomes

- Fire is managed to ensure:
 - life and property is protected
 - fire regimes are compatible with the conservation of biodiversity
 - Aboriginal sites and historic places are protected
- The potential for spread of fire into, within or out of the park is minimised.

Strategies and actions

- Manage wildfire and prescribed burning consistent with the park fire management strategies. Review the fire management strategies annually, and amend as necessary.
- Update the fire management strategies to include the park additions.
- Continue to actively participate in the Central Darling District Bush Fire Management Committee, and maintain close contact and cooperation with Rural Fire Service staff and volunteer brigades.
- Continue to participate in the preparation and revision of the District Bush Fire Risk Management Plan and Operations Plan.
- Investigate prescribed burning programs for fuel management and habitat management.
- Investigate additional fuel management strategies (such as slashing, early season burning) to be implemented in seasons of high ephemeral grass growth, to limit the potential for spread of fire into, within or out of the park.
- Maintain records of fire occurrence, with a particular emphasis on accurately mapping and recording the frequency, extent, intensity, seasonality and patchiness of fires.
- Seek the cooperation of adjoining landholders and other agencies in fire management activities.
- Investigate historical records of Aboriginal burning patterns from accounts of explorers and early pastoralists.
- Develop a ground tank management plan, to identify the ground tanks required/ not required for management purposes.

5.3 CLIMATE CHANGE

Anthropogenic climate change has been listed as a key threatening process under the TSC Act. Projections of future changes in climate for NSW and particularly western NSW include higher temperatures, increasing fire intensity and frequency, increasing lightning frequency, more intense but possibly reduced annual average rainfall, possible shift to a predominantly summer rainfall from a current winter dominated pattern, increased temperature extremes and higher evaporative demand. These changes are likely to lead to greater intensity and frequency of fires, more severe droughts, reduced river runoff and water availability, regional flooding and increased erosion (DECC, 2010a & 2010b).

Climate change may significantly affect biodiversity by changing population size and distribution of species, modifying species composition, and altering the geographical extent of habitats and ecosystems. The potential impact of climate change is difficult to assess since it depends on the compounding effects of other pressures, particularly barriers to migration and pressure from feral animals. Species most at risk are those unable to migrate or adapt, particularly those with small population sizes or with slow growth rates (DECC, 2010a & 2010b).

Programs to reduce the pressures arising from other threats, such as habitat fragmentation, invasive species, bushfires and pollution, will help reduce the severity of the effects of climate change.

Desired Outcomes

- The effects of climate change on natural systems are reduced.

Management Response

- Continue, and where possible improve, fire, pest and weed management programs to increase the park/planning area's ability to cope with future disturbances, including climate change, and encourage research into appropriate indicators to monitor the effects of climate change.

6. VISITOR OPPORTUNITIES AND EDUCATION

Park facilities and services provide opportunities to enjoy, appreciate and understand the value of our natural and cultural heritage. Only areas that can sustain use are promoted in this way. Information provision at such places and about the area in general assists the protection of natural and cultural heritage, promotes support for conservation and increases the enjoyment and satisfaction of visitors.

6.1 INFORMATION PROVISION

The park has a number of natural and cultural features of interest to visitors, including the Darling River, Paroo River Overflow, Aboriginal cultural sites and examples of pastoral infrastructure.

The Paroo-Darling National Park Visitor Centre at White Cliffs serves as the introductory focal point to the park, providing a range of orientation information as well as interpretation of the Aboriginal and pastoral history of the park.

The park's features will be promoted and interpreted to visitors in ways that protect their special values and encourages appropriate use. Provision of information about the park will involve three levels:

- promotion – to increase awareness of the existence of the park, its conservation importance and visitor opportunities;
- orientation – to enable visitors to find their way around the park, introduce them to its landscape and advise them about use restrictions; and
- interpretation – to provide greater detail or explanations about individual components of the park's environment in order to increase visitor understanding of the park's values.

Signage within park will continue to respect the names of the former pastoral properties, to retain links with the pastoral history and to assist park visitors with location and navigation. This naming convention may be expanded as additional information becomes available. For example the Wilga campground, located near the site of the former Coach and Horses Hotel, will be re-named the Coach and Horses campground.

Desired outcomes

- Visitors understand the significant landscape, natural, Aboriginal and historic values of the park.
- Visitors are aware of the park's recreational opportunities and facilities, and can safely and confidently travel around the park.
- Widespread community appreciation of and support for park values is developed and maintained.

Strategies and actions

- Develop an interpretation plan for the park.
- Seek appropriate opportunities to promote the park, including regional tourist publications.
- Continue to update the Paroo-Darling National Park brochure, as additional facilities are developed or as additional information becomes available.
- Develop and undertake *Discovery* interpretive programs appropriate to the level of visitation to the park.
- Provide interpretive, directional and regulatory signage at appropriate locations throughout the park, such as major park entrances and the Mandalay Road-Wanaaring Road intersection.
- The cultural heritage of the park will be reflected in park signage and locality names, both European and Aboriginal. The Wilga campground will be re-named the Coach and Horses campground.
- Actively participate in tourism organisations, including the White Cliffs Opal Fields Tourist Association and the Central Darling Shire Tourism and Economic Development Advisory Group.
- Provide licensed commercial tour operators with training and information on the natural and cultural values, recreational opportunities and management strategies of the park.
- Involve members of the Paakantyi and Ngijeempaa Aboriginal communities in active interpretation of the Aboriginal heritage of the park.

6.2 RECREATION OPPORTUNITIES

Paroo-Darling National Park and SCA currently attracts relatively low visitor numbers. However it is anticipated that the park will become a major tourist drawcard for the region as additional visitor facilities are developed and the park becomes better known. It is anticipated that in the future visitors to the park will have the opportunity to undertake activities such as sightseeing, flora/fauna viewing, photography, self-guided driving tours, cultural tours, bushwalking, camping, fishing and *Discovery* activities.

A visitor survey conducted at Mungo National Park found that the most common reasons for visiting the park were to see the sights, to enjoy nature and the outdoors, to learn about the cultural history of the area, to be close to nature, and to learn about native flora and fauna. These results provide some guidance for the planning provision of visitor experiences in Paroo-Darling National Park and SCA.

Visitor opportunities provided in national parks are generally at the low key end of the spectrum, in natural and semi-natural settings. Recreational uses that are ecologically sustainable and that directly contribute to visitor understanding and appreciation of the park are considered appropriate.

To be ecologically sustainable, management of visitor experience requires the careful design and construction of facilities, to ensure that the numbers of visitors and type of use is appropriate for the site, and to promote minimal impact. The provisions below are designed to maintain the low key, scenic, natural settings which are the special feature of the park and to provide for future use in a manner which protects ecological integrity and cultural heritage values.

Provision for visitor use of the park has been considered in a regional context, taking into account the recreational opportunities available on other Far West Region parks, in local towns and in major regional centres.

Current recreational opportunities include the Paroo-Darling National Park Visitor Centre at White Cliffs, the Wilga (Coach and Horses) campground and a day use area at Peery Lake (currently under development). A walking track, lookout and mound spring viewing platform at Peery Lake, and a walking track at Mirriappa Creek, are currently being planned.

The zoning plan described in Section 3.2 identifies zones for the recreational developments contained within this plan, as well as providing for the future development of recreational opportunities in key areas of the park.

The land on which the Wilga (Coach and Horses) campground has been developed was acquired but has not been gazetted as part of the park, to allow the development of visitor facilities as part of the Gateway Concept. The Gateway Concept is an initiative aimed at fostering private sector partnerships in the provision of services off-park. There are also a number of possibilities for the private sector to become involved on the park in future, including the management of facilities such as campgrounds and information centres. This concept also provides for increased socio-economic opportunities for Wilcannia, White Cliffs and the broader community.

No wood fires will be permitted in the park. This is consistent with many other parks in the arid zone. Fallen timber is an important resource in these environments, and should remain in the landscape to provide habitat for a range of organisms, to condition soils and to prevent erosion. Gas barbecues are provided at the Wilga (Coach and Horses) campground, and will be developed at other recreational sites where possible. Occasional exceptions may be made on a case by case basis, for example as part of cultural heritage activities for the *Discovery* program. In such cases, firewood used will be salvaged from park operations (such as track clearing or tree lopping) or from other environmentally-sound sources. Education of participants with regard to the “no wood fires” policy and the value of fallen timber as habitat will be integrated into any such activities.

Desired outcomes

- A variety of low key visitor opportunities are available that encourage appreciation of the natural and cultural environment.
- Appropriate visitor facilities that encourage appreciation of the natural and cultural environment will be designed, developed and managed to provide a satisfying visitor experience and minimise impacts.
- Visitor use is compatible with the purpose of the park and is ecologically sustainable.

Strategies and actions

- The Wilga (Coach and Horses) campground will be extended to provide additional sites, to cater for future demand. It will be maintained as a basic camping area.
- The development of a basic campground of up to 12 sites within the Peery Recreation Zone will be investigated.
- Other than on the Darling River, recreational use of motorised craft will not be permitted on lakes and waterways within the park.
- A visitor monitoring system will be developed, to gain accurate visitation data across the park to assist management decision making.
- Cooperative operations with the private sector, including involvement in the Wilga (Coach and Horses) campground, will be pursued where appropriate, as a means of achieving better social and economic outcomes opportunities for Wilcannia, White Cliffs and the broader community.
- Provide opportunities for the Paakantyi and Ngiyeempaa Aboriginal communities to run cultural tours in the park.
- Promote the use of gas or liquid fuel stoves by park visitors for cooking and warmth.
- Maintain the gas barbecues at the Wilga (Coach and Horses) campground, and where possible provide gas appliances at other recreational sites as they are developed.
- Provide educational and interpretive material at key sites and in park publications to explain the “no wood fires” policy and the value of fallen timber as habitat.

7. RESEARCH AND MONITORING

NPWS will provide support to scientific study in the national park that will lead to improvements in management outcomes by increasing our understanding of its natural heritage, cultural heritage and social values and the processes that may impact upon them. Research also assists with managing legal responsibilities for native fauna and flora species and cultural heritage objects or places. As Paroo-Darling National Park is a recent addition to the reserve system there are considerable research opportunities available to adequately audit and assess natural and cultural resources present on the park. Effective management strategies for the park will be dependent on research outcomes in the future. Information gathered on the park will also benefit land management processes off-park.

To date several studies have been undertaken but additional research will be required as part of the strategy to improve management practices on the park. Completed studies include:

- heritage assessment statements for the major building precincts across the park (Vines, in prep);
- vegetation mapping of Wilga, Mount Murchison and Coonavitra (Westbrooke et al 2006a, Westbrooke et al 2006b);
- geomorphological landform identification and mapping of Tilpilly (Hesse 2004);
- a social history of Paroo-Darling National Park (Donovan 2003);
- carbon dating of Aboriginal oven hearths on the foreshore area (Holdaway et al 2003);
- vegetation mapping of Peery, Arrowbar and Mandalay (Westbrooke et al 2003);
- vegetation mapping of Tilpilly (Hunter and Fallavollita 2003);
- archaeological site analysis for Pine Creek, and sections of the north west Peery Lake foreshore (Holdaway et al 2003, Holdaway et al 2002);
- reptile surveys of Peery, Arrowbar, Mandalay and Wilga undertaken by the Australian Museum and Australian Herpetological Society in 2001 and 2002 (unpublished data);
- waterbird surveys (Kingsford et al 1994, Knight 1994).

Topics for future research could include:

- archaeology, palaeontology and hydrology;
- cultural heritage and social research;
- an inventory of Aboriginal knowledge of native plants;
- an inventory of Aboriginal knowledge of native fauna;
- vegetation community and community dynamics;
- land condition monitoring (vegetation recovery);
- reference areas within the park specifically for baseline data collection and ongoing monitoring programs, to measure management regime effectiveness;
- identification of the specific needs of native plant populations that may require habitat manipulation for their survival/recovery;
- a comprehensive fauna survey of the park, including surveys of water birds on Peery and Poloko Lakes during times that the lakes are flooded;
- identification of the specific needs of native fauna populations that may require habitat manipulation for their survival/recovery;
- potential impacts on the mound springs at Peery Lake;

- prescribed burning programs for fuel and habitat management and asset protection;
- fuel management strategies for seasons with high ephemeral grass growth; and
- visitor monitoring/accurate visitation data.

Desired outcomes

- Increased knowledge of the natural and cultural assets of the park.
- Research that assists management decision making.
- Research that assists to promote an awareness and understanding of the park.
- Research causes minimal environmental or cultural heritage damage.
- Cooperative research partnerships are formed.

Strategies and actions

- Prepare a prospectus of priority research opportunities that can assist management decision-making.
- Encourage organisations and individuals to take up priority research opportunities and, where appropriate, provide active support for this research.
- Develop cooperative research partnerships and agreements with appropriate educational and research organisations.
- Encourage individuals or groups to submit opportunistic observational information gathered in the park.
- Ensure that all research reports and data are provided to NPWS for park records and management purposes.
- Where appropriate, interpret and publicise research findings to park visitors and the community.

8. OTHER USES

Several Travelling Stock Routes (TSRs) border or cross the park: along the eastern boundary of the Peery section, through the Mount Murchison section near the river, and through the Wilga section near the river (refer to Figures 3 and 4). These are infrequently used and, as is the normal practice in the Western Division, when not in use as a TSR they are managed according to the adjoining land use (in this case national park).

The main roads through the park are managed by Central Darling and Cobar Shire Councils. The roads to the Perry Lake day use area and to the Wilga (Coach and Horses) campground are maintained by NPWS.

Some landholders adjoining the park have traditionally used minor roads through the area for access to their properties. Since the properties forming the park were acquired, these neighbours have emphasised the importance of retaining this access, which in some cases provides the only means of leaving their properties.

East Australian Pipeline Limited has a registered easement that traverses the park from north-west to south-east, and carries natural gas from Moomba in South Australia to Wilton in New South Wales. An access track is situated alongside the pipeline, which is used for routine inspections and access for pipeline maintenance.

Country Energy has a series of single wire earth return (SWER) powerlines that traverse the park. A basic access track is situated alongside each powerline, which is used for routine inspections and access for maintenance.

Licensed commercial fishers occasionally request access to traverse the park to gain access to lakes and waterways. Commercial fishers may apply and have applications assessed to use management trails within the park in accordance with the legislation and the NPWS Professional Fishing Access Policy.

Applications for commercial activities such as filming, photography and commercial tour operators on the park have been made in the past, and are likely to increase in the future. NPWS will accommodate commercial activities where appropriate, according to NPWS legislative and policy requirements. These activities may be subject to conditions, to minimise impact and ensure compliance with this plan.

Desired outcomes

- Use of travelling stock routes has minimal impacts on the natural and cultural values of the park.
- Adjoining landholders with traditional access to their properties through the park will retain this access, subject to written approval.
- Management and use of the existing gas pipeline and powerline easements will have minimal impacts on the natural and cultural values of the park.

- Management of commercial activities, including commercial fishing, is consistent with NPWS legislation and policies.

Strategies and actions

- Continue to liaise with the Far West Livestock Health & Pest Authority and adjoining landholders regarding the use of travelling stock routes, and continue to manage them as part of the park.
- Investigate granting of written approval to adjoining landholders requiring traditional access to their properties through the park. NPWS will retain the right to issue conditions and/or temporarily close these access routes if necessary (e.g. heavy rain, pest control activities), however affected landholders will be informed of such closures.
- Any work on the gas pipeline, powerlines and associated access tracks must be approved in writing by the Area Manager, and may be subject to conditions to minimise potential impacts.
- Applications for appropriate commercial activities on the park will be considered in accordance with NPWS policies.
- NPWS will actively pursue the addition of the TSRs into the park.

9. NPWS MANAGEMENT FACILITIES AND OPERATIONS

The management infrastructure of Paroo-Darling National Park and SCA includes:

- a workshop and compound at Peery
- a homestead at Peery, which is used for permanent staff accommodation
- shearers quarters at Peery, which are used for visiting staff accommodation
- an airstrip at Peery
- a homestead at Arrowbar, which is used for permanent staff accommodation
- shearers quarters at Mandalay, which are being developed for use as staff accommodation, and as a cultural renewal camp for use by the Aboriginal community to connect with Country.
- a workshop at Wilga
- a homestead at Wilga, which is used for permanent staff accommodation
- a second homestead at Wilga, which may be developed for use as staff accommodation and office
- shearers quarters at Wilga, which are used for visiting staff accommodation
- a workshop at Tilpilly
- a homestead at Tilpilly, which is used for permanent staff accommodation
- shearers quarters at Tilpilly, which are used for visiting staff accommodation

In addition, the visitor centre for the park is located at White Cliffs, and a workshop and compound are located in Wilcannia. Staff housing and a secure storage facility in White Cliffs are also being considered.

The park has an extensive network of vehicle tracks developed by the former landholders for property management. Many of these will not be required for visitor access or park management purposes, and may be closed. Some access tracks may be required for park management purposes (e.g. fire management). Development of any new tracks will be subject to approval through the Review of Environmental Factors (REF) process.

The park has an extensive network of boundary and internal fencing, developed by the former landholders for property management. Boundary fencing will be maintained under agreements with neighbouring landholders, consistent with the NPWS fencing policy. Many internal fences will not be required for park management purposes, and may be removed subject to an assessment of historic heritage value and recording of construction and location details. Fence strainers and corner posts will be retained.

The park has a small number of borrow pits that have been used as a source of material for road maintenance. The NPWS Policy Statement on use of raw materials states that "Extractive activities ... will be limited to those required for the purposes of park management. ... Operations will be undertaken only when the material is necessary to achieve management objectives and practices and an appropriate level of environmental assessment is conducted". Existing borrow pits will continue to be used for road maintenance within the park, subject to approval of a Review of Environmental Factors. Borrow pits not required for park management or road maintenance purposes may be closed and rehabilitated.

Attached to the Wilga section of Paroo Darling National Park is a current irrigation licence, number 85SL019830, for 102 megalitres, used for ongoing irrigation of the cultural plantings including the orchard.

The park has a large number of ground tanks (dams) that were developed by the former landholders for stock watering purposes. Some of these will be maintained for domestic water supply, fire management, pest management or road maintenance purposes. Ground tanks not required for park management or road maintenance purposes may be closed and rehabilitated. Where possible, natural hydrology will be restored.

Desired Outcomes

- Management facilities adequately serve park management requirements and have limited environmental impact.
- Management facilities and infrastructure provide a safe working environment for staff, and meeting Occupational Health and Safety, residential tenancy and any other appropriate standards.

Strategies and Actions

- Maintain management facilities and infrastructure in good condition, and ensure that any appropriate standards are met.
- Maintain visitor access tracks and park management tracks to a suitable standard. Where possible ensure that tracks are on sustainable alignments. Where necessary, realign tracks subject to an approved Review of Environmental Factors.
- Lease homesteads in the park to NPWS staff for accommodation, as part of the adaptive reuse of buildings and infrastructure.
- Maintain boundary fencing under agreements with neighbouring landholders, consistent with the NPWS fencing policy.
- Remove internal fences not required for park management purposes, subject to an assessment of historic heritage value and recording of construction and location details.
- Continue to source material for park management or road maintenance purposes from existing borrow pits, subject to approval of a Review of Environmental Factors. Close and rehabilitate borrow pits that are not required for park management or road maintenance purposes.

- Develop a ground tank management plan, to identify the ground tanks required/ not required for management purposes. Close and rehabilitate ground tanks that are not required for park management or road maintenance purposes. Where possible, natural hydrology will be restored.
- Close and where necessary rehabilitate pre-existing property management tracks that are not required for visitor access or park management purposes.
- Maintain close liaison with neighbouring landholders and local communities regarding matters of mutual interest and effective management (e.g. whole of landscape approach).

10. PLAN IMPLEMENTATION

This plan of management establishes a scheme of operations for Paroo-Darling National Park and State Conservation Area. It will remain in force until amended or replaced in accordance with section 73B of the National Parks and Wildlife Act. The plan is part of a system of management which includes the National Parks and Wildlife Act, management policies, established conservation and recreation philosophies, and strategic planning at corporate, directorate and regional levels. The latter may include development of related plans such as regional recreation plans, species recovery plans, fire management strategies and conservation plans.

Relative priorities for activities identified in this plan are set out in the following table. These priorities are subject to the availability of necessary staff and funds. High priority activities are those considered imperative to achievement of the objectives and desired outcomes. They must be undertaken in the near future to avoid significant deterioration in natural, cultural or management resources. Medium priority activities are those that are necessary to achieve the objectives and desired outcomes but are not urgent. Low priority activities are desirable to achieve management objectives and desired outcomes but can wait until resources become available.

The environmental impact of proposed activities will be assessed at all stages in accordance with established environmental assessment procedures. If the impacts of any activity proposed in this plan are found to be unacceptable, the activity will not be undertaken or be modified so as to comply with the environmental assessment outcomes.

Strategies and Actions

- Undertake an annual review of progress in implementing this plan of management.
- Undertake an assessment after 5 years of the effectiveness of managing the park in accordance with this plan and of the degree of success in achieving the plan's objectives and desired outcomes. Base the evaluation on the monitoring programs set out in this plan and any others that may be developed.

Implementation Table

Priority	Activity	Plan reference
High	Investigate impacts on the mound springs at Peery Lake through an exclosure trial. Monitor the impacts on both fenced and unfenced mound springs, to determine appropriate future management.	4.1, 4.3, 5.1
	Develop cooperative relationships with water management authorities, neighbours and stakeholders, and promote the importance of flooding and drying events to maintain key ecological processes.	4.2
	Provide input into water management planning and strategies.	4.2
	Complete the vegetation mapping of the park, and ensure transfer of vegetation data to the NPWS Geographic Information System (GIS).	4.3
	Implement measures included in threatened species Priority Action Statements and recovery plans, including for the salt pipewort (<i>Eriocaulon carsonii</i>)	4.3, 4.4
	Investigate options for cooperative park management with the Paakantyi and Ngiyeempaa Aboriginal communities.	4.5
	Involve members of the Paakantyi and Ngiyeempaa communities in the conservation and protection of Aboriginal heritage within the park.	4.5
	Promote the Aboriginal cultural significance of the area to park visitors, through interpretive signage, park publications and guided tours.	4.5
	Ensure the safe keeping of any Aboriginal cultural material held by NPWS, and consult with members of the Paakantyi and Ngiyeempaa communities to ensure appropriate use/presentation. Where possible, repatriate this material in accordance with the NPWS Repatriation of Aboriginal Cultural Material Policy.	4.5
	Pursue opportunities for Paakantyi and Ngiyeempaa Aboriginal people to maintain their cultural links with the park.	4.5
	Encourage research into the archaeology of the park, for management decision making and broader education/interpretation purposes. Ensure that Paakantyi and Ngiyeempaa Aboriginal people are involved in any such research.	4.5
	Prepare and implement conservation management plans for all historic buildings. Develop strategies for the protection of other heritage assets.	4.6
Pest control programs will continue to target priority species of introduced plants and animals, in accordance with the Far West Region Pest Management Strategy.	5.1, 5.3	

Priority	Activity	Plan reference
High (cont'd)	Priority for control will be as follows: <ul style="list-style-type: none"> – species that are declared noxious or for which a national emergency control program has been declared or are known to be an important problem in other parks or states; – species that have a significant environmental impact, including damage to threatened species, catchment values and recreation values; – species that may affect neighbouring lands or are considered of high priority by the community; – where benefits gained from previous control programs need to be maintained; or – where a particular window of opportunity exists (e.g. controlling feral goats during extended hot periods when water sources are limited). 	5.1
	Seek the cooperation of adjoining landholders and other agencies in pest control programs.	5.1
	Seek cooperation from adjoining landholders to remove stock as soon as possible when stock incursions occur.	5.1
	Develop and implement a goat management plan	5.1
	Manage wildfire and prescribed burning consistent with the Paroo-Darling National Park fire management strategies. Review the fire management strategies annually, and amend as necessary.	5.2, 5.3
	Update the fire management strategies to include the park additions.	5.2
	Continue to actively participate in the Central Darling District Bush Fire Management Committee, and maintain close contact and cooperation with Rural Fire Service staff and volunteer brigades.	5.2
	Continue to participate in the preparation and revision of the District Bush Fire Risk Management Plan and Operations Plan.	5.2
	Seek the cooperation of adjoining landholders and other agencies in fire management activities.	5.2
	Develop a ground tank management plan, to identify the ground tanks required/not required for management.	5.2
	Develop an interpretation plan for Paroo-Darling National Park.	6.1
	Provide interpretive, directional and regulatory signage at appropriate locations throughout the park, such as major park entrances and the Mandalay Rd-Wanaaring Rd intersection.	6.1
	Reflect the cultural heritage of the park in park signage and locality names, both European and Aboriginal. The Wilga campground will be re-named the Coach and Horses campground.	6.1

Priority	Activity	Plan reference
High (cont'd)	Involve members of the Paakantyi and Ngijeempaa Aboriginal communities in active interpretation of the Aboriginal heritage of the park	6.1
	Provide opportunities for the Paakantyi and Ngijeempaa Aboriginal communities to run cultural tours in the park.	6.2
	Promote the use of gas or liquid fuel stoves by park visitors for cooking and warmth.	6.2
	Maintain the gas barbecues at the Wilga (Coach and Horses) campground, and where possible provide gas appliances at other recreational sites as they are developed.	6.2
	Provide educational and interpretive material at key sites and in park publications to explain the “no wood fires” policy and the value of fallen timber as habitat.	6.2
	Investigate granting of written approval to adjoining landholders requiring traditional access to their properties through the park. NPWS will retain the right to issue conditions and/or temporarily close these access routes if necessary (e.g. heavy rain, pest control activities), however affected landholders will be informed of such closures.	8
	Maintain boundary fencing under agreements with neighbouring landholders, consistent with the NPWS fencing policy.	9
	Undertake an annual review of progress in implementing this plan of management.	10
Medium	Undertake management and construction of all roads, tracks and facilities so as to minimise impacts on the geomorphology and landscape features of the park.	4.1
	Reduce the rate of soil erosion by controlling unnatural impacting factors (e.g. control of feral animals, reduction of large-scale intense fires) and monitor trends over time.	4.1, 5.3
	Establish reference areas within the park specifically for baseline data collection and ongoing monitoring programs, to measure the effectiveness of management regimes. This will include monitoring of the mound springs community to investigate any potential impacts of increased visitation rates through development of visitor facilities.	4.3
	Undertake measures to protect the nelia (<i>Acacia loderi</i>) woodland community, including control of rabbits and goats and protection from inappropriate fire regimes.	4.3

Priority	Activity	Plan reference
Medium (cont'd)	Undertake fauna surveys of the park to build upon existing data, with regard to varying seasonal changes and flood regimes. In particular, undertake surveys of water birds on Peery and Poloko Lakes (Paroo River Overflow) Poopelloe and Wongalara Lakes (Darling River floodplain) during times when the lakes are flooded.	4.4
	Identify specific needs of native fauna populations that may require habitat manipulation for their survival/recovery (e.g. understorey revegetation, fire regimes, herbivore or predator control) and monitor the effectiveness of any such programs.	4.4
	Ensure that fauna records are entered into the Atlas of NSW Wildlife database.	4.4
	Undertake an inventory of Aboriginal knowledge of bush foods medicines and other resources, for information and interpretation purposes.	4.5
	Ensure that Aboriginal cultural site information is entered into the Aboriginal Heritage Information Management System (AHIMS) database.	4.5
	Promote the historic heritage significance of the area to park visitors, through interpretive signage, park publications and where consistent with heritage values, allow access to heritage sites.	4.6
	Develop and implement a maintenance program for significant historic buildings and other heritage assets. This will include a bi-annual condition inspection.	4.6
	Ensure that historic heritage site information is entered into the Historic Heritage Information Management System (HHIMS) database.	4.6
	Investigate prescribed burning programs for fuel management and habitat management.	5.2
	Investigate additional fuel management strategies (such as slashing, early season burning) to be implemented in seasons of high ephemeral grass growth, to limit the potential for spread of fire into, within or out of the park.	5.2
	Maintain records of fire occurrence, with a particular emphasis on accurately mapping and recording the frequency, extent, intensity, seasonality and patchiness of fires.	5.2
	Encourage research into indicators to monitor the affects of climate change	5.3
	Seek appropriate opportunities to promote the park, including regional tourist publications.	6.1

Priority	Activity	Plan reference
Medium (cont'd)	Develop and undertake Discovery interpretive programs appropriate to the level of visitation to the park.	6.1
	Actively participate in tourism organisations, including the White Cliffs Opal Fields Tourist Association and the Central Darling Shire Tourism and Economic Development Advisory Group.	6.1
	Extend the Wilga (Coach and Horses) campground to provide additional sites to cater for future demand, and maintain as a basic camping area.	6.2
	Investigate the development of a basic campground of up to 12 sites within the Peery Recreation Zone.	6.2
	Other than the Darling River, recreational use of motorised craft will not be permitted on lakes and waterways within the park.	6.2
	Prepare a prospectus of priority research opportunities that can assist management decision making.	7
	Encourage organisations and individuals to take up priority research opportunities and, where appropriate, provide active support for this research.	7
	Develop cooperative research partnerships and agreements with appropriate educational and research organisations.	7
	Ensure that all research reports and data are provided to NPWS for park records and management purposes.	7
	Where appropriate, interpret and publicise research findings to park visitors and the community.	7
	Maintain management facilities and infrastructure in good condition, and ensure that any appropriate standards are met.	9
	Maintain visitor access tracks and park management tracks to a suitable standard. Where possible ensure that tracks are on sustainable alignments. Where necessary, realign tracks subject to an approved review of environmental factors.	9
	Lease homesteads in the park to NPWS staff for accommodation, as part of the adaptive reuse of buildings and infrastructure.	9
	Continue to source material for park management or road maintenance purposes from existing borrow pits, subject to approval of a review of environmental factors. Close and rehabilitate borrow pits that are not required for park management or road maintenance purposes.	9

Priority	Activity	Plan reference
Medium (cont'd)	Develop a ground tank management plan, to identify the ground tanks required/ not required for management purposes. Close and rehabilitate ground tanks that are not required for park management or road maintenance purposes. Where possible, natural hydrology will be restored.	9
	Close and where necessary rehabilitate pre-existing property management tracks that are not required for visitor access or park management purposes.	9
	Undertake an assessment after 5 years of the effectiveness of managing the park in accordance with this plan and of the degree of success in achieving the plan's objectives and desired outcomes. Base the evaluation on the monitoring programs set out in this plan and any others that may be developed.	10
Low	Encourage and promote appropriate archaeological, palaeontological and geomorphological research for management decision making and broader education and interpretive purposes.	4.1
	Encourage vegetation community and community dynamics research, particularly in relation to fire regimes, to identify specific needs of native plant populations that may require habitat manipulation for their survival/recovery (e.g. revegetation programs, fencing or fire regime manipulation).	4.3
	Encourage research into fauna distribution, abundance and interactions, to identify specific needs of native fauna populations that may require habitat manipulation for their survival/recovery (e.g. understory vegetation or predator control) and monitor the effectiveness of any such programs.	4.4
	Nominate for inclusion on the State Heritage Register any historic place or historic item considered to be of State significance.	4.6
	Investigate historical records of Aboriginal burning patterns from accounts of explorers and early pastoralists.	5.2
	Continue to update the Paroo-Darling National Park brochure, as additional facilities are developed or as additional information becomes available.	6.1
	Provide licensed commercial tour operators with training and information on the natural and cultural values, recreational opportunities and management strategies of the park.	6.1

Priority	Activity	Plan reference
Low (cont'd)	Develop a visitor monitoring system to gain accurate visitation data across the park to assist management decision making.	6.2
	Pursue where appropriate cooperative operations with the private sector, including involvement in the Wilga (Coach and Horses) campground, as a means of achieving better social and economic outcomes opportunities for Wilcannia, White Cliffs and the broader community.	6.2
	Encourage individuals or groups to submit opportunistic observational information gathered in the park.	7
	Continue to liaise with the Far West Livestock Health and Pest Authority and adjoining landholders regarding the use of travelling stock routes, and continue to manage them as part of the park.	8
	Any work on the gas pipeline, powerlines and associated access tracks must be approved in writing by the Area Manager, and may be subject to conditions to minimise potential impacts.	8
	Applications for appropriate commercial activities on the park will be considered, in accordance with NPWS policies.	8
	Actively pursue addition of the TSRs into the park.	8
	Remove internal fences not required for park management purposes, subject to an assessment of historic heritage value and recording of construction and location details.	9

ACRONYMS

CAMBA	China-Australia Migratory Birds Agreement – an agreement between the Government of Australia and the Government of the People’s Republic of China for the protection of Migratory Birds and their Environment (dated 20 October 1986)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
GIS	Geographic Information System – a computer-based system that allows very large amounts of data to be displayed and printed in map form.
JAMBA	Japan-Australia Migratory Birds Agreement – an agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (dated 6 February 1974)
NPW Act	<i>National Parks and Wildlife Act 1974</i> (NSW)
NPWS	NSW National Parks and Wildlife Service
REF	Review of Environmental Factors
SCA	State Conservation Area
SWER	Single wire earth return, a single wire powerline
TSC Act	<i>Threatened Species Conservation Act 1995</i> (NSW)
TSR	Travelling Stock Route

GLOSSARY

Aeolian	Deposited by wind.
Alluvial	Deposited by water.
Archaeology	The study of human cultures.
Biodiversity	Biological diversity, namely the variety of life forms: the different plants, animals and micro-organisms, the genes they contain, and the ecosystems they form. It is usually considered at three levels: genetic diversity, species diversity and ecosystem.
Biogeographic region	A land area defined by a combination of biological and geographic criteria, and composed of a cluster of ecosystems and communities that are repeated in similar form throughout.
Colluvial	Deposited or built up at the bottom of a low grade slope or against a barrier on that slope, as a result of rainwater or downhill creep by gravity.
Conservation	All the processes and actions of looking after a place (such as protection, maintenance, management, sustainable use and restoration) so as to retain its natural and cultural significance.
Cultural heritage	The value people give to items through their associations with them. It can be tangible (ie have physical manifestation in the form of art, buildings etc.) or intangible (ie spiritual or social associations, songs, stories and cultural practices). Cultural significance includes values that are social, spiritual, aesthetic, historic and scientific. When natural resources acquire meaning for a particular group, they become cultural resources as well.
Ecological community	An assemblage of species occupying a particular area.
Ecological processes	All those processes that occur between organisms, and within and between population and communities, including interactions with the non-living environment.
Endangered ecological community	An ecological community specified in Part 3 of Schedule 1 of the TSC Act.

Endangered	A species, population or ecological community that is listed in Schedule 1 of the TSC Act as in danger of becoming extinct.
Evaporite	Mineral sediments resulting from evaporation. The mound springs at Peery Lake are formed from this material.
Fauna	Under the NPW Act, any mammal, bird, reptile or amphibian. NPWS has responsibility for the conservation of fauna. Note: this definition excludes fish or invertebrates.
Feral species	A domesticated species that has become wild.
Fire Management	Includes all activities associated with the use and control of fire.
Geographic Information System (GIS)	A computer-based system that allows very large amounts of data to be displayed and printed in map form. Data can be manipulated and interrogated in a variety of ways. Most GISs can also be used to make predictions based on available information (eg potential distributions of rare and threatened species).
Geomorphic	Land form (geomorphology: the study of land forms).
Historic places	Landscapes, sites, buildings or other works, together with pertinent contents and surroundings, which contain historic resources. Places can include structures, ruins, archaeological sites and areas.
Introduced species	A species occurring in an area outside its historically known natural range as a result of intentional or accidental dispersal by human activities. Also known as exotic, alien or pest species.
Land System	Areas or groups of areas throughout which there is a recurring pattern of topography, soils and vegetation.
Lithosol	A shallow soil dominated by the presence of weathering rock and rock fragments.
Palaeontology	The study of the development of life on earth.
Policy	A statement of attitude and course of action, directed toward the attainment of the corporate goals and/or objectives of the Service.

Ramsar Convention	The UNESCO Convention on Wetlands of International Importance, adopted at Ramsar, Iran in 1971. The ecological character of a declared Ramsar wetland is a matter of National Environmental Significance under the EPBC Act.
Recovery plan	A document prepared under the TSC Act that identifies the actions to be taken to promote the recovery of a threatened species, or endangered population or ecological community.
Silcrete	A hard silica crust on or near the surface of a soil formed in a semi-arid climate.
Traditional owners	A local descent group of indigenous people who have common spiritual affiliations to an area and primary spiritual responsibility for sites in that area.

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