



Office of
Environment & Heritage
NSW National Parks & Wildlife Service



Plan of Management



Willandra National Park

WILLANDRA NATIONAL PARK

PLAN OF MANAGEMENT

NSW National Parks and Wildlife Service

November 2012

This plan of management was adopted by the Minister for the Environment on 3rd November 2012.

Acknowledgements

The NPWS acknowledges this park is in the traditional country of the Ngiyampaa Wangaaypuwan people.

The document is based on a draft plan prepared by staff of the Western Rivers Region, Griffith Area, of the NSW National Parks and Wildlife Service (NPWS). Information used in this document has been drawn from many people with past associations with the park and has contributed enormously to an understanding of the history and values of the area.

Photographs: Cover: Willandra Homestead, by Colin Killick/NPWS. Page 1: View across the open plains to the Willandra shearing precinct, by Andrea Cashmere/NPWS.

For additional information or any enquiries about this park or this plan of management, contact the NPWS Griffith Area Office, 200 Yambil St, Griffith NSW 2680 or by telephone on 6966 8100.

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FOREWORD

Willandra National Park is located 64 kilometres west of Hillston and 150 kilometres north-west of Griffith in western NSW. It is 19,385 hectares in size.

Willandra National Park is representative of the grassland and cottonbush plains of central western NSW and contains a sample of the Riverine Plain of the Murray Darling Basin Lowlands. The park provides habitat for sixteen threatened animal species and two threatened plant species, including ducks and other waterbirds that use Willandra Creek and the ephemeral lakes within the park.

The park contains a range of Aboriginal sites. In the past Willandra Creek served as an important travel route and source of food for the Ngiyampaa Wangaaypuwan people.

Willandra Homestead is listed on the NSW State Heritage Register as a rare and intact example of domestic rural architecture post-World War One. The buildings, paddocks, watering systems, roads and tracks, and the changes to natural watercourses reflect the use of the property during the ninetieth and twentieth centuries. The shearing shed is recalled in folk songs and was the site of strikes and disputes by shearers in the late seventeenth century.

The New South Wales *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each national park. A draft plan of management for Willandra National Park was placed on public exhibition from 24 September to 31 December 2010. 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, such as investigating methods to improve regeneration of native vegetation communities, undertaking actions to protect threatened species, and undertaking feral animal control to reduce erosion and improve regeneration. The plan also provides for enhanced recreation opportunities through improved visitor information, provision of visitor accommodation in historic buildings, and opportunities for scenic drives, bushwalking, horse riding and cycling.

This plan of management establishes the scheme of operations for Willandra National Park. 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 WILLANDRA NATIONAL PARK

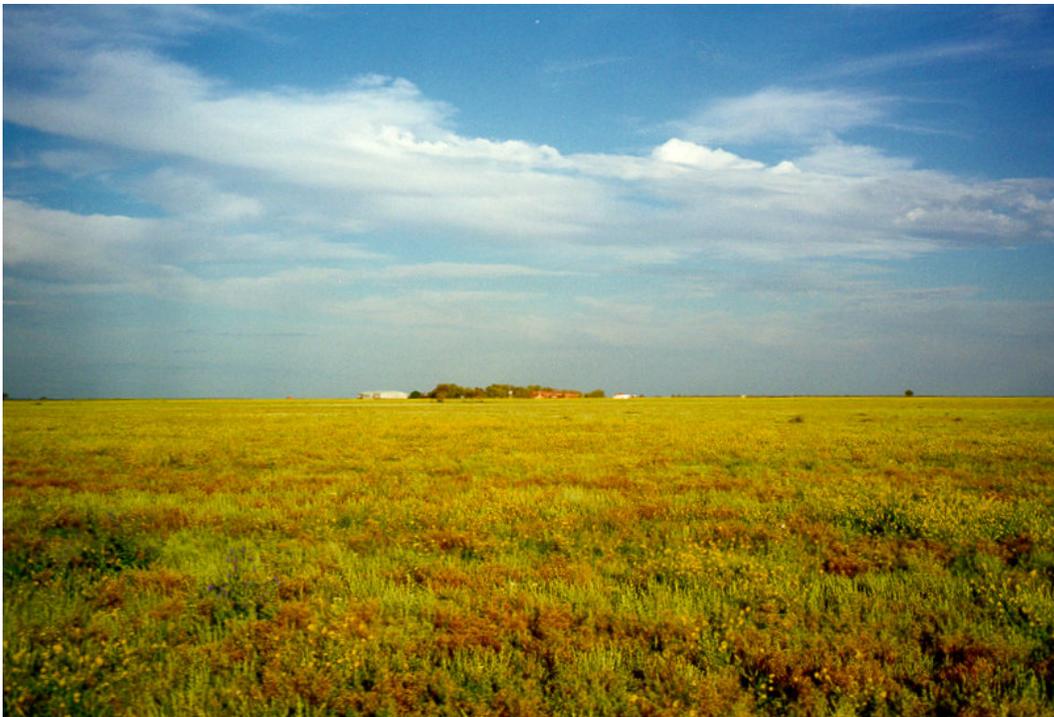
1.1 LOCATION, GAZETTAL AND REGIONAL CONTEXT

Willandra National Park is 19,385 hectares in size and located 64 kilometres west of Hillston and 150 kilometres north-west of Griffith in western NSW (see Map 1). Willandra National Park was gazetted in 1972 over 13,000 hectares of Crown leasehold land resumed by the NSW Government. A further 6,000 hectares of freehold land, including the homestead and shearing precincts, was purchased using funds donated by Boral Pty Ltd and gazetted in 1975 under the *NSW National Parks and Wildlife Act 1974*.

The park is located on the northern end of the Riverina Bioregion (the Riverine plains of the Murray Basin Lowlands) (NSW National Parks and Wildlife Service, 2003). Only 3.7 percent of the Bioregion is within NSW conservation reserves and it is one of the least conserved bioregions in the state.

The surrounding area is used primarily for sheep and cattle grazing. Intensive irrigated agriculture also occurs within the area.

Willandra National Park is located within the Western Division of NSW and the geographical area of the Carrathool Shire Council, the Lachlan Catchment Management Authority and the Griffith Local Aboriginal Land Council.



2 MANAGEMENT CONTEXT

2.1 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 NPW Regulation, *Threatened Species Conservation Act 1995* (TSC Act) and the policies of the National Parks and Wildlife Service (NPWS).

Other legislation, international agreements and charters may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979* (EPA Act) may require 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) also applies in relation to actions that may impact threatened species listed under that Act.

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 Willandra National Park except in accordance with the plan. The plan will also apply to any future additions to Willandra National Park. Should management strategies or works be proposed for the park or any additions that are not consistent with the plan, an amendment to the plan will be prepared and exhibited for public comment.

This plan of management replaces the plan of management for Willandra National Park adopted in 1989 (NPWS, 1989).

2.2 MANAGEMENT PURPOSES AND PRINCIPLES

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 (section 30E), 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.

2.3 STATEMENT OF SIGNIFICANCE

Willandra National Park is considered to be of significance for the following values:

Biological values

- contains a sample of the Riverine Plain of the Murray Darling Basin Lowlands;
- the park is representative of the grassland and cottonbush plains of central western NSW;
- Willandra Creek and the ephemeral lakes within the park provide habitat for wetland species;
- the park provides habitat for sixteen threatened animal species and two threatened plant species.

Landscape values

- the expansive horizons of the Riverine Plain, interrupted only by vegetation of the Willandra Creek and black box depressions;
- the distinctive layout of the homestead and shearing precincts.

Aboriginal and historic heritage values

- a variety of Aboriginal sites, the creation story of Willandra Creek, and its use as a travelling route to the Willandra Lakes system;
- Willandra Homestead is listed on the NSW State Heritage Register as a rare and intact example of domestic rural architecture post-World War One;
- the park is listed on the Australian Heritage Database as an example of a property important in developing local, regional and national economies.

Recreation values

- a variety of accommodation options in pastoral buildings as well as nature-based camping opportunities;
- buildings of cultural heritage interest, including the homestead and shearing precincts;
- the presence of the homestead and garden as an oasis in the otherwise vast semi-arid plain;
- opportunity to experience the semi-arid northern Riverine environment with open plains and wooded areas along Willandra Creek.

Research and educational values

- schools and universities use the park for scientific and educational purposes;
- the potential for research relating to the flora, fauna and ecosystems of the semi-arid Riverine plains.

2.4 SPECIFIC MANAGEMENT DIRECTIONS

In addition to the general principles for the management of national parks, the following specific management directions will apply to the management of Willandra National Park.

The primary emphasis of this plan is the conservation of the natural and cultural heritage values of the park. Visitor opportunities compatible with, and that promote the understanding and enjoyment of, these values are also a key emphasis. These will be achieved through the following:

- conservation of the historic buildings and the landscape of the historic precincts in accordance with their high level of cultural significance;
- protection and rehabilitation of vegetation communities outside of the historic precincts;
- protection of native animal communities from predation and competition by feral and introduced animals;
- promoting visitor awareness of the landscape, plant and animal communities and cultural heritage of the park through appropriate interpretation;
- promoting the park as a tourist destination, including camping facilities and the provision of accommodation in pastoral buildings; and
- encouragement of scientific and educational inquiry into the natural and cultural values of the park.

3 VALUES

The location, landforms and plant and animal communities of an area have determined how it has been used and valued. Both Aboriginal and non-Aboriginal people place values on natural areas, including aesthetic, social, spiritual and recreational values. These values may be attached to the landscape as a whole or to individual components, for example to plant and animal species used by Aboriginal people. This plan of management aims to conserve both natural and cultural values. For reasons of clarity and document usefulness, various aspects of natural heritage, cultural heritage, threats and on-going use are dealt with individually, but their inter-relationships are recognised.

3.1 GEOLOGY, LANDFORMS AND HYDROLOGY

Willandra National Park is situated on the northern edge of the Riverine Plain of the Murray Darling Basin Lowlands. The Riverine Plain was formed during the Quaternary period (1.8 million years to present) by large rivers flowing off the eastern highlands depositing huge amounts of alluvium, creating gently sloping fans and floodplains across the Murray Basin. By the Holocene Epoch (10,000 years before present to today) the climate was warmer, rivers had retreated, the smaller Lachlan and the Murrumbidgee Rivers flowed along their present courses and large volumes of dust blown from the arid interior had settled to form a mantle over the alluvial plains.

The landscape today is very flat, averaging 100 metres above sea level, and with horizons interrupted only by trees along creeks and depressions.

Soil erosion is a natural process in Willandra National Park. The heavy grey soils of Willandra Creek and the depressions are at times subject to low levels of water erosion. Texture contrast soils in plains areas have historically suffered from sheet erosion.

The two watercourses on the park, Willandra and Yangellawah Creeks, are distributaries of the Lachlan River. Water flow down Willandra Creek is highly regulated due to weirs constructed along the Lachlan River. Yangellawah Creek and local depressions (including Hall's Lakes) hold water after local heavy rain or floodwaters flowing from the Lachlan River.

Issues

- The flat topography means built structures are highly visible in plains areas.
- The introduction of rabbits, past grazing by introduced stock and vegetation clearing have accelerated erosion in some areas, especially on texture-contrast soils.
- Vehicles driving off the formed roads can create visible tracks that take years to recover.

Desired Outcomes

- The scenic values of the park, in particular the open horizons, are protected.
- Significant geological and geomorphological features are protected.
- The landscape and soils continue to naturally evolve and the impact of non-natural causes of erosion is minimised.

Management Response

- 3.1.1 Introduced species such as rabbits and goats that accelerate soil erosion will be controlled (see section 4.1).
- 3.1.2 Signage will be erected to inform visitors to stay on public access roads.
- 3.1.3 The extent of clay pans and condition of sandy rises will be monitored by aerial photography and ground inspection, with remedial action undertaken in areas subject to continuing soil erosion.
- 3.1.4 Management and visitor facilities will be designed and located so as to minimise their visual and erosional impacts.

3.2 NATIVE PLANTS

Before European settlement, bladder saltbush (*Atriplex vesicaria*), cottonbush (*Maireana aphylla*) and native grasses are believed to have been the main plant cover on the plains (Beadle 1948; Moore 1953). The introduction of herbivores (rabbits, sheep and cattle) from the 1830s combined with the introduction of pasture species is believed to have reduced the prominence of perennial saltbush species in favour of grasses. Differences in vegetation are still discernable between former paddocks, reflecting past grazing intensities, especially in holding paddocks and around water sources (including along Willandra Creek).

Bladder saltbush is not known to occur on the park today, but cottonbush occurs in varying densities across the park, along with several other saltbushes such as thorny saltbush (*Rhagodia spinescens*), woolly copperburr (*Scerolaena lanicuspis*) and slender-fruited saltbush (*Atriplex leptocarpa*). Black bluebush (*Maireana pyramidata*) occupies small areas of the park, and evidence suggests past grazing impacts has reduced its distribution across sandy rises.

The grass and forb species reflect the climatic transition between summer and winter-dominated rainfall zones. Several grasses have affinities with communities found in semi-arid northern NSW. Warm-season rains promote the growth of native millet (*Panicum decompositum*), cup grass (*Eriochloa crebra*), fairy grass (*Sporobolus caroli*) with scattered, sometimes locally dominant, curly Mitchell grass (*Astrebla lappacea*) and Queensland blue grass (*Dichanthium sericeum*). Button grass (*Dactyloctenium radulans*) is found on sandier soils.

Autumn and winter rains favour some native species, such as ringed wallaby grass (*Austrodanthonia caespitosa*) and spear-grass (*Aristida scabra*), but generally naturalised species predominate, such as rye grass (*Lolium perenne*), barley grass (*Hordeum leporinum*) and wild oats (*Avena fatua*). Introduced burr medic (*Medicago polymorpha*) and ward's weed (*Carrichtera annua*) are also common.

The low sandy rises and sandy loams found on the park are thought to have supported an open woodland community, today only existing as remnant specimens or small stands. Scattered trees remain of white cypress pine (*Callitris glaucophylla*), needlewood (*Hakea tephrosperma*), rosewood (*Alectryon oleifolius*), miljee (*Acacia oswaldii*), emu bush (*Eremophila longifolia*), punty bushes (*Senna spp.*) and prickly wattle (*Acacia victoriae*). The construction of fenced enclosures to keep areas free from vertebrate grazing has assisted in the protection of remnant populations of these species.

Black box (*Eucalyptus largiflorens*) and river cooba (*Acacia stenophylla*) are the dominant species along the intermittent creeks and ephemerally flooded depressions. The understorey is usually nitre goosefoot (*Chenopodium nitrariaceum*) and lignum

(*Muehlenbeckia florulenta*), with smaller depressions supporting cane grass (*Eragrostis australasica*). Cumbungi (*Typha orientalis*) and common reed (*Phragmites australis*) grow along the channel of Willandra Creek when water is present. The ongoing health and regeneration of these communities rely on appropriate water regimes being delivered down the Willandra Creek system.

Two plants listed under the schedules of the TSC Act have been recorded on Willandra National Park (Table 1). In addition the threatened Mossgiel daisy (*Brachyscome papillosa*) has been recorded on a neighbouring property and may occur on the park.

Table 1 Threatened plant species recorded at Willandra National Park.

Common name	Scientific name	Status*
Slender Darling Pea	<i>Swainsona murrayana</i>	Vulnerable #
Red Darling Pea	<i>Swainsona plagiotropis</i>	Vulnerable #

* Status is based on the schedules of the NSW *Threatened Species Conservation Act, 1995*.

Denotes species nationally threatened under the national *Environmental Protection and Biodiversity Conservation Act, 1999*.

Issues

- Regeneration of shrubs and trees on sandier soils appears sporadic, in part due to grazing pressures, especially introduced species such as rabbits.
- Flooding regimes and water quality in the Willandra Creek system are satisfactory for the ongoing maintenance and regeneration of riverine vegetation.
- Uncertainty as to the composition of past vegetation communities, loss of seed banks, past erosion, competition from introduced plant species and ongoing grazing pressures are significant challenges to restoring natural vegetation.

Desired Outcomes

- The full range of native plant species and communities found in the park are conserved.
- Negative impacts on native plant species are stable or reduced.
- Vegetation outside the historic precincts has its structural diversity and habitat values conserved and restored.

Management Response

- 3.2.1 Maintain and monitor regeneration patterns of woody vegetation both within fenced enclosures and across the park.
- 3.2.2 Construct additional fenced enclosures if necessary to protect sensitive vegetation types.
- 3.2.3 Investigate methods to improve regeneration of native vegetation communities, especially those found on sandier soils.
- 3.2.4 Ensure that management and visitor facilities are not located in areas of significant plant species or restricted plant communities.
- 3.2.5 Survey for known and potential threatened plant species to understand patterns of distribution and ecological preferences. Establish monitoring of known populations.

- 3.2.6 Implement priority actions for threatened plant species. This includes identifying threats to existing populations, the control of exotic grazing pressures such as rabbits or goats (refer to section 4.2), and site surveys during the growth and flowering periods as part of the environmental assessment process for any new developments.
- 3.2.7 Liaise with relevant authorities on water management issues along Willandra Creek, especially those affecting ecosystem health of riverine communities on the park.

3.3 NATIVE ANIMALS

European settlement is associated with the loss of several native animals once occurring across semi-arid NSW, including the burrowing bettong (*Bettongia lesueur*), bilby (*Macrotis lagotis*) and the eastern hare-wallaby (*Lagorchestes leporides*) (Lunney *et al.* 1994, Krefft 1848). The ecological impact from the loss of these species is uncertain, although evidence suggests medium-sized mammals such as these played an important role in ecosystem dynamics (e.g. Noble *et al.* 2007).

Today the most obvious native animals are kangaroos and emus (*Dromaius novaehollandiae*). The park supports populations of red (*Macropus rufus*), eastern grey (*M. giganteus*) and western grey (*M. fuliginosus*) kangaroos. Numbers of large kangaroo species are generally believed to be higher since European settlement through the increased provision of watering points and reduction in predation pressures (Landsberg *et al.* 1997), although densities vary dramatically on park due to seasonal conditions.

Known small mammals are the fat-tailed dunnart (*Sminthopsis crassicaudata*), and planigales (*Planigale gilesi* and *P. tenuirostris*). The threatened striped-faced dunnart (*Sminthopsis macroura*) is known only from a skull fragment identified in owl pellets (Rose 1981, unpubl.). Nine species of bat, including the threatened little pied bat (*Chalinolobus picatus*), occur on the park.

Several frogs and reptiles are known to be present. Most commonly seen are carpet pythons (*Morelia spilota*) and eastern brown snakes (*Pseudonaja textilis*). The endangered southern bell-frog (*Litoria raniformis*) has not been detected since the mid-1980s and is believed to be locally extinct.

A total of 195 bird species have been recorded in the park. Ducks and other waterbirds are commonly seen along Willandra Creek when it is flowing. Areas of cumbungi and common rush provide habitat for spotted and Baillon's crakes (*Porzana fluminea* and *P. pusilla*), purple swamphens (*Porphyrio porphyrio*) and Eurasian coots (*Fulica atra*). After heavy rain the temporary wetlands of Hall's Lakes and Yangellawah Creek provide useful waterbird habitat.

When water is present in Willandra Creek for extended periods, species including water rats (*Hydromys chrysogastor*), long-necked and murray tortoises (*Chelodina longicollis* and *Emydura macquarii*) occur, and the predominant fish is the introduced European carp (*Cyprinus carpio*).

The open plains support a number of declining ground-nesting species such as Australian pipit (*Anthus australis*), singing bushlark (*Mirafra javanica*), brown songlark (*Cinclorhamphus cruralis*), white-fronted chat (*Epthianura albifrons*) and banded lapwing (*Vanellus tricolor*) (Barrett *et al.* 2003). Good seasons attract numbers of stubble quail (*Coturnix pectoralis*) along with the nomadic little and red-chested buttonquails (*Turnix velox* and *T. pyrrhotorax*). Other ground-dwelling birds include the inland dotterel (*Charadrius australis*) and the endangered plains-wanderer (*Pedionomus torquatus*).

The plains-wanderer prefers low, sparse native grasslands on hard, red-brown loams (Parker and Oliver 2006). Although most of the plains on Willandra National Park are structurally unsuitable for this species (Baker-Gabb 1990), plains-wanderers have been found on the park over several years, including very dry periods, indicative of a small resident population. It has been estimated that overgrazing of suitable habitat during widespread droughts reduces the NSW plains-wanderer population to only 1000 individuals, with birds remaining only on lightly grazed properties (DEC 2003). Therefore any location with this species is significant.

In total, sixteen threatened animal species have been recorded on the park (see Table 2). Several of these appear to be occasional visitors to the park, such as the black-breasted buzzard (*Hamirostra melanosternon*), Australian bustard (*Ardeotis australis*), barking owl (*Ninox connivens*) and painted honeyeater (*Grantiella picta*).

Table 2 Threatened animal species recorded at Willandra National Park.

Common name	Scientific name	Status*
Southern Bell Frog	<i>Litoria raniformis</i>	Endangered#
Blue Billed Duck	<i>Oxyura australis</i>	Vulnerable
Freckled Duck	<i>Stictonetta naevosa</i>	Vulnerable
Australasian Bittern	<i>Botaurus poiciloptilus</i>	Vulnerable
Black-breasted Buzzard	<i>Hamirostra melanosternon</i>	Vulnerable
Australian Bustard	<i>Ardeotis australis</i>	Endangered
Barking Owl	<i>Ninox connivens</i>	Vulnerable
Plains-wanderer	<i>Pedionomus torquatus</i>	Endangered#
Pied Honeyeater	<i>Certhionyx variegatus</i>	Vulnerable
Painted Honeyeater	<i>Grantiella picta</i>	Vulnerable
Major Mitchell's Cockatoo	<i>Cacatua leadbeateri</i>	Vulnerable
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	Vulnerable
Hooded Robin (eastern subspecies)	<i>Melanodryas cucullata cucullata</i>	Vulnerable
Diamond Firetail	<i>Stagonopleura guttata</i>	Vulnerable
Australian Painted Snipe	<i>Rostratula australis</i>	Endangered#
Stripe-faced Dunnart	<i>Sminthopsis macroura</i>	Vulnerable
Little Pied Bat	<i>Chalinolobus picatus</i>	Vulnerable

Source: Atlas of NSW Wildlife.

* Status is based on the schedules of the NSW *Threatened Species Conservation Act, 1995*.

Denotes species listed as nationally threatened under the Commonwealth *Environmental Protection and Biodiversity Conservation Act, 1999*.

Issues

- Willandra National Park is likely to be an important local refuge in the northern Riverina if surrounding habitat becomes overgrazed.

- Survey work is required to ascertain the ongoing status of threatened species likely to occur on the park.
- Willandra National Park is one of only two protected areas in NSW with recent records of plains-wanderers and with a suite of declining grassland species.
- Introduced species, inappropriate fire regimes and visitor use (see sections 3.6, 4.1 and 4.2) can have negative impacts on native fauna habitat.

Desired Outcomes

- The habitat and populations of native fauna including threatened species within the park are conserved.

Management Response

- 3.3.1 Protect the habitats of native fauna species from visitor impacts, the effects of introduced species and inappropriate fire regimes.
- 3.3.2 Continue to record fauna species and implement targeted fauna surveys, including annual kangaroo density surveys.
- 3.3.3 Implement recovery plans and priority action statements for threatened species, such as ongoing rabbit, cat and fox control (section 4.1) to assist in protecting ground-dwelling native species including the plains-wanderer.

3.4 ABORIGINAL HERITAGE

Aboriginal communities have an association and connection with the land. The land and water within a landscape are central to Aboriginal spirituality and contribute 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, kinship systems and strengthening social bonds. Aboriginal heritage and connection to nature are inseparable from each other and need to be managed in an integrated manner across the landscape.

Willandra National Park is within the traditional and contemporary country of the Ngiyampaa Wangaaypuwan people. In the past Willandra Creek served as an important travel route and source of food for the Ngiyampaa Wangaaypuwan. It also represents a shared boundary with the neighbouring Wiradjuri people to the south. The formation of the Willandra Creek is told in a creation story, where the creek was formed from the track of a gigantic kangaroo pursued by two Bookoomuri (clever men) (NPWS 1999). The connection of Aboriginal people with the area was maintained through employment on the station as stockmen and domestic staff (NPWS 1999). Oral accounts suggest this area was used until the 1930's for food gathering and cultural practices.

A range of pre-contact and post-contact Aboriginal sites are found across the park, including scarred trees and open campsites. Known dates of occupation around the Willandra area are at least 15,000 years old (NPWS 1999).

Open surface campsites are commonly exposed in scalded areas, bringing to the surface stone flakes, grinding dish fragments and baked termite mound material used as heat retainers. Technological features of the stone flakes indicate these sites probably date to the late Holocene.

While NPWS has legal responsibility for the protection of Aboriginal sites and places, it acknowledges the right of Aboriginal people to make decisions about their own heritage. It is therefore policy that Aboriginal communities be consulted and involved in the management of Aboriginal sites, places and related issues and the promotion and presentation of Aboriginal culture and history. The park is within the area of the Griffith Local Aboriginal Land Council. The Hillston and Ivanhoe Aboriginal communities have an interest in the park, but there may also be other Aboriginal community organisations and individuals who potentially wish be involved in use and management of the park.

Issues

- The integrity of Aboriginal sites near visitor access areas and vehicle tracks (especially in the vicinity of Hall's Lakes) are vulnerable to disturbance by erosion, vehicle damage and physical handling by visitors.

Desired Outcomes

- Negative impacts on Aboriginal heritage are stable or reduced.
- Aboriginal people are involved in management of Aboriginal cultural values in the park.

Management Response

- 3.4.1 Manage Aboriginal heritage in consultation with the Griffith Local Aboriginal Land Council and Hillston and Ivanhoe Aboriginal community organisations.
- 3.4.2 Ensure that future activities do not disturb Aboriginal sites and places by undertaking a cultural assessment (including an archaeological survey if necessary) prior to all works with the potential to impact on Aboriginal sites and places.
- 3.4.3 Provide visitor information regarding the inappropriate handling and disturbance of cultural objects.
- 3.4.4 Undertake an assessment of the impact of the road and visitor facilities (refer to section 3.6) in the Halls Lake area in consultation with local Aboriginal community organisations.

3.5 HISTORIC HERITAGE

Willandra National Park reserves approximately eight percent of the former "Big Willandra" pastoral station at its greatest extent, including the main homestead area, shearing shed, the wool scour site and one of the outstations. The park contains a diverse range of buildings, materials and construction techniques from the 1880s to the 1960s. These buildings and structures are important physical evidence of changing standards of living and technology, with continuous adaptation to meet the evolving needs of the pastoral station and its occupants (NPWS 1999).

The eastern section of the park contains the majority of historic sites and is divided into three distinct historic precincts (refer to Maps 1, 3 & 4):

- the Homestead Precinct, including the homestead (1918), cottages (1940's), jackeroos quarters (1918) and ram shed (1933);

- the Shearing Precinct, including the shearing shed (1960), and the shearers quarters, cook house and overseer's cottage (all 1936); and
- the Merton Outstation Precinct (pre-1918), consisting of scattered ruins representative of isolated outstation.

These precincts represent the working and living arrangements of the Willandra pastoral station which operated, in conjunction with other areas now outside the park's boundaries, as a pastoral property for over 100 years.

Several weirs were also built along Willandra Creek to retain water. At least two were built near the Homestead Precinct, another near the Merton Outstation to enable the operation of a wool scour, and another in the western section of the park to retain water for stock. These weirs are now effectively ruins, having not been maintained for, in most cases, over 50 years. The homestead weir remains the most intact of those on park. Weir infrastructure is controlled by State Water.

The Willandra Homestead is listed on the State Heritage Register as "a rare, intact and confident example of domestic rural architecture influenced by international trends in architectural design and aesthetics ... in vogue at the end of World War One" (NPWS 1999). Built in 1918 and informed by international trends in architectural design and aesthetics, the homestead uses some of the earliest asbestos fibrous cement sheeting manufactured in Australia, as well as innovative lining materials such as Canadian 'Beaverboard'.

Inclusion on the State Heritage Register carries with it the obligation to maintain heritage items in accordance with best practice heritage management principles and guidelines issued by the NSW Heritage Council. The Conservation Management Plan for Willandra National Park (NPWS 1999) has been endorsed by the Heritage Council as the basis for management of the homestead and shearing shed precincts.

The Conservation Plan identifies that "Big Willandra" station was important for its role in developing a national and international reputation for wool production and rearing strong, large-framed merino breeding stock for dry regions. It conveys historically important information about land legislation and tenure, the management and organisation of the social and physical dimensions of pastoral life and labour in a remote environment. The pastoral landscape (including the layout of the buildings, paddocks, watering systems, roads and tracks, and the changes to natural watercourses) are significant for their ability to reflect the available technology and the management regimes of successive owners during the ninetieth and twentieth centuries.

Willandra National Park is also significant for its association with key political movements in pastoral union history and for its place in Australian folklore. The station was the site of strikes and disputes by shearers, the most celebrated in 1890 when shearers allegedly armed themselves to support the fledgling Australian Shearers' Union. The station is recalled in folk songs such as 'Flash Jack from Gundagai'. Hall's Lakes are so named because the bushranger Ben Hall reputedly camped at the location.

While stabilisation works were made through the 1970s and 1980s, the homestead and shearing precinct buildings were fully restored during 1996 to 2001.

Introduced plant species were established in the Homestead Precinct and other locations during agricultural use of the park. Some of these retain historic significance (refer to Section 4.1).

Places in the park outside the Homestead and Shearing Precincts (not shown on the maps in this plan) are managed in accordance with the Riverina Region Cultural Heritage

Management Strategy (NPWS 2001). This recommends the management of these historic places and features on the park as ruins.

In accordance with the Willandra Conservation Management plan, the Shearing Precinct may be used under agreement for shearing and crutching.

Issues

- Willandra National Park contains significant historic heritage infrastructure which require ongoing maintenance.

Desired Outcomes

- Willandra National Park is conserved and managed as a significant, intact and integrated set of infrastructure, buildings, fabric and features which demonstrate the activities and lifestyles of a large pastoral property in western New South Wales.
- Public appreciation of the cultural significance of Willandra National Park is maintained or enhanced.
- Building fabric, features and associated artefacts of primary significance at Willandra National Park identified as significant in the Willandra National Park Conservation Management Plan will be conserved.

Management Response

- 3.5.1 The heritage of Willandra National Park will be maintained in accordance with State heritage guidelines, the Willandra National Park Historic Heritage Conservation Management Plan (1999) and the Riverina Region Cultural Heritage Management Strategy (2002).
- 3.5.2 All conservation works other than works listed as exemptions by the Heritage Council will be supervised by a qualified conservation specialist in accordance with the principles and methods specified in the Burra Charter (and approvals under the EPA and Heritage Acts).
- 3.5.3 Comprehensive photographic and written records of conservation works will be kept and maintained.
- 3.5.4 Monitor condition of the homestead weir and consult with relevant authorities if the structure deteriorates and constitutes a danger to the public.
- 3.5.5 Undertake regular building inspections to ensure buildings are maintained and conserved.
- 3.5.6 Manage historic places and features outside of the Homestead and Woolshed Precincts as ruins.
- 3.5.7 Maintain and enhance visitor appreciation and understanding of the heritage significance of built heritage at Willandra National Park (section 3.6).

3.6 RECREATION, EDUCATION AND RESEARCH

Recreation

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.

Willandra National Park is a regional and local tourist destination within western NSW. The main access to the park is via the Kidman Way, a major tourist route through inland NSW and Queensland. Willandra National Park provides a unique experience for visitors to the area, as accommodation of the type offered is not available elsewhere within the shire, and provides socio-economic benefits to the regional community through conservation of the local heritage and tourism.

Visitation to the park currently averages around 3,500 people a year, with highest visitation between March to October (especially around Easter) and peaks during school holidays. Over two-thirds of visitors are from NSW and the ACT, with the highest proportion from Sydney and the Riverina. While the greatest proportion are day visits, many travellers use Willandra as an overnight stay as part of a longer journey through western NSW, with travel onwards to Mungo and Kinchega National Parks popular options, or north into Queensland. Overseas visitors account for less than 10% of visits, and it appears many visit when working seasonally in the area. Overall it appears that both day visitor and camper numbers have increased since the 1980s, although yearly numbers fluctuate widely depending on seasonal conditions. While heavy autumn and spring rainfall limits access and significantly reduces numbers, good seasonal conditions and water in the Willandra Billabong are significant drawcards.

The most frequently used access to the park is through the privately owned property "Willandra Station". Access is also available from the Trida-Whealbah road that dissects the park (Map 1). These roads and the roads within the park become impassable after rain.

The Homestead and Shearing Precincts and the walking track along Willandra Creek are the focus for visitation.

Visitor accommodation is potentially available in the cottage, men's quarters and homestead (refer Map 3.). The most popular accommodation is the cottage, which is generally booked by couples or families. The men's quarters is usually used by groups, schools and universities. The homestead is restored and capable of providing accommodation, although it is not always available for use and, when available, overall occupancy rates have been low and maintenance costs high relative to other accommodation options. Large groups in the homestead during peak visitation periods also tend to implicitly lead to exclusive use of the homestead and grounds, reducing the ability of other visitors to appreciate one of the major attractions of the park. There is also a potential risk of damage to the building from careless behaviour and fire when people utilise the homestead.

Other recreational facilities are low-key and unobtrusive to suit the somewhat natural setting in which they are located. There is one campground with ten campsites, and a group campground which is available for larger groups or when the main campground is full. Facilities in the campgrounds include wood barbecues and toilets. There is a cold water shower near the group campground, and the men's quarters showers are available to campers when it is not occupied. There is one designated walking track and one drive

tour (the Merton Motor Trail) (Map 2). Picnic tables are provided in the campgrounds, at the weir and in the homestead grounds.

Only pedestrian access is permitted in the remote area west of the Trida–Whealbah Road, which is managed for nature conservation.

Horse riding is a rare activity in the park, due to the remote nature of the park. Horse riding is however permissible on public access roads in accordance with NPWS policy. Horse riding is not permitted off roads. Due to the lack of holding areas and potential disturbance to environmental and cultural values, overnighting of horses and/or groups of 5 or more horses require prior approval. Roads may be closed to horse riding, or numbers controlled, where there are unacceptable environmental impacts, or risks to riders or other park visitors. The use of horse drawn vehicles is not permitted in the park.

Issues

- Maintaining access to the park (including through private property) especially after wet weather.
- Quality of experience for day-use visitors, especially the potential of conflicting use of the homestead and surrounds when utilised for group accommodation.
- Providing accommodation to the public places significant demands on staff resources.
- In the semi-arid landscape fallen dead timber is valuable wildlife habitat and collection for firewood can significantly deplete this resource.
- Use of existing roads may impact on sensitive areas around Hall's Lakes and the shearing shed precinct where sites of potential archaeological interest are found.
- Due to the frequency of Willandra Creek being dry, some recreation facilities such as a pontoon beside the Willandra Homestead lawn and a pier on the Willandra Billabong do not provide functional or appropriate facilities.

Desired Outcomes

- A variety of low key visitor opportunities are available which encourage appreciation of the natural environment, with these opportunities carefully managed to be in harmony with the setting of individual sites.
- Facilities are designed and managed to provide a satisfying visitor experience and minimise impacts.
- Visitor use is compatible with the purposes of national parks, is ecologically sustainable and does not impact on or detract from the park's cultural significance or fabric.

Management Response

- 3.6.1 Seek to formalise an access agreement for public access through Willandra Station.
- 3.6.2 Recreational facilities will remain low-key, unobtrusive, and appropriate to the setting to retain the present visitor experience of the park (quiet, peaceful, broad horizons).

- 3.6.3 Existing recreation facilities and visitor accommodation will be maintained. The exception is water-based recreational infrastructure such as the pontoon and pier, which will not be maintained and will be removed.
- 3.6.4 Gas barbecues will be installed, and individual wood-burning barbecues will be reduced in number to lessen firewood demands and risk of unplanned fire.
- 3.6.5 The cottage and men's quarters will continue to be available for visitor accommodation. Accommodation in other buildings (including the Willandra Homestead) will be determined considering cost recovery, minimising conflict between day and overnight visitors, risk to infrastructure and adequate staffing levels to service the accommodation.
- 3.6.6 Public vehicle access will be permitted only on existing roads. Impacts will be monitored, roads may be realigned and parking areas provided in sensitive areas (e.g. near Hall's Lake and in the Shearing Shed Precinct) to reduce impacts on archaeological sites.
- 3.6.7 Horse riding will be permitted on roads in the park subject to NPWS recreational horse riding policies and the code of practice for horse riding in parks. In the event that the frequency and impact of horse riding increase significantly, the approval for horse riding in Willandra National Park will be reviewed.
- 3.6.8 Consent (subject to conditions) will be required for overnighting of horses, groups of 5 or more horses, and formal group events.
- 3.6.9 Only pedestrian access is permitted in the remote area west of the Trida–Whealbah Road.
- 3.6.10 Minimum impact walk-in camping will be permitted more than 500 metres from roads and visitor facilities with prior consent from NPWS (subject to conditions).
- 3.6.11 Bicycles will only be permitted on roads.
- 3.6.12 Recreational use and impacts will be monitored, and if necessary access restrictions may be applied to reduce impacts.

Education

Information provision assists the protection of natural and cultural heritage, promotes support for conservation and increases the enjoyment and satisfaction of visitors. The park has a number of natural and cultural features of interest to visitors, including the Willandra Homestead and Shearing Precincts, Hall's Lakes, Willandra Creek and the plains environment. These features are promoted and interpreted to visitors in a manner to protect their special values and encourage appropriate use.

Information to visitors is provided by:

- the website;
- introductory signs at the entrances to Willandra National Park;
- an information room located in Jackaroo's quarters (within the building including the office and staff quarters) with interpretive panels and brochures;
- the front rooms of the Willandra homestead allowing visitors to read historical accounts and view photographs in furnished rooms;
- small interpretive signs outside historic buildings indicating the age, function, social and historical contexts; and

- a park brochure.

Issues

- Sufficient directional and regulatory signage, as well as interpretive materials, are required to allow visitors to orientate themselves within the park and to appreciate all aspects of the park's natural environment and cultural values (including both Aboriginal and settlement history) in an appropriate manner.
- Some interpretive material requires review and updating.

Desired Outcomes

- There is community understanding and appreciation of the park's natural and cultural values.
- Visitors are aware of the park's recreation opportunities and can easily find their way to park facilities.
- The park is a useful educational resource for local schools and community organisations.
- Interpretation material is subtle and does not detract from the scenic values of the historic precincts and natural settings.
- Increased appreciation of the homestead and grounds by improved interpretation and displays.

Management Response

- 3.6.13 Willandra National Park will be promoted as a regional/local tourist destination; linked through cultural tourism to other destinations in the region.
- 3.6.14 Continue to cooperate with the Griffith and Carrathool Shires and Tourism NSW regarding promotional opportunities for the park.
- 3.6.15 Emphasise the themes of pastoral heritage, natural values and Aboriginal heritage, in promotion and interpretation programs.
- 3.6.16 Revise interpretive material as required.
- 3.6.17 Renew existing open-air interpretation signage, and provide an orientation display sited near the entry to the homestead precinct.
- 3.6.18 Support and assist educational use of the park by schools, community groups and individuals.

Research

The purpose of scientific study in the national park is to improve understanding of its natural and cultural heritage and the processes which affect them. Research also establishes the requirements for management of particular species, ecosystems and cultural heritage. In addition, research assists in visitor management and understanding the social impacts and needs in relation to park management.

Research and monitoring by NPWS and other organisations provides information for ongoing management decisions.

Examples of research and monitoring conducted on the park include the role of ants in ecosystem dynamics, macropod grazing, assessment of rangeland health, monitoring the condition of historic heritage, and collection of historic data through oral histories.

Issues

- Understanding of contemporary ecological processes, especially the plant community dynamics, is required to identify potential conservation issues.
- Further research into natural and cultural values of the park will enhance management and interpretation.

Desired Outcomes

- Research is undertaken that enhances the information base and assists understanding and management of the park.
- Research projects cause negligible environmental damage.
- Monitoring programs are in place to detect any changes in the status of park resources.

Management Response

3.6.19 Encourage research to provide information about the park's natural and cultural heritage and human use (including collection of oral and archival history) in order to facilitate management.

3.6.20 Any research into Aboriginal values or sites will involve the Griffith LALC (Section 3.4) and other appropriate Aboriginal community members.

3.6.21 Continue to permit other organisations and students to conduct appropriate research within the park that is directly useful for management purposes.

3.6.22 Encourage research to improve flora and fauna records, assist in protecting species, and understanding ecosystem dynamics.

3.6.23 Continue ongoing monitoring projects, subject to periodic review.

3.6.24 Encourage nature-study groups to share information gathered in the park.

4 THREATS

4.1 WEEDS AND PEST ANIMALS

The *Noxious Weeds Act 1993* places an obligation upon public authorities to control noxious weeds on land that they occupy to the extent necessary to prevent such weeds spreading to adjoining lands. Other introduced species threatening the viability of native plant and animal communities are priorities for control. The Western Rivers Region Pest Management Strategy guides pest control activities on the park.

A number of introduced plant species are found on the park. A diligent control program has reduced African boxthorn (*Lycium ferocissimum*) to scattered plants. Bathurst burr (*Xanthium spinosum*) can be a problem on access roads, tracks and disturbed areas following good seasonal conditions, along with devil's claw (*Proboscidea louisianica*). Noogoora burr (*Xanthium occidentale*) is found along the Willandra Creek, and is actively controlled along walking tracks and areas accessible to the public. Patches of horehound (*Marrubium vulgare*) also occur.

Exotic species planted for pasture improvement during agricultural use of the property include barley grass (*Hordeum leporinum*), rye grass (*Lolium perenne*) and medics (*Medicago* spp.). These dominant cool-season grassland species have probably changed nutrient cycles, grassland density and regeneration of native plants (Lenz *et al.* 2003). Other annuals to have become common grassland components are Ward's weed (*Carrichtera annua*), mustard weed (*Sisymbrium erysimoides*) and Paterson's curse (*Echium plantagineum*), especially along trail edges. Small patches of lippia (*Phyla canscens*) occur on the homestead lawn.

The Homestead Precinct contains introduced plants within the garden, and stands of athel pine and tamarisk (*Tamarix aphylla* and *T. ramosissima*) occur at the Shearing Precinct and Merton Outstation. The Willandra National Park Conservation Management Plan (1999) contains guidelines for management of the main introduced plant species, with significant plantings retained as part of the main historic precincts. Introduced species such as willows (*Salix* sp.) along Willandra Creek, pepper trees (*Schinus areira*), mesquite (*Prosopis* sp.) and asparagus fern (*Asparagus officinalis*) are removed if they propagate away from their original settings. Senescent trees are replaced with the same or structurally similar species in the Homestead and Shearing Shed Precincts where practical.

Old man saltbush (*Atriplex nummularia*) was planted near the homestead and camping area soon after park gazettal. Only two plants are likely to have occurred on the park at acquisition, one located near the old tip (now the camping area) and the other west of Hall's Lakes. It is not known if the park was within the original distribution of the species and it was subsequently eliminated, but the planted stock is not locally native (John Brickhill 2006, *pers. comm.*).

Introduced animals on the park include goats (*Capra hircus*), foxes (*Vulpes vulpes*), rabbits (*Oryctolagus cuniculus*), pigs (*Sus scrofa*), cats (*Felis catus*) and house mice (*Mus musculus*). Competition, grazing and habitat degradation from introduced herbivores (especially rabbits and goats) and predation from foxes and cats are significant threatening processes to the integrity of natural ecosystems. Pigs can cause damaging local impacts, especially along creeklines and temporary wetlands. Feral honeybees (*Apis mellifera*) compete for tree hollows and food resources, although the impact of feral bees at Willandra National Park is unknown.

Goat and pig numbers are reduced by trapping, aerial culling and occasionally mustering. Ongoing control is required as these species easily recolonise by moving

along the Willandra Creek system. Fox baiting is undertaken regularly on park to reduce predation on ground-dwelling species. Cats are occasionally trapped, especially around the homestead precinct.

Willandra National Park has a long history of rabbit control. Grazing impacts are localised, with warrens predominately on sandy rises and woodland edges. Recolonisation by rabbits is closely monitored and treated accordingly (for example by warren ripping).

Neighbouring stock, especially sheep and cattle, are a problem if boundary fencing is not maintained or when Willandra Creek is dry and does not provide an effective boundary.

While not an introduced species, plague locusts can occur after favourable seasons.

Issues

- Introduced rabbits, pigs, goats and straying domestic stock contribute additional grazing impacts, especially in riparian areas and adjacent floodplains.
- Foxes and cats prey on native fauna in an environment with a high number of ground-dwelling species.
- The presence, extent and impact of weeds varies widely between years depending on seasonal conditions.
- Old man saltbush is gradually propagating away from the original plantings, and these plantings are not native to the local area.

Desired Outcomes

- The impact of introduced species on native plants and animals is minimised.
- Weed control will be prioritised on the basis of threat to natural or cultural values, feasibility of control, and weeds of national and state significance.
- Introduced species are controlled in accordance with best management practice to deliver optimal biodiversity outcomes while maintaining historic heritage value.

Management Response

- 4.1.1 Control of pest species will be consistent with the Regional Pest Management Strategy.
- 4.1.2 Continue to monitor the distribution and population of feral animals, using ground/aerial inspections, observations from staff and information from neighbours and visitors.
- 4.1.3 Priority control areas for pest plants and animals will be high visitation areas, the homestead precinct, visitor facilities and sensitive environmental assets, such as sandy rises and the Willandra Creek floodplain.
- 4.1.4 Maintain and improve cooperation and communication with adjoining landholders and the Western Livestock Health and Pest Authority.
- 4.1.5 Undertake coordinated control programs of feral animals where possible in cooperation with other agencies, immediate neighbours and other stakeholders.
- 4.1.6 Encourage maintenance of effective fencing of boundaries with grazing properties to prevent domestic stock from entering into the park. Provide fencing

assistance where possible and appropriate in accordance with the NPWS Boundary Fencing Policy.

- 4.1.7 Work with neighbours to prevent stock incursions onto park.
- 4.1.8 Environmentally sensitive control methods will be employed on park to control locusts when necessary to minimise adverse effects on natural heritage.
- 4.1.9 Introduced woody plants not identified as historic plantings will be removed.
- 4.1.10 Introduced plants will be controlled where practicable by selective application of registered herbicides at recommended rates, chipping and mechanical removal (e.g. of African boxthorn) as required.

4.2 FIRE

The primary fire management objectives of the NPWS are to protect life and property and community assets from the adverse impacts of fire, whilst managing fire regimes to maintain and protect biodiversity and cultural heritage.

Fire is a natural feature of many environments and is essential to the survival of some plant communities. Inappropriate fire regimes can lead to loss of particular plant and animal species and communities, and high frequency fires have been listed as a key threatening process under the *NSW Threatened Species Conservation Act 1995*.

Management must aim to achieve both long-term conservation of native plant and animal communities and ongoing protection of life and property within and adjacent to the park.

Fire can also damage some types of Aboriginal sites and historic places. Features such as scarred trees, old buildings and farming implements can be permanently damaged or lost by wildfire. Other sites can be damaged by use of heavy machinery for fire suppression activities.

Ecological requirements

Chenopod shrubs (saltbushes and bluebush) are fire sensitive, so fires are generally considered harmful. Information is lacking for black box woodlands, lignum or nitre goosefoot along creek lines and depressions, but until further research indicates otherwise a prudent approach would be to reduce any fires to the smallest extent possible.

Fire history

The incidence of fire in Willandra National Park is low. The last significant fires (>5 hectares) to occur were two separate grass fires in 1983. The vegetation of semi-arid rangelands generally fails to produce sufficient fuel to carry fire except in response to above average rainfall, especially after good autumn and spring falls.

Fires on the park are generally started by lightning strikes in dry summer storms. High grass fuel levels provide the potential for fast-moving intense fires. During extended dry periods, dead lignum shrubs could significantly contribute to wildfire intensity along creek lines.

Prolonged low flows down Willandra Creek can allow cumbungi to grow across the creek bed. While cumbungi provides valuable cover for many wetland species, if left unchecked can create a significant barrier to downstream flow. Therefore cumbungi beds have been occasionally burnt to improve water flows.

Strategies and cooperative arrangements

A separate fire management strategy (NPWS 2005) has been prepared for the national park. This identifies the known fire history, key assets within the park including sites of natural and cultural heritage value, fire management zones including asset protection zones, fire control advantages such as management trails and water supply points, detection and cooperative arrangements.

Under the *Rural Fires Act 1997* the NPWS is a fire authority and is responsible for controlling fires on the national park and ensuring that they do not cause damage to other land or property. An important part of NPWS fire management is participation in local co-operative fire management arrangements, including implementation of Bush Fire Risk Management Plans developed by District Bush Fire Management Committees. The NPWS is a member of the Carrathool Bush Fire Management Committee and maintains liaison with the Merrowie and Mossgiel Rural Fire Brigades. Hazard reduction programs, ecological burning proposals and fire trail works are submitted annually to the Carrathool Bush Fire Management Committee.

Issues

- Life, property and community assets must be protected from adverse impacts of fire.
- Fire is not required to maintain the natural vegetation of the park.
- Fire fighting activities can potentially damage natural and cultural features.

Desired Outcomes

- Persons and property on or immediately adjacent to the park are protected from bushfires
- The potential for spread of bushfires on, from, or into the park is minimised.
- Fire regimes are appropriate for long-term maintenance of the park's plant and animal communities so that negative impacts of fire on natural values are stable or reduced.
- Aboriginal sites, historic places and culturally significant features are protected from damage by bushfires and suppression operations.

Management Response

- 4.2.1 Implement the Willandra National Park Fire Management Strategy.
- 4.2.2 Suppress all unplanned fires in the park as quickly as possible.
- 4.2.3 Management will aim to maintain biodiversity by minimising the area of fires to only part of the distribution of a vegetation community at any one time.
- 4.2.4 Monitor the extent of cumbungi growth in the Willandra Creek, particularly upstream from Willandra weir, and burn if it becomes a significant barrier to downstream flow.
- 4.2.5 Maintain regular liaison with the Mossgiel and Merrowie Bush Fire Brigades, as well as neighbours. Maintain membership of Carrathool Bush Fire Management Committee and cooperation with the Rural Fire Service.

4.3 CLIMATE CHANGE

Climate change has been listed as a key threatening process under the TSC Act. Projections of future changes in climate for NSW include higher temperatures, elevated CO₂, more intense but possibly reduced annual average rainfall, 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, increased erosion and ocean acidification.

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 weeds and feral animals. Species most at risk are those unable to migrate or adapt, particularly those with small population sizes or with slow growth rates.

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

Desired Outcome

- The impacts of climate change on natural systems are minimised.

Management Response

- 4.3.1 Continue existing fire, pest and weed management programs to increase the ability of native flora and fauna to cope with future disturbances, including climate change.
- 4.3.2 Liaise with neighbours, catchment management authorities and other agencies to encourage retention, and improve the condition of native vegetation close to the park.

5 MANAGEMENT OPERATIONS AND OTHER USES

In order to achieve protection of the values of the park, to provide opportunities for visitors and to facilitate management operations it is important to build and maintain appropriate infrastructure. Infrastructure may also be provided on the park by other authorities or for other purposes authorised under the NPW Act.

A travelling stock route, along the Trida-Whealbah Road, divides Willandra National Park (Map 1). During 2000 the western section of this route was fenced into the national park, with permission from the Hillston Rural Lands Protection Board (now part of the Western Livestock Health and Pest Authority), in an effort to reduce the amount of trespassing and to reduce stock straying onto the park. It was agreed that stock would be permitted to travel through the fenced section of the route, with gates at both the southern and northern end to allow stock access when required. Use of the stock route is not considered a threat to park values due to the infrequency of use.

Inland commercial fishers have stated that they have an interest in fishing the Willandra Creek system when conditions allow and occasionally require access through the park.

A gauging station managed by State Water measures the water levels of the Willandra Creek. It is located next to the pump shed within the Homestead Precinct. The homestead weir currently receives minimal maintenance and may develop structural problems in the future. It has a limited functional role today but is of important historical value.

Both bore water and water from Willandra Creek is used to water the Homestead Precinct, with water from Willandra Creek preferred when available. The high mineral content of bore water has deleterious effects on some perennial shrubs and trees when used for extended periods, and therefore the ability to maintain some plantings over the long-term.

Several buildings within Willandra National Park are used for management purposes. The overseer's cottage is used as a staff residence; sections of the jackeroo's quarters are used for visiting staff accommodation, an office and interpretation rooms; and one room within the homestead is used to store cleaning equipment. The workshop, stables and garage are also used for management purposes.

The park contains management trails that are also part of the fire break system. A helipad is located close to the Homestead Precinct.

A garbage tip is located within 500 metres of the camp ground. Domestic and visitor rubbish is now transported to the Hillston landfill.

Desired Outcomes

- Illegal activities within the park are minimised.
- Stock movement along the travelling stock route is controlled.
- Water levels in Willandra Creek continue to be monitored.
- Management facilities adequately serve the needs of park management and have acceptable environmental impact.

- Management facilities and infrastructure provide a safe working environment for staff and meet Occupational Health and Safety and residential tenancy standards.

Management Response

- 5.1 Continue to liaise with the Western Livestock Health and Pest Authority regarding use of the travelling stock reserve.
- 5.2 Continue to allow access to the gauging station by State Water.
- 5.3 Maintain the buildings and other facilities used for management purposes to a suitable standard.
- 5.4 Maintain park roads and boundary management trails to two-wheel drive dry weather standard.
- 5.5 Fishers licensed by the Department of Primary Industries may fish within the park. Commercial fishers may be permitted vehicular access for the purposes of launching vessels onto Willandra Creek within the park, subject to a permit being issued by NPWS and meeting conditions specified under the NPWS Professional Fishing Access Policy.
- 5.6 Aircraft will not be permitted to land in the park except for management or emergency purposes.
- 5.7 Investigate ways to minimise the effect of bore water on historic plantings when used for watering over extended periods.
- 5.8 Visitors and staff will be encouraged to remove their own rubbish from the park.
- 5.9 The rubbish tip site will be reduced in size and partially rehabilitated, with domestic rubbish transported into the Hillston tip. A small area will remain for green waste (to be periodically burnt) and another small area for miscellaneous material collected around the park (e.g. fencing wire).

6 Implementation Table

Response	On-park Ecological Conservation	Priority
3.1.1	Introduced species such as rabbits and goats that accelerate soil erosion will be controlled.	High
3.1.2	Signage will be erected to inform visitors to stay on public access roads.	High
3.1.4	Management and visitor facilities will be designed and located so as to minimise their visual and erosional impacts.	High
3.2.4	Ensure that management and visitor facilities are not located in areas of significant plant species or restricted plant communities.	High
3.2.5	Survey for known and potential threatened plant species to understand patterns of distribution and ecological preferences. Establish monitoring of known populations.	High
3.2.6	Implement priority actions for threatened plant species. This includes identifying threats to existing populations, the control of exotic grazing pressures such as rabbits or goats, and site surveys during the growth and flowering periods as part of the environmental assessment process for any new developments.	High
3.3.1	Protect the habitats of native fauna species from visitor impacts, the effects of introduced species and inappropriate fire regimes.	High
3.3.2	Continue to record fauna species and implement targeted fauna surveys, including annual kangaroo density surveys.	High
3.3.3	Implement recovery plans and priority action statements for threatened species, such as ongoing rabbit, cat and fox control to assist in protecting ground-dwelling native species including the plains-wanderer.	Medium
3.2.1	Maintain and monitor regeneration patterns of woody vegetation within exclosures and across the park.	Medium
3.2.2	Construct additional exclosures if necessary to protect sensitive vegetation types.	Medium
3.2.7	Liaise with relevant authorities on water management issues along Willandra Creek, especially those affecting ecosystem health of riverine communities in the park.	Medium
3.2.3	Investigate methods to improve regeneration of native vegetation communities, especially those found on sandier soils.	Low
3.1.3	The extent of clay pans and condition of sandy rises will be monitored by aerial photography and ground inspection, with remedial action undertaken in areas subject to continuing soil erosion.	Low

Response	Cultural Heritage	Priority
3.4.1	Manage Aboriginal heritage in consultation with the Griffith Local Aboriginal Land Council and Hillston and Ivanhoe Aboriginal community organisations.	High
3.4.2	Ensure that future activities do not disturb Aboriginal sites and places by undertaking a cultural assessment (including an archaeological survey if necessary) prior to all works with the potential to impact on Aboriginal sites and places.	High
3.5.1	The heritage of Willandra National Park will be maintained in accordance with State heritage guidelines, the Willandra National Park Historic Heritage Conservation Management Plan and the Riverina Region Cultural Heritage Management Strategy.	High
3.5.2	All conservation works other than works listed as exemptions under the Heritage Council will be supervised by a qualified conservation specialist in accordance with the principles and methods specified in the Burra Charter (and approvals under the EPA and Heritage Acts).	High
3.5.5	Undertake regular building inspections to ensure buildings are maintained and conserved.	High
3.5.7	Maintain and enhance visitor appreciation and understanding of the heritage significance of built heritage at Willandra National Park.	High
3.4.3	Provide visitor information regarding the inappropriate handling and disturbance of cultural objects.	High
3.4.4	Undertake an assessment of the impact of the road and visitor facilities in the Halls Lake area in consultation with local Aboriginal community organisations.	Medium
3.5.3	Comprehensive photographic and written records of conservation works will be kept and maintained.	Medium
3.5.6	Manage historic places and features outside of the Homestead and Woolshed Precincts as ruins.	Medium
3.5.4	Monitor condition of the homestead weir and consult with relevant authorities on if the structure deteriorates and constitutes a danger to the public.	Low

Response	Visitor Use and Services	Priority
3.6.2	Recreational facilities will remain low-key, unobtrusive, and appropriate to the setting to retain the present visitor experience of the park (quiet, peaceful, broad horizons).	High
3.6.3	Existing recreation facility and visitor accommodation will be maintained. The exception is water-based recreation infrastructure such as the pontoon and pier, which will not be maintained and will be removed.	High
3.6.6	Public vehicle access will be permitted only on existing roads. Impacts will be monitored, and roads may be realigned and parking areas provided in sensitive areas (e.g. near Hall's Lake and in the Shearing Shed Precinct) to reduce impacts on archaeological sites.	High
3.6.7	Horse riding will be permitted on roads in the park subject to NPWS recreational horse riding policies and the code of practice for horse riding in parks. In the event that the frequency and impact of horse riding increase significantly, the approval for horse riding in the park will be reviewed.	High
3.6.8	Consent (subject to conditions) will be required for overnighting of horses, groups of 5 or more horses, and formal group events.	High
3.6.9	Only pedestrian access is permitted in the remote natural area west of the Trida - Whealbah Road.	High
3.6.10	Minimum impact walk-in camping will be permitted more than 500 metres from roads and visitor facilities with prior consent from NPWS (subject to conditions).	High
3.6.11	Bicycles will only be permitted on roads.	High
3.6.12	Recreational use and impacts will be monitored, and if necessary access restrictions may be applied to reduce impacts.	High
3.6.1	Seek to formalise an access agreement for public access through Willandra Station.	Medium
3.6.4	Gas barbecues will be installed, and individual wood-burning barbecues will be reduced in number, to lessen firewood demands.	Medium
3.6.5	The cottage and men's quarters will continue to be available for visitor accommodation. Accommodation in other buildings (including the Willandra Homestead) will be determined on cost recovery, minimising conflict between day and overnight visitors, risk to infrastructure and maintaining adequate staffing levels to service accommodation.	Ongoing

Response	Community Programs and Education	Priority
3.6.13	Willandra National Park will be promoted as a regional/local tourist destination.	High
3.6.14	Continue to cooperate with the Griffith and Carrathool Shires and Tourism NSW regarding promotional opportunities for the park.	High
3.6.15	Emphasise the themes of pastoral heritage, natural values and Aboriginal heritage in promotion and interpretation programs.	High
3.6.18	Support and assist educational use of the park by schools, community groups and individuals.	High
3.6.23	Continue ongoing monitoring projects, subject to periodic review.	High
3.6.20	Any research into Aboriginal values or sites will involve the Griffith LALC (refer Section 3.4).	High
3.6.17	Revise interpretive material as required.	High
3.6.17	Renew existing open-air interpretation signage, and provide an orientation display sited near the entry to the homestead precinct.	High
3.6.21	Continue to permit other organisations and students to conduct appropriate research within the park that is directly useful for management purposes.	Medium
3.6.19	Encourage research to provide information about the park's natural and cultural heritage and human use (including collection of oral and archival history) in order to facilitate management.	Medium
3.6.22	Encourage research to improve flora and fauna records, assist in protecting species, and understanding ecosystem dynamics.	Low
3.6.24	Encourage nature-study groups to pass on information gathered in the park.	Ongoing
Action	Weeds and Pest Animals	Priority
4.1.1	Control of pest species will be consistent with the Regional Pest Management Strategy.	High
4.1.2	Continue to monitor the distribution and population of feral animals, using ground/aerial inspections, observations from staff and information from neighbours and visitors.	High
4.1.3	Priority control areas for pest plants and animals will be high visitation areas, the homestead precinct, visitor facilities and sensitive environmental assets, such as sandy rises and the Willandra Creek floodplain.	High
4.1.8	Environmentally sensitive control methods will be employed on park to control locusts when necessary to minimise adverse	High

	effects on natural heritage.	
4.1.9	Introduced woody plants not identified as historic plantings will be removed.	High
4.1.10	Introduced plants will be controlled where practicable by selective application of registered herbicides at recommended rates, chipping and mechanical removal (e.g. of African boxthorn) as required.	High
4.1.4	Maintain and improve cooperation and communication with adjoining landholders and the Western Livestock Health and Pest Authority.	Medium
4.1.5	Undertake coordinated control programs of feral animals where possible in cooperation with other agencies, immediate neighbours and stakeholders.	Medium
4.1.7	Work with neighbours to prevent stock incursions onto the park.	Ongoing
4.1.6	Encourage maintenance of effective fencing of boundaries with grazing properties to prevent domestic stock from entering into the park. Provide fencing assistance where possible and appropriate in accordance with the NPWS Boundary Fencing Policy.	Ongoing
Response	Fire Management	Priority
4.2.1	Implement the Willandra National Park Fire Management Strategy.	High
4.2.2	Suppress all unplanned fires in the park as quickly as possible.	High
4.2.3	Management will aim to maintain biodiversity by minimising the area of fires to only part of the distribution of a vegetation community at any one time.	High
4.2.5	Maintain regular liaison with the Mossgiel and Merrowie Bush Fire Brigades. Maintain membership of Carrathool Bush Fire Management Committee and cooperation with the Rural Fire Service.	Medium
4.2.4	Monitor the extent of cumbungi growth in the Willandra Creek, particularly upstream from Willandra weir, and burn if it becomes a significant barrier to downstream flow.	Low

Response	Infrastructure and Maintenance	Priority
5.3	Maintain the buildings and other facilities used for management purposes to a suitable standard.	High
5.4	Maintain park roads and boundary management trails to two-wheel drive dry weather standard.	High
5.6	Aircraft will not be permitted to land in the park except for management or emergency purposes.	High
5.1	Continue to liaise with the Western Livestock Health and Pest Authority regarding use of the travelling stock reserve.	Medium
5.2	Continue to allow access to the gauging station by State Water.	Medium
5.7	Investigate ways to minimise the effect of bore water on historic plantings when used for water over extended periods.	Medium
5.8	Visitors and staff will be encouraged to take their own rubbish out of the park.	Medium
5.9	The rubbish tip site will be reduced in size and partially rehabilitated, with domestic rubbish transported into the Hillston tip. A small area will remain for green waste (to be periodically burnt) and another small area for miscellaneous material collected around the park (e.g. fencing wire).	Low

Legend

High priority activities are those 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.

Ongoing is for activities that are undertaken on an annual basis or statements of management intent that will direct the management response of an issue that arises.

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