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... caring for Country



Mungo Mobile

EXPLORE MUNGO

... travel into the heart of
an ancient landscape

UNDERSTAND MUNGO

... learn about a cultural
and natural treasure

SHARE MUNGO

... walk in the footsteps
of Aboriginal people

VISIT MUNGO

... plan your visit to
Mungo

MAPS

CONTENTS

Contents 1

EXPLORE MUNGO

... travel into the heart of an ancient landscape

- > Where to stay
- > Mungo Itineraries
- > Visitor Centre and Meeting Place
- > Aboriginal Discovery Tours
- > The Mungo Track
- > Pastoral Heritage Walk / Short Walks

UNDERSTAND MUNGO

... learn about one of the world's most ancient and precious cultural treasures

- > Ancient Mungo Environments
- > Mungo Archaeology
- > Mungo's Environment Today
- > Pastoral Heritage
- > World Heritage
- > Managing Mungo

Contents 2

SHARE MUNGO CULTURE

... walk in the footsteps of Aboriginal people

- > Aboriginal Discovery Tours
- > The Meeting Place
- > Ancient Footprints
- > Mungo Lady and Mungo Man
- > Three Tribal Groups
- > Aboriginal Country / language

VISIT MUNGO

... plan your visit to Mungo

- > Getting there
- > Nearby destinations
- > Weather
- > Safety

MUNGO MAPS

CREDITS

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Welcome to Mungo National Park in the Willandra Lakes Region World Heritage Area.

You have arrived at one of the world's very special places. Aboriginal people have walked here at Mungo in the footsteps of their ancestors since the Dreamtime.

Scientists have discovered artefacts of this ancient culture dating back over 50,000 years across the expanses of the last ice age.

This makes Mungo one of the oldest places outside of Africa to have been occupied by modern humans since ancient times.

Here you can explore the remarkable story of how a culture was able to stay strong and care for Country in the face of extreme climate change,



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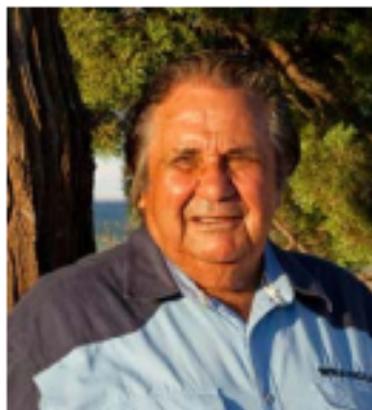
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Paliira kiirinana. Parimba.
Our Country is beautiful.
Please come.

Lottie Williams,
Paakantji (Barkinji) Elder



**Yammah Guddah
Yammah Guddah Ngallia
Ngurrampaa.**
Welcome to our Country.

Roy Kennedy,
Ngyiampaa Elder



**Telki thangurra.
Pirnmatha.**
Our Country is beautiful.
Please come.

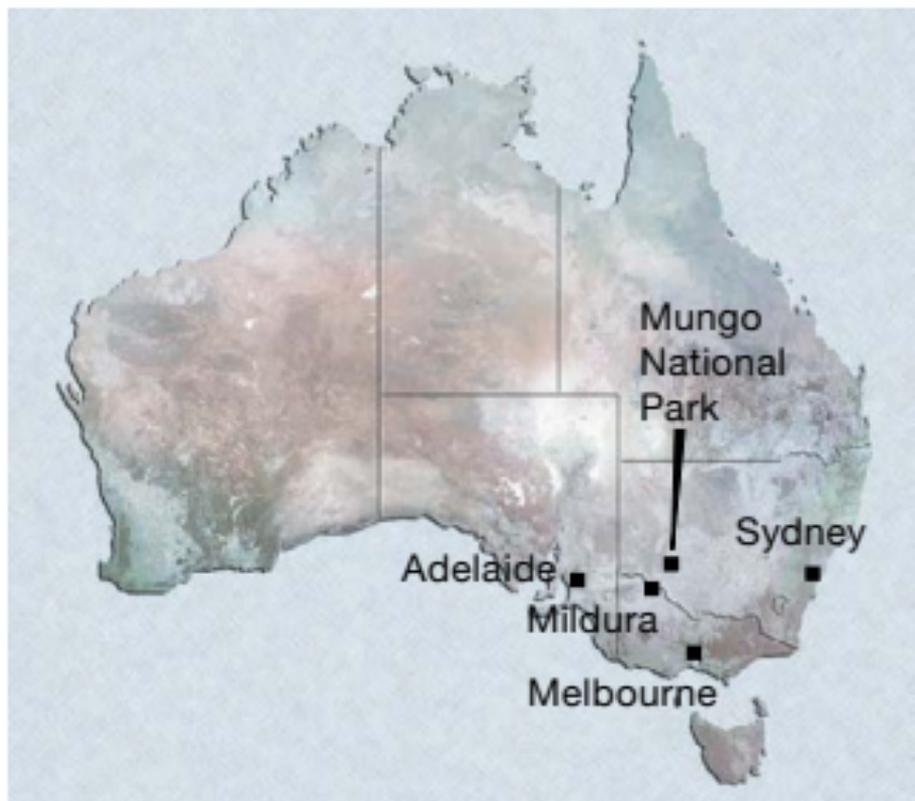
Jean Charles,
Mutthi Mutthi Elder

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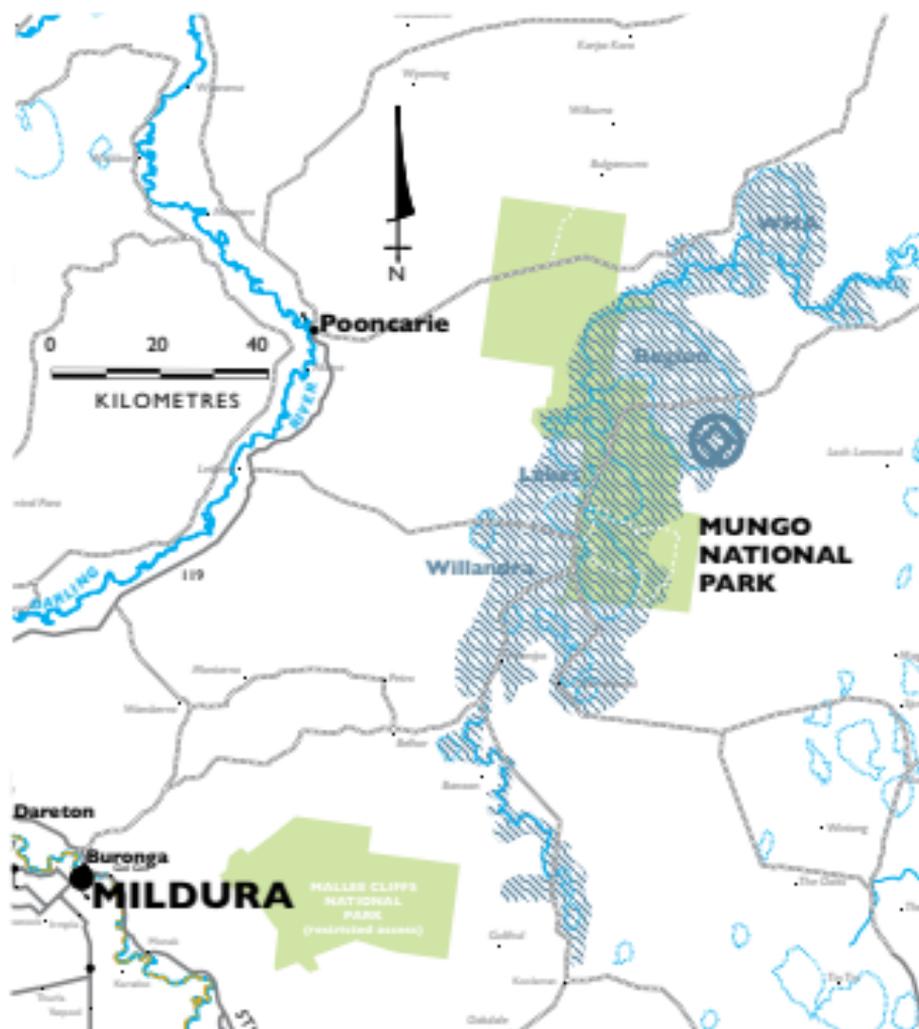


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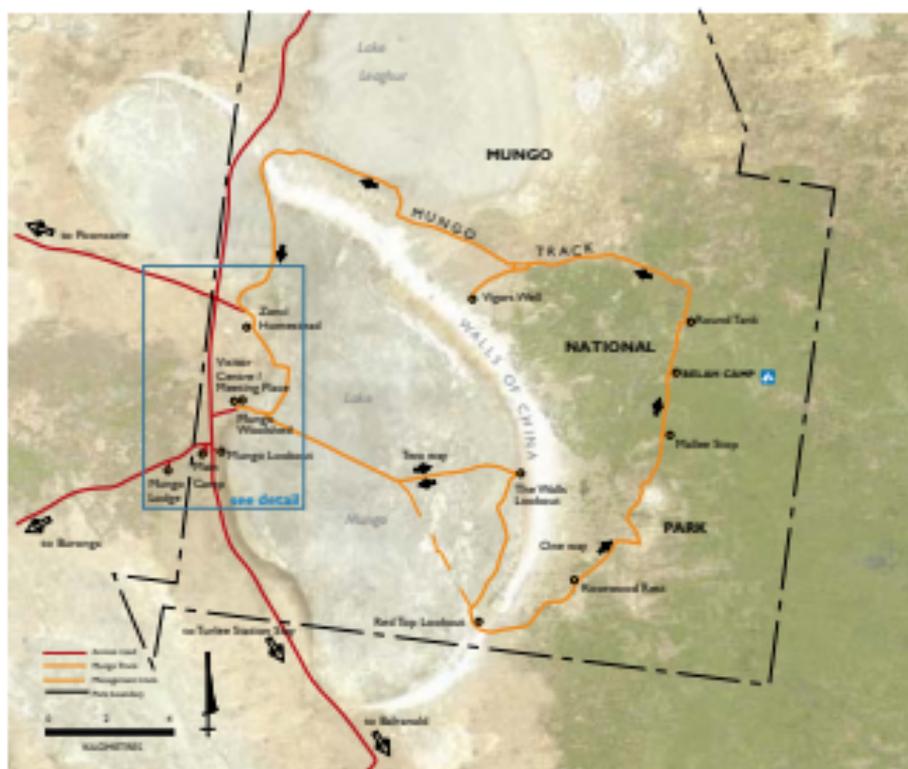


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..... Explore Mungo

... travel into the heart of an ancient landscape



You will need your own transport to explore Mungo National Park, unless travelling with an organised tour. Unsealed roads link all the main features, over distances which are mostly unsuited to walking. However the central area of park facilities can be readily linked on foot. These include Main Camp, the Meeting Place the Visitor Centre, Mungo Woolshed, the Shearers Quarters, Mungo Lookout, the Pastoral Heritage Walk, Foreshore Walk and Grassland Walk.

A four wheel drive vehicle is not necessary in dry weather. Some roads in and around the park may be closed after rain. If heavy rain is forecast you may consider leaving before roads become difficult or are closed. Mountain bikes are also a suitable means of transport around the park, and an ideal way to fully appreciate the Mungo Track.

... travel into the heart of an ancient landscape

..... Where to stay

Inside Mungo National Park, you can camp at Main Camp which is close to many features, and at the more remote Belah Camp on the Mungo Track. You can also hire bunkrooms at the Shearers Quarters. Facilities at all these places are wheelchair accessible.

Nearby and just outside the park, Mungo Lodge is one kilometre from Main Camp and offers four star accommodation in the main lodge and in cabins. Turlee Station Stay is south of the park and provides campsites, shearers' quarters and bush bungalows.

You can also find other accommodation outside the park.

Mungo Lodge:

P: +61 3 5029 7297

E: stay@mungolodge.com.au

W: www.mungolodge.com.au



... where to stay

..... Shearers Quarters

The recently refurbished Shearers Quarters is in the heart of the park, right beside the Visitor Centre/Meeting Place and a short stroll from the woolshed. It's the perfect place to have an enjoyable and relaxing stay while you explore Mungo.

Facilities are wheelchair accessible and arranged around a central courtyard. The accommodation can cater for up to 26 people in 5 rooms. You will need your own bedding (sleeping bags, pillows, blankets, etc). All rooms have split system heating/cooling (limited, economical use is essential).

The communal kitchen/dining room has all utensils and crockery, fridges, a microwave and stove barbecues are also available in the area. There are showers, flush toilets and hot water. We do request that you use water sparingly due to the low annual rainfall in the region.

Fees: \$30 per adult per night (16 years and over); \$10 per child per night (5-15 years); children under 5 years free. Minimum charge of \$60 per night. Vehicle entry fees also apply. Bookings are essential. All reservations incur a booking fee of 2.5%

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To book go to

www.nationalparks.nsw.gov.au/stay#

or call the Customer Experience team on
13000 PARKS (13000 272 57)

for late bookings made within 3 days before your
stay contact National Parks & Wildlife Service
Buronga office on
03 5021 8900



Accommodation is available within Mungo National Park at the Shearers Quarters. You can also pitch a tent at several locations including Main Camp.

... where to stay

Main Camp

Main Camp is the main base for campers and caravans in the park, on the Arumpo road (on the way in from Mildura) and only two kilometres from the Visitor Centre, Meeting Place and woolshed. Plenty of level, gravel tent sites are scattered amongst Belahs and cypress pines.

The Grassland Walk starts and finishes here, and a track leading to Mungo Lookout.

There are free gas barbecues and wood fireplaces available for campers.

Facilities include picnic tables, wood barbecues (bring your own firewood), gas/electric barbecues, non-flush toilets, amenities block.

Flush toilets and hot showers are available 2 km away at the Visitor Centre.

Camping fees are \$5 per adult per night, \$3 per child per night. Payment is by self registration. Envelopes and information are available at the front of the Visitor Centre.

**For information contact NPWS Buronga,
phone 03 5021 8900**

... where to stay

Belah Camp

Belah Camp is a great overnight spot for people taking their time driving or cycling the Mungo Track, or for those looking for a secluded campsite. No fires are allowed, but there are plenty of level, gravel campsites spread out under the Belah trees. Facilities are wheelchair accessible.



This campground is half way around the Mungo Track. The route includes unpaved roads, generally suitable for 2WD cars, though roads may become impassable in wet weather.

Facilities include picnic tables, non-flush toilets.

There is a dam here, supplied by surface runoff.

Camping fees are \$5 per adult per night, \$3 per child per night. Payment is by self registration. Envelopes and information are available at the front of the Visitor Centre.

Contact Buronga, Phone 03 5021 8900

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Mungo Itineraries

Here are some recommended activities for a visit to Mungo National Park, whether you're here for a quick half day or up to four days.

Half Day Visit

- See Mungo Lookout
- Visit the Meeting Place and Visitor Centre
- Take a Discovery Tour or short walk to the Walls of China

Full Day Visit

- See Mungo Lookout
- Thoroughly explore the Meeting Place and Visitor Centre
- Take a Discovery Tour or short walk to the Walls of China
- Walk either the Foreshore Walk or Grassland Walk

Mungo Itineraries

Two Day Visit: Day One

- See Mungo Lookout
- Thoroughly explore the Meeting Place and Visitor Centre
- Take a Discovery Tour or short walk to the Walls of China
- Walk either the Foreshore Walk or Grassland Walk

Two Day Visit: Day Two

- Drive the Mungo Track and explore the pastoral heritage displays in the Zanci Woolshed

Three Day Visit: Day One and Day Two

- As for a two day visit

Three Day Visit: Day Three

- Enjoy the Pastoral Heritage Walk between Mungo and Zanci Homesteads
- Walk either the Foreshore Walk or Grassland Walk, or take another Discovery Tour

Four Day Visit

As for a three day visit, but spend two days on the Mungo Track.

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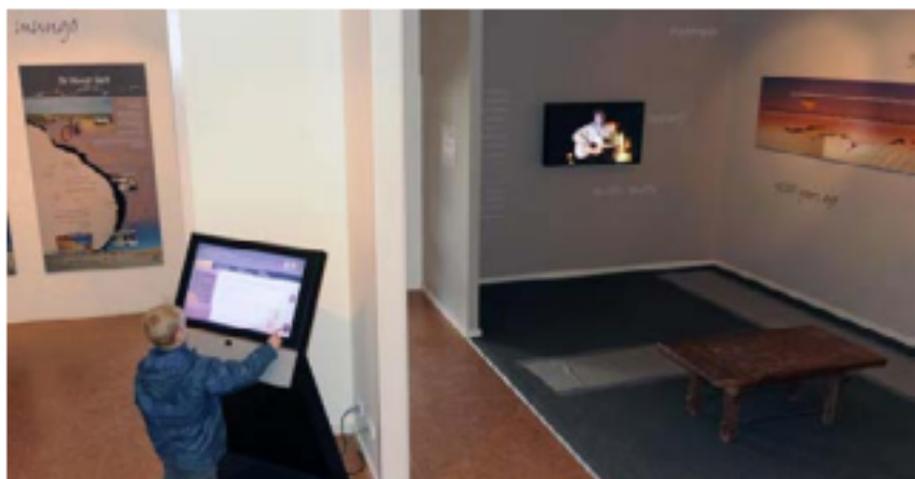
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..... Visitor Centre / Meeting Place

The Visitor Centre and Meeting Place are the 'nerve centre' of Mungo National Park. Here you can find out about Discovery Tours and start your tour.



This is also the place to begin your exploration of Mungo's cultural heritage and natural history. Informative exhibits inside the Visitor Centre lead to a dramatic re-creation of the famous 20,000-year-old human footprints at the outdoor Meeting Place. And the historic Mungo Woolshed is just a short stroll away.

Allow at least an hour to absorb the displays.



The Meeting Place is the perfect spot to re-group after wandering around the park. Relax at one of the shady picnic tables and lay out a spread for the family. Gas barbeques and water are on hand as well as other conveniences. And if you need to freshen up, toilets and showering facilities are available.

Camping fees for Main Camp can be paid at the Visitor Centre using the self-registration system.



... travel into the heart of an ancient landscape

.....Aboriginal Discovery Tours.....

Aboriginal Discovery Tours are the best way to learn about Mungo National Park and its ancient heritage, with the people who have lived the landscape for 45,000 years.

Aboriginal Discovery Tours are conducted by Aboriginal rangers from the three tribal groups of the Willandra Lakes region.

Tours include a variety of activities.

They operate during school holidays and some other times, as well as by special arrangement.

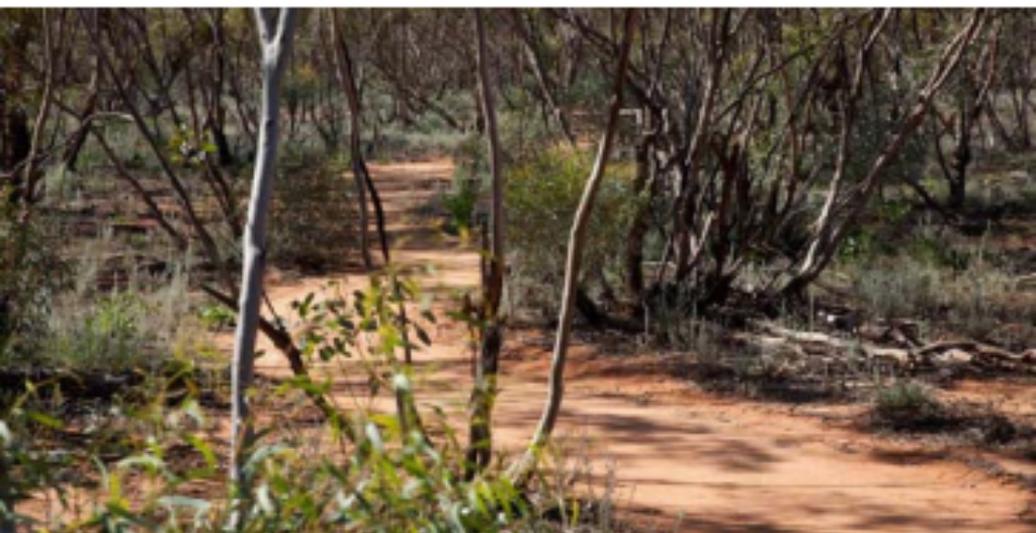
For bookings telephone 03 5021 8900.

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The Mungo Track

DISTANCE: 70 km loop

TIME: Most of a day to 2 days

METHOD: Drive or mountain bike

DIRECTION: One way only (anti-clockwise)

STARTS: Mungo Visitor Centre

A four-wheel-drive is not required, but the track may be closed after wet weather.

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Be prepared with spare tyres and, if cycling, a puncture repair kit.

The Mungo Track circuit links all the main attractions of the Mungo landscape in an in-depth exploration - perfect for those who really want to get amongst it.

The track takes in a variety of landscapes, heritage features, lookouts and short walks, so a leisurely approach is recommended.

The best experience is to take your swag or tent, stove and water and stop overnight at the peaceful Belah Camp, about halfway around the track. Here you can relish the silence and stars of the outback. Stopping overnight will be essential if travelling by mountain bike - unless you're very fit, fast and in a hurry!

Detailed information on what you see along the way is provided on trackside signs, as well as in the leaflet "Driving the Mungo Story".



... Mungo Track Route Description ...

The track kicks off at the Visitor Centre/Meeting Place and Mungo Woolshed, then crosses the bed of Lake Mungo to the lunette and the Walls of China. Here a stroll along the boardwalk is recommended.

Back on the track, it follows the edge of the old lake southwards and climbs up onto the lunette to the next stop at Red Top Lookout. Here another short boardwalk leads to deeply eroded ravines cutting through the layers of windblown sediment that hold the human and environmental history of Mungo.



Continuing around the back of the lunette, the track traverses the 'backblocks' of Mungo - a mixed landscape of bluebush, grassland, mallee eucalypts and belah-rosewood woodland. You can take a break at the picnic tables and patchy shade of Rosewood Rest or Mallee Stop. From Mallee Stop the Mallee Walk is an easy 500 metre ramble through a variety of mallee species and some spinifex, with informative signs.



At Belah Camp there's plenty of room for camping, many picnic tables, toilets and wispy shade from the Belah trees. Fires are prohibited so if you intend to camp you will need to bring a gas stove.

The next main feature is Round Tank, a remnant of stock watering strategies in this semi-arid climate, now used to lure feral goats into a trap. The Mungo Track then travels out of the mallee into open shrubland with scattered trees and passes Paradise Tank just before the turnoff to Vigars Well which is a must-see.

Here is another picnic table. The old well itself is interesting, and a short walk leads to the spectacular dunes that have blown out of the eroding lunette. How many different animal tracks can you find?



After Vigars Well the main track travels along the edge of the flat expanse of Lake Leaghur, stretching away into the distance, and then crosses the ancient channel (since dug out for a tank) that once fed water from Lake Leaghur into Lake Mungo.

After descending back to the Mungo lakebed an expansive view opens out along the arc of the Mungo lunette.

Relics of the pastoral days can be explored at the old Zanci homestead and then it's just a short drive back to Mungo Woolshed to complete the loop. But continue on for one more stop, at Mungo Lookout. From the picnic shelter the short track leads to a surprisingly spacious view for such a subdued landscape. Here, just 20 metres above the lakebed, you can see 10 km across Lake Mungo and much of the 30 km long lunette. It's a good place to reflect on all you've seen of the Mungo environment, its long history and all the human stories that have played out here.



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Pastoral Heritage Walk

DISTANCE: 7 km walk

DIFFICULTY: medium

TIME: 3 to 5 hours

STARTS:

From the picnic area next to the Meeting Place

Explore Mungo's pastoral heritage on this loop walk connecting Mungo Woolshed with the Zanci Homestead precinct built in the 1920s.

Experience what it was like to drop over and visit the neighbours on this half day outing.

The Pastoral Heritage Walk starts out along the opening section of the Foreshore Walk before branching across country to Zanci.

Along the way keep a close eye out for the many relics of the region's pastoral heritage that occur across this historic l



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Short Walks



Mungo Lookout

DISTANCE: 200 metres

DIFFICULTY: easy (wheelchair accessible)

TIME: 10 minutes

STARTS: Main Camp or the lookout carpark

From the picnic shelter and carpark off the main park access road, a quick path will take you to an expansive view over Lake Mungo. A slightly longer path gets there from Main Camp.

Mungo woolshed

.....

DISTANCE: short

DIFFICULTY: easy (some parts are wheelchair accessible)

TIME: up to 1 hour

STARTS: Mungo Woolshed carpark, beside the Visitor Centre



Stroll through the historic Mungo Woolshed and sheep yards and admire the craftsmanship, ingenuity and sweat of the early pastoralists. The building was constructed around 1877 of locally harvested cypress pine using a drop-log construction.

The timbers display some remarkable textures.

The woolshed's remarkable condition today owes much to the work of Albert Barnes who owned the Mungo property from 1932 until its purchase to establish Mungo National Park in 1978.

Neighbouring Zanci owner Roy Vigar recalled that Albert worked on the building every year and was very concerned about its history and significance. Albert's wife Venda noted that he "was really keen on keeping the woolshed. People would say why don't you knock it down and build a nice modern shed, but he liked the history and importance of the building."



Red Top Lookout

DISTANCE: 500 metres

DIFFICULTY: easy (wheelchair accessible)

TIME: 30 minutes

STARTS: Red Top Lookout on the Mungo Track

This short walk along a boardwalk takes in the views to the north along the Mungo lunette and to the west across the bed of Lake Mungo. The deeply eroded ravines cut through the layers of windblown sediment and can be spectacular at sunset. Informative signs explain some of the human and environmental history held within those sediments.



Walls of China

DISTANCE: 500m or more

DIFFICULTY: easy to moderate (wheelchair access on boardwalk)

TIME: 30 minutes to 2 hours

STARTS: Walls of China carpark

Another must-do walk which is best undertaken with a Discovery Ranger who can explain the significance of the lunette and its history, as well the human story.

But if a tour is not available, stroll along the boardwalk with its informative signage. Late in the day is a good time as it brings out the extraordinary colours, and early morning can also be evocative.





Grassland Walk

.....

DISTANCE: 1 km

DIFFICULTY: easy (wheelchair accessible)

TIME: 1 hour

STARTS: Main Camp

This pleasant nature walk meanders through flat country with a mixture of grassland (in season), shrubland of bluebushes and copperbushes and woodland of Belah, Cypress Pine and Wilga. The walk starts and finishes from the southern end of Main Camp. A number of brief information signs explain the plants, wildlife and management issues. The walk has no shade so should not be undertaken in the heat of the day.

Foreshore Walk

DISTANCE: 2.5 km

DIFFICULTY: medium

TIME: 1.5 hours

STARTS: The Meeting Place

This diverse walk starts behind the Meeting Place and follows markers across the ancient shoreline of Lake Mungo, climbs onto a low red dune and explores the wooded sand country beyond.

The middle part of the walk offers some shade from two species of cypress pines and mallee

eucalypts. This is one of the best areas of surviving pine woodland in Mungo National Park. A series of brief signs explain aspects of plant life, wildlife, landscape and park conservation issues. The track loops back along the vegetated dune crest to rejoin



the outward track and then follows it back to the Meeting Place. Alternatively, you can continue along the Pastoral Heritage Walk.

Mallee Walk



DISTANCE: 500 metres

DIFFICULTY: easy (wheelchair accessible with assistance)

TIME: 30 mins

STARTS: Mallee Stop on the Mungo Track

Another easy and mostly flat loop walk that explores one of the main local plant communities. The track starts from the Mallee Stop, around the eastern side of Lake Mungo on the Mungo Track, and loops through a fine area of mallee eucalypts and over a low, spinifex-covered dune. Signs explain the diversity of mallee species encountered, as well as other plants and fauna. Picnic tables are provided at the Mallee Stop, under patchy shade.



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Understanding Mungo ...

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The subtle landscape of Mungo and the Willandra Lakes is a precious window where we can look into the deep past of old Australia. Buried here in thick layers of sand and clay are the tell-tale signs of how the climate, waters and landforms have changed over the last 100,000 years and more.

And for at least 45,000 years we humans have shared that past. The ancient Willandra people thrived with the abundance of the lakes, then adapted to drier, hungrier times of the last ice age and survived to the present day. Their story can be discovered in the folds of the land, along with their fireplaces, burials, middens and tools.

Today, Mungo is one of the most important places in Australia for studying the environment of the past and the people who lived through it all. Why is it so? What makes Mungo so special?

Part of the answer lies in the unique position of the ancient Willandra Lakes, which sit near the centre of the Murray Basin. To the west are the mallee and dunefields, and to the east a riverine plain reaches up to the eastern highlands. In between, the 19 connected lakes, now dry, lay along the ancient line of Willandra Creek like a string of dams. The history of these fossil lakes is deeply entwined with what has happened in the dunefields, rivers and mountains hundreds of kilometres away.

This part of Australia has been geologically quiet for thousands of years. Although the lake basins began with small but very significant earth movements, no cataclysmic events, no volcanic eruptions and no glaciers have recently scoured the land. Into this relatively stable environment, sediment from the mountains has washed and accumulated, piling up like the pages in a history book, waiting to be read.

In this section of the website you can explore these and many other aspects of Mungo's natural and human history, including the modern landscape with its flora, fauna, pastoral history and how young people can get involved.



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... Ancient Mungo Environments ...



Why is Mungo so special?

How did the Willandra Lakes become one of the most important places in Australia for studying past environments and peoples?

The unique qualities of the Willandra Lakes region are no accident. Australia is an old and relatively stable continent compared with places that have seen 'recent' mountain-building and widespread glaciation.

The lakes are on a low-lying riverine plain, near the middle of the much larger Murray Basin. To the east lie the highlands of the Great Dividing Range and to the west are the dunefields (now largely inactive) of the central Australian desert.

The Willandra Lakes area was once inundated by the sea, but the waters withdrew four to five million years ago. No major earth movements have disrupted the area for a very long time, perhaps several million years.

No volcanoes have broken through the crust and spilled lava over the landscape. No glaciers have gouged older landforms away. Dunefields did move in from the west, but failed to swamp the lakes.

This long period of relative stability has allowed water and wind to shape the Willandra landscape over the past few million years. Willandra Lakes is a low-lying area that forms what geologists call a depositional environment. It has been such an environment for millions of years.

All that time, erosion has been wearing down the distant mountains, washing sediments out in great rivers onto the western plains.

The ancestral Willandra Creek carried clay and sand to the old Willandra Lakes and dumped the sediments in the still waters of the lake basins.

These sediments have then been blown by the prevailing westerly winds out of the lakebeds to build up, year by year and layer by layer, the crescent-shaped dunes (lunettes) that lie on the eastern edge of each lake.

Lunette-building requires very special circumstances. Groundwater and salt are critical in allowing the fine lakebed sediments to be picked up by the wind and carried onto the lunette.



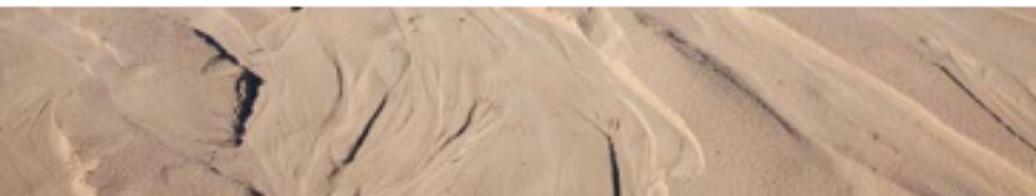
The progressive build-up of the Mungo lunette has created an archive of information, where human relics have been buried along with other evidence of the past, year by year, in layers like the pages of a book. Such layered sediments which can be studied by scientists accumulate in many different environments, including caves where people have lived for thousands of years.

The well known 'seven layers of Troy' are another example. One difference from many archaeological sites is that at Mungo the more recent erosion of the lunette by wind and water means a lot of the past can be seen without having to dig.

The Willandra Lakes are indeed special, and rare too. Only places where the land has been stable enough, for long enough, with the right depositional conditions, coupled with signs of human life, can provide such a wealth of connected information. Around the globe such places are very hard to find.

Note: The complex story of Mungo's past has been developed from a great body of research in many fields. Not all the details can be included here. Some aspects are still speculative or debated, and the story continues to be refined and corrected as research continues.

A key reference for the information in Ancient Mungo Environments is "Lake Mungo: window to Australia's past", an educational CD-RoM authored by Dr Jim Bowler (see www.eshowcase.unimelb.edu.au/packages/lake-mungo). However any errors remain the responsibility of the authors of this guide.



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A Mungo timeline

Many millions of years ago

Earth movements create the large, low-lying Murray Basin, where the Willandra Lakes lie today.

32 million years ago

The sea floods the Murray Basin from the south and covers the area where Willandra Lakes form later.

6.5 million years ago

The sea begins a slow and halting retreat from the Murray Basin.

3 million to 1 million years ago

The coastline nears its modern position, but earth movements block the ancestral Murray-Darling River near its mouth, causing a huge lake (Lake Bungunna) to back up into the Murray Basin.

The large lake suggests a wetter climate than today.

The Lake Bungunnia barrier is breached and the lake drains.

700,000 years ago

Active dunes form in central Australia and the mallee region of the western Murray Basin.

150,000 to 130,000 years ago

By 150,000 years ago the Willandra Lakes had formed and water filled the basins.

Low lunette ridges begin to develop on the eastern margins of the lakes, built up from sand blown off wave-formed beaches.

The Golgol layer forms the incipient Mungo lunette.

120,000 to 70,000 years ago

Water levels fall in Willandra Lakes during a relatively dry climatic phase.

75,000 to 60,000 years ago

Ice sheets expand across cooler parts of the globe, causing a fall in sea level.

Tasmania and New Guinea become joined to the Australian mainland.

The ocean gap between the larger Australia and the islands to the north shrinks to 120 kilometres.

About 60,000 years ago

The Willandra Lakes fill with water from the ancestral Lachlan River flowing down Willandra Creek, marking the onset of a period of abundant water in this part of Australia.

A period of full lakes, climate stability and biological abundance lasts for the next 20,000 years.

Lake Mungo is some 15 metres deep, with a surface area of about 200 square kilometres.

Dunes are vegetated and stable.

Woodland vegetation grows on the lunettes and lake surrounds.

The Lower Mungo layer is deposited on the Mungo lunette.

Sea level is some 40 metres below present.

The first human arrivals reach Australia across the sea gap from south east Asia, and spread across the continent.

About 55,000 years ago

The first human arrivals reach Australia across the sea gap from south east Asia, and spread across the continent.

About 45,000 years ago

The first human artefacts appear at Lake Mungo.
Some megafauna become extinct.

About 42,000 years ago

Mungo Lady and Mungo Man are buried in the Mungo lunette.

By 40,000 years ago

Water levels in Willandra Lakes fall and the lakes become salty.

Clay is blown over older sand lunettes. The Upper Mungo layer is deposited on the Mungo lunette.

People occupying the shores of the lakes, hunting, fishing and burying their dead.

40,000 to 22,000 years ago

The climate fluctuates for 18,000 years.

Water levels in Willandra Lakes also fluctuate, going through several cycles of filling then drying out again.

Sand blows on to the lunettes during lake-full phases, and clay during dry phases. The Arumpo and Lower Zanci layers are deposited on the Mungo lunette.

Vegetation fluctuates along with the climate, with periods of abundance when the lakes are full.

Humans leave abundant evidence, including the remains of fish, shellfish and small mammals. They may feast on mass fish deaths in the drying lakes.

22,000 to 18,000 years ago

The world enters a period of cooler climate, known as the Last Glacial Maximum. Icefields spread again across the northern continents. Sea level falls to 120 metres below present.

Australia turns cool, dry and windy. Glaciers grow around Mount Kosciuszko and in the Tasmanian highlands. Winter snowfields spread along the ranges. Temperatures are 6 to 9 degrees lower than today.

Plant and animal life are greatly diminished. Woodlands contract into grasslands and shrublands. The Murray Basin rivers are bare of trees.

Runoff and erosion from the highlands increases due to exposed ground. Fed by mountain snow-melt, the rivers carry high spring/summer flows and large amounts of sediment, but the Lachlan River shrinks back from the lakes and dissipates onto the barren plains.

Willandra Lakes gradually dry out, starting in the south and moving progressively north. Groundwater levels remain high for a time, but the lakes never fill again.

Sand dunes are devegetated and become mobile, moving in around the lakes from the west. Cold winds blow sand and dust-storms.

Clays are blown from drying lakes onto the lunettes. The Upper Zanci layer is deposited on the Mungo lunette.

Humans leave some evidence, including footprints on a moist claypan. People probably move northwards along the lakes, following the fish and shellfish as the water retreats and food resources diminish under harsh conditions in the wider landscape.

18,000 years ago

The worldwide ice age begins to thaw. Sea level rises, rainfall increases and vegetation greens the landscape again.

Conditions improve at Willandra Lakes, but the climate remains relatively dry. Vegetation slowly returns to become similar to what it is today.

Humans leave some evidence of their presence.

12,000 years ago

Rivers take on their current smaller form.

Trees return to the banks of the western rivers.

Sea level approaches its current level.

10,000 to present

The ice age is well and truly over. A relatively stable, semi-arid climate settles over Willandra and continues to the present.

The Lachlan River abandons the Willandra Creek channel and flows down the modern Lachlan channel.

The water table at Willandra Lakes falls, switching off the wet-dry lunette-building cycle so the lunettes stop growing.

Vegetation expands somewhat and erosion is reduced. Dunes become stabilised.

Thylacines and Tasmanian Devils become extinct and Dingoes arrive, on mainland Australia and in the Willandra area.

Humans leave intermittent evidence of their presence.

The last 200 years

Europeans arrive in the Willandra Lakes area in the 1840s, bringing sheep and cattle. Rabbits arrive about the 1880s.

Vegetation is reduced and changed by grazing of introduced mammals.

At the end of the 1800s, overgrazing and severe drought combine to shock the ecosystem.

The productivity of the environment plunges lower than it has been for 10,000 years, and stocking rates never recover.

Hairy-nosed Wombats, bilbies, bettongs and other small to medium sized native mammals are driven to extinction.

Lunette erosion, which commenced before white settlement, is accelerated by grazing. Archaeological relics are exposed.

Aboriginal people are dispossessed of their traditional lands but work in the early days of the pastoral industry.

Mungo National Park is reserved in 1979 and later expanded.

The Willandra Lakes Region is listed as a World Heritage Area in 1981.

Aboriginal people increase their presence again in the Willandra Lakes area.

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.....People in changing climates.....

Like all living things, humans have always responded to the climate of the time and the environment they lived in. Over the years changing climates have variously restricted and encouraged human migration and development.

Climate was the midwife to the birth of humanity in Africa. Then a warm and productive climate enabled modern humans to thrive and grow to the extent that they could migrate into new areas.

It was possibly the glacial period of cool climate and lower sea levels around 70,000 years ago that allowed people to cross the narrowed sea from north Africa into Arabia. This opened up all of Asia and Europe to human settlement.

After people reached south east Asia, the lower sea level made it possible to cross into Australia. These people must have been proficient with boats and ocean travel, perhaps from a long history of coastal living. Then, when the most recent icefields retreated from North America, humans were able to spread down through the Americas.

Archaeological evidence suggests that Aboriginal people reached Willandra Lakes in a time of plenty.

Between 60,000 and 40,000 years ago the lakes were full of both water and life. By around 20,000 years ago the glacial era climate had reached a peak of aridity, and no doubt the human population came under a great deal of stress.

People who study the broad sweep of human history see it as no accident that worldwide agriculture, cities, civilisation and nations developed during the last 10,000 years of relatively benign and stable climate.

These advances were fuelled at first by the fertile glacial soils of Europe and Asia, and later by the fossil fuels and other resources of all continents. Today, after 10,000 years of relative stability, the climate is on the move again.

How does climate change?

The Earth's climate is produced by a complex interaction of many factors. These include the amount of energy coming from the sun, shifts in the Earth's orbit, geological events like volcanic eruptions and the movement of continents, and the pattern of ocean currents and temperatures.

One of the most powerful drivers of the global climate is the composition of the atmosphere, especially the amount of carbon dioxide. The atmosphere is partly a product of life on Earth and continues to be intimately bound up with life, because various organisms both produce and absorb carbon dioxide, oxygen and other gases. Since the industrial revolution, humans have become another atmospheric factor by releasing large quantities of carbon dioxide that were previously stored in the form of coal, oil and standing forests.

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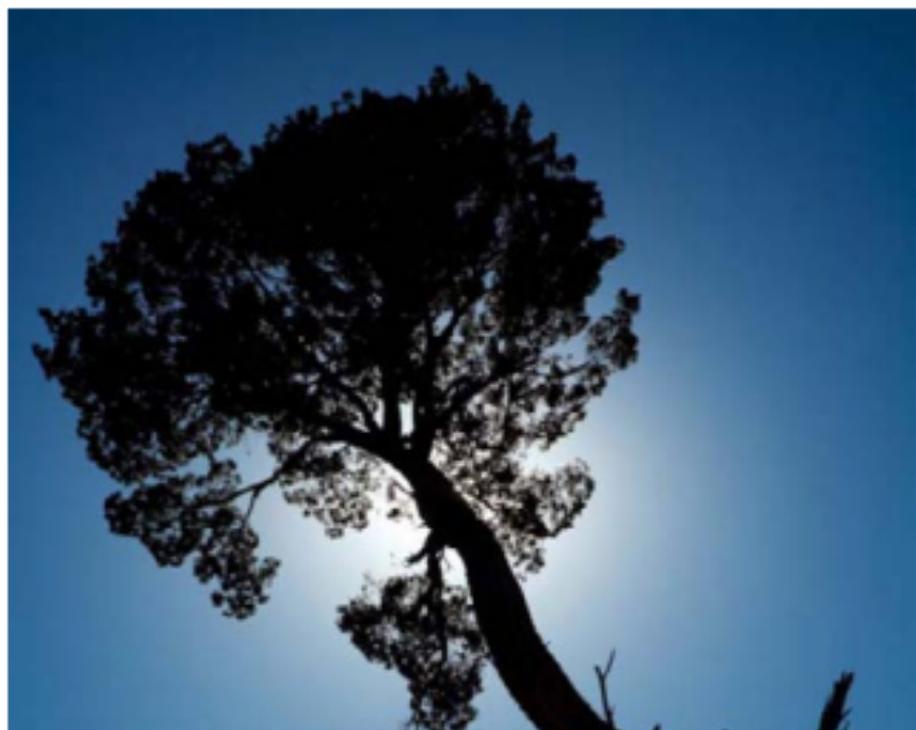
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..... Ancient Mungo environments



The forces that shaped the Mungo landscape over the eons are powerful, varied and ongoing. They have acted in a unique combination to create a place that has some very special qualities.



Rivers and glaciers

The ancestral Willandra Lakes were filled by the old Lachlan River flowing down Willandra Creek. The river gathered runoff from the high slopes of the Great Dividing Range, across an area extending from near Canberra almost to the Blue Mountains.

The Murrumbidgee River and the Murray River rise further south along the range, and also run out onto the western plains, but have never flowed into Willandra Lakes. Because of the higher mountains in their catchments, with more rain and snow, the southern rivers have always gathered more runoff than the Lachlan, particularly snow-melt in the spring. The Lachlan has been a less reliable river and has not always been capable of reaching Willandra Lakes.

Only small areas of Australia were affected by glaciers in recent global ice ages. This is because the continent has been in temperate latitudes for many millions of years and has no high mountains. When the Earth's climate cools down, most of the extra ice formation happens on the colder northern continents, where vast ice sheets spread southwards over relatively low-lying land. The high mountain glaciers of the Andes, Himalaya and other temperate ranges also expanded.

During the most recent ice age, which peaked around 20,000 years ago, several small glaciers flowed off the highest parts of the Snowy Mountains near Mount Kosciuszko (2228 metres) and on the higher peaks of New Guinea (up to 4884 metres). Ice was more extensive in Tasmania, with mountain glaciers over large parts of the Central Highlands (highest peak 1617 metres) and in the South West.





The New Zealand Alps were affected even more, being further south again and with much higher altitudes (up to 3754 metres today) and snowfalls. The melted glaciers have left a visible legacy of U-shaped valleys and lake basins carved out of solid rock by the grinding ice. In the Snowy Mountains, these include Blue Lake and Lake Albina.

During the last glacial, a curious thing happened to the western rivers. Even though the climate was relatively arid with much reduced rainfall, the evidence shows that the rivers were bigger than they are today and ran very strongly.



The role of wind

In the wide-open landscape of Lake Mungo, the wind is an almost constant presence. When you visit the Walls of China, you can see it moving sand off the lunette and across the dunes behind. The wind has been a major force in creating the landscape we see today.

The winds over the southern Australian inland have been coming mainly from the western quarter for millions of years. This has had a profound influence on the landforms of Willandra. The western winds have driven the climate, helped to create the shallow basins in which the lakes formed, blown the central Australian sand dunes towards the lakes and constructed the lunettes.

The wind was a factor in evaporation from the lakes, which is an important part of the story.

Although the westerlies often carried moist air, the low ground of the western plains gathered little in the form of rain. The area is also sheltered from the east by the distant mountains, so little rain penetrates from that side. The result is a relatively arid climate, drier than the mountains and the country towards the southern coast but not as arid as the desert country to the north-west.

On the other hand, the mountains of the Great Dividing Range intercept the westerlies, forcing up the moist air and extracting rain. Especially in winter, most rain and snowfall on the Australian Alps comes from the west. This precipitation feeds the western rivers such as the ancestral Lachlan, which over the eons has supplied more water to Willandra Lakes than might be expected from their semi-arid setting.

Winds blowing across Lake Mungo and the other old lakes created waves that washed up on all the shores. On the western side of the lakes, these waves cut into the dunes that were moving in from the west, creating a steep shoreline and dumping sediment into the waters. The sediment gathered on the eastern shores where the waves were also eroding the lakeshore and building beaches. In strong winds, sand from the beaches was blown up to form lakeside dunes.

In drier times, when the lake was empty or partly dry, those same prevailing westerlies picked up clay from the lakebed and blew it onto the lakeside dunes. Layer on layer of sand and clay built up into massive lunettes, by far the largest landforms in this otherwise almost flat landscape.



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Lakes, water and salt

The story of the Mungo landscape is a story of water and salt. Without water, the lakes would have no human history, and with no salt, the lunettes would barely exist.



But the amount of water is only part of the story, it's also about how that water is distributed in the landscape. The visible, surface water that came down the old Willandra Creek and pooled in the lakes is important, but so is the unseen water beneath the surface.

Groundwater has a much wider source and reacts more slowly to changes in surface supply. The groundwater under Willandra Lakes comes partly from the rivers that flow off the eastern mountains.

During the last glacial, when the water supply from Willandra Creek failed, the lakes were sustained at first by the groundwater level. And with colder temperatures, the water evaporated more slowly.

Lake levels fell gradually, through many fluctuations, and the lakes slowly dried out through long periods when areas of the lakebeds were exposed and moist. These periods were critical to the formation of the lunettes.



Salt was critical too. Groundwater throughout the Murray Basin carries salt. As the lakes dried out, which they did many times through their history, the salt in the lakewaters became progressively more concentrated.

When the lake surface fell below the groundwater level (water table), more salty water drained in to the lake from the surrounds.

In the end, the drying mud on the floor of the lakes would include a high proportion of salt. Without this salt, the wind would not be capable of picking up the hard-baked clay and blowing it away onto the lunettes.

The amount of salt in the lakes was important to

people too. Key food sources for the Willandra Aboriginal people included freshwater fish, yabbies and mussels.



As the lakes grew saltier these resources declined and disappeared. The

archaeological record provides some evidence that large fish kills provided feasting opportunities along the way.

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The lunette story



The Walls of China is the most well-known and celebrated feature in Mungo National Park. This low, curving line of sandy hills that arcs around the eastern shore of Lake Mungo is a lunette, a rather special landform that is now eroding under the rain and wind.



The name comes from the crescent moon shape of these dunes. Australia is the world centre of lunettes. Hundreds of them occur in western New South Wales alone, all with a rounded lake at their heart.

Yet how they came to be there was a mystery until only about 40 years ago. The flat basins were not even recognised as fossil lakes until scientists went to look at them. After Dr Jim Bowler and others undertook careful research, it is now known that lunettes only form beside lakes in semi-arid and sub-humid areas under special conditions.

A lunette is a single, massive dune ridge formed from clay and sand blown up from the lake. In profile, lunettes look like giant speed-humps, with gentle slopes and a broad top.

Some lunettes at Willandra Lakes - such as the Lake Chibnalwood lunette - show this shape clearly, but the original form of the Mungo lunette has been eroded away and is no longer so obvious.

The Lake Mungo lunette is some 20 metres high, 200 metres wide and 30 kilometres long. That's about 60 million cubic metres of dirt!

All of it was blown out of this one shallow lake basin. These lunettes are the biggest features in a mostly flat Willandra landscape. Not surprisingly, they took a long time to grow.

In fact the Willandra lunettes were growing for about 140,000 years, in an intermittent, stop-start sort of way. They stopped growing after the last ice age when the lakes finally dried up because lunettes need water and salt to grow.

They are now 'fossil' features from earlier times. Some modern lakes, such as those in south-western Western Australia, are still actively developing lunettes, which gives scientists a chance to see them actually forming.

A distinguishing feature of lunettes is that they are mostly composed of fine clay. The clay comes from the floor of the lake where it settles after being washed in. When the lakewaters retreat, the floor of the lake is exposed to the wind. But both damp clay and hard-set clay are difficult for the wind to pick up, which is where the salt comes in.

Salt interacts with water and clay on the damp lakebed to create a fluffy, granular material of sand-sized pellets that are easily picked up by the wind. Actual sand (silica grains), mostly from the exposed shorelines and beaches, is more easily moved by the wind and makes up a smaller proportion of the lunette. When the sediments are blown up onto the lunette, the vegetation growing there creates turbulence that slows down the wind, causing it to 'drop its bundle' of sand or clay.

The Mungo lunette has been built up slowly and progressively by the wind, laying down thin layer after thin layer over the eons until it was piled up 20 metres deep.

Along the way, all sorts of material has been



buried - plant remains (which have not survived), animal fossils, human remains and artefacts, shells, middens, fireplaces and more, all placed within the sediments in an orderly sequence

of passing years. Some lunettes, Mungo included, became like an indexed library of vital information about past environments and people.

More recently, Mungo and some other lunettes have begun to erode. Why some and not others? It might be the different sediment composition of various lunettes. The erosion probably commenced before white settlement, but has been accelerated by overgrazing. Ironically, the erosion is continuing to expose more relics from the ancient depths of the lunette.

Lake Mungo is different

Amongst the 19 fossil lakes that make up the Willandra system, Lake Mungo is even more special. When water came down Willandra Creek, it flowed into each major lake in turn: first Mulurulu, then the vast Garnpung and the smaller Leaghur, then down to Arumpo and Chibnalwood (which sometimes merged together in high water) and finally along Arumpo Creek to the small southern lakes.

But where was Lake Mungo? Mungo was different from the other lakes because it was a terminal basin with no outlet. It only filled when Lake Leaghur, immediately to the north, overflowed along a small connecting channel. It was, in effect, 'offline' from the other lakes. So the dynamics of water, evaporation and salt would also have been somewhat different in Mungo. Exactly how different is not fully understood, but it could explain some of the special features of Lake Mungo, such as its strong record of human presence compared to the other Willandra Lakes.

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..... The megafauna mystery

Giant beasts once roamed Willandra Lakes, the rest of Australia, and much of the world. This was during the Pleistocene epoch, between 10,000 and two million years ago.

Most of the megafauna became extinct towards the end of the Pleistocene, with Africa the last remaining stronghold of large mammals into the modern era.

This important and worldwide wave of extinction seems to have coincided with the arrival of humans in various continents, and the role of hunter-gatherers in wiping out the megafauna has been a hot topic of scientific debate.

Fossils of extinct megafauna are not very common at Willandra compared to some other parts of New South Wales.

The giant species which have left their remains buried in the Willandra sediments include *Zygomaturus*, a variety of plant-eating, wombat-like diprotodont, but it is only known from a single fossil. More common are *Procoptodon*, a

short-faced, giant kangaroo, the large wallaby *Protemnodon*, two large *Macropus* kangaroos and *Genyornis*, a very stout flightless bird.



Genyornis has been useful in working out when Australian megafauna became extinct, because it was widespread and left numerous fossils in the form of eggshell.

Back when Australia was much wetter, *Genyornis* and other giant flightless birds dominated the land,

but as the continent grew more arid, kangaroos and other macropods took over.

All *Genyornis* eggshells have been dated at older than 46,000 years. This is sometimes inferred as the time when most Australian megafauna met their demise. But other evidence suggests some species survived for much longer.

So did human hunting or widespread firing of the landscape wipe out the megafauna, as some researchers believe, or was climate change the main factor, as other scientists say?

It is generally thought from the archaeological record that people first arrived in Australia about 50,000 years ago, perhaps as long as 60,000 years back.

Many of the megafauna were slow-moving and perhaps easily hunted, but they would also have been vulnerable to changes in their environment. However there is little evidence to show that early Australian people hunted the big animals.

The earliest signs of people at Willandra Lakes are about 45,000 years old, and preserved in their campsites are the remains of what they ate. None of the Willandra megafauna have been found in campsites. In the ancient Willandra menu, meat meant mainly shellfish, yabbies, fish and a vast array of small mammals, including hare wallabies, bettongs, bandicoots, bilbies and native rats.

These species could be caught in either the lake or in lunette burrows. Larger kangaroos are less common in the remains, but perhaps these were caught and eaten away from the lakes. Maybe megafauna too were hunted and eaten on the plains?

While the jury is still out on what killed the megafauna, some more recent but pre-European extinctions may be attributable to the arrival of the Dingo (*Canis lupus dingo*) in Australia about 4,000 years ago. The Dingo would have competed with the Thylacine (*Thylacinus cynocephalus*) and Tasmanian Devil (*Sarcophilus harrisi*), two predators that lived in the Willandra until a few thousand years ago.



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Mungo archaeology

The people of Lake Mungo and the Willandra Lakes have a long past that is important to the whole world.

When Mungo Lady and Mungo Man turned up some 40 years ago they rocked the scientific community. They have been dated to 42,000 years old - the oldest human remains in Australia and some of the oldest modern humans in the world outside Africa.

And when 20,000 year old footprints of the Willandra people were found in 2003, they also rocked archaeological records. They are the only Pleistocene footprints in Australia and the most numerous yet found anywhere in the world.

These finds are remarkable enough, but perhaps the most important thing about the Willandra Lakes is how such discoveries can be connected with the landscape and climate.

Places like Mungo are rare, where changes in an environment can be matched with how people have lived there in a continuous record across vast ages.

The scientific evidence shows that Aboriginal people have lived at Mungo for at least 45,000 years. This is the dated age of the oldest stone artefacts that have been found so far, and represents a lineage that extends back over some 2000 generations.

But many Aboriginal people say they have been here even longer, reaching back into the Dreamtime, perhaps forever. The long history of occupation at Mungo has combined with ideal conditions for the preservation of some types of relics to create an archaeological treasurehouse.

Today, the Paakantji, the Mutthi Mutthi, the Ngyiampaa and all Aboriginal people hold their Willandra ancestors and their story as precious gifts to be shared with all people.

The traditional tribal groups welcome you here to explore some of the archaeological stories of Lake Mungo and the Willandra Lakes.



Signs from the past

The ancient Willandra people left behind a variety of materials that can help us to understand how they lived, who they were and how they related to the local environment as it changed around them.

This material was left mostly by accident, such as waste from food preparation, fireplaces, or stone tools manufacture. Some was more deliberate, such as burials.

Most of the archaeological materials are hard and durable including stone artefacts, mineralised bones and fire baked sediments. Plant matter and other soft material has not preserved well in the Mungo environment.

The lunettes are the main storehouses for these archaeological remains. As the windblown sediments gradually piled up, material left on the surface became buried, and the buried material was covered ever deeper.

This orderly collection helps to date the artefacts; by studying the layers in which they are found their age can be assessed. Recent erosion, of the Mungo lunette in particular, has brought many long-buried archaeological features to the surface. Other features, such as stone quarries and relatively recent campsites, are sometimes found on the open ground.

It is important to note that ALL archaeological objects are important and protected by New South Wales law. They must not be touched or disturbed. Aboriginal Discovery Tours are a great way to learn about local archaeology out in the field.



Stone artefacts

Stone is the most durable of all natural materials, and is naturally scarce around the Willandra Lakes. Apart from the white nodules of calcium carbonate that lie scattered around by nature, most other rocks you see in the area are likely to be human artefacts.

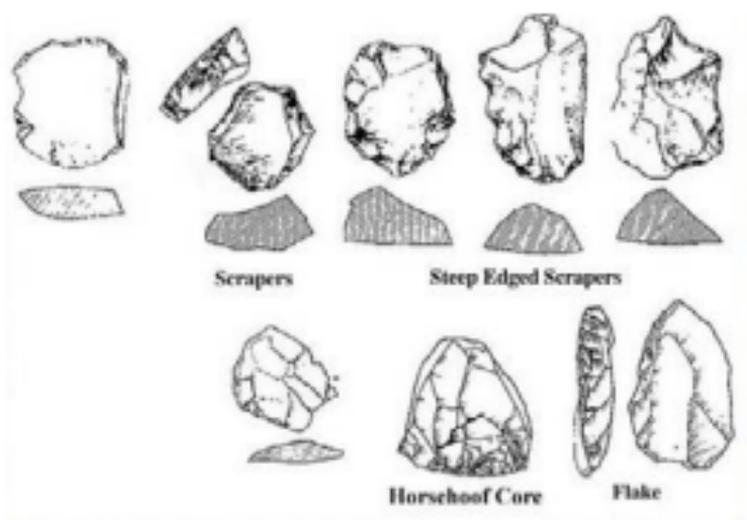
These may include recognisable stone tools such as points, knives, hatchets or axes, and grindstones. But by far the most common pieces of rock are waste flakes and cores, left over from knapping, a term used to describe the manufacture or maintenance of flaked stone artefacts.



There are large quantities of flaked stone spread over the Willandra landscape, and indeed across most landscapes in Australia, especially in the inland - which gives some measure of how long Aboriginal people have been living here and working stone.

A scatter of waste flakes often indicates a campsite where people worked on tools, or knapped flakes from a core to use straight away - flakes are sort of throwaway knives, they can have razor sharp edges and can be used immediately but often break or become blunt.

Stones that have been deliberately knapped show tell-tale features that are readily recognised by a trained eye. A whole branch of archaeology is dedicated to studying and classifying stone tools to learn about ancient technologies and how they changed through time and in different places.



Aboriginal people used stone tools for a huge variety of purposes. Large flat grindstones were used to grind grass and other seeds into a flour that was then made into damper. Points were used for spear tips.

Knives were essential for butchering game and making wooden tools. Scrapers were used for shaping wood and cleaning skins. Hatchet or axe heads were ground to a sharp edge, and were used to remove bark from trees. Stone was a vital and highly valued resource for hunter-gatherers, and was widely traded.

Stone tools cannot usually be dated directly, but sometimes their age can be determined from their association with fireplaces or where they lie in the layers of sediment.

In rare cases a tool may carry microscopic residue of organic material, such as flesh or plant matter.





So where did all this stone come from in a landscape of sand and clay? Some of it is local but much also comes from far away. Good flaking stone needs to be hard and fine-grained and to fracture smoothly. Various silica-rich rocks are ideal and were sometimes traded across large distances. The local Willandra stone is silcrete, a kind of fos

sil soil cemented together with silica in a natural process of water leaching. Layers of silcrete outcrop in places in the lakebeds, and most of these outcrops show signs of extensive quarrying by the ancient Willandra people.

Stone hatchets or axes from this area were brought in from elsewhere. Analysis of the stone has shown many hatchets in western New South Wales originated from axe quarries in central Victoria, some 400km to the south of Mungo.

Middens

Middens are the remains of meals, usually many meals. On the Australian coast, piles of discarded shells can be very extensive and many metres in height.



At Willandra, the accumulated remains of shellfish, fish, yabbies and mammals have all been found. By the fact that they are burnt, or of a consistent size, or otherwise arranged in ways that could not have happened naturally, archaeologists can usually tell if they were left by humans.

Shells can naturally accumulate along old lake beaches, for instance, but they will be mixed sizes, not burnt and often broken and worn by wave action.

Freshwater animals found in the middens include Golden Perch (*Macquaria ambigua*), Trout Cod (*Maccullochella macquariensis*), yabby (*Cherax destructor*) and a freshwater mussel (*Velesunio ambiguus*). All of these species are still found in the nearby Darling, Murray, Murrumbidgee and Lachlan rivers.

Organic remains can be directly dated using radiocarbon analysis, and of course they tell us what the people were eating. Plant remains have generally not survived, but the ancient Willandrans had a varied meat diet including fish, freshwater mussels, and many small mammals including four types of bandicoot, three rat kangaroos, three hare wallabies and native rats.

Fish and shell fossils are particularly useful because they can provide a lot of information. One of the most common fish fossils are small bones from the ear called otoliths.

These grow throughout the fish's life in concentric rings and can reveal not only how old the fish was but something of the chemistry of the water in which they were living, such as the salinity level.

Fireplaces

.....

Fireplaces are so fundamental to human experience that they invoke special feelings.

It can be very moving to stand over an ancient hearth where a family of ice age hunter-gatherers warmed themselves and cooked their meals beneath the same bright outback stars that we see today.

Three kinds of ancient fireplaces are found at Willandra. Very thin horizons of charcoal from burnt wood and ash are one type. Another is a bed of clay comprised of clay lumps that have been baked and used as a heat retainer and fire-bed.

The third, and most common form of fireplace is made from the capping of termite nests. Termites in this area make their nest underground, and the only surface indications are a small, shiny and bare circle of sediment, approximately 1m diameter.

The capping on these nests is very hard and it was often broken into pieces and used in fireplaces as a heat retainer and fire-bed.

Fireplaces survive well when buried in the sediments, and charcoal can be directly dated - provided it has not been contaminated with more recent carbon washed down from above.

Clay hearths have another special quality - they preserve a record of the alignment of the Earth's magnetic field at the time when they were baked. In this way a major shift in the Earth's magnetic field about 30,000 years ago was first discovered at Lake Mungo. The Lake Mungo Geomagnetic Excursion, as it is known, has since been confirmed at other locations around the world.

Burials

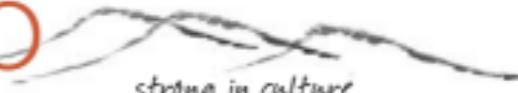
Burial places of their ancestors hold a special significance for Aboriginal people who put great importance on being laid to rest in one's own Country.

A large number of human remains have been discovered at Mungo, but few excavations of ancestral remains have been undertaken since the three traditional tribal groups became more involved in archaeological decisions.

Mungo Lady and Mungo Man are of world heritage significance because of their great age (42,000 years) and sophisticated burial rituals. Much has been learnt from their remains.

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Dating the past

Working out how old archaeological remains are is a vital part of archaeology. Scientific dating has confirmed the long residence of Aboriginal people in Australia. A number of methods are used, all of which have their advantages, limitations and level of accuracy. Complex dating problems often use a variety of techniques and information to arrive at the best answer.

Artefacts and other materials can be dated in relative terms by observing which layer of sediments they are found in. This applies the geological principle that under normal circumstances younger layers of sediment will be deposited on top of older layers. This 'law of superimposition' works in the well-defined layers of the Willandra lunettes, but only dates objects as younger or older than adjacent layers. To determine the year age (absolute age) of an object, a number of chemical and radioactive techniques can be used. Four main methods have been used in Willandra archaeology.

Radio carbon dating

This well known method was the first technique that became available for accurate dating of old materials.

It uses the fact that natural carbon contains a known ratio of ordinary carbon and the radioactive isotope carbon-14, and that this mix is reflected in carbon taken up by living organic materials such as wood, shells and bones. When organisms die, the carbon-14 begins to decay at a known rate.

Carbon-14 has a half-life of 5,730 years so dating is limited to between a few hundred and about 50,000 years.

Outside this range it becomes too inaccurate. It is also important that samples for dating are collected carefully to ensure they have not been contaminated with more recent carbon.

Radiocarbon analysis can only be used on organic materials, and is often used to date charcoal associated with campfires and archaeological deposits.

Potassium argon dating

Potassium-argon (K-Ar) dating is a radiometric technique that is used to determine the age of minerals that contain potassium, which include clay minerals and micas. It is most useful for minerals older than 100,000 years and can reach way back into the geological past.

The measurement is based on an isotope of potassium that radioactively decays at a known rate into argon. K-Ar dating has been used to date lava flows above and below archaeological deposits that contain important hominid fossils in Africa's Olduvai Gorge.

Optical dating

Optical dating, also known as optically stimulated luminescence (OSL), dates the last time mineral sediments (usually quartz or feldspar grains) were exposed to sunlight. In the Willandra area it is typically used on quartz sand grains which have been buried and have not been exposed to sunlight since burial.

These grains absorb radiation over time from the surrounding sediments and the radiation (electrons) remain trapped within the mineral grain structure.

When the grain is exposed to intense light of particular wavelengths in the laboratory, it emits a light signal with an intensity proportional to the radiation it has absorbed while buried.

This technique can determine ages between a few hundred years to more than 100,000 years.

It has been used at Willandra to date the layers above and below the location of Mungo Lady and Mungo Man, and the layers above and below the footprints horizon.

Dates above and below a location provide minimum and maximum age determinations according to the law of superimposition.

Thermoluminescence dating

Thermoluminescence is a similar technique to optical dating, but uses heat instead of light to stimulate the minerals. The method also assumes a 'zeroing' event in the life of the material, when it was either last heated or exposed to sunlight.

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..... Mungo's environment today

The Mungo landscape is of low relief and subdued. Even the spectacular Walls of China and the sand dunes are on a small scale.

But hidden in this subtlety lie great depths of meaning and signs of the tumultuous events of the past.

The vast spaces, big skies and earthen colours evoke a sense of endurance that reaches over the horizon to times long gone but with us still.

The Mungo environment we see today is the result of complex natural forces acting over many thousands and millions of years.

For the last 45,000 years at least, we humans have witnessed those changes. We can now see that the modern landscape, with all its plants and animals, is just a snapshot in time and is bound to keep changing.

The story of the past can be read in the land as we see it today. The plants and animals have evolved from species that have gone before, and landscape changes have left evidence in the lakebeds, the lunettes, the dunes and the sediments. More recently, humans have influenced the landscape, vegetation and wildlife, perhaps subtly in Aboriginal times, and much more forcefully since white settlement.

Mungo National Park is most important for its connected environmental and human histories, but it also protects an important sample of the surviving landforms, flora and fauna of the Murray Basin's mallee plains.

Here you can explore Mungo as it is now, while thinking about what has gone before.



The Mungo landscape continues to be moulded by wind and rain. Today the park is dominated by the ancient dry lake basins (playas) of Mungo, Leaghur and Garnpang, with lunettes on their eastern shores and dunefields to the west. East of the lakes are more dunefields and sand plains. The major land systems are described below.

Playas and basins

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 made up mostly of loosely cemented whitish sands and well consolidated clays, with considerable gully erosion. The Leaghur and Garnpang lunettes have only suffered minor erosion and have abundant vegetative cover.





Sandplains and dunefields

.....

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

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.



Lunettes

.....

The lunettes are major landforms of great importance to the ancient heritage of the area. Four major layers of sediment form the Mungo lunette, and each represents a different period of time and different environmental condition.

The layers have been named after the local pastoral stations Golgol, Mungo, Arumpo and Zanci, and were deposited in that order. The upper three contain a vast amount of evidence of human occupation including hearths, middens, stone tools and burials; as well as megafaunal remains.

Over thousands of years, wind and water have carved the lunette into spectacular formations comprised of sand and clay.

Rain washes away the soft sands and muds, creating the rilled ridges and residuals that characterise the Walls of China. The dislodged sand is then picked up by the wind and heaped into huge mobile dunes along the back of the lunette.

The fragile carvings in the lunette make for excellent photos in the setting sun. Remember that it's strictly forbidden to climb on the lunette features or disturb artefacts.



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Plants



Eight main plant communities are represented in Mungo National Park and are distributed according to soil type and conditions of drainage and salinity.

Grasslands / herblands



Tussock grasslands of *Eragrostis australasica* occur in wetter areas of the lake bed. On scalded areas an annual herbland dominated by *Atriplex lindleyi* has developed, with associated species including

Dissocarpus paradoxus,
Osteocarpum acropterum
v. deminuta,
Sclerolaena divaricata,
and *Maireana ciliata*.



Bluebush / saltbush herblands

.....

This community occurs mostly on the dry lake beds. Dominant species include *Atriplex holocarpa*, Old Man Saltbush (*A. nummularia*), *A. vesicaria*, *Chenopodium curvispicatum*, *C. nitrariaceum*, Ruby Saltbush (*Enchylaena tomentosa*), *Maireana georgei*, *M.pyramidata*, *M. sedifolia*, *Muehlenbeckia florulenta* and *Nitraria billardieri*.

Most of these shrubs are members of the chenopod family, a group that has evolved to survive in harsh conditions of drought and salinity. As a result, chenopod shrublands occupy vast areas of inland Australia.

Some saltbushes are perennial shrubs ranging from 20 cm to 150 cm in height, with ascending or descending woody branches and small, cylindrical, fleshy leaves. The ruby saltbush (*Enchylaena tomentosa*) bears a small tomato-like berry up to 6 mm in size that can vary in colour from red to orange to yellow and can be safely eaten.

Other forms of saltbush can grow up to two metres high with a diameter of 3 to 4 metres. These species can have tangled or ascending and descending branches with flat leaves of which the margins or outer edges can be smooth or toothed.

Mixed shrubland

This is the main community on the lunette, with mallee (*Eucalyptus* spp.), cypress pine (*Callitris* spp.), Butterbush (*Pittosporum angustifolium*), Sandhill Wattle (*Acacia ligulata*), Needlewood (*Hakea leucoptera*), Rosewood (*Alectryon oleifolius* ssp. *canescens*), Black Bluebush (*Maireana pyramidata*), grasses and herbs.

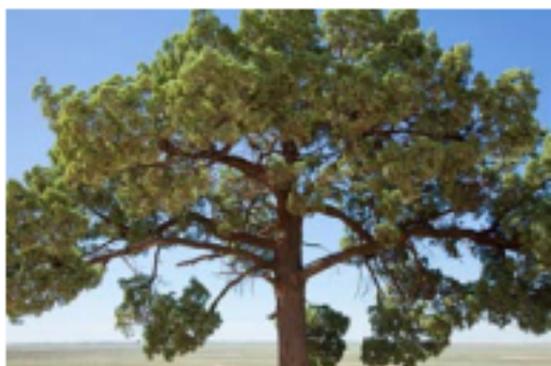


White Cypress Pine woodland

.....

Pine woodland occurs mainly on deep red sandy loam country on the western side of the dry lakebeds. The herb and grass understorey species include

Actinobole uliginosum, *Calandrinia eremaea*, *Calotis hispidula*, *Crassula colorata* v. *acuminata*, *Rhodanthe moschata*, *Tetragonia moorei* and *Zygophyllum ammophilum*.



Three species of cypress pine occur in the park and vary in colour:

Mallee Cypress Pine (*Callitris verrucosa*) has blue-green foliage and densely warted cones;

Murray Cypress Pine (*C. gracilis*) has olive-green foliage and slightly larger cones;

White Cypress Pine (*C. glaucophylla*) has blue-grey to blue-green, scale-like foliage.

The cypress pine is renowned for its resins, which resist rot and termite attack. It was these qualities that made it so popular for fence posts, house and shed stumps, and wall and floor boards. The seeds from the young cones are a popular food for Pink Cockatoos. Mature pine communities can be seen on the Foreshore Walk.

Belah / rosewood woodland

This woodland occurs on the gently undulating sandplains of brown loamy sands, in association with *Myoporum platycarpum* ssp. *platycarpum* and Wilga (*Geijera parviflora*), with an understorey including *Enchylaena tomentosa*, *Chenopodium curvispicatum*, Black Bluebush (*Maireana pyramidata*) and *Sclerolaena patentiuspis*.



Mallee open shrublands

.....

The mallee shrublands of Mungo occur on sandy loam interdune plains and are dominated by a mix of mallee eucalypts, including Yorrell (*Eucalyptus gracilis*), White Mallee (*E. dumosa*) and Red Mallee (*E. socialis*). Understorey plants include *Atriplex stipitata*, Narrowed-leaved Hopbush (*Dodonaea viscosa ssp. angustissima*), *Eremophila glabra*, *Maireana pentatropis* and *Enchylaena tomentosa*.

The word mallee comes from an Aboriginal word for eucalyptus trees that are multi-stemmed from their base. Another feature of mallees is the lignotuber. This is an underground woody structure that stores

water and nutrients, allowing the mallee to survive in semi-arid rangelands and to resprout after bush fire. The term mallee



is now also used to describe communities of mallee eucalypts. You can see a variety of mallees identified with signs on the Mallee Walk.

Mallee open shrublands with spinifex

.....

This community occurs on the east-west sand ridges of shallow sands overlying sandy clays. Associated shrubs include Narrowed-leaved Hopbush (*Dodonaea viscosa* ssp. *angustissima*), *Maireana pentatropis*, *Eremophila glabra* and *Grevillea huegelii*. This community can also be seen on the Mallee Walk and nearby along the Mungo Track.



Acacia open woodland / open shrubland

.....

Acacia communities occur in isolated pockets of the sandplains on heavier soils. The dominant shrubs are Mulga (*Acacia aneura*), Yarran (*A. melvillei* - listed as vulnerable species under the NSW TSC Act), Nelia (*A. loderi* - listed as vulnerable species under the NSW TSC Act) and *A. ligulata*. The understorey is a mixture of native and exotic herbs and grasses.



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Wildlife



Any trip to Mungo would be incomplete without seeing a mob of Emus prancing through the bluebush, cockatoos screeching at sunset or a Red Kangaroo scratching himself in the morning light.

Back when the lakes were full the place was brimming with wildlife that nourished the Aboriginal inhabitants - ducks, swans, waders, pigeons, fish, yabbies, lizards, bettongs, bandicoots, wallabies, mice, rats and more.

The fish and waterbirds are long gone, and many of the small mammals disappeared more recently, but the native fauna remains a fascinating part of Mungo's outback mystique.

A great variety of native vertebrate animals has been recorded here - 110 species of birds, 22 mammal species and 62 reptile species. Eighteen of these are classified as endangered.

The first ground-dwelling animals you'll see in Mungo National Park will probably be our largest marsupials - kangaroos. These herbivores spend their days grazing quietly in the grasslands or resting in a scratched-out pad in the woodland shade. The best time to observe kangaroos is from about 4 pm through to 9 am. You'll need to be very quiet because they are shy and easily scared.



At Mungo there are three species of large kangaroo:

Red Kangaroo

(Macropus rufus)

The males are the easiest to identify by their earthy red coats and pale belly, legs and tail. Some males can be the colour of bluebush, while the females are generally blue-grey and smaller.

Western Grey Kangaroo

(Macropus fuliginosus)

This 'roo is sooty grey tinged with a rust colour, and is adapted to scrub and woodland communities. Western greys are commonly known as 'scrubbers', possibly due to their appearance, or their habitat.

Eastern Grey Kangaroo

(Macropus giganteus)

This is very similar in appearance to a western grey, but doesn't have the western grey's tell-tale black fur on its extremities.

Of the three species, the Red Kangaroo is better adapted to drought conditions because it doesn't stick to a home range but roams to follow good conditions.

Following ancient tradition, the Paakantji and Ngiyampaa people do not eat grey kangaroos.

You might be lucky enough to see a Short-beaked Echidna (*Tachyglossus aculeatus*) while you're in Mungo. These monotremes are highly specialised feeders, devouring ants, termites, grub larvae, worms, mites, insect pupae and small spiders. They seek out food by ripping open logs and stumps or digging into ant mounds and nests, guided by smell and minute electrical signals

detected in the snout.



In summer you'll probably see echidnas more at dawn and dusk, but in the cooler months they can be

found throughout the day, taking advantage of the temperate conditions. Look closely at an echidna and you'll see a layer of fur between the spines, the colour of which varies with the environments they live in.

The echidna usually seeks shelter in rabbit or wombat burrows, hollow logs or thick bushes, while females build their own burrows when incubating or suckling their young. Although echidnas are known to hibernate in the cold regions of the east and south, it's unlikely that they do this as far west as Mungo National Park.

A number of small and medium-sized mammals have become extinct in the Willandra area since white settlement, but others still survive.

These include two mouse-sized, carnivorous marsupials: the Fat-tailed Dunnart (*Sminthopsis crassicaudata*), which stores fat in its tail for lean times and whose nocturnal tracks can often be seen on the dunes and the Common Dunnart (*S.*



murina). The Southern Ningai (*Ningai yvonneae*) is a tiny but energetic predator that weighs only about 10 grams.

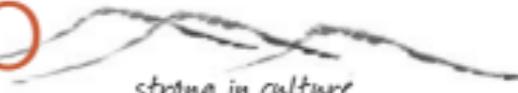
It lives in the mallee country and eats insects, spiders and small lizards. This ningai is endangered by loss of habitat,

predation by foxes and cats, grazing and frequent fires.

In the evenings, you might see small insect-eating bats (microbats) flitting around the sky. Bats are the most diverse group of mammals in Willandra, with nine species including the endangered Little Pied Bat (*Chalinolobus picatus*). These microbats roost in hollow trees, and sometimes in old farm buildings.

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Birds

Mungo supports a wide variety of bird life, mainly due to the varied landforms and habitat of the region. About 150 species can be seen here, but some are more conspicuous than others.

While bushwalking through the mallee community for example, there's a good chance you'll spot some Mallee Ringnecks (*Barnardius zonarius*). These parrots hang out in flocks or pairs, and can be identified by their green plumage and creamy-yellow neck band.

They're about 30 cm long and, like most parrots, are brightly coloured and wonderful to watch. They usually nest in tree hollows and feed on grass seeds, herbs, berries, fruit, buds and blossoms, as well as the seeds of red gum and Yorrell.

A very sociable animal, especially around campgrounds, is the grey Apostlebird (*Struthidea cinerea*), so named because they hang around in family groups, sometimes of about a dozen birds.

They are also referred to locally as 'bludger birds', because they're always on the lookout for food scraps. But please don't feed them because anything but their natural food of seeds and insects is not good for their health.

Apart from the largest Australian bird of all, the flightless Emu (*Dromaius novaehollandiae*).





Many of these birds can be seen drinking at one time or another from the ground tanks located around the park.

Generally each species has a specific drinking time, and once you've worked these out, you can be ready to watch each species at its favourite time.

At times there may only be a handful of birds drinking, while at others the watering spot will be bustling with excitement and intense chatter as the birds come in for a drink during a dry spell. These are perfect opportunities for observing the interactions and specific characters of some of these outback birds.

If you're visiting the lakebed, which is covered with various species of saltbush and bluebush, keep an eye out for the Orange Chat (*Epthianura aurifrons*). This little bird will most likely be running across the ground. The male will be an orange-red colour and the female more of an orange-yellow.

Much more brilliant however, is the Crimson Chat (*Epthianura tricolor*), which can be found within the bushes along the edges of mallee habitat. Again you'll notice that the males have more dominant colours.

The female has mottled tinges of red on her forehead, and the same on her cream belly, while the male displays a vivid red bonnet and apron.

Chats are highly colourful little creatures and are among the few small birds that walk, but do not hop.

They have a brush-like tip on their tongue, assumed to be an adaptation for extracting nectar from the flowering plants of the region.

Their nests, cup-shaped and made of fine twigs and grasses, can be found on low bushes in spinifex clumps, or on the ground.

If you are stopped in wonder by the sounds of a rich and melodious call, it's most likely the flute-like song of one of the species of butcher birds.

Keep an eye out for the Pink Cockatoos, which can at times be seen in their hundreds, particularly when coming in to roost for the night.



Another wonder to keep an eye out for is the Nankeen Kestrel (*Falco cenchroides*), sometimes referred to as a sparrow hawk. This tan-coloured bird with darker, pointed wing-tips is amazing to watch as it hovers in place watching for signs of movement on the ground, perhaps a mouse, an invertebrate, or something from the reptile kingdom.

Once sighted, the little kestrel tucks in its wings and dives straight for its target. With prey clutched tightly in its talons, it alights on a stump, branch, or fence post to savour the rewards of its efforts.

Other bird species you might see in various parts of the park include:

Galah *Eolophus roseicapillus*

Pink Cockatoo *Lophochroa leadbeateri*

Red-rumped Parrot *Psephotus haematonotus*

Blue Bonnets *Northiella haematogaster*

Budgerigars *Melopsittacus undulatus*

Zebra Finches *Taeniopygia guttata*

Common Bronzewing *Phaps chalcoptera*

Crested Pigeon *Ocyphaps lophotes*

Singing Honeyeater *Lichenostomus virescens*

Australasian Pipit *Anthus novaeseelandiae*

Variiegated Fairy-wren *Malurus lamberti*

Australian Bustard *Ardeotis australis*

Chestnut Quail Thrush *Cinclosoma castanotum*

Gilbert's Whistler *Pachycephala inornata*

Pink Cockatoo *Lophochroa leadbeateri*

Malleefowl *Leipoa ocellata*



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Reptiles



A walk through any habitat in the park will undoubtedly result in the sighting of one of the many lizards and snakes to be found at Mungo. Forty species of reptiles have been recorded here, including ten species of gecko and sixteen species of skinks.

The largest reptile in the park is the harmless Carpet Python (*Morelia spilota*), which can grow up to four metres long, but is more likely to be two metres.

These animals are models of patience, as they will hang from a branch over a known animal track for up to a week. The snake will wait for something to pass by, and if nothing does, it will simply pack up camp and try somewhere else.

The Carpet Python is a beautiful snake, with superb pale to dark brown colouring with black splotches and yellow patterned markings over the full length of the body. The under surface is cream or yellow blotched with dark grey.

You probably won't come across a snake in or around the park's campsites, but they are not uncommon outside the camping area.

Snakes are naturally shy animals and will avoid contact with humans wherever possible. It's best not to take chances though, and to be aware that they're around and that it's their home you are visiting.

Wear sensible footwear, and if you do happen to come across a snake, just walk calmly away.



Several reptile species make their home in the saltbush, including the Shingleback (*Tiliqua rugosa*), sometimes known as the stumpy-tail or sleepy lizard. You may find a Shingleback resting under a shrub or sunning itself in the open. Their diet consists of vegetable matter such as fruit and berries or ground blossoms, but they will also eat insects and snails.

The Lined Earless Dragon (*Tympanocryptis lineata lineata*) lives in many of the different habitats of Mungo. Don't let the name fool you, for this lizard grows to only 15 cm long. It's quite attractive in its brown, black and orange outfit, with thin white stripes running the length of its body. It lacks visible ear openings – hence the name.

While you're driving around or hiking, keep an eye on fence posts, stumps, and shrubs, where you are likely to see a Bearded Dragon (*Pogona barbata*). These lizards like sunning themselves in unusual, but very practical places.

Being reptiles and cold blooded, they use the energy of the sun to regulate their body temperature. They grow up to 40-55 cm long.



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Frogs and invertebrates

Not much is known about the amphibians in the park. 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 also potentially live here.

Many of the mammals and birds in Mungo rely on invertebrates such as beetles, bugs, spiders and insect larvae for food.

Some invertebrates rely on the vegetation of the park for food and protection from the surrounding environment. They return the favour by helping to pollinate plants, forming an essential link for plant reproduction.

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..... Mungo's environment today



It can be a fun exercise to wander around the sand dunes early in the morning to see what animal tracks you can find, and work out what they've been up to. Kangaroos, emus, dunnarts, introduced rabbits, foxes and goats, and a whole variety of birds and invertebrates all leave their tracks in the sand, many during the night.

Recent changes

.....

It is generally accepted that Aboriginal people have influenced the Australian environment for the last 50,000 years or more, but there is great debate about the extent of that influence.

The main tools available to hunter-gatherers for changing things at a large scale were fire and hunting. Repeated burning can change the pattern of vegetation, and therefore even local climate to some degree. Hunting can reduce animal populations and possibly hasten extinctions.

Vegetation has changed and animals have become extinct in Australia over the time people have lived here, but this period also corresponds with big shifts in climate and some landscape changes - such as mountain glaciers, sea level changes and moving dunes.

Currently, there is no scientific agreement as to whether megafauna extinctions and the reduction of moist vegetation in Australia were driven mainly by climate, or mainly by Aboriginal practices.

The Thylacine (*Thylacinus cynocephalus*) and Tasmanian Devil (*Sarcophilus harrisii*) became extinct in the Willandra area and mainland Australia relatively recently. This may have been due to the arrival of the Dingo (*Canis lupus dingo*) about 4,000 years ago.

There is no doubt that with the arrival of European settlers in Australia in 1788, humans became a major ecological force that led to dramatic changes in just 200 years. The Mungo landscape does not look the same as it did in 1830.

The Willandra Lakes area was not cleared of its native vegetation like moister lands to the east, but heavy grazing, pests such as rabbits and goats, changed patterns of fire and timber-getting have all had their impacts. Increased water storage has encouraged higher kangaroo populations which have added to grazing pressure.

It is likely that some plants have gone extinct, while others have been much reduced. When Australia was 'riding on the sheep's back' it was actually riding partly on the back of Old Man Saltbush (*Atriplex mummularia*), a particularly nutritious, drought-resistant and widespread shrub much loved by sheep and cattle. Old Man Saltbush these days is uncommon in the Willandra area.

Many weeds have invaded as a result of overgrazing, and other key elements of the native vegetation are in decline. A lot of cypress pine (*Callitris* spp.) was cut down for timber in the early days of pastoralism, and seedlings now struggle to reach maturity because they are nibbled off by sheep (outside the national park), rabbits and goats. Belah (*Casuarina pauper*) and Rosewood (*Alectryon oleifolius* ssp. *anescens*) are similarly threatened in the long term.

Acacia shrublands usually found on the low-lying sandplain areas are also declining. These include communities of Mulga (*Acacia aneura*), Nelia (*Acacia loderi*) and Yarran (*Acacia melvillei*). 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 story is even sadder for fauna. While the larger macropods have benefited from increased water supplies, many other mammals have become extinct in the Willandra area, and across western NSW, since white settlement.

These include:

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*

Numbat *Myrmecobius fasciatus*

Most of these were burrowing mammals of small to medium size, and were highly vulnerable to competition from rabbits and predation by the European Fox and Feral Cat.



Birds of the area which have become threatened, mainly due to changes in Vegetation, include:

Australian Bustard *Ardeotis australis*

Chestnut Quail Thrush *Cinclosoma castanotum*

Gilbert's Whistler *Pachycephala inornata*

Pink Cockatoo *Lophochroa leadbeateri*

Malleefowl *Leipoa ocellata*

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..... **Pastoral Heritage pre 1900**



In 1788, Aboriginal societies had a complex land tenure system in which responsibilities for tracts of land rested in knowledge of the songs, myths, dances and ceremonies associated with particular places, and the ancestors who gave these places creative power in the Dreamtime.

Rights to land could be inherited from parents (primarily through the father, although one's mother's country was also of importance), through conception places, birthplaces, initiation places or naming places, or through personal or collective totemic associations.

Individual connections to land existed within a wider network of cultural and economic exchange.

Land played a central role in Aboriginal people's lifeworld: as religious text, economic resource, genealogical tree, and historical manuscript.

Land was actively used and managed by its Aboriginal owners, for whom its productivity was not assumed, but depended on its custodians looking after it in proper ways which were inscribed and performed in ceremonies.

In pre-colonial Australia, there were many techniques used to regularise and increase the numbers of game and plants. Information about appropriate harvesting times, or restrictions on hunting game to ensure its continued survival, were passed on in songs and oral tradition.

1820s

As the early explorers set about their work of charting the lands Europeans had commenced to occupy in the early 1800s, they were briefed to report back on the suitability of the lands they encountered for grazing and agriculture.

Their encounters with the land were always tempered by the concepts of *terra australis* and *terra nullius* – the blank lands to the south on which the desires and actions of these white explorers and their cartographers were inscribed. Indeed, the familiar ‘otherness’ with which medieval historians had populated their maps of the South Land was nothing compared to what the first explorers would see.

The description of these unknown lands was essential to the process of claiming ownership and distribution through grants or bills of sale. Maps identified natural vegetation and grazing country in the pursuit of tabulating the pastoral profitability of the landscape.

They inspired the opening of the landscape to further European invasion beyond the limits of location. However, the bureaucratic reality of the settlers’ property thirst was that the colonial government could not keep up with the demand for land, despite the imposed limits of location.

By the 1820s, much farming land remained unsurveyed. Settler expansion continued, with or without the consent of the colonial government, and encountered varying forms of Aboriginal resistance as it occurred.

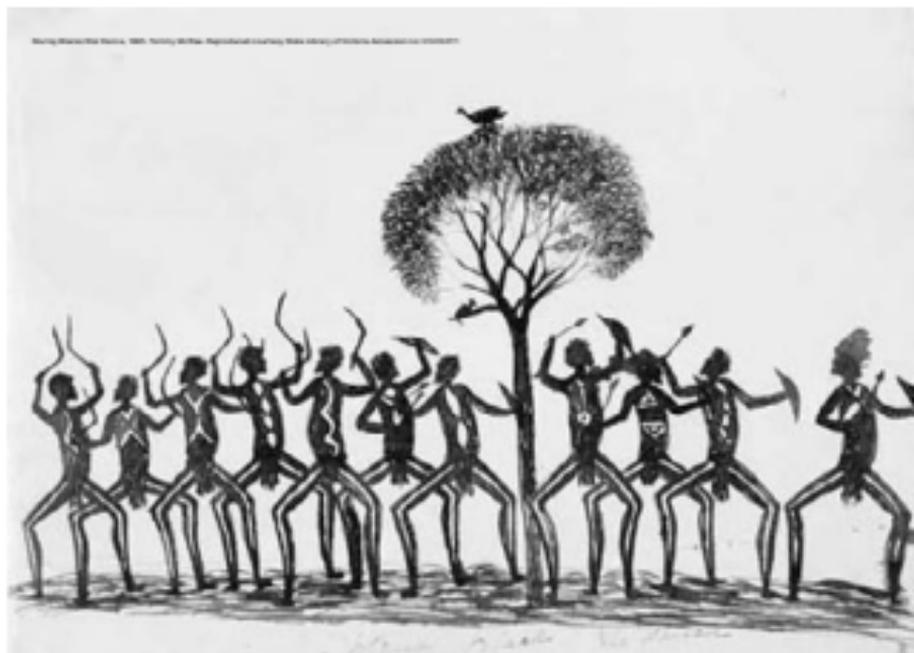
On 5 September 1826, a government order allowed Governor Darling to create the 'limits of location' within which settlers could take up land. A further order on 14 October 1829 increased the area that was to be settled to include the 'nineteen counties'.

From the earliest days of the colony there was some unauthorised occupation of Crown land both within and outside the limits of location and the nineteen counties.

Various acts and regulations were in operation from 1824 in an attempt to curb this type of land occupation, which was referred to as 'squatting'.

As a result of these legislative measures, authorised occupations such as grazing leases and depasturing licences were introduced to regularise settlement on Crown land.

The squatters' push for new lands to graze their sheep beyond the limits of location is a defining point in the development of Australia's pastoral industry.



Invasion

.....

As settlers ventured beyond the limits of location, Aboriginal people targeted their stock as new sources of food. The penalties for attacks on stock, or indeed settlers, were in many cases extreme. In 1824, Aboriginal resistance to pastoralism west of the mountains was met with a proclamation of martial law or 'summary justice'.

In 1829 when Sturt reached the Darling River it appears that the Aboriginal people of the area had already suffered significant disruption due to European disease. He records that 'a violent cutaneous disease raged through the tribe, sweeping them off in great numbers'.

Similarly Mitchell recorded in 1839 that 'the populations of the Darling seemed to have been much reduced by smallpox.

Generally explorers stuck close to the rivers and the descriptions of people occupying the immediate river floodplain tend to be more common than descriptions of people occupying the more arid areas. European settlement began along the Darling River from the late 1840s onwards and yet there are few accounts of Aboriginal people from this time. It is clear that Aboriginal people resisted European incursions into their land.

Mitchell recorded clashes with Aborigines on the Darling in 1835 and the Murray in 1836. Aboriginal inhabitants of the junction of the Darling and Murray Rivers had a series of battles with Europeans driving sheep and cattle to Adelaide between 1839 and 1841. These clashes ended after a bloody punitive expedition from Adelaide inflicted severe casualties.

Throughout parts of the Darling River valley the conflict got so intense by the 1850s that many stations were actually abandoned. However, increases in the price of meat and steep rises in the price of wool raised the incentive for Europeans to retake the Darling and by 1859 this had largely been achieved.

The accounts of the clashes and the moves by Europeans to take control of this country and the counter moves by Aboriginal people to retake it, provide some of the clearest accounts of settlement as invasion in New South Wales.

Dual Occupation

.....



The rapid expansion of pastoral runs and their consolidation in the mid 1800s placed serious pressures on Aboriginal landowners.

A continuing issue for British reformers at this time was the recognition of colonised people's property rights in land.

The British Colonial Office, in response to lobbying from humanitarian and reformist groups, was forced to recognise 'native title' and usage rights over pastoral lands in New South Wales in the 1840s.

In 1849, Earl Grey, the secretary of state for colonies – who was sympathetic to reformists' demands – instructed Governor Fitzroy to enforce an interpretation of the Lands Acts to guarantee Aboriginal people access to their traditional lands.

This was to be in the form of 'dual occupancy' with pastoralists: a situation where Aborigines and squatters had mutual rights'. Grey argued that Crown leases to pastoralists allowed only limited rights, and that much of the rights of possession remained 'reserved' to the Crown.

Further, Grey called for the establishment of small, agricultural reserves for Aboriginal people. In 1850, around 40 of these areas were approved as reserves across the new pastoral districts outside the nineteen counties.

The pastoral lobby, which had become powerful in NSW at that time, strongly opposed any constraint on the rights given to pastoral lessees.

Its opposition defeated the implementation of Earl Grey's instruction, although it did not invalidate his interpretation of the pastoral lease. The status of pastoral leases and Aboriginal rights would be a key issue that would return in the Mabo and Wik decisions in the 1990s.

The river blocks

.....

The first pastoral settlements along the Darling River followed quickly in the wake of the explorer Charles Sturt's 1844 expedition into the interior from Adelaide.



Squatters rapidly retraced his steps and when a survey of the river was undertaken in 1847, it found that most of the river frontage was already taken up.

Violent resistance from the local Aboriginal people however caused some landholders to abandon these early holdings and it was only with the arrival in 1853 of native police to the area to subdue the local tribes that settlement gained a real foothold.

In 1852, Tom Paine opened a hotel at Menindee and in 1855, the runs of the central Darling were officially surveyed and opened for tender.

This was a major step as it gave the early squatters a chance to tender for their runs and get security of tenure at the same time as allowing for an adjustment of the landholdings to ensure each run had adequate river frontage.

Explorer John McKinley took up several of these properties including one that later became known as Kinchega. Then in 1859, the pioneer of the river steamboat operations Captain Francis Cadell managed to travel up the Darling River as far as Mt Murchison Station (near Wilcannia). With news going out that the Darling River was navigable, settlers began to pour into the area.

The town of Wentworth – located at the junction of the Murray and Darling rivers – soon developed as the major transport hub of the region and as a depot for the supply of materials to the interior.

It was during this period that the Turlee and Gol Gol stations were established and it is likely that at this time Aboriginal people also formed part of the permanent or casual labour force on these stations.

Free selection

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A new system of land occupation was introduced in 1861 with the Robertson Land Acts, whereby all Crown land, including that held on pastoral lease, was open to free selection.

These Acts abolished the old land distinctions of the colony – settled districts (the nineteen counties plus specific established areas), and ‘intermediate’ and ‘unsettled’ districts.

They inaugurated a new system in response to the mass immigration of people of small means who had experienced difficulty establishing themselves under the old regulations.

While land in the settled districts had been sold by auction, vast areas of rich grazing lands were under the control of the squatters.

In an attempt to redress this imbalance, the new legislation implemented Robertson’s land scheme for ‘free selection before survey’, whereby the whole leasehold area of the colony was open to selection and sale at any time.

All of the Crown lands, including those on pastoral leases, were open to free selection before survey, and the tenure of pastoral leases was reduced. Robertson sought to open the land to freehold agricultural settlers in an attempt to break the land domination of squatters.



It was hoped that such legislation would introduce new smaller holdings and prevent speculation. Unfortunately the infant administrative system was incapable of preventing squatters and large landholders benefitting from a system designed for free selectors.

Runholders used various methods to safeguard their lands. 'Peacocking' or 'picking the eyes out of the land' involved buying up watered land, thus making outlying lands useless to free selectors. Without government support for small farmers, by way of capital and legislative restrictions on land profiteering, the 1861 legislation was limited in effect.

The back-blocks

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The obvious choice of land for the first settlers in the Western Division was that with access to good water supplies – mostly located along the rivers. This hence left the drier back-blocks open for the next wave of settlers that came in the wake of the Robertson Land Act initiatives.

Robertson had not wished to damage the pastoral interests of the squatters and so land that had been improved was therefore excluded from selection. Despite assurances, conflict between selectors and squatters was keen in the western districts of NSW, particularly along the river fronts, as both groups vied for the best land.

However, the nature of the backblocks meant that conflict was minimal if it occurred at all, one reason being that a lack of natural water sources meant that any watering places were the result of improvements.

A number of large back-block properties were established in what later became known as the Willandra Lakes region. One of the earliest back-block runs occupied by Europeans was Turlee, taken up by George Lee in 1850. Close-by to the north were the runs of North Turlee and North Turlee Block A, both part of William Nash's holdings from 1864.

Both Mungo and Zanci Stations were originally part of Nash's North Turlee properties. In 1869 John Ettershank assumed control of Nash's holdings during which time it was first suggested that the Woolshed at Mungo be constructed.

Apparently both Nash and Ettershank had utilised the Mungo area of the Turlee holdings as a headstation for the property. In 1874 Robert Patterson, a Victorian pastoralist, purchased the leases for the properties North Turlee and North Turlee A, marking the start of the Patterson family's association with the area.

In the following year Robert Patterson's nephew – Robert – bought the next door property of Gol Gol. When he then acquired the Turlee blocks from his uncle two years later in 1877, they became part of his expanded Gol Gol holdings.



Water

Water was fundamental to the survival of the stations in the western districts, particularly the back-block stations away from the rivers.

A number of water soakages occur along the edges of Mungo lunette. These were likely to have been exploited by Aboriginal people and were the first supplies used by pastoralists.

With the selection of land for a station, the first and most important improvement was the sinking of wells and tanks to ensure a more reliable water supply.

Not every shaft sunk resulted in water being found however and between March 1875 and September 1881, eighty-three trial shafts had been sunk on Gol Gol at a total cost of £1,260.39

Once water bearing shafts were established it was imperative to ensure that they remained in good repair, particularly in times of drought.

Water tanks then represented the most important improvement on the properties, for without water neither stock nor settler could survive long.

The importance of the tanks to the properties is clearly illustrated in the lists of improvements to property given in 1885 in application for new leases.

On Mungo, then still part of Patterson's Gol Gol Station, the cost of tanks, wells, drains and associated water-related improvements totalled some £3425, by far the largest combined expense for the property.

Water tanks and good land management were imperative to the survival of the property, a fact that was illustrated during the late 1880s and early 1890s when the combined problems of drought and the arrival of rabbits affected the western districts.

The provision of water in tanks and wells had led some property owners to seriously overestimate the grazing capacity of their land up to the 1880s.

Flocks of over 50,000 sheep were not uncommon on some runs in back country. However, farms with large numbers of grazing animals were most vulnerable to the combined effects of rabbits and drought.

Harvesting the clip

The woolshed at what was to become Mungo was erected on the station sometime between 1869 and 1880. The most probable date range for the construction of the Woolshed is between 1877, when Patterson purchased the property and 1880, with the most likely date being 1878 when the property's boundary fences were constructed.



The shed was originally built with provision for thirty blade shearers and associated internal holding pens. Underfloor holding pens were built to keep sheep dry prior to shearing. Rooms for sorting and later for pressing wool were also built.

Patterson purchased a wool press for the property in July 1881 at a cost of £131, from David Munro & Co in Melbourne. The press had the ability to be run either by hand or steam power, with belts and drives designed for the purpose.

Originally built to accommodate hand shearers, the woolshed was later converted to mechanical shearing by Patterson after 1888.

Even prior to the introduction of mechanical shears, the shed had a high output, with 29,182 sheep being shorn in 1886. Associated with the woolshed were shearers quarters and managers cottage, both built close to the shed. A scour tank was also installed in the vicinity of the woolshed to clean the wool prior to transport.

Scoured wool was often preferred by buyers and was also lighter thereby reducing transport cost. For a station such as Gol Gol and later Mungo, any reduction in the transport of its product was a major factor. In the early years of ownership Patterson had wool sent to Melbourne for scouring.

In later years it appears that not only did Patterson scour wool on site but that wool was scoured for neighbouring properties. Much of this woolscouring work was undertaken by Chinese contract workers who provided an essential source for both this operation and the sinking of wells in the back-block properties.



Pastoral lease reform

The Crown Lands Act 1884 gave greater fixity to pastoral lessees. To provide the land, each squatter's run was to be divided into two portions: one half retained by the lessee, and other area 'resumed' and opened for selection by a class of small farmers.

The areas retained by the squatters were held under pastoral lease, but they were entitled to occupy the resumed areas for grazing purposes under licence until they were selected. The Crown Lands Act meant that pastoral holdings were now divided into two parts: a leasehold portion and a resumed portion.

Land held under freehold title was not included, and pastoralists were more secure on the leasehold portion of their runs, which usually included the main improvements such as the station homestead.

Pastoralists could use the resumed areas if they paid an annual licence fee.

Various problems continued to plague free selection and, where possible, they were answered with legislative changes. The Crown Lands Act 1895 was a response to the frequent litigation due to dummying and the disappointing levels of free selection.

To encourage selection, this Act provided new classifications of land tenure: homestead selection, settlement lease and improvement lease.

Unfortunately, drought in the first few years of the twentieth century hampered the 1884 and 1889 legislative plans to set up a newly amended class of small-scale free selectors.

Travelling stock routes

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The extensive nature of late nineteenth-century pastoralism in Australia created a need to move stock long distances overland to widely dispersed market centres.

Informal livestock trails and travelling stock-routes originally developed in NSW alongside the early road transport network, but by the 1860s regulations began to be put into effect to control some of the established and most-used stock-routes.

The Occupation Act of 1861 stipulated that stock were not to be permitted to stray more than half a mile onto unfenced land which bordered a recognised line of stock travel.

It also stipulated that stock needed to be driven at least four miles every day. In 1864, a permit system was established to control the route to be travelled by sheep crossing into NSW.

Legislation from this time also began to gazette camping reserves and specific public watering points along stock-routes. The establishment of the exact routes throughout the nineteenth century relied primarily on the need to supply sheep with water every six miles, and cattle with water every ten miles.

In 1902, with the passing of the Pastures Protection Act, 66 Pastures Protection Boards were established, charged with the responsibility of dealing with the control of livestock diseases and travelling stock.

By this time, the network of stock-routes across NSW had become extensive. The Pasture Protection Boards took on responsibility for building watering facilities and the gazettal of fenced camping reserves for public use along stock-routes.

Today there are still almost 2000 constructed watering facilities, including bores, dams and windmills, along with other facilities such as yards and dips, associated with stock-routes in NSW.

During the later nineteenth and early twentieth centuries, such fenced camping reserves and travelling stock-routes provided a generally unrestricted form of land tenure which provided opportunities for Aboriginal people to camp and travel unhindered, even while closer settlement was providing a hindrance to such opportunities elsewhere.

Rabbits

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Rabbits had started to appear in the Mungo area by 1879. As with other properties across NSW these pests quickly became a major problem for landholders, competing directly with sheep for food and water in the fragile environment.

The problem was recognised by the government in 1883 with the passing of the Rabbit Nuisance Act which, among other things, offered money for professional hunters to kill them.

More common methods of control were extensive use of netted rabbit-proof fencing and poisoning campaigns. In the three years to 1889 Gol Gol Station received £2932.3.10 under the Rabbit Destruction Subsidy. The ground tanks were netted to keep out the rabbits and rabbits were trapped around the tanks.

In 1880 a whole bale of rabbit skins was sent to Melbourne. In 1905 that Gol Gol Station maintained three teams at work with phosphorising machines to control the problem.

The machines consisted of a cart pulled by horses that made a furrow, into which was laid a phosphorous-laced pollard bait.

The 1890s depression

International markets, as much as internal conditions of drought or environmental degradation, have always affected the NSW pastoral industry.

The first collapse of the international wool markets in the 1840s hit the industry hard, but it recovered for a boom peaking in the 1870s when wool prices were at their highest.

By 1881 there were 8 million sheep in western NSW, nearly doubling in the next decade to 15 million. However, by the 1890s the industry was reeling from the fall in international wool prices and an eight-year drought that commenced in 1895. Other problems that were particularly experienced in the Western Division were rabbit plagues and overstocking. In these years, many runs were abandoned as banks foreclosed and selectors were forced off the land.

Their runs were often taken up by larger company holdings. The Western Lands Act 1901 established a policy of retaining land in the most fragile areas, like the Western Division, as Crown land.

Aboriginal people and the 1890s depression

The drought and economic depression that wreaked havoc for European pastoralists and selectors was also a disaster for Aboriginal people turning their homeland into a veritable wasteland.

This is a potent reminder of the ways European practices and economies inescapably intersected with Aboriginal people's fate.

Drought and depression of the 1890s and again in the 1930s would see forced removals from ancestral country that had previously been resisted.

A disaster for all groups, the river peoples and the dryland peoples fared differently as the economic fortunes of pastoralists in those places fluctuated. Aboriginal people across the Western Division found a diversity of work on pastoral properties through the nineteenth century as open warfare had subsided.

At this stage many were able to remain on their own country as they negotiated the trauma and dislocation of invasion.

For example, as Europeans pushed up the Darling, Anabranch and other rivers, Aboriginal people had taken on shepherding jobs.

As rabbits moved up the rivers and into the backcountry by the end of the nineteenth century the massive efforts to eradicate them included Aboriginal workers. This was often undertaken by women who set to with their digging sticks, babies in hessian bags slung to their sides often taking a pull at the breast as mother worked.

However it didn't provide secure employment in those desperate economic times as the NSW Aboriginal Protection Board Report for 1895 noted:

“The year has been an unfavourable one for Aborigines in the interior, the drought having rendered their means of subsistence more than usually precarious.

“Native game has now become scarce in a great many districts – in some extinct; and by the discontinuance of rabbiting on nearly all sheep-stations the Aborigines have lost one of their main sources of employment. The demands upon the Board have in consequence been more than numerous.”

As pastoralists either abandoned holdings or shrank their workforces, not only individual Aboriginal workers but also their families were forced off stations. As a result of the depression, the Aboriginal people of southwest NSW who had previously been generally free of missions now found themselves forced to seek assistance from the Aboriginal Protection Board.

For example Ngyiampaa and Wiradjuri people in the broad Willandra region moved to two nearby reserves, one at Hillston gazetted in 1904 and one at Mossgiel gazetted in 1907.

Some of these people later congregated on Carowra Tank Station east of Ivanhoe near Trida above Willandra – an unsupervised APB reserve being notified there in 1907, changing to a supervised station in 1927.

Ngyiampaa people around the Mossgiel to Ivanhoe area however retained a very stable population from 1889 to 1915. Remaining on their own country they maintained languages and pre-contact cultural traditions longer than neighbouring groups, through to the 1930s.

They worked on the surrounding pastoral properties as stationhands, shearers, stock workers and domestic help. Aboriginal stock workers and domestic staff were known to have worked on Willandra Station through the 1930s. However as drought persisted through the 1920s the arid back country around Ivanhoe suffered more severely.

By 1933 the water supply dried up at Carowra Tank and the newly empowered APB decided to 'concentrate' the approximately 100 residents, as well as people from Wilcannia and down the river at Pooncarie, onto the Menindee Reserve on the Darling.

The Wangaaypuwan (Ngyiampaa) and Wiradjuri from Carowra Tank were forced entirely away from their country and were on alien land amongst strangers. The social and cultural groups who were forced into cohabitation at Menindee were entirely different – not least dryland people being forced into river country. At least Paakantji people of the Darling River towns were on their own country. Tuberculosis was prevalent at Menindee and was highest amongst the Ngyiampaa.

Paakantji people were eventually able to escape the reserve as employment opportunities increased along the Darling; less the case for the drier country of the Ngyiampaa to the east. They were trapped at Menindee to a greater extent than the Paakantji.

The dry plains had however been less attractive to selectors than the river country and many of the stations had remained large enough to retain workforces for longer. In this the Mutti Mutti and others who lived on traditional country or had moved to Balranald for work on the southern edge of the backcountry were able to maintain employment on pastoral properties, moving all through that country.



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The arrival of the Stirat family at "Zanci" 1904.

1901 and the Western Lands Act

The years leading up to Federation in 1901 took a dramatic toll on the landscapes of western NSW. First there was devastating drought of the 1890s and the damaging arrival of rabbits.

At the same time falling wool prices throughout the 1880s had been offset by greater numbers of sheep on pastures, where 1892 was 'the peak of westward advance'. On top of that the 1890s brought economic depression.

Across large sections of the Western Division, the saltbush, which had been destroyed through overstocking and drought, never recovered. In addition the cloven hooves of introduced animals and the invasion of countless hordes of rabbits ate out the native vegetation and ground the fragile soils to dust.

By the end of the 1890s there were fewer Europeans living in the Western Division than the 1860s. Pastoralists had borrowed heavily from the banks throughout the late 1800s and the depression and drought bankrupted many of them.

Many of the huge outback properties that ended up in the hands of companies or offshore banks. The cultural landscape shifted away from owner-occupiers on the huge estates to a constant flow of managers.

Concurrently, and in contradictory fashion, the push for closer settlement under the 1884 Crown Lands Act accelerated the process of breaking up the huge holdings into smaller owner-occupied selections. It dislocated the already vulnerable economies of many stations on land that was unable to support it.

In response to this crisis in the state's pastoral industry, the Western Lands Act was passed in 1901. In addition to setting up a Western Lands Board to administer all the lands in the Western Division, it brought in a lease system that gave security of tenure for 40 years.

This provided the landholders with a firm asset against which they could raise additional finance and invest in their properties. In return, it gave the Lands Board significant power to supervise and restrict as necessary the pastoralists land use practices in order to better protect the grazing lands of the Western District.

Soldier settlement

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The subdivision of properties that began before the First World War accelerated with the introduction of the Soldier Settlement Scheme. This involved the purchase by the Federal Government of large parcels of Australian farming lands in order to divide them up and make these holdings available to returned soldiers.



The Soldier Settlement Scheme was devised to transplant returned soldiers from the cities, where they might prove a liability, to rural areas where it was hoped they would become self-sufficient.

State governments assisted the scheme with loans of up to £500 for buildings, clearing, fencing and stock.



Land was made available through subdivided Crown lands, unsettled or leasehold holdings, farming allotments carved from state government purchased estates, and individual farms bought by the State Land Settlement Authority.

When a similar scheme was proposed to reward Second World War soldiers, a review of the previous scheme was held.

It discovered a number of flaws, including the redundancy of the farming skills test due to the overwhelming numbers of returned soldiers, popular opinion and the press, post-war price increases for stock and equipment, and the inexperience of returned soldiers. Problems had also been caused by the declining prices of agricultural commodities from the period 1924 to 1930, and the financial stress on state governments had not been adequately anticipated by either each state authority or the Federal Government, which had accepted the transfer of responsibility.

Schemes for closer settlement after the First World War generally 'failed miserably'. Blocks were generally too small, liabilities too great, and a desire to recognise a debt of gratitude for war service resulted in many inexperienced men being allocated blocks.

The Second World War Soldier Settlement Scheme stated that settlement should be undertaken only where economic prospects were reasonably sound, and holdings were of sufficient size to enable settlers to operate efficiently and earn a reasonable income. The Soldier Settlement Commission sought large holdings for subdivision and properties 'occupied' by absentee owners. One of the immediate consequences was the break-up of many of 'the large fine-wool clips' of the Western district. Poor land and a lack of capital again ensured many failures.

Mungo and Zanci

In 1921 Gol Gol Station was broken up under the soldier settlement scheme that followed the First World War.

This process created several new stations including, Mungo and Zanci along with the neighbouring Joulni and Leaghur Stations.

In 1921 the 16,000ha (39,520 acres) run, known as Mungo, was taken up by the brothers Ewen and Angus Cameron under the terms of Section 26 of the Western Lands Act of 1901, and thereafter was managed as an independent station with owner-occupiers.

Unlike some other soldier settlers, the Cameron brothers were fortunate in that their block was already improved, with the Mungo homestead, woolshed and associated buildings and tanks already in place.

The Camerons also had the advantage of having experience on the land before they took up Mungo, with Angus having been an overseer at Paika Station near Baranald.

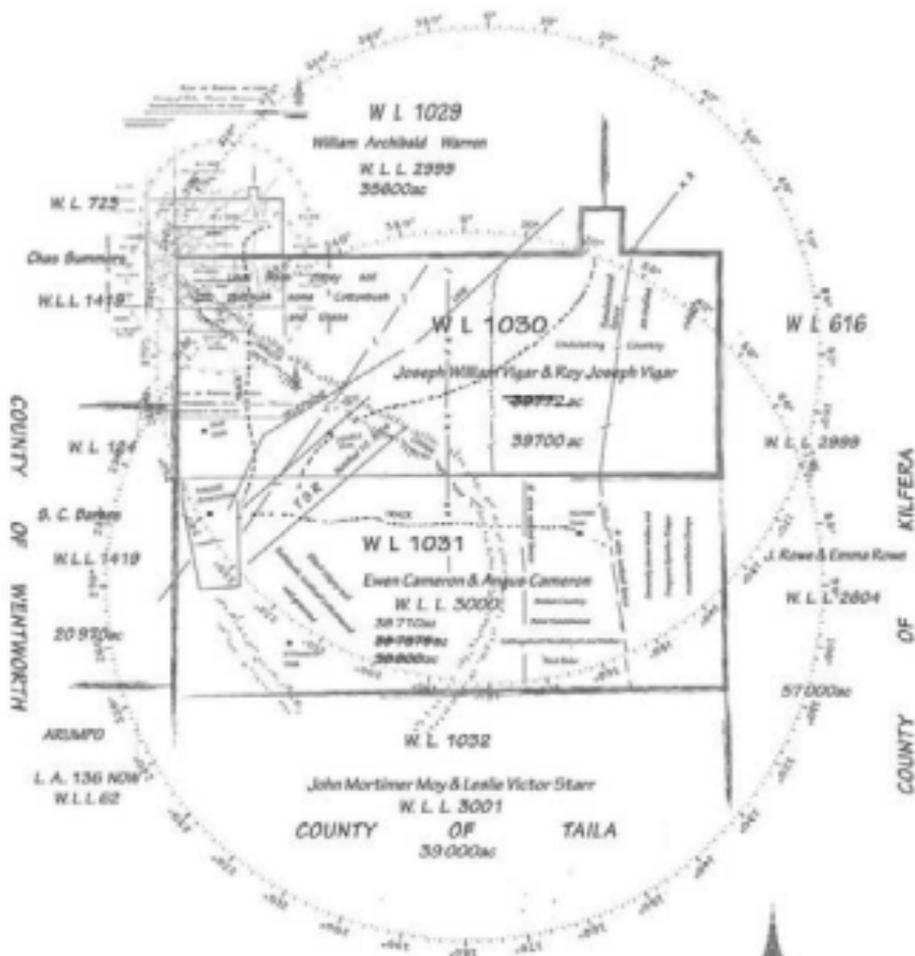
Although the early years of their occupation were prosperous, with good years from 1922 to 1924, the brothers were hit hard by droughts through 1926–1928 and the property never fully recovered.

PLAN OF PORTION WL 1030

County of ~~Wentworth~~ *Taila*, Western Division
 Resumed & Leasehold Areas N° 148 "Gol Gol"

Applied for under the 20th Section of the Western Lands Act of 1901 by ~~Joseph William Vigar & Roy Joseph Vigar~~

J. K. Exte Modified 10.3.04
 Gazette dated 30.6.22



PLAN OF PORTION WL 1031

Counties of ~~Wentworth & Taila~~ *Wentworth & Taila*, Western Division
 Resumed & Leasehold Areas N° 148 "Gol Gol"

Applied for under the 20th Section of the Western Lands Act of 1901 by Ewen Cameron & Angus Cameron



In 1934 the property was sold to Albert Barnes, who like the Camerons had considerable experience in the area, having been brought up at the Lethro property on the Darling River to the west. Barnes later recalled that when he took control of the station it was in a bad condition, and he spent much of the first twelve months sinking tanks and mending fences.

During the same year, 1934, Albert married Venda Stirrat who was a niece of Roy Vigar of neighbouring Zanci Station.

This union served to make Mungo a centre for community activity in the area and to bring the two stations closer together in a co-operative way.

Indeed, in following years, Roy Vigar's second niece Jean married Alec Barnes of Joulni Station nearby.

Zanci

As with Mungo Station, Zanci had originally been part of North Turlee Run managed by William Nash until subsumed by the Pattersons at Gol Gol in 1877.

In 1921, like Mungo, Zanci was separated from Gol Gol under Section 26 of the Western Lands Act 1901, for a soldier settlement property run by Joseph William Vigar and his son Roy Joseph Vigar.

In 1922 Joseph Vigar was killed in a horse and buggy accident and Roy ran the property with the help of his intellectually disabled brother Harold.

While their pre-1921 background is similar, the fundamental difference between the new Mungo and Zanci Stations was that while Mungo had been substantially improved, with a house and woolshed plus associated buildings, Zanci had only fencing and a few water tanks with no substantial dwelling or other buildings.

This fact put the Vigers at a considerable disadvantage, for before the property could become profitable the necessary infrastructure needed to be built.

Of primary importance was a house. This pressing need became doubly important with the arrival at Zanci of Roy Vigar's sister and her family – the Stirrats – in 1924.

While the first house was being built, the families lived in tents on the property close by the house site. It was completed by 1925 but was only ever meant to be a temporary dwelling until a more substantial homestead could be completed. It was built of galvanised iron and pressed kerosene tins, had only two rooms with a detached kitchen of drop-log construction.

By the early 1930s the second, permanent homestead had been constructed.

Clad in galvanised iron, the single-storey dwelling had a timber frame built with locally obtained timbers. The homestead was part of a complex of buildings including a cool room, drop-log sheds, yards and an underground dugout, built in response to the oppressive heat in the area.

Above: Two family names are associated with the early days of Zanci. Roy Vigar (right) owned the property, and he was joined in its operation by the arrival of his sisters' family, the Stinrats in 1924.



Life at Zanci

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“In 1922 Roy Vigar would leave Zanci in his unregistered T-model Ford 1 ton truck, just on dusk and get into Mildura at dawn.

“He would drive to a mates place and park the truck in the backyard, then go to the grocers and have his order home delivered, then leave Mildura at dusk and be home the next morning. He did this about twice a year and never got caught...

“In 1924 Bill and Ida Stirrat sailed aboard the paddleboat Rubie from Renmark to Wentworth, then by horse and buggy with a sleepover under the stars to the outback Zanci Station. The oldest daughter Venda was 9 years old, with younger siblings Jean Roger, Don and Nona.

“This major move was due to Bill having tuberculosis and being told to shift to a drier climate. So they chose to go and live with Ida’s brother in the very dry NSW outback.

“On arrival at the property they had to erect tents to sleep in as there was only a kitchen made out of kerosene tins and corrugated iron with an old wood stove to cook on.

“The tents had bag floors that were swept with a straw broom once a day. The kitchen had a wooden floor, which was scrubbed on hands and knees once a day.

“Meat was killed on the property and all raw ingredients were bought from Wentworth, then Mildura twice a year in large bags and stored in a loft in the woolshed. Vegetables were grown only in the good years when there was plenty of water.

They milked cows and had scolded or separated cream which was made into butter and sold. Venda recalls having to take butter to Garnpang Station 24 km away on horseback. This little trip would take her and one of her siblings all day.

“Ida was a real lady and the table had to be set with a tablecloth and napkins even when it was blowing a dust storm or 140°F in the shade. This practice would have made for a lot of washing.” – Colleen Barnes



Two brides, two brothers

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The 1920s drought was a time of great hardship for many farmers across the Western Division.

This resulted in them being particularly vulnerable to the financial hardships of the Great Depression in the 1930s and many farmers were forced off the land. Amidst these troubled time however, there were opportunities to be had for those who could still access some capital and acquire land in a buyers market.

Albert Barnes was one such fortunate soul. Hence when he married Venda Stirrat in the early 1930s the newly-wed couple were able to move into Mungo Station – right next door to Zanci where Venda's father and mother lived. Later when Albert's brother Alec married another of the Stirrat family daughters Jean, they were able to purchase another adjacent property – Jounie.

This influx of Barnes' then continued into the early 1940s, when a third brother – Clarrie and his wife Gladys – then bought Leaghur Station. This ensured an extended family clan was well established around the Mungo hub. These were difficult days for the young families making their way on the land as there was no ground water on any of the stations and access to Mildura was slow and unpredictable.

The families did however have an advantage in that because of their close links, they were able to share resources in such a way as to overcome some of the economic disadvantages that had resulted from the splitting up of the large properties into small, marginal units under the soldier settlement scheme.

Mungo

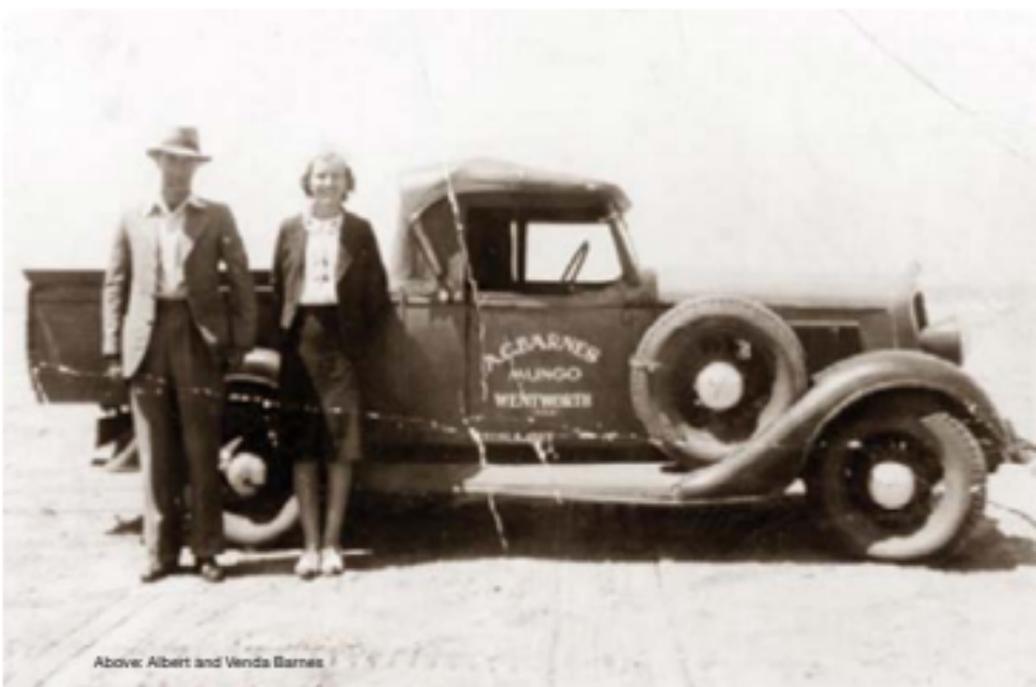
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Unlike some other soldier settlers, the Cameron brothers were fortunate in that their block was already improved, with the homestead, woolshed and associated buildings and tanks already in place.

The Camerons also had the advantage of having experience on the land before they took up Mungo, with Angus having been an overseer at Paika Station near Balranald. Although the early years of their occupation were prosperous, with good years from 1922 to 1924, the brothers were hit hard by droughts through 1926 –1928 and the property never fully recovered.

In 1934 the property was sold to Albert Barnes, who like the Camerons had considerable experience in the area, having been brought up at Lethro on the Darling River to the west.

Barnes later recalled that when he took control of the station it was in a bad condition, and he spent much of the first twelve months sinking tanks and mending fences.



Above: Albert and Venda Barnes

During the same year, 1934, Albert married Venda Stirrat who was a niece of Roy Vigar of neighbouring Zanci Station.

This union served to make Mungo a centre for community activity in the area and to bring the two stations closer together.

Albert Barnes undertook a number of changes to the station to keep abreast of changes in farm techniques and the changing physical nature of the region.

Shearing

“When the Vigars arrived in 1922, they only had a little old shearing shed to work in. There was a Super diesel motor that ran the overhead gear for the two narrow comb handpieces.

“In 1947 they built the new woolshed where it stands today using part of the original Mungo Woolshed Wool Room. They used the Mungo oregon beams for the support of the overhead gear. They then bought a diesel powered Ronaldson and Tippett.



Yarding sheep at Zanci after WWII

“Shearing time was by far the busiest time for the grazier.

“Weeks of preparation beforehand, moving sheep closer to the shed, cleaning out the shed and shearers huts and making sure all the mechanical gear worked.

“The wool clip was their main source of income and had to be done perfectly. As the sheep were shorn, they were put through the dip. After shearing was completed, they spent weeks cleaning up, droving the sheep back to their paddocks and organising the wool for transportation to market.

“Very long days for the owner and his workers – on the move before the shearers were out of bed and still out there after they were back in bed.

“The Mungo shed worked the same, but it had always been a huge shed. They could ‘shed’ more sheep overnight and have more in the yards.” – Colleen Barnes

The social network

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“There was a fair bit of socialising in the ‘olden’ days. When the kids at Zanci were young they used to play tennis on the white clay pans near the house.

“When Venda and Albert moved into Mungo they erected a proper tennis court and this court was played on every Sunday with people coming from all over the district.

“Then when Jean and Alex brought Joulni, they had a tennis court too so they alternated Sundays. The ladies would bring a plate for lunch and everyone would enjoy a picnic lunch.



“Cricket was also played on Sundays, but only in the season. There were actually cricket clubs. These were Garnpang with whom the Zanci mob played, Marma, Prungle and Joulni.



“They enjoyed the Lethero (a property on the Darling River owned by Albert’s parents). There was a picnic there every New Years Day, where they’d run all sorts of foot races and the men had a shooting competition. At night music and a dance in the hall entertained them.

“For one day in 1937 and 1938, they held the Mungo Horse Races. It was actually run on a flat at Joulni. This was a grand occasion with everyone dressing up and having a little flutter on the horses. After the races it was back to the Mungo Woolshed for a dance.

“The reasons for dances at the Mungo Woolshed ranged from 21st birthdays to anniversaries to a charity fundraiser for Marilyn Scadding as County Queen. The centenary of the Mungo Woolshed was held in 1972 and people came from everywhere. They dressed in period costume and a prize was given for the best-dressed couple.” – Colleen Barnes

Soldier settlement and Aboriginal people



The Soldier Settlement Scheme, along with broader economic conditions, changed the social landscape of pastoralism for both Aboriginal people and settlers during the 1930s.

Intensive grazing, interference with water supplies, the shooting of native game and the post-war subdivision of properties, coupled with the 1930s economic depression, the intrusion of the Aborigines Protection (and later Welfare) Board and

the dispersal of Aboriginal communities by these government agencies altered the social landscape. Family-sized blocks needed few if any permanent workers and had neither the means, nor need, to support an Aboriginal camp – as the larger pastoral properties had done in earlier periods. This was a time of increasing government control over Aboriginal people in rural areas.

By the 1930s, in most parts of New South Wales nearly all Aboriginal pastoral workers were either fringe dwellers or 'clients' of the Aborigines Protection Board. The labour roles of Aboriginal women had largely been superseded, and pastoral work for men tended to be limited to contract shearing and stockwork.

By 1930 there was a major increase in the populations of supervised reserves, when large numbers of Aboriginal people found themselves out of work after it was made obligatory to pay Aboriginal workers the same wages as white workers.

The Aborigines Protection Board (1909–1939) and later Aborigines' Welfare Board (1940–1969) forcibly removed Aboriginal people from 'fringe camps' to reserves and managed stations throughout this time. By 1935, many Aboriginal people had been forced off smaller unsupervised reserves, many of them self-established farms, and the population of the small number of supervised reserves doubled.

The 1936 amendments to the Aborigines' Protection Act dictated that Aboriginal people would be confined on reserves until they had been educated so that they could be assimilated into white society.

This was the first of three major contributing factors during the middle part of the twentieth century which challenged and severely undermined the relative stability of relationships between Aboriginal people and pastoralists that had been established during the period 1855–1930.

The post-war wool boom

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The importance of wool to the allied war effort in World War Two was such that Britain bought Australia's entire wool clip for the duration and shearers were prohibited from volunteering for war service. By 1941 Australia was home to around 125 million sheep. This equates to approximately 16 sheep for every square kilometre of the continent.

The war was a significant event in the development of the Australian wool industry as it came at a time when synthetic fabrics were just emerging to challenge the dominance of natural fibres. This had resulted in a tax being levied on all wool sales in 1934 in order to establish the Australian Wool Board to promote (but not market) wool.

Wool loading at Zanci Woolshed in 1955



This marketing received a boost in the wake of the war as fashion houses like Christian Dior launched new looks using bountiful amounts of natural fabrics as a reaction to the austerity of the war years.

This demand for wool coincided with an easing of a decade of drought in 1947 to usher in a boom period for wool.

This was aided soon after by renewed demand with the outbreak of war on the Korean peninsula.

By 1951 the entire British stockpile of 10 million bales had been sold and wool revenues were helping rebuild Australia's financial position in the wake of World War Two.

As the decade progressed new markets opened also and by 1962 Japan bought twice as much Australian wool as Britain did.

With demand like this, investment in sheep farming continued to surge and by 1970 Australia was home to a record 180 million sheep.

At this time the Australian Wool Corporation was intervening strongly in the wool market by purchasing all wool not reaching the minimum price at auction in order to later sell it at times of higher prices.

Then in 1974 a reserve price was introduced to guarantee growers a minimum price for their wool.

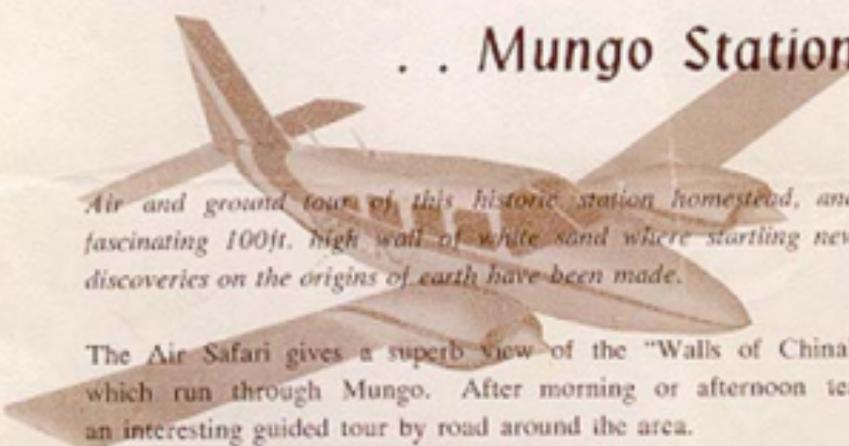
This system survived through the end of the Cold War in the late 1980s when the collapse of Soviet markets meant that the reserve price scheme was suspended, leaving Australia with a problematic stockpile of nearly 5 million bales of wool.

HOLIDAYMAKERS

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The Walls of China

From the late 1960s and throughout the 1970s two new activities came to the pastoral stations around Lake Mungo; scientific research and tourism.

A brief survey of books on the scenic wonders of NSW from the 1960s and earlier suggests that Lake Mungo and the Walls of China were not particularly well known before that time, at least outside the immediate area.

The name 'Walls of China' had however been used to describe the area since at least 1896. This feature was described at that time in evidence for a lease appraisal given by John Patterson in May of that year.

Australian artist Russell Drysdale, who was a keen outback traveller, painted Walls of China on a visit there in 1945.

This powerful image and others recording visits by photographic groups shows that the Walls were valued for their scenic values before the archaeological discoveries of the 1970s.

Baroona Tours was taking visitors onto the Walls in minibuses in the late 1960s and Junction Tours started taking tours in the early 1970s.



Venda Barnes operated a shop catering for tourists to the Walls of China. The shop was located in a number of different rooms within Mungo Homestead and this required Venda to obtain a licence to operate the shop.

From 1968 scientific researchers, including those from the Australian National University, began investigations around Lake Mungo the results of which led ultimately to the creation of Mungo National Park and listing of the Willandra Lakes Region as a World Heritage Area.

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..... Pastoral Heritage after 1967



Above: Albert and Venda Barnes standing outside the Mungo Woolshed prior to the sale of the Mungo property to the NPWS in 1978.

Aboriginal rights and the 1967 referendum

In 1967, a federal referendum was held that stands today as a watershed in the recognition of Aboriginal rights in Australia.

By 1967, Aboriginal people had obtained both full citizenship and voting rights. The constitution however expressly prohibited the Federal Government from making special laws in relation to Aboriginal people or to count them in the national census.

Redressing this special separation of Aboriginal people from the rest of the Australian population was correctly seen as a pressing imperative in order to address indigenous rights.

Accordingly when nine out of ten voters endorsed the change it was seen as a clear community mandate for the Federal Government to implement policies to benefit Aboriginal people. The referendum result immediately took on a crucial symbolic meaning during a period of increasing Aboriginal self-confidence.

It was however some five years before any real change occurred as a result of the referendum. Federal legislation has since been enacted covering land rights, discriminatory practices,

financial assistance and preservation of cultural heritage.

The other aspect of the constitutional change, enabling of Aborigines to be counted in population statistics, has led to clearer comparisons of the desperate state of Aboriginal health.

Wattie Creek and equal wages

.....

Although it occurred some 2000 kilometres to the north of NSW, the 1966 Gurindji strike at Wave Hill pastoral station in the Northern Territory was to have enormous repercussions for Aboriginal pastoral labourers across Australia.

Echoing developments in New South Wales of three to four decades earlier, in late 1965 Aboriginal pastoral workers in the Northern Territory were granted wages equal to their fellow non-indigenous pastoral workers under the federal industrial award.

However, on being informed that they would have to wait three years for this to take effect (giving the pastoral companies time to adjust to these new costs) by September 1966 the whole Aboriginal staff of Wave Hill station decided to strike.

Removing themselves to a camp at Wattie Creek, they announced to the pastoral company Vestey's that they wanted their land returned.

Aboriginal people in New South Wales saw these demands as akin to their own calls to have their aspirations in land realised, and with new-found support from the 'new Left' in the wake of the 1967 referendum, Aboriginal farmers and pastoralists in New South Wales strengthened their demands for land justice.

Their situation was not as bad as in northern Australia, where, due to a reluctance or inability to pay equal wages, thousands of Aboriginal pastoral workers and their families were forcibly removed from pastoral stations where many of them had lived since birth. Nevertheless, the Gurindji case contributed to a period during the 1960s in which Aboriginal people found their place in the New South Wales pastoral workforce contested.

1967 – enter the NPWS

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National parks were not a new idea for NSW by the time the National Parks and Wildlife Service was created in 1967.

Nature conservation reserves had by this time been established under various titles (including national park) across most areas of the state.

Generally however, these reserves had been established over areas of vacant Crown land and as there was next to none of this in the state's Western Division no conservation reserves had been created here.

An opportunity to break this nexus came to the attention of the then Fauna Protection Panel around 1964 when they learnt that several leases covering large areas of land were coming up for renewal in the Western Division. They hence commenced investigating the nature conservation value of these areas.

Their timing in this was well nigh perfect as the start of this work met with a supportive Lands Department Minister, Tom Lewis, following the election of the Askin Government in April 1965.

Lewis vigorously embraced the concept of establishing national parks in the west of the State and under his impetus, the government was able to announce its plans for the establishment of Kinchega National Park on land around Menindee to the east of Broken Hill at the same time as the inaugural National Parks and Wildlife Bill was introduced into parliament on 6 December 1966.

The park was later gazetted when the revised legislation was eventually proclaimed on 1 October in the following year.

One interesting aspect of this decision to establish parks in the State's Western Division was the fact that Lewis was familiar with several of the graziers holding large pastoral leases in the area — leases which needed to be allowed to lapse in order to establish parks such as Kinchega.

He had in fact attended school in Adelaide with Gwynne Hughes whose family had farmed on the land around the Menindee Common for several generations. His decision to proceed with the establishment of national parks in the west of the State, thus cut rather close to home for Lewis and it is a measure of his determination to establish national parks in this region, that he pushed ahead with their gazettal.

1969 and the protection of Aboriginal heritage

.....

While the NPWS gained some immediate connection with Aboriginal heritage protection when the Mootwingee Historic Site was created in 1967, it was a further two years before it became responsible for the protection of all the State's Aboriginal relics such as middens, stone implements, rock engravings, carved trees and bora rings.

In 1969, amendments to the NPW Act provided penalties for the destruction or damage of Aboriginal artefacts, irrespective of whether they occurred on private or NPWS land. It also set up the Australian Museum as the legal custodian of all subsequently discovered, movable Aboriginal relics — hence prohibiting their sale or removal from the State.

In addition, the legislation formalised the role of the Aboriginal Relics Advisory Committee by establishing it on a statutory basis. This committee's role was to advise the NPWS and the Minister on any matters relating to Aboriginal relic and site preservation. Included on this committee was the NPWS' newly appointed resident archaeologist, Sharon Sullivan, though significantly there were no Aboriginal representatives.

This very much represented the prevailing state of play whereby Aboriginal relic protection proceeded on a custodial, rather than on a cooperative basis.

It should, however, be remembered that at this time the ink had only recently dried on the constitutional changes passed by referendum in 1967 enabling Aboriginal people to be included in census counts of the Australian population. The notion of actively involving Aboriginal people in the management of their own cultural heritage was one which was still some years away and one which the work of the NPWS would help to foster.

Paying for the parks –the National Parks and Wildlife Foundation

The arrival of the new government department in the form of the NPWS was not one that brought joy to the hearts of many in the rural community in the early 1970s. The seriousness with which the government took the planned program to expand the State's national park network had already been signalled with the establishment of Kinchega National Park.

By preferring to establish this park rather than renew the property's lease, the government effectively upped the ante on the issue of establishing conservation reserves in the west of the State. Would these actions be repeated in other areas of NSW? Would the NPWS' new powers to actually resume land areas be extensively used in a bid to expand the State's park system?

No one knew, and in the absence of any clear indication from the organisation as to what its land acquisition policies would be, speculation and worst case scenarios flourished.

The NPWS was probably the only government department ever to come into being that was interested in actually acquiring large tracts of land to the exclusion of most of the existing uses such as grazing and logging.

To counter this the NPWS set about a policy of downplaying the government's power to resume private lands for the purposes of conservation and to focus instead on purchasing key properties with nature conservation values in the west of the state as these became available. This however was a problem as the new department's budget was very limited and its acquisition funds were miniscule. To counter this Tom Lewis created the National Parks and Wildlife Foundation in order to provide a means by which both companies and private individuals could contribute to nature conservation.

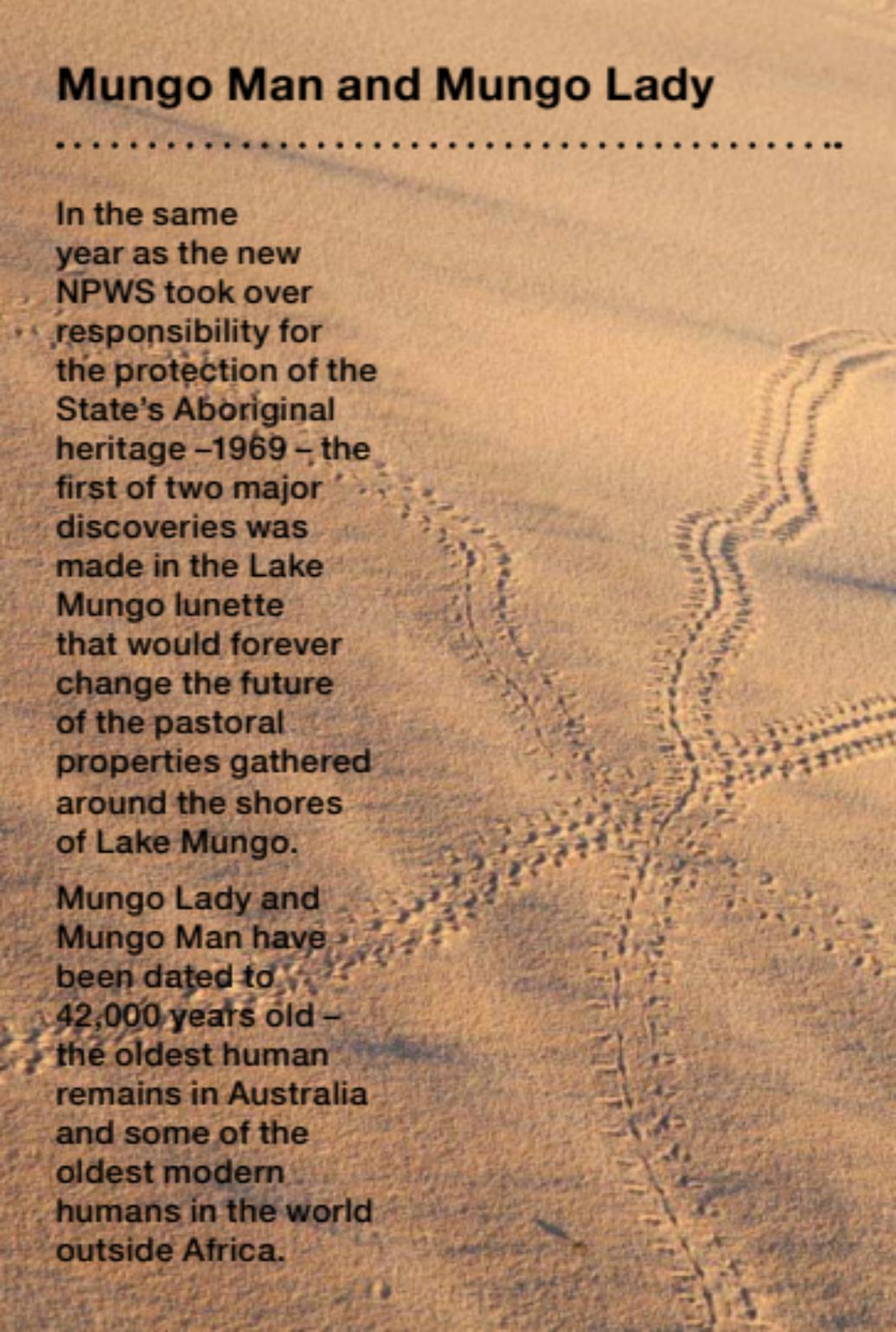
One of the Foundation's early endeavours was to hold an annual doorknock appeal to involve the general public in raising funds for the acquisition of land for national parks. The first such appeal held on 25 February 1973 raised over \$110 000. Using the slogan 'National parks don't grow on trees' the annual appeal also provided an important means of generating public interest and commitment towards the expansion of the state's network of national parks and reserves.

Some idea of the significance of this money may be appreciated from the fact that by 1975, \$1.16 million raised from public donations had gone directly into the purchase of lands for inclusion within national parks and nature reserves. These included the establishment of Sturt National Park, Willandra National Park and Yathong Nature Reserve in the west of the State.

Mungo Man and Mungo Lady

In the same year as the new NPWS took over responsibility for the protection of the State's Aboriginal heritage – 1969 – the first of two major discoveries was made in the Lake Mungo lunette that would forever change the future of the pastoral properties gathered around the shores of Lake Mungo.

Mungo Lady and Mungo Man have been dated to 42,000 years old – the oldest human remains in Australia and some of the oldest modern humans in the world outside Africa.



Mungo National Park

The move toward the NSW National Parks and Wildlife Service ownership of Mungo and Zanci Stations began in 1971 with the visit to Mungo by a NPWS officer to investigate the Lake Mungo Aboriginal archaeological discoveries.

Publicity about the finds had led to both an increase in the number of visitors to the area and an increase in professional anxiety over the preservation and future management of the site.

By 1973 pressure was being put on the NPWS to implement some type of protection to the archaeological sites and the Walls of China.

Researchers from the Australian National University had contacted NPWS to report on their excavations on site as well as to express concern over the number of tourists visiting the site, and the use of motorbikes and dune buggies on the Walls of China.

Concern had also been raised by Albert Barnes, who saw the tourist sideline as impacting on his management of the property. In 1975 it was proposed that the area be considered by the Interim Committee of the National Estate for inclusion on its list.

Throughout 1976 Barnes', the NPWS, ANU and the Western Lands Commission were in constant contact over the future of the station and the management of the resources.

Included as an issue was that Albert and Venda Barnes had been on the land for 43 years and were beginning to consider leaving it altogether.

With this as an option, and with their consent, NPWS finally made a bid on the property, and in 1978 purchased the Mungo Station for \$116,000 from the Barnes family, with businessman Dick Smith acting to facilitate the arrangements.

The property was bought through the National Parks and Wildlife Foundation, a fund established in 1970 to raise money for the acquisition of land for national parks and for ongoing scientific research into conservation. In March 1979 the Mungo National Park was dedicated.

Subsequent additions to the park have since occurred through the purchase of the Zanci (1984), Garnpang, Leaghur, PanBan and Balmoral (1997) and Joulmie (2010) properties.



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World Heritage

The global importance of the Willandra Lakes was recognised in 1981 when the region was added to the World Heritage List. It was one of the first Australian World Heritage sites.

By 2010 Australia had 17 world heritage places, but Willandra is one of only four that are listed for both their natural and their cultural values. The others are Uluru-Kata Tjuta National Park, the Tasmanian Wilderness and Kakadu National Park.



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The World Heritage emblem represents the interdependence of the world's natural and cultural diversity. It is used to identify properties protected by the World Heritage Convention and inscribed on the official World Heritage List, and represents the universal values for which the Convention stands.



While the central square symbolizes the results of human skill and inspiration, the circle celebrates the gifts of nature.

The emblem is round, like the world, a symbol of global protection for the heritage of all humankind. Designed by Belgian artist Michel Olyff, the emblem was adopted as the official symbol of the World Heritage Convention in 1978.

The Willandra Lakes Region WHA

The Willandra Lakes Region was inscribed on the World Heritage List because it is of outstanding universal value according to three criteria.

Natural: as an outstanding example representing the major stages in the Earth's evolutionary history; and as an outstanding example representing significant ongoing geological processes.

Cultural: bearing an exceptional testimony to a past civilisation.

The World Heritage process

The International Convention for the Protection of the World Cultural and Natural Heritage (the World Heritage Convention) is a very successful international agreement that was established under the auspices of the United Nations in 1972.

Australia was one of the first signatories in 1974, and by 2009 the convention had been signed by 189 countries. The convention requires countries to commit to the identification, protection, conservation and presentation of World Heritage sites.

The World Heritage Convention is administered by the World Heritage Committee, which is made up of 21 nations elected from the signatories to the convention. A key function of the World Heritage Committee is to consider new nominations.

To qualify for World Heritage, a place must meet specific (and quite technical) natural and/or cultural criteria, as well as associated integrity conditions (the values must be in good condition and well looked after). It's not easy to get 'over the bar'. The over-riding requirement is that places must be of 'outstanding universal value' and important to all humanity.

By 2009 there were 890 World Heritage sites around the globe. They include such precious and well known places as Mount Everest (Sagarmatha National Park), Chartres Cathedral, the Grand Canyon, Angkor, the Parthenon, South West New Zealand, the Great Wall of China and the Galapagos Islands.

Under Australia's federal system, the states are responsible for land management generally and for day-to-day management of World Heritage areas. But since it is the Australian Government that is the signatory to the World Heritage Convention, World Heritage sites are usually managed under an agreement between the state and the Commonwealth.

The Willandra Lakes Region World Heritage Area includes both national park and rural grazing properties. The New South Wales National Parks and Wildlife Service (NPWS, part of the Department of Environment, Climate Change and Water) manages Mungo National Park and the leaseholders manage the grazing properties.

Overall management of World Heritage values across the area is supervised by a World Heritage Management Committee which is made up of representatives of NPWS, landholders, Aboriginal traditional tribal groups, scientists and other stakeholders.

Looking after Mungo

.....

Mungo National Park and the Willandra Lakes Region World Heritage Area need to be carefully looked after to protect and present their special values into the future. A detailed management arrangement is in place to carry out this difficult job. It involves several government agencies, Aboriginal people, landholders, scientists, local councils and others in a cooperative effort.

The NSW National Parks and Wildlife Service (NPWS, part of the NSW Office of Environment and Heritage) is the government agency with the legal responsibility for the management of Mungo National Park, through local staff.

Management is guided by the Mungo National Park Plan of Management (2006) a legally-binding document that sets out management issues and priorities. The plan of management is consistent with World Heritage management requirements.

Key priorities include the protection of cultural heritage (including European pastoral heritage), control of weeds and feral animals, fire management and providing opportunities and information for visitors. Much of Mungo National Park is also part of the Willandra Lakes Region World Heritage Area, which brings additional management responsibilities.

Park management is overseen by the Joint Management Advisory Committee for Mungo National Park. This committee is made up as follows:

- five representatives (5) from the Paakantji and Ngyiampaa people of the Traditional Tribal Groups Elders Council;
- one senior NPWS official;
- one representative of Environment Australia (Australian Government agency with responsibility for World Heritage);
- one park neighbour;
- one representative of a peak conservation group;
- one representative of Balranald Shire Council; and
- one representative of Wentworth Shire Council.

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..... Managing Mungo



The Aboriginal Ownership Act provides for full joint management of Mungo National Park by traditional Aboriginal custodians. However the traditional tribal groups have decided not to pursue full joint management at this time. The Paakantji, Ngyiampaa and Mutthi Mutthi were identified during extensive community consultation as the three tribal groups who have traditional associations with the Willandra Lakes region.

Rather than 'divide' the World Heritage Area up on a tribal basis, the three groups developed a concept of 'shared heritage' and agreed that management decisions were the business of all three tribal groups. They established the Traditional Tribal Groups Elders Council as a body to coordinate Aboriginal involvement with the park.

In 2007 the Mutthi Mutthi people decided that they would not be involved in the Elders Council and Joint Management Advisory Committee. The Mutthi Mutthi continue to be involved in other aspects of the park.

Four highly respected Aboriginal women had a pivotal role in the early days of Mungo National Park. They helped to establishing the involvement of the three traditional tribal groups and more respectful procedures for dealing with ancestral remains.

Today, local Aboriginal people value and remember the struggle and the contribution of the 'four Aunties':

Alice Kelly, a member of the Balranald based Mutthi Mutthi people, was a member of the NPWS Lower Darling Regional Advisory Committee for many years.

Alice Bugmy, a Paakantji Elder from Broken Hill, was a representative for the Western Regional Aboriginal Land Council.

Tibby Briar, a Paakantji Elder from Dareton, was also a representative for the Western Regional Aboriginal Land Council.

Elsie Jones OAM, a Paakantji Elder from Wilcannia, had a keen interest in educating children about her culture.

The Willandra Lakes Region World Heritage Area takes in most of Mungo National Park and a larger area of leasehold land that is mainly used for grazing. As signatory to the World Heritage Convention, the Australian Government is responsible for protecting, conserving and presenting the World Heritage values of the area, while the NSW Government and leaseholders are responsible for day-to-day management.

The responsibilities of the various groups are set out in the Willandra Lakes Region World Heritage Area Plan of Management (1996).

The plan of management is a strategic document that also contains broad management guidelines for the World Heritage Area.

Management of the World Heritage Area is advised by two committees: the World Heritage Area Community Management Committee and the World Heritage Area Technical and Scientific Advisory Committee. NPWS is represented on both bodies.

The traditional tribal groups provide input and representation to the Community Management Committee through the World Heritage Area Elders Committee.



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Share Mungo culture





Visitors to Mungo National Park can share in an Aboriginal culture that has survived in the same shifting landscape for at least 45,000 years. That's around 2,500 generations!

Today three traditional tribal groups care for their Country at Mungo. The Paakantji, Ngyiampaa and Mutthi Mutthi people walk here in the footsteps of their ancestors, ensuring their children grow strong in their culture. The tribal groups also seek to share their knowledge of Country with visitors to Mungo.

The Elders of the Paakantji, Ngyiampaa and Mutthi Mutthi people invite you to explore their stories.

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.....Aboriginal Discovery Tours

The award winning Mungo Aboriginal Discovery Tours are conducted in Mungo National Park by rangers from the three tribal groups of the Willandra Lakes region.

Aboriginal Discovery Tours are the best way to learn about Mungo National Park and its ancient heritage, with the Aboriginal people who have lived the landscape for 45,000 years.

Tours operate during school holidays and some other times, as well as by special arrangement. All tours are dependent on weather and bookings are essential. See News and Events for upcoming tours or phone 03 5021 8900.



Walls of China Tag-along tour

Link up with Aboriginal Discovery rangers for an informative tour of the famous Walls of China. Learn about the 45,000+ years of Aboriginal cultural history of the Willandra Lakes and discover the compelling story of survival associated with the rise and fall of the lake. Bring along drinks, sturdy footwear, camera, binoculars, sunscreen and hats. Your own transport is required for this activity.

Difficulty: Medium

Meeting Place: Mungo National Park Visitor Centre



Evening adventure

A chance to meet Aboriginal Discovery rangers at the main campground for an educational and informative outdoor presentation including a 'Starry Starry Night' feature and light refreshments. As the night lengthens, sit back and enjoy the relaxing company. Bring along drinks, sturdy footwear, cameras, binoculars and a warm jacket. Please note that this activity is dependent on weather.

Difficulty: Easy

Meeting Place: Mungo National Park Visitor Centre

Foreshore Walk

Join our Aboriginal Discovery rangers for an informal adventure of exploration and learning. Discover what the pink cockatoo uses for a dinner plate and see the shady homes of the kangaroo. We may even be lucky enough to try a little bush tucker! Highly recommended for all. Bring along drinks, sturdy footwear, camera, binoculars, sunscreen and hats.

Difficulty: Medium

Meeting Place: Mungo National Park Visitor Centre

The Meeting Place



Remarkable human footprints walked straight out of the last ice age when they were re-discovered at Willandra Lakes in 2003 during a routine survey for archaeological sites. The footprints may have been exposed for some time before 2003, and some local Aboriginal people say they already knew they were there.

Research has revealed that the well preserved footprints are about 20,000 years old, and can tell some amazing stories. They are the oldest footprints ever found in Australia and the largest set of ice age footprints in the world.

A key feature of the Meeting Place is the re-creation of part of the ancient human tracks that were re-discovered in 2003.

The footprints record some frozen moments in the lives of Aboriginal people who travelled across a damp claypan around 20,000 years ago. This is the largest known collection in the world of such ancient human footprints.

Today these fragile relics are specially protected. The footprints are extremely precious to the people who are directly descended from those who made them so long ago, and they are important to all humanity. To let everyone experience something of the wonder of the tracks, a section has been reproduced as an accurate replica at the Meeting Place. The replica was made using three dimensional laser scans and digital modelling.



The lakeshore lunettes are the resting place of many Aboriginal ancestors. It was here, in the eroding sediments of the Mungo lunette, that the 42,000 year old remains of Mungo Lady and Mungo Man were found.

When they returned from the deep past, Mungo Man and Mungo Lady re-wrote the book on Australia's ancient human history.

The lunette-shaped viewpoint at the Meeting Place symbolically represents and commemorates the ancient resting place of these and countless other Aboriginal people.





The Meeting Place also represents how science and culture meet here in the Willandra Lakes Region World Heritage Area.

Together, science and culture tell the story of how one of the world's most ancient cultures was able to survive and adapt to the extreme changes in climate that turned a flourishing inland lake system into the connected series of dry lakebeds that we see today.

The shifting sands of Mungo hold a record of Aboriginal life extending back beyond the expanses of the last ice age. Mungo's living Aboriginal culture holds an unbroken record of how people have walked in the footsteps of their ancestors here since the Dreamtime.



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..... **Ancient footprints**



What research has been done on the footprints?

.....

A flurry of excitement and research followed the re-discovery of the footprints. How old were they? How did they survive? Who made them? What were the people doing? What else can we learn from them?

Some of the covering sand dunes were carefully dug away to reveal more footprints. The tracks were all measured, mapped and scanned digitally. Latex moulds were made.



Ground-penetrating radar was used to map the claypan which extended under the sand. The chemistry of the clay was analysed.

How the claypan related to adjacent sediments was studied. The sediments above and below the clay layer were dated using optically stimulated luminescence (OSL).

Most exciting of all, a group of Pintubi people came down from central Australia to use their traditional tracking skills to interpret the tracks.

“The Pitjantjatjara visit was very strong and spiritual. They shared the cultural and tracking skills that they have maintained through thousands of years.

When walking on the footprint site they commented that it was a dreamtime site and we should be proud as it was more proof of our continuous occupation and connections to this wonderful part of Australia.

It made me feel proud to be connected to the Willandra Lakes and Mungo National Park.”

Warren Clark, Executive Officer - Mungo Joint Management Advisory Committee

Why can't we see the real footprints?

.....

Eventually, three years after their re-discovery and intense scrutiny, the trackways were carefully covered over again with a bed of sand - the same sand that had protected the footprints from the elements for thousands of years.

The tracks are so fragile and precious that they have to be protected from everybody, even researchers.

Preserved, they can be re-examined in the future if the Aboriginal Elders and others agree it is necessary.



“We were scared that someone would dig them up. We knew that dinosaur footprints had been stolen from a place in Western Australia. At the time, we never had the protection to keep them safe.”

Lottie Williams, Paakantji Elder

How many tracks are there?

The intense research has revealed a lot about the footprints. Approximately 500 prints have been recorded in more than 25 individual trackways. Most of these are human but there are also some marsupial and emu tracks. The trackways disappear beneath the sand dunes, with less than a third of the claypan so far exposed.

Are tracks like these rare?

These are the only human tracks of Pleistocene age yet discovered in Australia, and the largest collection of such prints anywhere in the world.

“The fossil trackways were discovered in the Willandra Lakes region of New South Wales during 2003 and are the largest known collection of Pleistocene human footprints in the world.”

Steve Webb, Matthew L. Cupper and Richard Robins, scientists

When were the footprints made?

The footprints were pressed into the soft floor of a damp claypan beside a small basin some 20,000 years ago, during the Pleistocene era.

At that time the last glacial maximum was in full flight. The climate around Willandra Lakes was dry, cold and windy. Sand dunes were blowing in from the west, and the lakes were steadily drying out - first in the south then moving northwards.

The wider landscape was becoming increasingly barren, so people were probably following the drying lakes north for the shellfish and other food they offered. Animals too would have been attracted to the lakes and nearby soaks.



Who made the footprints and what were they doing?

It was on one of those cool Pleistocene days that a group of several adults, adolescents and a few children, perhaps a family group, walked across the claypan heading east.

The tracks include that of a young child, with a foot about 15 cm long, who meandered back in the opposite direction to the main group. Was the child called back, or just playing about as children do?

“The footprints and stride lengths show how the child walked, paused, turned and ran away from the group they were with, before walking briskly back towards them.

“Perhaps the child was called back by an adult or older sibling. So seldom in open-site archaeology do we see such a personal and familiar signature.”

Harvey Johnston and Michael Westaway,
Archaeologists

A day or two after the first group, another group, probably men, crossed the claypan. They were moving very fast. The Pintubi trackers not only reckon the men were running together after prey, but they also spotted where a thrown spear missed and skidded into the ground.

Most remarkable of all was a single line of right footprints, pushed heavily into the clay. There is no corresponding left footprints.

The Pintubi were sure this was a one-legged man, hopping very fast along with the other hunters. Such prowess suggests that the man was well practised in hopping, rather than perhaps having a temporary injury.

He may have been using a stick. Did this man lose his leg in a fight with man or beast? Did the ancient Willandra people carry out amputations? We may never know the answers to questions like these, or understand this man's story.

What were these people like?

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Another line of investigation was biomechanical analysis of the footprints. This has shown that the tracks were made by women, men, adolescents and children.

Several of the men were of large stature, approaching two metres tall. There have been various interpretations of their running speeds, but the latest analysis suggests that two of the men were running at moderate long distance speeds in soft mud, leaving heel-strike marks with slippage and mud squeezing between the toes.

“The size of the prints and the pace lengths in most trackways indicate tall individuals who were able to achieve high running speeds.”

Steve Webb, Matthew L. Cupper and Richard Robins, scientists

How did the footprints survive for so long?

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Like most fossils, very particular circumstances had to come together to preserve the footprints. The claypan is about 15 cm thick and composed of thin layers a type of magnesite rich clay that is not common in the Willandra Lakes area. The clay was probably blown out of the nearby lake basin in dry periods. When this clay dries out it sets very hard, like concrete.

Even so, if the tracks had been out in the wind and rain for too long they would have been eroded away. So it is likely that they were covered over soon after being made, by dune sands blowing in from the west in the barren, windy climate of the Pleistocene.

It was the covering sand that protected the tracks for most of those 20,000 years, before being partly blown away again in recent years. That is why sand was used again in 2006 to cover the tracks for protection.

“The footprint site widens our perceptions of a past society more graphically than other forms of archaeological study. It also presents an added dimension to our understanding of the morphology and physical capabilities of Pleistocene humans... The footprints are a rare glimpse into life at the height of the last glacial period.”

Steve Webb, Matthew L. Cupper and Richard Robins, scientists



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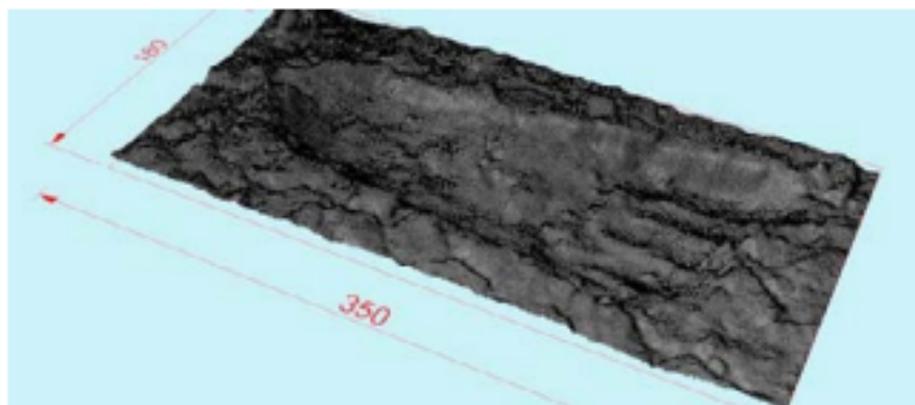
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..... **Reproduction of the footprints**





1. Clean up scan data

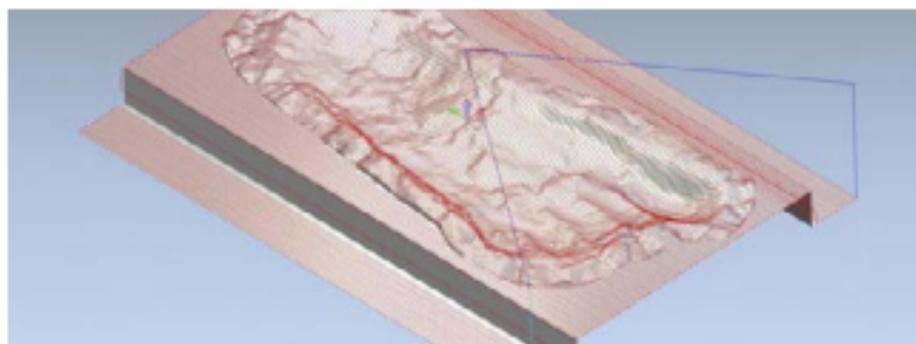
Electronic Scan files received from surveyor are read into a 3D CAD application as a three dimensional mesh of triangles.

The model is manipulated in three dimensions to align it to a horizontal plane and fit into the required tile size. Any excess surface data is also trimmed off at this stage.

2. Create tool paths to make a pattern

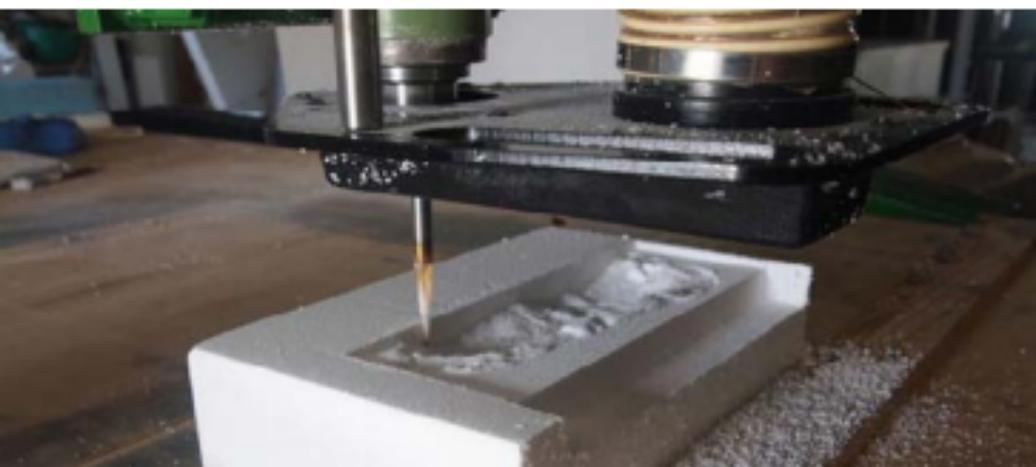
The model is then read into a CAM (Computer Aided Manufacturing) application which is used to produce the tool paths for the CNC (Computer Numerically Controlled) 3 Axis router.

In this application the raw material size is modelled and the 3D model of the footprint further manipulated to give a smooth finish towards the edges of the tile.



The tool to be used to cut the polystyrene material is selected. In this case a very fine tapered ball nose cutter is used to accurately replicate the fine detail in the footprint. The application then generates the required toolpath to cut the shape. The CAM application generates positioning codes, called G & M codes, which are exported to a text file to suit the particular CNC machine.





3. Cut the shape into the polystyrene

A block of polystyrene is cut to the required size and mounted into the CNC Router machine.

The file of G & M codes is loaded and the cutting process begins.

Once the machining process is completed the block of polystyrene is trimmed using a hot wire cutter to the required size and sharp edges blended by hand sanding.

4. Create a rubber mould from the polystyrene pattern

A sealer is applied to the polystyrene patterns and they are then boxed up in preparation to receiving the liquid rubber mould material.



The liquid rubber is mixed and poured over the pattern and allowed to cure for a few days to produce a flexible rubber mould.

5. Create a Concrete Tile from the rubber moulds

These moulds are then filled with concrete to make the final tiles.



Final footprint tiles ready for installation.
Photographs, text, and footprint fabrication: John Balthazar, Industrial Carving Services

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..... Mungo Lady and Mungo Man

Mungo Lady and Mungo Man are perhaps the most important human remains ever found in Australia. Their discovery re-wrote the ancient story of this land and its people and sent shock-waves around the world.

These 42,000 year old ritual burials are some of the oldest remains of modern humans (*Homo sapiens*) yet found outside of Africa. Mungo Lady is the oldest known cremation in the world, representing the early emergence of humanity's spiritual beliefs.

Mungo Lady and Mungo Man are particularly special to their Aboriginal descendants who still live around the Willandra Lakes area. The Paakantji, Ngyiampaa and Mutthi Mutthi people are proud of what the ancient remains prove of their endurance in the land and survival from the distant past. Many believe that Mungo Man and Mungo Lady returned to teach something to all people.

The return of Mungo Lady and Mungo Man put Lake Mungo on the world map. They led to the establishment of Mungo National Park and the recognition of the Willandra Lakes Region World Heritage Area as a place that is important to all humanity.

A note about Aboriginal remains

The recovery and management of the remains of ancestors is an issue of great sensitivity to Aboriginal people. This sensitivity comes from both cultural beliefs and the treatment of Aboriginal people by governments, scientists and others in the recent past.

Many skeletons and other remains, both ancient and modern, were taken and studied without permission. Some were scattered, sent overseas and kept in collections. This is still a controversial issue today and not all remains have been returned to their Country and their people.

You cannot see the remains of Mungo Man and Mungo Lady today, and you will not see pictures of them here. We hope the information that is provided here will help you understand how important Mungo Lady and Mungo Man are to the Ngyiampaa, the Mutthi Mutthi and the Paakantji, to all Aboriginal people, to all Australians and to people everywhere.

Who was Mungo Lady?

About 42,000 years ago, Mungo Lady lived around the shores of Lake Mungo. A time of plenty was coming to an end at Willandra Lakes, when the basins were full of water and teeming with life. The human population was at its peak, and Mungo Lady was the daughter of many mothers - the generations before her that had lived at Lake Mungo since the Dreamtime.

She collected bush tucker such as fish, shellfish, yabbies, wattle seeds and emu eggs, nourished her culture and taught her daughters the women's lore. When Mungo Lady died, we know her family mourned for her. Her body was cremated, the remaining bones were crushed, burned again and then buried in the growing lunette.

Who was Mungo Man?

About 42,000 years ago, Mungo Man lived around the shores of Lake Mungo with his family. A time of abundance in the Willandra Lakes system was drawing to a close, but he could still hunt many species of game, including some of the soon-to-be-extinct megafauna. Mungo Man cared for his Country and kept safe the special men's knowledge.

By his lore and ritual activity, he kept the land strong and his culture alive.

When he was young Mungo Man lost his two lower canine teeth, possibly knocked out in a ritual. He grew into a man nearly 1.7m in height.

Over the years his molar teeth became worn and scratched, possibly from eating a gritty diet or stripping the long leaves of water reeds with his teeth to make twine. As Mungo Man grew older his bones ached with arthritis, especially his right elbow, which was so damaged that bits of bone were completely worn out or broken away. Such wear and tear is typical of people who have used a woomera to throw spears over many years.

Mungo Man reached a good age for the hard life of a hunter-gatherer, and died when he was about 50. His family mourned for him, and carefully buried him in the lunette, on his back with his hands crossed in his lap, and sprinkled with red ochre. Mungo Man is the oldest known example in the world of such a ritual.

“Mungo Man was around 50 years of age and the condition of arthritis was so advanced that he would not have been able to fully extend his arm or turn his hand properly. It is easy to picture him sitting, slowly rubbing the ancient elbow in front of his fire on a cold ice age night.”

Steve Webb, anthropologist



Who found Mungo Lady?

In the 1960s a young geologist began to take an interest in the Willandra area. Jim Bowler was looking for somewhere he could extend his studies into what happened to Australia's landscape and climate in the Pleistocene epoch (between 1.8 million and 10,000 years ago).

From aerial photographs he recognised a large complex of fossil lakes in the now semi-arid plains of south-western New South Wales. Bowler was particularly drawn to Lake Mungo because erosion of the lunette offered a chance to look into ancient layers of sediment.

In 1967 Bowler investigated layers of windblown sand and clay piled up in the lunette. He found freshwater mussel shells and what looked like stone tools deep down in ancient deposits. Returning in 1968 he saw what looked like burnt bones and decided to bring in some archaeologists. A year later John Mulvaney and Rhys Jones probed the bones and turned over an unmistakable human jaw.

Bowler described how they were confronted with "the very presence of humanity itself". Caught by surprise, the archaeologists collected the bones in a leather suitcase that Mulvaney had with him and took both back to the Australian National University.

The remains were labelled Lake Mungo I and later determined to be of an adult female. She became known as Mungo Woman, or Mungo Lady.

How was Mungo Man found?

Late one afternoon in 1974, after some heavy rain, geologist Jim Bowler was riding his motor bike around the Lake Mungo lunette, continuing his studies.

He spotted something he hadn't seen before - the gleam of a white object poking out of the soil. When he looked closer he realised it was a human cranium. Bowler asked anthropologist Alan Thorne to help with the excavation. It revealed the almost complete skeleton of an adult male, who was designated Lake Mungo III.

Where are Mungo Lady and Mungo Man today?

After lengthy negotiations with Aboriginal Elders of the three traditional tribal groups, Mungo Lady was brought back to her Country in 1992. Reburial has problems because of the ongoing erosion of the lunette, and a special keeping place has not yet been constructed.

So Mungo Lady rests in a locked safe at Mungo National Park, where two keys are required for access. One key is held by scientists, the other by the Elders.

Mungo Man is still at the Australian National University, while discussions about his future continue. While Aboriginal people value the information that has come from research on the remains, many also feel that enough is enough, and both of these ancient Mungo people should be reburied on their Country.

“Nan started talking about Lady Mungo, because of how important it was to have Lady Mungo back here on Country because she could feel her spirit all the time...

“My Nan went and talked to the other Elders, from the other tribal groups. And that’s when they decided that they would put up a big fight to have Lady Mungo returned back out here to Country. They did bring her back, and they took her down to where she was first found.

“The Elders realised that they actually couldn’t do reburial at that time because of the erosion that happens out here.”

Tanya Charles, Mutthi Mutthi

How do we know how old they are?

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Dating the past is a complex area of science that continues to advance. All dating methods have shortcomings and degrees of inaccuracy, and the age of Mungo Lady and Mungo Man has been controversial from the beginning.

Before the remains were discovered, scientists thought that Aboriginal people had been in Australia for perhaps 20,000 years, while many Aboriginal people saw themselves as being here forever.

Early estimates of the age of Mungo Man ranged from 28,000 years to 32,000 years. Then in 1999 new methods estimated Mungo Man to have lived some 62,000 years ago, a radical conclusion that was at odds with what was known about human migration across the globe.

In 2003 Harvey Johnston and Professor Jim Bowler brought together a panel of experts to try and settle the debate. Using evidence from a range of optically stimulated luminescence dating methods and four different laboratories, the scientists were able to reach an agreed age.

Both Mungo Man and Mungo Lady were 40,000 and up to 42,000 years old. That is where the science stands at present.

“This research extends far beyond mere academic interest. Non-indigenous Australians too often have a desperately limited frame of historical reference. The Lake Mungo region provides a record of land and people that we latter day arrivals have failed to incorporate into our own Australian psyche. We have yet to penetrate the depths of time and cultural treasures revealed by those ancestors of indigenous Australians.” Jim Bowler, geologist



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..... Three tribal groups

Today Three Tribal groups of Aboriginal people share this traditional Country while the care and management is in the control of the Two Traditional Tribal groups Paakantji and Ngyiampaa in the Willandra Lakes World Heritage Area and Mungo National Park. The Paakantji, Ngyiampaa and Mutthi Mutthi people walk here in the footsteps of their ancestors, ensuring their children grow strong in their culture. The tribal groups also seek to share their knowledge of Country with visitors to Mungo National Park.

The Paakantji and Ngyiampaa people jointly manage Mungo National Park with the New South Wales National Parks and Wildlife Service. People from all three tribal groups are employed in various positions in the park and run a program of Aboriginal Discovery Tours to share their heritage with visitors.

Being involved with Lake Mungo in this past four years, it's been an absolute joyride for me, and I just want to keep it going. I want to keep it going for Mum and Dad, I want to keep it going for my people, I want to keep it going for my children.

Sharon Kennedy, Ngiyampaa

Over the years I got interested in working with the archaeologists, doing research work and various projects up at Lake Mungo... The best part of my job is I'm staying on Country and looking after Country... It's showing the continual link of our people with the area... I feel good. I'm doing what I want to do. I like working on Country, being in the bush. I've got the best job in the world.

Darryl Pappin, Mutthi Mutthi





This painting represents spirit and place - the coming together of three tribes, the Mutthi Mutthi, Paakantji 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.



For the three tribal groups Mungo is a meeting place, where three traditional territories come together.

The Ngyiampaa (pronounced nee-yam-par) are dryland people. Ngyiampaa Country takes in the plains and rocky hills east of the Darling River, extending north from Willandra Creek.

The Paakantji (pronounced par-kan-tgee, and also written Barkintji) are river people. Paakantji Country extends along the Darling River, and associated floodplains and waterways from north of Broken Hill and Wilcannia to the Victorian border.

The Mutthi Mutthi (pronounced mutty-mutty) people belong to the Murray, Murrumbidgee and Lachlan Rivers. Mutthi Mutthi Country extends east and south from Willandra Lakes. Aboriginal people have not been able to live permanently around the Willandra Lakes since the lakes dried up during the last glacial period. But archaeological evidence shows that people have maintained a seasonal presence, most likely when water was locally available. In more recent years Aboriginal people have lived and worked on pastoral stations in the area.

Today, Ngyiampaa, Mutthi Mutthi and Paakantji people mostly live in towns around the region, such as Ivanhoe, Wilcannia, Pooncarie, Wentworth, Dareton, Mildura, Euston, Balranald and Hay.

Aboriginal Country

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When Aboriginal people use the English word 'Country' it is meant in a special way. For Aboriginal people culture, nature and land are all linked. Aboriginal communities have a cultural connection to the land, which is based on each community's distinct culture, traditions and laws.

Country takes in everything within the landscape - landforms, waters, air, trees, rocks, plants, animals, foods, medicines, minerals, stories and special places.

Community connections include cultural practices, knowledge, songs, stories and art, as well as all people: past, present and future.

People have custodial responsibilities to care for their Country, to ensure that it continues in proper order and provides physical sustenance and spiritual nourishment. These custodial relationships may determine who can speak for particular Country.

These concepts are central to Aboriginal spirituality and continue to contribute to Aboriginal identity. Aboriginal communities associate natural resources with the use and benefit of traditional foods and medicines, caring for the land, passing on cultural knowledge and strengthening social bonds.

Access to Mungo National Park and other protected public lands provides particular opportunities for Aboriginal people to sustain spiritual and cultural activities.

I love this land I walk on.

Warren Clark, Paakantji

Coming to Mungo I get a different sense of feeling, that I'm home. You seem to know when you're back in your own Country. It's not taught to you, its built in you. It's in your soul, that that's your Country.

Roy Kennedy, Ngyiampaa Elder

My mother was taken away from her people, and from her Country. And likewise me, and my brothers and sisters, we were taken away, the stolen generation. But we came back to our Country. This is our Country. It's a part of us, so we are who we are. That's our identity. We're nobody if we don't have Country.

Patrick Lawson, Paakantji

Aboriginal Language

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The Mutthi Mutthi, Ngyiampaa and Paakantji people each have their own languages.

Traditionally, they were oral languages that had no written form.

Only in recent years have some efforts been made to work out how the sounds could be written down using English letters. Often this is only approximate, because some sounds in Aboriginal languages have no direct equivalent in English.

None of the three languages have been fully documented with their vocabulary, pronunciation and grammar. Some words have changed their spelling along with different versions of the written language. This is one reason you might see some words that are spelt in different ways - like Paakantji and Barkinji.

Language is fundamental to a people's culture but much has been lost since white settlement and the associated disruption of Aboriginal communities and their way of life. For many years Aboriginal people were not allowed to speak their own language in public or in schools.

If children spoke their own 'lingo' they were at risk of being taken away from their parents. Oral languages depend on being passed down from person to person, and fluent speakers of Ngyiampaa, Mutthi Mutthi, and Paakantji are now in small numbers.

That's where I grew up, in Murrin Bridge, on the mission. We were under the Protection Board. We had managers that we had to get permission off before could go out of the mission, then we had to let them know when we came back onto the mission. We had a very hard life living under the Protection Board.

Dawn Smith, Ngyiampaa Elder

When I was a young fella, in those days we weren't allowed to live in town. It was a rough old time, we went through a lot. The Kennedy family lived in Ivanhoe and we settled under the old wilga tree, out in the commons where the drovers used to spell their horses... That was the only place we had to live, so we built shacks under the old wilga tree.

Roy Kennedy, Ngyiampaa Elder

My mother is a strong Barkinji woman, and she knew the Barkinji language, but she wasn't always comfortable in teaching us.

She wouldn't teach us the Barkinji language while we were going to school... If we went to school talking the Barkinji language, or saying any Barkinji words, the welfare would be knocking on my mother's door. We always had the risk of being taken away, for just learning our culture.

Warren Clark, Barkinji

I still understand my language, and I'm glad I learnt. It wasn't easy, because my Mum and her sisters weren't allowed to speak the language in town, in Pooncarie.

Or they'd gaol you, they said. So they never spoke in town while they were doing the shopping, they'd just walk down the road a bit and started talking on their way home. So I've never lost any of the language, which I'm very proud to say.

But it's hard to be able talk to people who hardly know the language. My sister was good, but she's passed away now. She knew all the language, and we could talk it.

Lottie Williams, Paakantji Elder

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Visit Mungo



To visit Mungo National Park, a good local map is recommended, backed up with a satellite navigation device if you prefer. There is no mobile coverage at Mungo National Park. Due to long stretches of unsealed roads, we advise that you take your time to enjoy the big open spaces and changing landscape. All routes involve two-wheel-drive unsealed roads which may be closed during and after wet weather. Even if you get through during wet weather, to preserve the park's roads, access may be closed to the Walls of China or any unsealed roads inside the Park. Check the latest information.

Rental vehicles are available in Mildura.

The drive from Mildura to the park travels north-east on 20 km of sealed and 88km of unsealed roads. To Check road conditions phone 03 5027 5040

From Wentworth, a sealed road follows the Darling River for 119 km, north-east to Pooncarie. At 22 km south of Pooncarie, an unsealed road turns off to the east and takes you 59 km to the park.

From Ivanhoe on the Cobb Highway, the park headquarters is about 170 km south-west on mostly unsealed back roads. This route travels through the park for some distance.

From Balranald two routes, mostly on unsealed back roads, approach the park from the south-

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Nearby Destinations

The Willandra-Mildura region is a great place to explore Australia's rich heritage of national parks. At least 14 major conservation reserves lie within 4 hours' drive of Mildura.

They extend across three states and take in more than 1.6 million hectares, ranging from the grasslands of Willandra to Pink Lakes and vast stretches of mallee. The main parks are described below, with links for more information.

And then there's all the attractions of the Murray, Darling and Murrumbidgee rivers, big skies and the gourmet produce of the riverlands.

Visit visitmildura.com.au and www.visitnsw.com.au for more information on regional attractions and travel.

Kincheha National Park

NSW 44,260 hectares

Floodplains and sand dunes join the Darling River to several large overflow lakes that have a similar history to Willandra Lakes. From a base in the shearers quarters or a quiet riverside or lakeside camp you can explore the famous historic woolshed and learn about the ancient Aboriginal heritage. Located near Menindee, 111 km east of Broken Hill and 211 km from Lake Mungo via Pooncarie.

Willandra National Park

NSW 19,386 ha

Willandra Station was once famous for its wool, and these days it offers an insight into the pastoral history of the region. The homestead, on the Willandra Creek that once fed Willandra Lakes, has been restored to its former glory. The grasslands and coolibah-lined creek beds to the west of the homestead are home to kangaroos, Emus and ground-nesting birds. The park is 70 km from the nearest town of Hillston and 240 km east of Lake Mungo via backroads.

Yanga National Park

This new park was established on an historic pastoral property in 2009 to protect 170 km of Murrumbidgee River frontage, floodplain wetlands, saltbush expanses and majestic River Red Gum forests, all home to a huge diversity of wildlife. You can visit the grand old 1870s homestead and huge woolshed, view historic displays or just relax at one of the many picnic and camping areas. The village of Balranald on the Murrumbidgee River is the gateway to the park, and is 150 km from Lake Mungo.

Hattah-Kulkyne National Park

Victoria 48,000 ha

A series of overflow lakes off the Murray River and extensive mallee woodlands are the order of the day here. Popular activities include canoeing, walking, bicycling and scenic driving. You can picnic and camp in the park, and nearby towns including Mildura, which is just 40 km to the north.

Murray-Sunset National Park

Victoria 142,300 ha

Murray-Sunset takes in much of the mallee country south-west of Mildura. The colourful salt beds of Pink Lakes are a special attraction, with their excellent walking tracks. A network of 4WD tracks explore remote parts of the park, and there are

several camping areas. From Mildura, the park can be reached from the north by the Sturt Highway, from the east by the Calder Highway or from the south on the Mallee Highway.

Wyperfeld National Park

Victoria 356,800 ha

As the largest park in this semi-arid region, Wyperfeld encompasses a chain of mostly dry lakebeds, riverine forests of Black Box and River Red Gum, cypress pine woodlands, mallee lands and vast area of sand dunes and heath that come alive with wildflowers in the spring. Facilities include a visitor centre and camping areas. The park is about 180 km south of Mildura off the Calder Highway.

Big Desert Wilderness

Victoria 113,500 ha

This park was created to preserve the largest area of intact mallee in Victoria. As an undeveloped park it is ideal for experienced bushwalkers, birdwatchers and naturalists. The wilderness joins large conservation reserves across the border in South Australia. It lies about 250 km from Mildura via the Calder Highway and Ouyen, and campsites are available along the Nhill-Murrayville Road.

Chowilla Regional Reserve and Game Reserve

South Australia 92,618 ha (combined)

Straddling the Murray River, these parks feature floodplain and wetland environments, with mallee woodlands and bluebush stretching north to Danggali Conservation Park. Camping, picnicking, fishing and boating are popular activities. The reserves are 152 km west of Mildura along Wentworth Road.

Danggali Conservation Park and Wilderness Protection Area

South Australia 252,079 ha

As the largest of South Australia's riverland parks, Danggali is known for its vast mallee scrublands and wilderness appeal. You can camp in remote locations, birdwatch and explore relics of pastoral history. The park lies north of Chowilla Regional Reserve, about 220 km from Mildura.

Murray River National Park

South Australia 13,023 ha

Three sections of park lie along the Murray River floodplains between Renmark and Loxton. Renmark is 146 km west of Mildura on the Sturt Highway.

Cooltong Conservation Park

South Australia 3,681 ha

This mallee park is of particular importance to the rare Malleefowl. You can picnic and walk, but there is no camping within the park. It is just west of Renmark, which is 146 km west of Mildura on the Sturt Highway.

Ngarkat Conservation Park

South Australia 270,000 ha

This large area joins Big Desert Wilderness in Victoria to create a massive protected area of mallee. The park offers 4WD touring, campsites and walking tracks, along with a rich variety of birds and mammals of semi-arid environments. It lies south of the Mallee Highway, about 280 km from Mildura.

Billiat Conservation Park

South Australia 38,742 ha

Billiat is a low-key mallee park with no facilities. It is 18 km south of Alawoona and 219 km from Mildura via the Sturt Highway and Loxton.

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Weather

Mungo's climate is much the same as that of Mildura.

The semi-arid climate means Mildura has an average of only 106 cloudy days a year.

Rainfall averages just 280 mm a year, with most rain falling in spring and the least in autumn. But rainfall is notoriously erratic and big falls that close roads can happen any time if you're unlucky.

Summer is generally hot, with average maximums of around 32 degrees and average minimums of between 16 and 17 degrees. But humidity is often low.

In winter the days are cool and the nights cold, with average maximums of 15 degrees and average night-time lows of around 4 degrees. Frosts are not uncommon.

The climate is ideal for travelling and exploring the country in the cooler months.

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Safety

Mungo National Park is in a remote area. There are few services nearby and it can be very hot and dry with little shade.

Visitors need to be well prepared to ensure a safe and enjoyable trip. Following a few simple guidelines will help.

Planning your visit

Plan your visit carefully, using up to date information. Think about what you will be doing, how long you are staying and what you will need to take with you.

There are no supplies of food, fuel or equipment available near the park. Drinking water is in limited supply. The closest town for food and fuel is Pooncarie, 81 km away.

Ensure you take plenty of food, water, medical needs and equipment for your trip.

Take appropriate clothing for the expected conditions.

Find out about the latest road conditions from the National Parks and Wildlife Service (Buronga: +61 3 5021 8900), Mildura Tourism (+61 3 5027 3624) or local police.

Driving

Most roads are unsealed and can become impassable after rain.

Conditions vary on unsealed roads, so drive carefully.

Watch out for sand, mud, dust, corrugations, loose gravel, unmarked bends and oncoming vehicles.

Kangaroos and emus often cross the road, especially at dawn and dusk. They are usually in groups.

Avoid travelling after dark and at dawn and dusk.

Make sure your car is well maintained and in good condition.

Carry a spare tyre, a jack and tools, and know how to use them.

Carry extra water and warm bedding in case of breakdown.

Consider carrying spare fuel.

Use a good map, plus a satellite navigation device if you have one.

Tell someone where you are going and when you expect to arrive.

Walking

Plan your walk and know where you are going.

Wear appropriate clothes and strong footwear.

Cover up from the sun, wear a hat and sunglasses and use sunscreen on exposed skin.

Be prepared for rain.

Carry plenty of water and some food.

Drink often.

In cooler weather, carry a warm top.

In summer, consider covering up and/or using insect repellent.

Tell someone where you are going and when you expect to be back.

Leave snakes and other wildlife alone.

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Credits

A project of the Willandra Lakes Traditional Tribal Groups Elders Council and New South Wales National Parks and Wildlife Service (Department of Environment, Climate Change and Water)

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Dr Michael Westerway

Pastoral Heritage section credits

The text in the pastoral heritage section of the guidebook has been selectively extracted from three documents commissioned by the NSW National Parks and Wildlife Service that all tell important parts of the story of Mungo's cultural heritage since 1788.

These documents are listed overleaf.

SHARED LANDSCAPES: ARCHAEOLOGIES OF ATTACHMENT AND THE PASTORAL INDUSTRY IN NEW SOUTH WALES. Studies in the Cultural

Construction of Open Space. Rodney Harrison (2004). Sydney, Australia: UNSW Press.

WOMEN AND LANDSCAPE: NSW WESTERN PARKS PROJECT: AN HISTORICAL STUDY OF WOMEN AND OUTBACK LANDSCAPES for the Cultural Heritage Division of NSW National Parks and Wildlife Service. Dr Johanna Kijas June 2003

CONSERVATION MANAGEMENT AND CULTURAL TOURISM PLAN , MUNGO NATIONAL PARK . Prepared for NSW National Parks and Wildlife Service, by Godden Mackay Logan March 2003

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