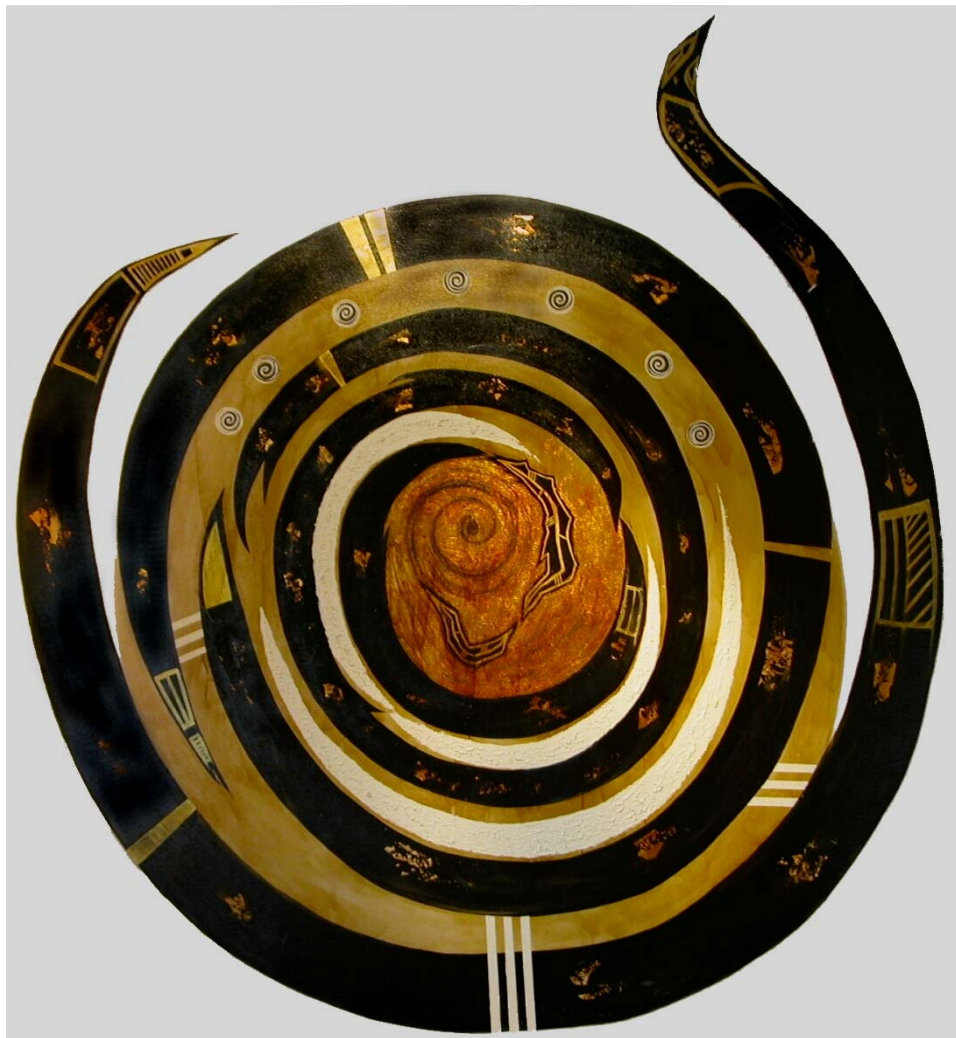


Mungo National Park

Plan of Management



Department of Environment and Conservation (NSW)

**MUNGO NATIONAL PARK
PLAN OF MANAGEMENT**

NSW National Parks and Wildlife Service

Part of the Department of Environment and Conservation (NSW)

July 2006

This plan of management was adopted by the Minister for the Environment on 26th July 2006.

Acknowledgments

This plan of management is based on a draft plan prepared by staff of the Lower Darling Area of the NSW National Parks and Wildlife Service, now part of the Department of Environment and Conservation.

Valuable information and comments were provided by: Mungo National Park Advisory Committee, Willandra Lakes World Heritage Area Committees and Elders Council, members of the Paakantyi, Mutthi Mutthi and Ngyiampaa traditionally affiliated tribal groups and members of the public.

For additional information or enquiries about this plan, contact the Service's Lower Darling Area Office at PO Box 318, Buronga NSW 2739 or by phone on (03) 5021 8900.

Front cover: ' Mungo – meeting place' by Craig Charles, Mutthi Mutthi.

This painting represents spirit and place – the coming together of three tribes, the Mutthi Mutthi, Paakantyi and Ngyiampaa.

The centre spiral represents the middle of the Lake, the Walls of China and sacred sites. The many captions of gold leaf on the black swirls signify special 'sites' – uncovered and swept away by the winds. Three white swirls signify ceremonial grounds and the various lines and squares represent man-made sites which have come and gone. The gold represents the richness of the land and strength of its peoples.

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MINISTER'S FOREWORD

Mungo National Park is situated in south-western NSW in an area known as the Willandra Lakes region. It is 110km north east of the Victorian/New South Wales border towns of Mildura/Wentworth and 140km north-west of the New South Wales town of Balranald. The park covers an area of 90,256ha, of which approximately 65% falls within the Willandra Lakes Region World Heritage Area.

The area holds great significance for three traditional Aboriginal tribal groups, Paakantyi, Mutthi Mutthi and Ngyiampaa, who are closely involved in the management of the World Heritage Area and Mungo National Park.

A draft plan of management for Mungo National Park was placed on public exhibition from 28 May until 9 September 2004. The exhibition of the draft plan attracted 7 submissions that raised 10 issues. All submissions received were carefully considered before adopting this plan.

This plan of management aims to achieve conservation of the values of the World Heritage Area. Management will reflect the ongoing cultural significance of Mungo National Park to Aboriginal people, and the traditional tribal groups will have an important continuing role in management of the park.

The plan aims to maximise conservation of natural heritage values while also conserving cultural heritage values, both Aboriginal and those relating to past use of the landscape as pastoral properties.

To meet present and predicted future demands of visitors to Mungo, access will be controlled to areas of the park identified as significant and sensitive. Suitable infrastructure will be developed at selected sites so that access can occur without compromising heritage values.

This plan of management establishes the scheme of operations for Mungo National Park. In accordance with Section 73B of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.

Bob Debus
Minister for the Environment

FOREWORD BY JOINT MANAGEMENT ADVISORY COMMITTEE

The Mungo National Park Plan of Management has been the most significant achievement of the Mungo Joint Management Advisory Committee to date. The Joint Management Advisory Committee is the first of its kind in New South Wales. Its membership is made up of three representatives from each of the Traditional Tribal Groups, Paakantyi, Mutthi Mutthi and Ngyiampaa; and one representative from the Balranald and Wentworth Shire, adjoining landholders, a conservation group, Australian Government Department of Environment and Heritage and NPWS.

The Joint Management Advisory Committee has been pleased to work with the National Parks and Wildlife Service in the formulation of this important document. The Plan provides a clear direction for the future management of this most important National Park, an area that has long been the focus of the Mutthi Mutthi, Paakantyi and Ngyiampaa people in their struggle for recognition of traditional country.

Committee members: **Mutthi Mutthi** - Mary Pappin (Chairperson) Jean Charles Daniel Kelly. **Ngyiampaa** - Joan Slade Roy Kennedy Laurence Jones. **Paakantyi** - Noel Johnson Junette Mitchell Lottie Williams. **Wentworth Shire** - Anne Kiely. **Balranald Shire** - Alan Putil. **Neighbour** - Des Wakefield. **Conservation** - Martin Westbrooke. **NPWS** - Steve Millington. **Department of Environment and Heritage** - Kieran Hotchin.

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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 the legislative and policy framework, primarily the *National Parks and Wildlife Act 1974*, the *Threatened Species Conservation Act 1995* and the policies of the NSW National Parks and Wildlife Service (NPWS). The policies arise from the legislative background of the NPWS and internationally accepted principles of park management. They relate to nature conservation, cultural heritage conservation, recreation, commercial use, research and communication.

Other legislation, international agreements and charters may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979* requires the assessment and mitigation of the environmental impacts of any works proposed in this plan.

1.2 NATIONAL PARKS IN NEW SOUTH WALES

National parks are reserved under the National Parks and Wildlife 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.

Mungo National Park is wholly contained within the Willandra Lakes Region World Heritage Area. Management of this World Heritage Area is directed by a comprehensive Plan of Management (1996) which was prepared after an extensive community consultation process which identified all of the traditional tribal groups who occupied traditional lands in the World Heritage Area. Three tribal groups, Paakantyi, Mutthi Mutthi and Ngyiampaa, are currently working effectively in the management of the World Heritage Area, having formed the 3TTG (three Traditional Tribal Groups) Elders Council. Rather than 'divide' the World Heritage Area up on a

tribal basis, the 3TTG Elders Council developed a concept of 'shared heritage' and agreed that management decisions inside the World Heritage Area boundary were the business of all three tribes. Mungo National Park is a Schedule 14 park, ie. it is nominated for joint management under the *Aboriginal Ownership Amendment Act 1996* No.142; the care, control and management of which is vested in a board of management. The make-up of this board is negotiated and agreed to by the Minister for the Environment and Local Aboriginal Land Council members. The board would consist of a majority of Aboriginal owners.

At the present time the Aboriginal community has decided not to pursue full joint management for Mungo National Park as allowed for in the Aboriginal Ownership Act. The NSW NPWS respects this decision but wish also to encourage constructive input into the management of Mungo National Park by the traditional owners in the interim.

To formalise the involvement of traditional owners in the management of Mungo National Park, and in lieu of full handback, the NSW NPWS in early 2000 began discussions with the 3TTG Elders and other Aboriginal community members about options for co-management. These options included the establishment of an Advisory Committee for Mungo National Park comprising a majority 3TTG Elders. This concept was the basis for negotiations of the Joint Management Agreement.

Consultation and involvement by stakeholders was always paramount in the preparation of the Joint Management Agreement. Several drafts were produced with a final copy being ratified by the 3TTG Elders Council on March 24, 2001. This Joint Management Agreement encourages and provides the 3TTG elders with extensive input into the management of Mungo National Park, however it is always acknowledged that until full handback, the care, control and management of Mungo National Park would still legally remain with the Director-General, NPWS.

The Joint Management Agreement is evidence of the good faith of the parties to work together in the spirit of reconciliation and co-operation. It is not intended to in any way impact upon or transgress any Native Title Rights, nor prescribe future contemporary management boundaries or arrangements, or impede any other rights that may exist in relation to Mungo National Park.

Principles:

1. The NSW NPWS acknowledges the aspirations of the 3TTGs to re-establish their traditional links to the land.
2. The NSW NPWS acknowledges that the existing plan of management for Mungo National Park is deficient in involving members of the 3TTGs in the management of Mungo National Park.
3. The NSW NPWS recognises that the 3TTGs issues and cultural heritage relating to Mungo National Park must be managed with the consultation and involvement of the 3TTGs.

4. The 3TTGs recognises that the care, control and management of Mungo National Park rests with the Director-General, NPWS, and that the NSW NPWS must manage it with full consideration for the *National Parks and Wildlife Act 1974*, the *Environmental Planning and Assessment Act 1979*, the *Threatened Species Conservation Act 1975*, the *Public Finance and Audit Act 1983*, the *Public Sector Management Act 1988*, and other legislation.
5. The NSW NPWS acknowledges that the Joint Management Advisory Committee will consist of a majority of traditional owners who will advise the NSW NPWS on the management of Mungo National Park within the parameters of the current Plan of Management, legislation, and this Joint Management Agreement.

1.3 WORLD HERITAGE

The International Convention for the Protection of the World Cultural and Natural Heritage was adopted by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) in 1972. The Convention provides a framework for international co-operation and the collective protection of cultural and natural heritage of outstanding universal value.

The primary purpose of management of a declared World Heritage property is, in accordance with Australia's obligations under the World Heritage Convention, to identify, protect, conserve, present and transmit to future generations, the World Heritage values of the property.

This plan of management was prepared in accordance with the Australian World Heritage Management Principles set out in the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. These principles place an obligation on the NSW NPWS for long-term care and stewardship of Mungo National Park and other listed areas to ensure that their values are conserved and if necessary rehabilitated, and that individual or cumulative actions do not degrade their values.

The Willandra Lakes Region World Heritage Area Plan of Management contains broad management guidelines for the World Heritage Area. This plan of management is consistent with the World Heritage Area Plan of Management. The Mungo National Park Joint Management Advisory Committee includes several members of the World Heritage Area Elders Committee. The World Heritage Area Elders Committee provides guidance to Aboriginal representatives on the World Heritage Area Community Management Committee and the World Heritage Area Technical and Scientific Advisory Committee. The Department of Environment and Conservation (NSW) also has a representative on the Community Management Committee and the Technical and Scientific Advisory Committee as well as on the Mungo National Park Joint Management Advisory Committee.

2. THE PLANNING AREA

2.1 LOCATION, GAZETTAL AND REGIONAL SETTING

Mungo National Park came into being in 1979 when the NSW National Parks and Wildlife Service (NPWS) acquired the 1922 'soldier settlement' block known as Mungo. Interest in Mungo stemmed from the archaeological treasures progressively being uncovered in the Lake Mungo lunette, better known as the 'Walls of China'. The archaeological finds were of global significance in the understanding of human evolution and occupation in Australia. In 1984 the adjoining block to the north, Zanci, was added to the park to give a total area of 29,466 hectares.

The adjoining leasehold blocks, Leaghur, Garnpang and Balmoral (or parts thereof), which were held by the Department of Land and Water Conservation, were added to Mungo National Park in October 2002. This extension to the park, which added 60,790ha, brought the total area of Mungo National Park to 90,256ha, of which approximately 65% (58,849) falls within the Willandra Lakes Region World Heritage Area. Mungo National Park represents about 25% of the total World Heritage Area and the park now contains about 90% of recorded archaeological sites within the World Heritage Area.

A further 22,330 hectares of the Pan Ban lease to the north of the park (called the Numbucurra block) was acquired in 2003. Gazettal was deferred as there was a mining lease over the land, but the lease has now lapsed and the block will be gazetted as part of Mungo National Park in 2005. This plan of management applies to this land and to any future additions to the national park. Where management strategies or works are proposed for the park or any additions that are not consistent with the plan, an amendment to the plan will be required.

The area holds great significance for three traditional Aboriginal tribal groups, Paakantyi, Mutthi Mutthi and Ngyiampaa who are closely involved in the management of the World Heritage Area, including Mungo National Park.

The park is situated in the rangelands of south-western NSW in an area known as the Willandra Lakes region. It is 110 km north east of the Victorian/New South Wales border towns of Mildura/Wentworth and 140 km north-west of the New South Wales town of Balranald. It falls within the Balranald and Wentworth Shires and the surrounding lands are Western Lands pastoral leases running mainly sheep. Some dryland cropping also occurs to the south of Mungo. The commercial harvesting of kangaroos is also an industry in the area, as is tourism.

The Willandra Lakes region, including a portion of Mungo National Park, was placed on the World Heritage List in 1981 based on its globally significant archaeological, geomorphological and palaeontological values. The area provides a unique window on the changing climate and society's interaction with the environment during the Pleistocene period. The World Heritage Area covers 240,000 hectares.

The climate is cool semi-arid with an annual average rainfall in the order of 250mm. Winters are mild with an average daily July minimum of 5 and maximum of 15

degrees celcius. Summers are hot and dry with the average February daily minimum of 16 and maximum of 32 degrees celcius. The annual evaporation rate is approximately 1900mm and this is of particular significance to domestic water supply management within the park as the primary water supply is in ground tanks.

2.2 LANDSCAPE CONTEXT

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 the activities of modern day Australians continue to influence the land through recreational use, cultural practices, the presence of introduced plants and animals and in some cases air and water pollution.

Mungo National Park protects an area of outstanding international and national significance for its landscape and cultural heritage values; its archaeological, geomorphological and palaeontological features. The area is of state and regional significance for its cultural, biodiversity, social, educational and economic values.

The Willandra Lakes region, including Mungo National Park, is a landscape that has steadily evolved over the past two million years. It lies within the Lower Murray-Darling Basin, which is an extensive area of Tertiary marine sediments overlain by Pleistocene aeolian deposits of mud and sand. It is a semi-arid landscape of 360 degree horizons with the only relief being low red sandy ridges and crescent shaped dunes (lunettes) rising up to 40m on the easterly shore of relict lakebeds. The vegetation communities that predominate are mallee eucalypts, Belah/Rosewood and Cypress Pine woodlands, shrubland and grassland.

The interconnected system of the Willandra Lakes were once fed by Willandra Creek, (a distributary of the Lachlan River), on its way to the Murrumbidgee River during periods of greater water flow between 45,000 and 25,000 years ago. Declining flows during the period 25,000 to 12,000 years ago have left the relict lake system and Willandra Creek an ephemeral stream.

As Australia's climate changed through the period 25,000 to 12,000 years ago the lakes progressively dried out; however, as the region has been unaffected by changes in sea level, glaciation or major tectonic movement it presents a remarkable record of Pleistocene changes and human response to that change. This record can be found in the layers of sediments in the lunettes flanking the lakebeds such as the Walls of China at Lake Mungo. These sediments provide a 50,000 year record and include evidence of a reversal of the earth's magnetic field, known as the Mungo Geomagnetic Excursion and remains of Australia's megafauna.

Evidence of Aboriginal occupation dating back at least 40,000 years has been found, including a ritual burial site dating back 40,000 years and possibly the worlds oldest cremation at 40,000 years ago.

Early European explorers such as Charles Sturt, Major Thomas Mitchell, Burke and Wills passed through the region but it was pioneering pastoralists searching for

grazing lands that created permanent white settlement. Many pastoral families remaining in the district today have links with these early settlers.

Both Aboriginal and non-indigenous 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 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, 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

Mungo National Park is of international and national significance for its cultural, archaeological, landscape, biodiversity and research values; and of state and regional significance for its social, economic and recreation values.

Key cultural heritage values include:

- Continuous Aboriginal occupation for at least 40,000 years from the Pleistocene to present day
- Contains evidence of traditional Aboriginal culture
- Involvement of traditionally affiliated tribal groups in management
- Has great spiritual significance for Paakantyi, Mutthi Mutthi and Ngyiampaa
- Contains significant pastoral heritage values in the form of 19th century buildings and other infrastructure developed by early European settlers
- Strong links from the pioneering pastoral era to present day lessees of surrounding properties

Key landscape heritage values include:

- Relict Pleistocene lake system
- Record of past climate change and interactions between human societies and a changing natural environment
- Example of salinity in landscape evolution
- Palaeontological evidence - the Mungo Geomagnetic Excursion – evidence of significant changes in the earth's magnetic field

Key biodiversity values comprise:

- Flora and fauna associations more typical of Victoria and South Australia than of other regions of NSW.
- A high level of vegetation cover and integrity for the region.
- Survival of rare and threatened species of flora and fauna

Major recreation and tourism values include:

- Camping and nature based tourism opportunities for private parties and commercial tour groups.
- Outstanding opportunities for educational tourism centred on unique world heritage values
- Regionally significant landscape values such as the Mungo lake bed and the Walls of China
- Opportunities for contemplation and spiritual experience

Research and educational values:

- Landscape and natural resource evolution and human response to same
- Human physical and cultural evolution
- Study of present ecosystem dynamics
- Endangered species management

- Insights into contemporary aspirations and culture
- Opportunity to educate the wider community in scientific methodology in various fields and the management application of that information

3.2 MANAGEMENT DIRECTIONS

All management will be consistent with relevant legislative requirements, both as they relate to National Parks and World Heritage areas, and established NPWS policies.

The role of the Mungo National Park Joint Management Advisory Committee will be pivotal in the planning process and future management directions and decisions.

Management directions will be value and issue focused; and stated in terms that will allow for development of clear management actions that will have measurable performance indicators.

Some of the management directions outlined below will be applicable to several value groups.

3.2.1 CULTURAL HERITAGE

- Conservation of World Heritage values will be an overriding objective of this plan
- Cooperative partnerships with traditional tribal communities through their elected representatives will form the basis for all management planning and decision making
- Management objectives for all issues will reflect the ongoing cultural significance of Mungo so that the whole human story can be told without “fossilising” to a particular period
- In partnership with Aboriginal communities the cultural values will be further explored, documented and an ongoing monitoring system put in place to ensure all sites are protected
- The significance of Mungo will be promoted to the wider community

3.2.2 LANDSCAPE

- The geomorphological features will be protected
- The historic elements of the landscape will be evaluated, conserved and monitored. Management of historic resources will aim towards in-situ conservation and adaptive re-use where possible.
- Key elements of pastoral heritage will be conserved and interpreted
- Access will be managed so as to present the landscape evolution story whilst also protecting the resources
- A strategic plan for directional and interpretive signage will be developed to ensure the scenic values and atmosphere are not compromised
- Research into the changing natural environment and the relationship to human land use will be encouraged
- The story of landscape and land use evolution will be promoted

3.2.3 BIODIVERSITY

- Further resource investigation will be undertaken to identify and map the biological resources of the park as it is acknowledged that without an understanding of the resource, sound management cannot proceed
- Biodiversity values are indivisible from Aboriginal cultural heritage values and traditional tribal groups will have an important role to play in relation to surveys and management directions
- Management will aim to maximise conservation of natural heritage values while also conserving cultural heritage values
- Tools for achieving biodiversity outcomes will include fire management, pest plant and animal control and management of total grazing pressure
- Conduct research and monitoring of threatened species and their habitats, consistent with the objectives and actions of relevant recovery plans, to ensure that on-park management is achieving positive outcomes for threatened species and all endemic biota.

3.2.4 RECREATION AND TOURISM

- The role of the Joint Management Committee and Elders Council will be critical in deciding the appropriateness of any future developments
- It is recognised that to meet the present and predicted future demands of visitors to Mungo a more strategic approach to visitor management on site needs to be developed and implemented so as to protect critical sites, e.g. The Walls of China
- Areas of the park identified as significant and sensitive require control of access, including for staff and contractors. Suitable infrastructure needs to be developed so that access does not compromise values
- Tour operator accreditation and licensing will be a priority and used as a management tool in controlling visitor access to sensitive areas and disseminating accurate information
- Partnerships with tourism organisations and private enterprise will be pursued where appropriate to promote Mungo National Park and share visitor information and provision of services
- The regional context will be considered when examining potential recreation opportunities

3.2.5 RESEARCH AND EDUCATION

- Research and monitoring priorities will reflect knowledge requirements for operational planning issues and recovery planning priorities for threatened species, hence a long term research strategy needs to be identified
- Partnerships with research institutes will be pursued to provide the basis of a long term strategy
- Protocols will be established for program approval and procedure
- Park infrastructure and facilities will be made available to encourage research partnerships and programs

- An electronic database of all available research findings and resource information will be developed and maintained in the Area office
- Controlled dissemination of information will be encouraged to provide information and education for the wider community and raise the profile of Mungo as a World Heritage Area

3.2.6 MANAGEMENT

- Mungo National Park is listed on Schedule 14 of the National Parks and Wildlife Act for handback to the traditional owners. This option has been considered in recent times and the decision has been to defer full handback at present. The Mungo National Park Joint Management Advisory Committee has been established as an interim measure.
- The key management advisory body will be the Mungo National Park Joint Management Advisory Committee
- The committees established under the World Heritage Area will also play an integral role in the consultation and management decision making processes
- No management programs will be initiated without adequate staffing and financial resources for full completion and monitoring of management outcomes for natural and cultural heritage values
- Future staffing requirements will be used to provide opportunities for employment of members of the three traditionally affiliated tribal groups
- An objective for all management activities and actions will be environmental best practice

4. CONSERVATION OF CULTURAL AND NATURAL HERITAGE

4.1 GEOLOGY, LANDSYSTEMS AND PALAEOLOGY

Mungo National Park and the surrounding Willandra Lakes region are of international significance for both natural and cultural values. In respect of this outstanding natural heritage, it is the area's record of climate and landscape evolution during the Pleistocene and Holocene that make it unique. Mungo landscape reads like an open page of the past two million years; it is a geomorphological record unparalleled in Australia.

The park lies within the Lower Murray-Darling Basin, a landscape of little relief a mere 60 to 100 metres above sea level. The underlying Tertiary sediments of sand and mud, that were washed down from the south-eastern highlands, are overlain by aeolian Pleistocene deposits. As the rivers draining the eastern highlands, the Murray, Murrumbidgee and Lachlan, changed their course in response to fluctuating flows and shifting sand dunes, the Willandra Creek, a tributary of the Lachlan, was blocked and the Willandra Lakes System formed about 400,000 years ago. The lakes underwent a sequence of fluctuating water levels and the prevailing westerly winds steadily built lunettes on the eastern shores of the lakes. These fluctuations in flows and lake levels were brought about by climatic changes, including periodic glacial fluctuations in the south-eastern highlands.

A large proportion of the park consists of playas and basins of the relict lakebeds of Lake Mungo, Leaghur and Garnpang and their associated lunettes, surrounded by undulating sandplain and dunefield landsystems.

Playas and Basins – *Garnpung & Mungo landsystems*

The lakebed soils are a mosaic of grey and red heavy clays and in places contain channels and gilgais. The Mungo lunette, "The Walls of China", is mostly loosely cemented whitish sands and well consolidated clays, exhibiting considerable gully erosion. The Leaghur and Garnpang lunettes have only suffered minor erosion and have abundant vegetative cover.

Sandplains- *Bulgamurra, Mulurulu & Overnewton landsystems*

The undulating sandplains consist of calcareous loamy to sandy loam red and brown soils with isolated depressions of grey clays.

Dunefields-*Arumpo, Leaghur & Mandleman landsystems*

The dunefields of the park vary. They include, parallel dunes of deep loamy sand with narrow swales of calcareous loamy red earths; dunefields of parabolic and unaligned dunes with deep sandy red soil swales; high unstable dunes of deep white sand interspersed with flats of calcareous loamy brown soils.

The most famous of the lake lunettes is the crescent shaped Mungo lunette, called “The Walls of China”. It was formed during the millennia of fluctuating lake levels as westerly winds swept sand and red dust from the lake shore and from the plains to build up on the lake’s eastern shoreline. From about 45,000 years ago the evidence of Aboriginal occupation and usage of the lacustrine environment began to be evident in the layers of the lunette; as were the remains of some of Australia’s megafauna species. The depositional layers of the Mungo lunette have been named after the local pastoral stations Gol Gol, Mungo and Zanci; and were deposited in that order. The upper two contain a vast amount of evidence of human occupation including hearths, middens, stone tools and burials; as well as megafaunal remains including: *Zygomaturus trilobus*, the worlds largest marsupial; *Genyormis newtoni*, a large emu like flightless bird; *Procoptodon goliah*, a giant kangaroo; and *Protemnodon*, another of the large kangaroos.

Remains of modern locally extinct fauna found in the lunette include the Tasmanian Devil (*Sarcophilus harrisii*); Tasmanian Tiger (*Thylacinus cynocephalus*); Northern Hairy-nosed Wombat (*Lasiorhinus krefftii*); Burrowing Bettong (*Bettongia lesueur*); Swamp Rat (*Rattus lutreolus*) and Hare Wallaby (*Lagorchestes lepidorides*).

Lacustrine resources found in the middens include Murray Cod (*Maccullochella peeli*); Golden Perch (*Macquarie ambigua*); yabby (*Cherax destructor*); and freshwater mussel (*Velesunio ambiguus*).

Another notable find within the lunette was evidence of a geomagnetic excursion that had hitherto been unrecorded and is now known as the ‘Mungo Excursion’. The evidence of a deviation in the Earth’s magnetic axis of 120 degrees from its present came from clay heat retainers used in Aboriginal fireplaces.

The accelerated erosion of the Mungo lunette which was largely brought about by European pastoral activity and introduced species such as rabbits, has sculpted the lunette to its present shape. This erosion uncovered the treasure trove of materials which made “The Walls of China” so well known and precipitated its world heritage status, as well as creating its scenic landforms.

Wind, and to a lesser degree water erosion, still affects all the geomorphic units within the park. Whilst erosion is a natural process and dunes in the semi-arid landscape naturally move over time, any unnaturally caused or accelerated erosion is undesirable.

Desired Outcomes

- The landscape and soils of Mungo National Park continue to naturally evolve and the impact of non-natural causes of erosion is minimised/eliminated.
- An improved understanding of the geomorphic 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 and in particular the lunettes around the relict lakebeds will be protected.

Strategies and Actions

- Archaeological and palaeontological research will be encouraged and promoted for management decision making and broader education and interpretive purposes.
- An inventory of sites that require special protection and/or remedial works will be prepared and all necessary works carried out.
- Tracks identified as no longer being required for park management will be closed and rehabilitated.
- Maintain all management roads, trails and facilities to minimise impacts on the geomorphology and landscape features of the park. (Also see sections 5.1 Soil erosion, 5.2 Introduced species, 5.3 Fire management.)

4.2 ABORIGINAL HERITAGE AND ARCHAEOLOGY

NGYIAMPAA TRIBE

The Ngyiampaa people today still have association with the Willandra region and Mungo National Park. Their association comes through the Willandra Creek, that is through their southern boundary, where they meet up with the Mutthi Mutthi Peoples. This is our tribal boundary.

Willandra Creek was and still is one of the main traditional water supplies that come through Ngyiampaa country, this is where we connect to the Willandra and Mungo National Park. Our ancestors would have travelled down the creek, around the lakes and met other tribes and had ceremonies and trade around the lakes.

Roy Kennedy – Ngyiampaa Tribal Elder, Hay

MUTTHI MUTTHI TRIBE

Mungo is the dreaming place for the Mutthi Mutthi people. It is where our people come to hold ceremonies. Mungo is a place of love, peace and harmony for the Mutthi Mutthi people. It is also the meeting place of the Tribes, where we held meetings, ceremonies and traded things. The Mutthi Mutthi had a long association with the Willandra Lakes and Mungo long before the white settlers came through this country. The dreaming lines of the Mutthi Mutthi are still there today; and so are those of the other tribes associated with that place today.

Mungo is the most “cultured” place as it reflects the past of the people and the land, it is a place that requires respect. It is the creation place where all things were brought into being.

We realise today that this is the place where people and the land become one, where our people walk with the spirits of our ancestors.

Today we look at this place and we belong. It is a place where all our concerns and worries disappear – it has that effect on people. It is our most sacred site and demands respect.

The future of the Willandra Lakes and Mungo National Park relies upon good management and respect of all those people that have an association with it.

“The children and students must come to Mungo to learn and enjoy the spiritual and cultural significance of this, our most important place of our people, as this is the place of love, peace and harmony.”

Alice Kelly – Mutthi Mutthi Tribal Elder, Balranald

SOUTHERN PAAKANTYI

“There was a little bunyip sitting on a log partly in the water and this wiimpatya came along and took him. Another wiimpatya said to leave him there and not to take him, but the first one he took him anyway. This old frog, he lived down a hole and sucked all the water in as punishment for taking the bunyip. These two wiimpatya, they wanted a drink. The bossy one said to the frog ‘give us some water or I’ll spear you.’ The other one said not to, it was better to wait, but the first one speared the frog and all the water started to come up. As more and more water came up the water got deeper and deeper. The two fellows started running but the water got too deep to run through, the first wiimpatya dropped the bunyip. The water kept rising and it flooded the country and the two fellows had to start swimming and they turned into two black swans.”

“This was one story my mother would tell me when I was a child. It had a lesson in it, like all the stories. This lesson was not to kill things, unless it was for food. Some things we couldn’t kill even for food as they were our ancestors, our totem.”

Lottie Williams –Paakantyi Tribal elder, Pooncarie

Archaeological Values

The global significance of the cultural heritage values of the Willandra region qualified the area for World Heritage status. The Aboriginal prehistory within the region is possibly the most significant in Australia. Ongoing associations with the land are of great importance to Paakantyi, Mutthi Mutthi and Ngyiampaa people of today.

Much has been written on the Aboriginal prehistory and archaeological significance of the region (refer references at back of this plan). The following is a brief overview.

Mungo National Park is part of an area that has one of the longest records of human occupation in Australia. The most abundant archaeological sites within the park are stone artefact scatters and fireplaces. Some of these fireplaces had clay heat retainers and the evidence of the Mungo geomagnetic excursion of 28,000 – 31,000 years ago comes from these. Some of the fireplaces contain burnt fish bones and small middens containing shells of freshwater mussels have been found in the Mungo lunette. On the western shore of Lake Mungo just north of the homestead a silcrete quarry was the source of many of the stone artefacts scattered through the park, cores and flakes being most commonly found.

It is known from burial sites just outside the park that Aboriginal occupation of the area extends beyond 40,000 years. These burials are also amongst the world's oldest ritual burials and cremations.

The continuity of the archaeological record from 40,000 plus years ago to modern times, coupled with the evidence of landscape and natural resource evolution over that time, allow for an unprecedented comparison of Australian settlement and technology with that of other parts of the world. Evidence shows that social and economic developments in Australia occurred at a similar or earlier time than comparative developments elsewhere in the world. The shift from lacustrine resources to terrestrial resources as the climate changed and the lakes dried out is evident at Mungo National Park.

Desired Outcomes

- The presentation of Aboriginal culture will be overseen and directed by Paakantji, Mutthi Mutthi and Ngyiampaa people.
- All visitors to Mungo National Park will be made aware of the significance of the area, both in its prehistory and modern era context.
- The three Traditional Tribal Groups (3TTGs) develop an increased capacity to meet management, educational and interpretive demands, which will increase with growing visitation to the park.
- Archaeological and Aboriginal cultural material will be protected from damage and inappropriate use/presentation.

Strategies and Actions

- The NPWS and others will assist the 3TTGs in promoting and presenting the Aboriginal cultural heritage values of the area in accordance with the wishes of the 3TTGs.
- The NPWS will assist the 3TTGs in collating an inventory of Aboriginal knowledge of flora and fauna.
- The NPWS will assist with developing the capacity of the 3TTGs to present, promote and protect the area's cultural values. Specific activities will include the Discovery programs, interpretation training and working in partnerships with commercial tour operators.
- Once the 3TTGs have established their off-park cultural centre, the NPWS will help facilitate all visitors to enter the park via this venue.

4.3 HISTORIC HERITAGE

European settlement of the Willandra Lakes region dates back to the 1850's when huge pastoral holdings were taken up in the mallee lands of south-west New South Wales. Amongst these was North Turlee Block A Run, taken up by William Nash in 1864. It was later subsumed into the adjoining Gol Gol Station owned by Robert Patterson and run as an outstation until 1921.

As was the case in other parts of Australia the 1920's saw the establishment of soldier settlement blocks for WW1 veterans. The subdivision of some of Gol Gol in 1921 created Mungo and Zanci blocks, each of 16,000 hectares. Another block, Joulni, was also established. It adjoins Mungo National Park on its southern boundary and contains some of the most significant archaeological sites in the World Heritage Area. It is now in the name of the 3TTG incorporated body.

The first European owners of the Mungo block were Ewan and Angus Cameron. The name Mungo is thought to have two possible origins. The Paakantyi word for canoe, which were common craft along the Murray and Darling rivers, is "mungoe". Another possible source stems from St. Mungo, patron saint of Glasgow, the Cameron brothers being of Scottish descent. The first European owners of Zanci were Joseph Vigar and his son Roy.

In 1934 Albert and Venda Barnes purchased Mungo and owned it until 1979 when they sold it to the National Parks and Wildlife Service. The adjoining Zanci block was sold to the NPWS by Russell and Rita Clothier and added to the park in 1984.

Several key features of this early pastoral era have been stabilised or restored. The Mungo woolshed dating from about 1878 is one of the most historically significant built features of the park with its drop-log construction of White Cypress Pine. Mungo homestead and shearers quarters, along with the Zanci stables, dugout and shearing shed and yards are also important historic sites and of great interest to many visitors. A portion of the Mungo shearers quarters burnt down on 31 December 2004.

The most recent additions to the park are the properties called Leaghur, (purchased from Clarrie and Gladys Barnes) Garnpang (purchased from the Richardson family) and Balmoral. Garnpang in particular has a rich historical resource that requires careful management.

A comprehensive report, the Mungo Conservation Management and Cultural Tourism Plan, on the historic heritage of Mungo National Park was completed in March 2003 and is listed in the reference section.

Desired Outcomes

- That the key structural indicators of the history of the area be preserved, and adapted where necessary to facilitate ongoing use.
- Best practice cultural heritage management will deliver effective and efficient on-ground conservation outcomes.
- Visitors to Mungo National Park gain an understanding of the evolution of land use, lifestyle and society through the presentation and interpretation of the historic features.

Strategies and Actions

- Management of cultural heritage will be consistent with the Far West Region Cultural Heritage Management Strategy.
- A maintenance works program for historic structures and buildings will be prepared and implemented. Included in this will be an annual condition monitoring program.
- The following recommendations of the Conservation Management and Cultural Tourism Plan will be implemented:
 - An inventory of movable heritage items and artefacts will be collated and Movable Heritage Conservation Plan prepared and implemented.
 - A Conservation Plan for the Woolshed and Woolshed underground tank will be prepared and implemented.
 - Fire protection measures will be put in place to minimise the fire risk to heritage assets.
 - A study of ground tank heritage values will be undertaken.
 - A Review of Environmental Factors (REF) for Balmoral homestead (ruins) precinct.
- The historic heritage of the area will be interpreted to park visitors.
- A cultural heritage assessment will be undertaken of the shearers quarters historic precinct to assess how best to conserve the heritage values following the fire. Visitor accommodation may be provided in a new building on the site of the quarters or in nearby consistent with the heritage assessment.

- An assessment of the historic heritage values on Leaghur and Garnpang will be undertaken and a conservation management plan prepared and implemented for each property or the historic precincts around the homesteads on each property.

4.4 NATIVE PLANTS

The vegetation communities of Mungo National Park include the following:

- Grasslands/Herblands – tussock grassland of *Eragrostis australasica* occur in wetter areas of the lake bed. On scalded areas an annual herbland dominated by *Atriplex lindleyi* has developed, associated species include *Dissocarpus paradoxus*, *Osteocarpum acropterum* v. *demenuta*, *Sclerolaena divaricata*, and *Maireana ciliata*.
- Bluebush/saltbush shrublands – mostly on the dry lake beds, dominant species include *Atriplex holocarpa*, *A. nummularia*, *A. vesicaria*; *Chenopodium curvispicatum*, *C. nitrariaceum*; *Enchylaena tomentosa*, *Maireana georgei*, *M. pyramidata*, *M. sedifolia*; *Muehlenbeckia florulenta*; *Nitraria billardierei*
- Mixed shrubland – a lunette community of mallee, pine, Butterbush – *Pittosporum phylliraeoides*, Sandhill Wattle – *Acacia ligulata*, Needlewood – *Hakea leucoptera*, Rosewood – *Alectryon oleifolius* ssp. *canescens*, Bluebush – *Maireana pyramidata*, grasses and herbs.
- Cypress Pine - *Callitris glaucophylla* woodland – on deep red sandy loam country mostly on the western side of the dry lake beds; the herb and grass understorey species include *Actinobole uliginosum*, *Calandrinia eremaea*, *Calotis hispidula*, *Crassula colorata* v. *acuminata*, *Rhodanthe moschata*, *Tetragonia tetragonoides* and *Zygophyllum ammophilum*.
- Belah - *Casuarina pauper*/Rosewood - *Alectryon oleifolius* ssp. *canescens* open woodland – on the gently undulating sandplains of brown loamy sands; in association with *Myoporum platycarpum* and *Geijera parviflora*, with an understorey including *Enchylaena tomentosa*, *Chenopodium curvispicatum*, *Maireana pyramidata* and *Sclerolaena patentiuspis*.
- Mallee open-shrublands *Eucalyptus gracilis* / *E. dumosa* / *E. socialis* - on sandy loam interdune plains; understorey includes *Atriplex stipitata*, *Dodonaea viscosa*, *Eremophila glabra*, *Maireanapentatropis* and *Enchylaena tomentosa*.
- Mallee open-shrublands with spinifex *Triodia scariosa* – on the east-west sand ridges of shallow sands overlying sandy clays; associated shrubs include *Dodonaea viscosa*, *Maireana pentatropis*, *Eremophila glabra* and *Grevillea huegelii*.
- Acacia open-woodland/open-shrubland *Acacia aneura* / *A. melvillei* / *A. loderi* / *A. ligulata* in isolated pockets of the sandplains on heavier soils. The understorey is a mixture of native and exotic herbs and grasses.

The arrival of stock in the 1850's saw the beginning of a phase of intense pressure on the vegetation communities of the entire region and this was exacerbated by the impact of rabbits from the 1880's. The decline in the integrity of the native vegetation has continued for the past 150 years with feral goats and increased kangaroo numbers adding to the pressures of domestic stock. Within the national park domestic stock and feral species impacts have ceased or at least eased, however the high density of kangaroos (up to 80 per square kilometre) is still of concern in

relation to vegetation community sustainability. Research carried out in similar vegetation communities in nearby Hattah Lakes National Park¹ concludes a density of five kangaroos per square kilometre is desirable for vegetation management and biodiversity conservation.

With the exception of the mallee communities, particularly mallee with spinifex, exotic weed species are widespread and common throughout. This is a direct result of decades of high grazing pressure.

Of particular immediate conservation concern are declining acacia shrublands usually found on the low-lying sandplain areas; namely *Acacia aneura* (Mulga), *Acacia loderi* (Nelia) and *Acacia melvillei* (Yarran). All three species exhibit senescent populations with no recruitment. Also, on the Mungo lunette the *Acacia ligulata* community is in decline due to erosion.

The mallee/spinifex community of Mungo National Park is more typical of mallee/spinifex communities in Victoria and South Australia than in other regions of New South Wales. Therefore it is of important conservation significance for this community and associated fauna in the context of New South Wales species management.

Desired Outcomes

- Increased understanding of the vegetation communities and of community dynamics.
- The vegetation communities within Mungo National Park are allowed to be shaped by the natural ecological processes 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

- Implement and maintain an expanded monitoring program on the effects of grazing on native vegetation.
- An inventory of Aboriginal knowledge of vegetation communities will be undertaken to identify and record native plant food and medicinal resources.
- Identify needs in relation to vegetation mapping and prepare a plan to acquire resource inventory that will address information requirements. Complete vegetation mapping of the park on NPWS Geographic Information System (GIS).

¹ Sluiter, I.R.K. Allen, G.G. Morgan, D.G. Walker I.S. (1997) ***Vegetation responses to stratified kangaroo grazing pressure at Hattah-Kulkyne National Park, 1992-96*** Flora and Fauna Technical Report No. 149. Department of Natural Resources and Environment & Parks Victoria

- Identify information needs in relation to vegetation community dynamics with particular emphasis on total grazing pressure and response to various fire regimes. Prepare a research plan to examine options for research to be undertaken.
- Establish reference areas within the park specifically for baseline data collection and ongoing monitoring programs to measure management regime effectiveness.
- Instigate a recovery program for *Acacia aneura*, *A. loderi* and *A. melvillei* by fencing remnant populations.
- Identify specific needs of native flora populations that may require habitat manipulation for their survival/recovery, e.g. revegetation programs, fencing or fire regime manipulation and monitor the effectiveness of any such programs. Initial projects will be fencing Pine/Belah community near main campground and identified high conservation value sites along Lake Mungo foreshore.
- Undertake kangaroo population management to achieve desired overall densities of five animals per square kilometre. A water management strategy, which may include closure or fencing of some ground tanks, will be implemented as an initial action. If this strategy is not successful, others may be considered and implemented providing they are supported by sound data.
- Actively seek and encourage research by forming partnerships with teaching institutions and facilitating long-term research and monitoring programs.

4.5 NATIVE ANIMALS

The native fauna of the region has been under considerable stress since the introduction of stock and other exotic species. The negative impact on the natural vegetation had a corresponding impact on the sustainability of native fauna populations and many species have become locally extinct.

The fauna of the park, particularly in the recent extension areas, is yet to be thoroughly surveyed and assessed.

Mammals

The most visible and abundant of the native fauna are two of the large macropod species, the Red and Western Grey Kangaroo, *Macropus rufus* and *M. fuliginosus*. The Eastern Grey Kangaroo *M. giganteus* is also present. The increase in permanent water supply brought about through the building of ground tanks has increased the viability of the large macropod species and their population in Australia's semi-arid zone has increased dramatically in areas where the limiting factor of lack of water has been removed.

Whilst several of Australia's large macropods have benefited from settlement, many small and medium sized mammals have all but disappeared. Species now absent

from Mungo include the Northern Hairy-nosed Wombat, *Lasiorhinus krefftii*; Bridled Nailtail Wallaby, *Onychogalea fraenata*; Eastern Hare-wallaby, *Lagorchestes leporides*; Brush-tailed Bettong, *Bettongia penicillata*; Burrowing Bettong, *Bettongia lesueur*; Western Barred Bandicoot, *Perameles bouganville*; Bilby, *Macrotis lagotis*; and Numbat, *Myrmecobius fasciatus*.

Surviving species include Echidna, *Tachyglossus aculeatus*; Common Dunnart, *Sminthopsis murina*; Fat-tailed Dunnart, *S. crassicaudata*; Southern Ninggai, *Ningai yvonneae*; and nine species of bats, including the endangered Little Pied Bat, *Chalinobus picatus*. Possible survivors include the threatened Bolams Mouse, *Pseudomys bolami*; Giles Planigale, *Planigale gilesi*; and Southern Ninggai, *Ningai yvonneae*. Mungo National Park could provide valuable refuge habitat for these species.

Reptiles and Amphibians

The semi-arid landscape is often the home to a rich assemblage of reptiles and this is the case particularly in the spinifex/mallee community and the lakebed shrublands. The ubiquitous Shingleback, or “Stumpy tail”, *Trachydosaurus rugosus*; is the most encountered reptile in the park. Other species include the Bearded Dragon, *Pogona vitticeps*; Mallee Dragon, *Amphibolurus fordi*; Gould’s Goanna, *Varanus gouldii*; Eastern and Western Brown Snake, *Pseudonaja textilis* & *P. nuchalis*; Mulga or King Brown Snake, *Pseudechis australis*. The Western Blue Tongue Lizard, *Tiliqua occipitalis*; and the Spinifex Slender Blue-tongue lizard, *Cyclodomorphus melanops*; which are listed as threatened in New South Wales, have also been recorded in the park. In excess of forty species have been recorded, including ten species of gecko and sixteen species of skinks.

Not much is known about the composition and abundance of amphibians. The Common Spade Foot Toad *Neobatrachus sudelli*, Long Thumbed Frog *Limnodynastes fletcheri* and the Spotted Grass Frog *L. tasmaniensis* are reasonably common around ground tanks, particularly those that hold water for long periods. The threatened Painted Burrowing Frog *Neobatrachus pictus* may potentially occur at Mungo.

Birds

One of the most common and regular wildlife encounters at Mungo is the Emu, regularly seen stalking the bluebush/saltbush lakebeds and investigating the goings-on around the woolshed and visitor centre. Other common species include Mallee Ringneck Parrot, Blue Bonnet Parrot, Singing Honeyeater, Richard’s Pipit, Variegated and Blue Winged Wren, Apostlebird and Australian Kestrel. About 150 species are recorded from the area including several threatened species such as the Australian Bustard, Chestnut Quail Thrush, Gilbert’s Whistler, Pink Cockatoo and Mallee Fowl. Other likely/possible species include Hooded Robin, Southern Scrub Robin and Striated Grass Wren and Red-lored Whistler.

Desired outcomes

- A comprehensive knowledge base of the fauna species present within the park, along with their distribution, status and ecological requirements and response to park management practices, will form the basis for management decision making.
- The present diversity of fauna within the park will be retained and rare and threatened native species have their status improved.

Strategies and Actions

- Aboriginal knowledge of the fauna of the region will be collated and information from members of the three traditional tribal groups will be sought to gain a better understanding of the park's wildlife.
- A comprehensive vertebrate fauna survey will be conducted across all vegetation communities to augment currently available information and provide baseline data against which ongoing monitoring can be assessed. This will include establishment of permanent pitfall sites and seasonal bird survey transects.
- Native species identified as rare or threatened will receive initial priority with regard to management actions consistent with relevant recovery plan objectives, e.g. habitat manipulation, competition or predator control.
- Research relevant to management programs and desired outcomes will be actively encouraged. Particular attention will go toward obtaining information on ecosystem dynamics, e.g. impact of high grazing pressure from the large macropods on overall biodiversity and ecosystem robustness.
- An initial survey for Malleefowl will be undertaken in the Garnpang area and, if present, Mungo will be incorporated into the annual Malleefowl surveys conducted within the area. This will be consistent with the methods used in other NPWS estate (Tarawi, Mallee Cliffs, Yathong and Nombinnie) and with the objectives of the draft NSW Malleefowl Recovery Plan that is currently in preparation.
- The fox control program will be expanded in the park, specific to the Fox Threat Abatement Program.

5. PARK PROTECTION

5.1 SOIL EROSION

Soil erosion is part of the natural geomorphic process, particularly in semi-arid environments where wind erosion sculpts the landscape and creates dunal systems. The entire Willandra Lakes system was created as a result of wind driven sand, forming dunes that blocked the flow of Willandra Creek. The lunette associated with each lake was built up through a wind erosion process of lakebed and lakeshore sediments.

Natural processes are also involved in the ongoing wearing away of these lunettes, however several unnatural factors have greatly accelerated the process. The first of these was the introduction of cloven-hoofed animals that stripped the vegetation and mechanically impacted on the topsoil with their hard hoofs. Introduced animals, particularly the rabbit, and high numbers of the large macropod species also contribute to accelerated erosion. Human activity has also played its part, and presently poses the greatest risk of unnaturally high erosion rates.

The most severe examples of erosion can be found on the Lake Mungo lunette, which paradoxically is a highlight feature of the park with its window to the past having been opened through erosion. Many archaeological artefacts are liable to exposure, or to being covered over, as movement of soil and sand continues.

Desired Outcomes

- Human induced soil erosion in the park is minimised, with particular emphasis on protecting cultural heritage from vehicular and foot traffic.
- Accelerated rates of erosion from introduced animals are eliminated.

Strategies and actions

- Conduct an inventory of erosion problems relevant to management activities and develop a strategy to reduce/eliminate unnatural impacts.
- Design and undertake all works in a manner that minimises soil erosion.
- Minimise erosion arising from prescribed burns or wildfire control activity.
- Undertake rehabilitation works where needed in the park, e.g. the track from Walls Tank to the Walls.
- Extend the current boardwalk at the Walls to cater for interpretive and recreational pursuits whilst minimising visitor impacts.

5.2 INTRODUCED SPECIES

An introduced species is defined in this plan as any plant or animal species not native to the national park. Introduced species within Mungo National Park and on adjoining land are of concern because they have the potential to have detrimental effects on ecological and cultural values and can spread to and from neighbouring land. In addition, 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.

Several species of introduced plants and animals are present in Mungo National Park. Of the weed species, Patterson's Curse – *Echium plantagineum*, Onion Weed – *Asphodelus fistulosa*, Bathurst Burr – *Xanthium spinosum*, Horehound – *Marrubium vulgare*, Tree of Heaven - *Ailanthus altissima* and Tobacco Bush – *Nicotiana glauca* are of primary concern. None of these species is universally spread throughout the park, the Mallee/Spinifex vegetation community being the least affected by exotic plants. Roadsides and artificial watering points are problem areas for Patterson's curse, Onion Weed and Bathurst Burr, whilst Horehound is widespread through the sandplain landsystems and Tobacco Bush is common along the back of the Mungo lunette. Tree of Heaven is confined to a small area around the Leaghur homestead.

Of the introduced animal species, the European Wild Rabbit – *Oryctolagus cuniculus*, has had the greatest negative impact on the region's biodiversity and ecological processes. Fortunately calicivirus has helped reduce and keep numbers at a relatively low level over the past six years. The Mungo and Zanci portions of the park have had 90% of warrens ripped. Fumigation and gas blasting of warrens has also been effective and particularly useful in sensitive areas where the likelihood of cultural sites precludes ripping.

Feral Goats – *Capra hircus*, are present throughout the district and can be found in the park, particularly in the Mallee. Ground tanks provide water for this species. These artificial watering points can however, be strategically used to trap goats.

The European Red Fox – *Vulpes vulpes*, and the Feral Cat – *Felis catus*, are both widespread and common predators although their direct impact on the native fauna of the park is not yet quantified.

Introduced Honey Bees – *Apis mellifera* are of potential concern in relation to occupying nesting sites in tree hollows.

Desired Outcomes

- The impact of introduced species on native plants and animals is understood; and then eliminated or minimised within the park and on adjoining properties.
- There are no or minimal negative impacts from control methods, ie. cure must not be worse than the illness.

- Tangible and quantifiable benefits of pest management programs are demonstrated.
- Practices in the park serve as a model for adjoining properties and the district.

Strategies and Actions

- Survey the recent park additions and document extent of introduced species.
- Incorporate Mungo extensions into the Area Pest Management Plan.
- Control introduced species and eradicate them where practicable in accordance with best management practice, to deliver optimal biodiversity outcomes.
- Expand existing monitoring of control programs to include extensions.
- Monitor vegetation response to warren ripping.
- Give priority for the control of introduced species to those 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;
 - have a significant environmental impact, including damage to threatened species, catchment values and recreation values;
 - may affect neighbouring lands or are considered of high priority by the community;
 - management is needed to maintain benefits gained from previous control programs or to allow another high priority management program to be effective;
 - where a window of opportunity occurs; or
 - where the species is a new infestation and/or is limited in extent, so that its eradication would be relatively straightforward.
- Avoid unnecessary environmental disturbances. Where disturbance is inevitable or is planned, consider the likely impact of the activity in terms of introduced species and put in place controls or programs to reduce any such impact.
- Seek the cooperation of neighbours in implementing weed and pest animal control programs. Undertake control in cooperation with the Rural Lands Protection Board.
- 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.
- Fence off soak areas in the new additions to alleviate damage caused by goats.

- Review and summarise outcomes of control programs annually, provide results for NPWS publications and to distribute information on pest programs to the wider community.

5.3 FIRE MANAGEMENT

Fire is a natural feature of the environment and is essential to the survival of some plant and animal communities. Inappropriate fire, however, can damage natural and cultural heritage and endanger park visitors and neighbours. Management of bushfire in the park is a complex issue. Management must aim to achieve both long-term conservation of native plant and animal communities and ongoing protection of life, property and cultural heritage within and adjacent to the park.

Ecological requirements

Bushfire regimes are a major determinant of the distribution and abundance of plants and animals in the park. They also affect nutrient cycles, erosion patterns and hydrological regimes. Ecological research suggests the following requirements for biodiversity conservation:

- variability of fire intervals and area burnt is important to conserve floristic diversity and provide diversity of habitat for animals; fire at regular intervals will lead to loss of species;
- most plant species and communities require infrequent fires of moderate to high intensity to achieve regeneration but patchy burns are better for fauna as they retain shelter and food refuges;
- fires during the breeding season are the most damaging to fauna communities because of direct killing of young and increased exposure;
- A minimum fire interval in any given area should be approximately 10 years. In the mallee, maximum fire intervals are largely unknown, however current NPWS research programs will be expanded to Mungo National Park to assist in determining appropriate fire intervals.

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.

Fire history

The most recent major fire known to have affected the lands contained within Mungo National Park was in 1975. This fire occurred after a run of good seasons had produced a build up of vegetation, particularly spear grass. Not enough is known about the fire history of Mungo, especially the recent additions. The fire management strategy will identify fire history as an area of research.

Strategies 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 the NPWS's fire management role is participation in local co-operative fire management arrangements, including membership of the Wentworth/Balranald Bush Fire Management Committee. Under Section 52 of the Rural Fires Act each Bush Fire Management Committee is to prepare two types of plans, a Bush Fire Risk Management Plan and a Plan of Operations. These statutory plans are important for fire suppression in and around Mungo National Park as they detail notification, first response and other operational arrangements between the relevant fire fighting agencies.

Under the Rural Fires Act when a fire occurs on 'prescribed land', the Shire's Fire Control Officer must comply with the conditions set out by the agency for that prescribed land in any relevant bush fire management plan or "other relevant plan" agreed to by the authority responsible for the prescribed land. Reserve fire management strategies are such plans under Sections 38(4) and 44(3) of the *Rural Fires Act 1997*.

Therefore, a draft fire management strategy is to be prepared for Mungo National Park. This will identify the bushfire threat, requirements for the conservation of native plants and animals and community protection measures in areas where it is identified that fire is a threat to property. In particular, fire management guidelines will be detailed for threatened fauna species recorded or predicted to occur in the park.

The fire management strategy will also include the following:

- Mapping and survey of the vegetation, fire potential, fire history, threatened species and their habitats and heritage sites.
- Development of mallee fire ecology guidelines for biodiversity.
- An evaluation of the park's fire history and its impacts.
- Formulation of fire management objectives and strategies.
- Production of various mapping products to aid fire suppression and other operations.
- Development of work programs for fire research and monitoring and fuel management.
- Operational guidelines for fire suppression activities.

Management will aim to maintain biodiversity by restricting fires to only part of the distribution of a vegetation community at any one time and ensuring that the fire thresholds are not exceeded.

A variety of fire management strategies have been developed including fuel reduction, fire trails, detection and cooperative arrangements. Some, or at times all, of these will be applied where appropriate to best protect life, property and natural and cultural assets. Close to boundary areas, fuel reduction programs and fire trail maintenance will be designed and implemented in cooperation with neighbours.

Desired Outcomes

- Fire regimes are appropriate for long-term maintenance of the park's plant and animal communities and protection of threatened species populations and their habitats.
- The potential for spread of bushfires on, from, or into the park is minimised.
- Persons and property within, or immediately adjacent to, the park are protected from bushfires.
- Aboriginal sites, historic places and culturally significant features are protected from damage by bushfires and suppression activities.

Strategies and Actions

- Use prescribed fire to achieve a variety of fire regimes that maintain fire thresholds for each vegetation community in accordance with the fire management strategy.
- Seek to avoid use of heavy machinery for fire suppression in areas of threatened species and their habitats, Aboriginal sites and historic places.
- Rehabilitate areas disturbed by fire suppression operations as soon as practical after the fire.
- Encourage research into the ecological role of fire in the park, particularly the fire response of significant or threatened plant species and communities and the fire requirements of the flora and fauna they support.
- Continue to actively participate in the Wentworth/Balranald Bush Fire Management Committee. Maintain close contact and cooperation with Council fire officers and volunteer bush fire brigades.
- Where appropriate, carry out fuel management in cooperation with neighbours for mutual protection.
- Finalise the draft fire management strategy for Mungo National Park by December 2006. Place the strategy on exhibition for public comment prior to adoption by the NPWS.

6. VISITOR OPPORTUNITIES AND EDUCATION

6.1 INFORMATION PROVISION

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.

The park has a number of natural and cultural features of interest to visitors. Primarily the focus has been on The Walls of China and associated landscapes, archaeology and palaeontology, the Mungo woolshed and precinct, Zanci homestead precinct and the general landscape and vegetation features of the lakebed, sandplains and dunal systems. Historical features such as Vigar's Wells have been included on the self-guided drive tour.

The visitor centre at Mungo has served as the introductory focal point and provides a range of orientation information as well as interpretation of the prehistory. An audio/visual facility will be progressively developed to provide a flexible and interactive mechanism for interpretation of the cultural aspects of Mungo National Park and the World Heritage Area.

The park's features will be promoted and interpreted to visitors in a manner that protects their special values and encourages appropriate use. Provision of facilities such as picnic areas, camping areas and walking tracks in those locations that can sustain such use is discussed in section 6.2 while this section discusses provision of information.

It is the expressed wish of the three Traditional Tribal Groups that all visitors to Mungo enter the park via an Aboriginal Cultural Learning Centre so as to be welcomed to Aboriginal Lands and begin to understand the importance of Mungo to Baakantyi, Mutthi Mutthi and Ngyiampaa people.

Provision of information about Mungo National Park will involve three levels:

- promotion to increase community awareness of the existence of the park, its conservation importance and visitor opportunities;
- orientation and regulatory to enable visitors to find their way around the park, introduce them to its landscape and advise them about use restrictions; and
- interpretation of individual components of the park's environment in order to increase visitor understanding of the park's values and of the environment in general, and provision of minimal impact use information.

Desired Outcomes

- That all visitors understand the cultural significance of Mungo and connection between this World Heritage Landscape and the Paakantyi, Mutthi Mutthi and Ngyiampaa people of today.

- There is widespread 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 schools and community organisations.

Strategies and Actions

- Involve the 3TTG community members in development of all interpretive material and programs.
- Provide training and support for 3TTG community members to enhance interpretive and guiding skills.
- An interpretation plan for Mungo National Park and the Willandra Lakes Region World Heritage Area will be developed in conjunction with key stakeholder groups, including 3TTG members, advisory committees and tourism bodies. This plan will be completed by 2006.
- Utilise skills and information from researchers and academics that have an association with Mungo and expressed a desire to "put something back".
- School holiday Discovery programs will be run by 3TTG members.
- Assist the 3TTGs in seeking funding for the development and production of publications such as guidebooks, videos and postcards.
- Emphasise the following themes in promotion and interpretation programs:
 - Mungo's World Heritage Area status and what it means in terms of international significance
 - Aboriginal culture and connection to the land and how this has evolved over the millennia and continues to evolve today
 - Geomorphology and palaeontology within the context of climate change in South-east Australia
 - Pastoral history, from exploration and early white settlement, through soldier settlement. The hardships and impacts of pastoral pursuit in a semi-arid environment
 - Mungo geomagnetic excursion
 - History of research undertaken at Mungo and its impacts on the understanding of human development in Australia and worldwide
 - Present day flora and fauna as well as past environments and megafauna assemblages
 - The unique model of joint management between the 3TTGs and NPWS at Mungo National Park

- Management strategies of NPWS specific to Mungo and NPWS operations in general
- Ensure relevant and accurate pre-visit information is widely accessible through a variety of media such as the NPWS web site and distribution of the park brochure to tourist information centres and other appropriate locations.
- Place orientation/interpretive signs at appropriate locations.
- Support and assist educational use of the park by schools, community groups and individuals through provision of information and programs.
- Produce media releases and attend meetings with neighbours and community organisations to promote community understanding of park values and management strategies.
- Work with local and regional tourism groups to present the environmental, cultural and social values of Mungo National Park and the Willandra Lakes region to communities across Australia and to market and manage visitation to the area accordingly.

6.2 RECREATION OPPORTUNITIES

Mungo National Park currently attracts approximately 35-40,000 visitors per annum. Visitation occurs all year round but is mostly in the cooler months of the year from April to October, peaking during school holiday periods. Visitor numbers have steadily increased over the past decade (1995 figures were approximately 20-24,000), and are expected to continue to rise, particularly if proposed developments in the region such as the EnviroMission Solar Tower and sealing of the Arumpo road from Mildura go ahead.

Currently the main access from Mildura, Wentworth, Balranald and Ivanhoe are two-wheel drive dry weather only roads. Roads to and within Mungo can be closed for short periods due to rain, however this is an infrequent occurrence.

A recent visitor survey² found that Mungo attracts most its visitors from interstate (35.5% from Melbourne region) but Sydney is also an important visitor market (17.8%). Activities undertaken included sightseeing, flora/fauna viewing, photography, self-guided drive tour, bushwalking, camping, Discovery activity and commercial tour.

Most respondents (83%) were visiting Mungo for the first time and the most common reasons for visiting were to see the sights, enjoy nature and the outdoors, learn about the cultural history of the area, be close to nature and to learn about native flora and fauna.

² Archer, D. & Griffin, T (2002) *A Study of Visitor Use and Satisfaction in Mungo National Park*
CRC Sustainable Tourism University of Technology SYDNEY

Visitor opportunities provided in national parks should be those at the low key end of the spectrum, in natural and undeveloped settings. Recreational uses which are ecologically sustainable and which directly contribute to the visitor's understanding and appreciation of the park are considered appropriate.

Management of visitor use to be ecologically sustainable requires placing limits on the number of access points, design of facilities to ensure that numbers of visitors and the style of use is appropriate for the site, and promotion of minimal impact use. 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 opportunities provided on other NPWS Far West Region parks and on nearby parks within the Victoria and South Australia mallee reserve systems.

Desired Outcomes

- A variety of low key visitor opportunities are available that encourage appreciation of the natural and cultural environment.
- Facilities are designed and managed to provide a satisfying visitor experience and minimise impacts.
- Visitor use is compatible with the purposes of national parks and is ecologically sustainable.
- Revenue from park entry and camping fees is maximised through compliance monitoring.

Strategies and actions

- Encourage use of minimal impact recreation practices through the strategic placement, development and maintenance of facilities such as camp grounds, day use and picnic areas, drive tours, walking trails, interpretive and information signs.
- Encourage visitors to use fuel stoves. The number of wood barbecues and fire pits provided will not be increased. The policy to allow wood fires March to October will be reviewed. No firewood is to be collected on the park.
- The environmental impacts of wood fires in the semi-arid environment will be interpreted.
- Vehicles will be permitted only on the public access roads shown on the map (centre pages).
- Monitor car numbers within the park by counters placed strategically on trails. Make spot checks to record numbers of visitors using picnic and camping areas.

- Monitor the condition of popular visitor areas and assess impacts; place number limitations if required.
- Allow and encourage cycling on public access roads. Cycling will not be permitted off these roads.
- Permit group tours and activities subject to the following:
 - limits on group sizes and frequency of use if necessary to minimise environmental impacts and conflicts with other park users;
 - access will only be permitted to areas available to the general public;
 - prior permission for groups of more than 12; and
 - a licence for commercial use which will include 3TTG accreditation and protocols for visiting sensitive areas.
- A training package for tour guides specifically for Mungo will be developed in conjunction with the 3TTGs and commercial tour operators.
- The Visitor Centre will continue to be a primary interpretive focal point and introduction to the park. The audio/visual room will provide a focus on cultural aspects of Mungo and the entire World Heritage Area and a mechanism for 3TTG members to tell the story of Mungo.
- The NPWS will support the 3TTG objective of establishing a World Heritage Area Keeping Place and Cultural Centre off the park as a cultural interpretive focal point.
- The day-use area at the Visitor Centre will be maintained and gas BBQ facilities will continue to be provided.
- The Mungo Woolshed and Shearers Quarters will be maintained to interpret the pastoral history and as a basic accommodation facility to sleep a maximum of 20 visitors.
- The Zanci Homestead precinct will continue to be maintained for interpretation of pastoral history. The Pastoral Loop will be maintained to provide an opportunity to undertake a short tour of Mungo/Zanci.
- The self-guided tour drive will be maintained as the principal means of access around the park and one of the key mechanisms for interpreting the different environments and features of the park.
- The Walls of China will continue as a focal point for visitors with the current boardwalk extended and additional interpretive signage installed.
- A shade shelter will be erected at the Walls carpark.
- The old section of road between the new Walls carpark and boardwalk will be converted to a disabled access walking track. Surplus gravel will be reused.

- The picnic table and old track markers going to the Walls from Walls Tank will be removed.
- At Red Top on the Drive Tour a carpark, boardwalk and viewing platform will be developed and access restricted to the boardwalk. The two-way road may be extended to the Red Top carpark.
- The Mallee Walk interpretive material will be upgraded.
- Belah camp will continue as a basic campground facility with no wood fires permitted.
- At Vigar's Wells a walking track to the platform around the wells will be constructed. The vehicle parking capacity will be monitored and assessed for possible expansion.
- The Grasslands Walk access will be defined and directional and interpretive signage updated.
- The Foreshore Walk will be upgraded and maintained.
- Certain points along the main roads within the park may provide landscape feature interpretation opportunities, the potential for information bays will be assessed and if appropriate liaison will be undertaken with the local government authority.
- The main campground at the park entrance will be extended to provide the ability to cater for up to 20 more camp sites at peak times and also to permit resting of sections of the campground on a rotational basis.
- All toilet and shower facilities will be gradually upgraded to ensure environmental best practice and maximise recycling of grey water.
- The NPWS will pursue the Gateways³ concept for Mungo National Park as a means of achieving better social and economic outcomes for the regional community.

³ The Gateways concept is a NSW Government initiative aimed at fostering private sector partnerships in the provision of services off-park for national parks. Any development should contribute to conservation of park values and can include facilities such as campgrounds and amenities, information centres and interpretive material.

7. RESEARCH AND MONITORING

The purpose of scientific study in the national park is to improve understanding of its natural and cultural heritage and the processes that affect them. Research also establishes the requirements for management, both for entire ecosystems and of particular species, as well as for cultural heritage assets. Research also assists in visitor management and understanding the social impacts and needs in relation to park management.

Mungo National Park has a rich history of research, primarily focused on its archaeology and palaeontology. Indeed it was the significance of the research carried out in these fields in the late 1960's and early 1970's that initiated the national park declaration process. Much has been written about the cultural heritage of Mungo and several references are listed at the end of this plan.

As an ongoing basis to the management decision making process the NPWS research efforts must be directed towards the areas of greatest need. Research by other organisations and students may provide valuable information for management. A prospectus will be prepared to encourage involvement of other organisations in priority research areas. Some important research topics include the following:

1. Collation of Aboriginal knowledge of flora and fauna.
2. A comprehensive survey of flora and fauna, particularly threatened species, across all vegetation types.
3. A study into the distribution of artificial waters and their impacts on the park's ecosystems and its biodiversity values.
4. An evaluation of macropod densities in relation to pre European settlement levels current impacts on ecosystems and biodiversity.
5. An active program aimed at the recovery of threatened *Acacia* species (*Acacia loderi* and *A. melvillei*) on the park, including evaluation of impacts of grazing pressure by macropods.
6. Production of a comprehensive vegetation map on NPWS GIS.
7. Establishment of reference areas for baseline data collection and ongoing monitoring programs to measure efficacy of various management regimes for fire, weed control, threatened species recovery and total grazing pressure.
8. Survey and mapping of introduced species, and research into their ecological impacts.
9. Evaluation of fire history and impacts, research and development of mallee fire ecology guidelines for fuel load management as well as biodiversity outcomes.

10. Ongoing research into the rich record of environmental changes and human response to change.

11. The impacts of upstream developments/extraction on the park.

Desired Outcomes

- Increased knowledge of the distribution and abundance of endemic biota and their habitat requirements and appropriate management.
- World Heritage Area protocols for research projects will be adhered to.
- Research is undertaken that enhances the information base and assists management of the park.
- Research programs have the full support and involvement of the three Traditional Tribal Groups.
- Research promotes an awareness and understanding of Mungo's importance in the global context.
- Monitoring programs are in place to detect any changes in the status of park resources.
- An understanding of visitor patterns, expectations and satisfaction levels.

Strategies and Actions

- Follow World Heritage Area guidelines in relation to protocols for gaining approval for research projects. This will include approval by the Mungo National Park Advisory Committee and involvement by Paakantyi, Mutthi Mutthi and Ngyiampaa community members.
- Prepare a prospectus of preferred research and encourage organisations and individuals to undertake research that is directly useful for management purposes, particularly those issues mentioned in points 1 to 11 above.
- Require any research structures and long term markers to be placed in locations that will minimise their visual impact and require their removal upon completion of the research.
- Encourage bird watchers and amateur naturalists or similar groups to pass on information gathered in the park.
- Interpret and publicise research findings where appropriate to park visitors and the broader community.
- Conduct visitor surveys both on park and in key regional centres to research visitor patterns, expectations and satisfaction levels.

8. OTHER USES

Mungo National Park has attracted considerable interest in the field of commercial filming and photography. The NPWS standard policy and procedures will continue to apply, with the additional condition that all applicants be approved by the Joint Management Advisory Committee.

Ceremonial and hunting and gathering rights for members of the three traditionally affiliated tribal groups will be recognised and facilitated. This process will need to include adherence to State firearms legislation and NPWS policies and OH&S requirements.

The opportunity exists for the 3TTGs to manage existing accommodation on the park, such as the campground and shearers quarters; and to establish a retail outlet to sell food and beverages, books, craft and souvenirs.

At several locations a travelling stock route (TSR) dissect the park. They are TSR No. 327, TSR No.583 and TSR No.24868. The travelling stock routes are infrequently used and as is the normal practice in the Western Division they are managed according to the abutting land-use, in this instance national park.

Desired Outcomes

- Commercial and other non-standard national park uses have minimal environmental, heritage and management impact.
- Commercial use will be managed in such a way as to maximise the benefits to Traditional Tribal Group members and the National Parks and Wildlife Service.

Strategies and Actions

- Follow the established protocols relating to 3TTG approval of commercial filming and photography.
- Investigate areas suited specifically to commercial filming and photography and develop management guidelines for such sites.
- Establish procedures that allow selected 3TTG members to hunt for traditional food or ceremonial purposes within designated areas of the park in accordance with legislative and policy requirements.
- Investigate opportunities for 3TTGs to operate the existing accommodation and to establish a retail outlet on the park to sell food and goods appropriate to the cultural character of the park under a concession arrangement.

- Keep non-NPWS utilities under review and managed to minimise impacts.
- Continue to liaise with neighbouring landholders regarding the use of the travelling stock routes, and continue to manage them as part of the national park.
- Review travelling stock routes with particularly high natural and cultural conservation values and pursue avenues for possible relocation and revocation.

9. NPWS MANAGEMENT FACILITIES AND OPERATIONS

The main management infrastructure consisting of a visitor centre and office, works depot and staff housing is located at the Mungo Homestead precinct. It will continue as the main management centre for the expanded park. The Garnpang homestead offers the opportunity for staff accommodation and a satellite workshop facility. Pest plant and animal control will be a major focus within the recent additions, therefore a field officer - pests, should be located at Garnpang. The Garnpang homestead precinct also contains a shearers quarters that could be restored to provide accommodation facilities.

The Leaghur homestead also has potential for permanent staff accommodation once necessary works are completed and the shearers quarters offers potential accommodation for contractors, researchers, schools, and special interest groups.

Desired Outcomes

- Management facilities that adequately serve the needs of park management and have acceptable environmental impact.
- Management facilities and infrastructure provide a safe working environment for staff, meeting Occupational Health and Safety and residential tenancy standards.
- Management facilities and actions will minimise risk and enhance visitor safety.

Strategies and Actions

- Maintain vehicle tracks and fire trails to a good standard of stability and access.
- Rationalise trail network to minimise environmental disturbance and maximise trail network efficiency in terms of ongoing maintenance costs.
- Continue to source gravel for road maintenance from three existing borrow pits.
- Rehabilitate disused light aircraft runway, reuse suitable material for roadworks.
- Reseal and extend bitumen at park entry past Mungo woolshed and house tanks so as to minimise dust problems at the visitor centre and shearers quarters/woolshed complex and maximise water run-off into house tanks.
- Resurface drive tour and maintain to a standard.
- Maintain boundary fencing and comply with NPWS Good Neighbour policy and procedures.
- Maintain close liaison with park neighbours to deal with matters of mutual concern.

- Construct a security fence around Mungo works depot.
- Relocate Balmoral machinery and workshop sheds to Mungo works depot.
- Ensure works depot is adequately equipped and all relevant Australian Standards and OH&S requirements are met.
- Enhance water supply to Mungo staff residences, workshop, visitor centre and shearers quarters by maximising catch potential and minimising water loss through evaporation. Install catch drain piping off bitumen road and evaporation control mats on two house tanks.
- Install mains power at house tanks and electric pump, decommission windmill.
- Investigate feasibility of a pipeline from Darling River as a possible water supply.
- Provide a secure cover over and fence off all wells.
- Bring Leaghur and Garnpang homesteads up to residential tenancy standards to facilitate staff accommodation.
- Prepare an accommodation strategy to cater for longer term staff increases.
- Upgrade and maintain shearers quarters facilities at Leaghur and Garnpang to accommodate contractors, researchers, school and special interest groups.
- Prepare a Memorandum of Understanding between NPWS and the owners of Mungo Lodge with respect to usage of the Mungo Lodge airstrip.

10. PLAN IMPLEMENTATION

This plan of management establishes a scheme of operations for Mungo National Park. The plan is part of a system of management developed by the National Parks and Wildlife Service. The system includes the National Parks and Wildlife Act, management policies, established conservation and recreation philosophies, and strategic planning at corporate, directorate and regional levels; as well as World Heritage Area planning. The latter may include development of related plans such as regional recreation plans, species recovery plans, fire management plans, pest species management plans and conservation plans. Specifically in relation to World Heritage Area planning, as far as possible this plan will work toward assisting the 3TTG's in achieving their visions and aspirations as outlined in their own Management Plan.

Section 81 of the Act requires that this plan of management shall be carried out and given effect to and that no operations shall be undertaken in relation to Mungo National Park unless they are in accordance with the plan.

Implementation of this plan will be undertaken within the annual programs of the NPWS's Far West Region. The actions identified in the plan are those to which priority will be given in the foreseeable future. Other management actions may be developed consistent with the plan objectives and strategies.

Relative priorities for identified activities are set out in the table below. These priorities are determined in the context of directorate and regional strategic planning, and are subject to the availability of necessary staff and funds and to any special requirements of the Director-General or Minister. The implementation of the plan will be monitored and its success in achieving the identified objectives will be assessed.

The environmental impact of proposed activities will be assessed at all stages in accordance with established environmental assessment procedures. Where impacts are found to be unacceptable, activities will be modified.

This plan of management does not have a specific term and will stay in force until amended or replaced in accordance with section 73B of the Act. The plan applies both to the land currently reserved and to any future additions. Where management strategies or works are proposed for additions (or the existing area) that are not consistent with the plan, an amendment to the plan will be required.

Strategies and Actions

- Undertake an annual review of progress in implementing this plan.
- Undertake an assessment after 5 years of the effectiveness of managing Mungo National 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	Map existing roads and tracks. Close and rehabilitate tracks no longer required	4.1
	Prepare an inventory of sites that require special protection and/or remedial erosion control works – carry out protective measures as required	4.1, 5.1
	Assist the 3TTG communities to present the Aboriginal cultural values of Mungo and produce their own material	4.2, 6.1
	Assist in the provision of training opportunities for 3TTG members to run Discovery programs and build on their capacity for tour guiding	4.2, 6.1, 6.2
	Support 3TTGs development of a cultural centre off park	4.2, 6.2
	Prepare a maintenance works program and annual monitoring program for historic structures – implement and record works carried out	4.3
	Collate an inventory of moveable heritage items and prepare a Movable Heritage Conservation Plan	4.3
	Prepare a conservation plan for the Mungo Woolshed and Woolshed underground tank	4.3
	Install fire protection measures for heritage assets	4.3
	Assess ground tank heritage values as part of Strategic Water Management Plan	4.3, 4.4, 4.5, 5.2, 5.3
	Undertake REF for Balmoral ruins	4.3
	Undertake cultural heritage assessment of the Mungo shearers quarters precinct – provide accommodation consistent with the assessment	4.3, 6.2
	Prepare a conservation management plan for Leaghur and Garnpang homestead precincts	4.3
	Implement and maintain an expanded vegetation monitoring program, establish key reference areas	4.4
	Fence Acacia shrubland remnants and monitor population recruitment	4.4
	Implement strategic water management plan	4.4, 5.2
	Continue kangaroo surveys, implement strategies to achieve population densities consistent with biodiversity conservation outcomes	4.4
	Conduct a comprehensive vertebrate fauna survey across all vegetation communities and establish permanent monitoring sites	4.5
	Conduct Malleefowl survey	4.5
	Investigate status of rare or threatened species or communities and implement management strategies	4.4, 4.5
Extend Walls boardwalk and upgrade interpretation	5.1, 6.1, 6.2	
Survey park additions and document extent of introduced species – expand existing control and monitoring programs	5.2	
Expand fox control program	5.2	

	Fence natural soaks on extensions	5.2
	Prepare a Fire Management Strategy, exhibit, and implement approved strategy	5.3
	Remove picnic table and old track markers going to the Walls from Walls Tank	6.2
	Prepare research approval protocols	7
	Prepare a prospectus of preferred research projects	7
	Investigate concession operation opportunities for 3TTG members	8
	Resurface Drive Tour	9
	Install mains power supply and electric pump to hose tanks, decommission windmill	9
	Cover and fence off all wells	9
	Upgrade Leaghur and Garnpang homesteads to comply with residential tenancy standards	9
	Prepare staff accommodation strategy	9
Medium	Assist 3TTGs to collate traditional Aboriginal knowledge of the flora and fauna	4.2, 4.4, 4.5
	Implement actions from Moveable Heritage Conservation Plan	4.3
	Implement actions from Woolshed Conservation Plan	4.3
	Implement actions from Conservation Management Plan for Leaghur and Garnpang homesteads	4.3
	Complete vegetation mapping of park on NPWS GIS	4.4
	Prepare research plan for information needs in relation to vegetation community dynamics in response to grazing and fire - encourage education institutions to undertake research	4.4, 7
	Fence areas of Pine/Belah community near main campground and areas of high conservation value along Lake Mungo foreshore – monitor species regeneration	4.4
	Monitor vegetation response to warren ripping	5.2
	Prepare an Interpretation Plan for Mungo National Park and the Willandra Lakes Region WHA and implement prescribed actions, including orientation and interpretation signage	6.1
	Review firewood policy and provide information to visitors	6.2
	Redevelop Red Top area	6.2
	Erect shade shelter at Walls carpark	6.2
	Upgrade Mallee Walk interpretive material	6.2
	Construct walking trail from Vigar's Wells carpark to Well platform	6.2
	Upgrade Grassland Walk trail and provide new interpretive signage	6.2
	Upgrade Foreshore Walk	6.2
	Extend main campground to cater for additional 20 campsites at peak visitation times; and allow for rotational resting of sections of the campground	6.2
	Upgrade all toilet and shower facilities to maximise environmental best practice and recycling of grey water	6.2

	Establish procedures to allow nominated 3TTG members to hunt within designated areas of the park	8
	Investigate areas suited specifically to commercial filming and photography and develop site management guidelines	8
	Pipe water run-off from section of bitumen road into house tanks	9
	Construct security fence around Mungo works depot	9
	Relocate Balmoral machinery and workshop sheds to Mungo depot	9
	Install evaporation control matting on two house tanks	9
	Prepare a memorandum of understanding between NPWS and Mungo Lodge regarding use of Mungo Lodge airstrip	9
Low	Develop tour guide training package	6.1
	Convert old road to Walls to a disabled track	6.2
	Investigate suitable sites along Ivanhoe road for potential information bays to provide landscape interpretation	6.2
	Monitor visitor numbers and impacts and conduct visitor surveys	6.2, 7
	Liaise on management of TSRs and review status	8
	Investigate feasibility of a water supply pipeline from the Darling River	9
	Reseal and extend bitumen at park entry past house tanks	9
	Rehabilitate disused light aircraft runway	9

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.

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