



NSW NATIONAL PARKS & WILDLIFE SERVICE

Wongarbon Nature Reserve

Plan of Management



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Wongarbron Nature Reserve is part of Country for the Wiradjuri Aboriginal People.

This plan of management was prepared by staff of the NSW National Parks and Wildlife Service (NPWS).

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Front cover image: Brown treecreeper (*Climacteris picumnus*). Photo credit: DPIE

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Wongarbron Nature Reserve Plan of Management

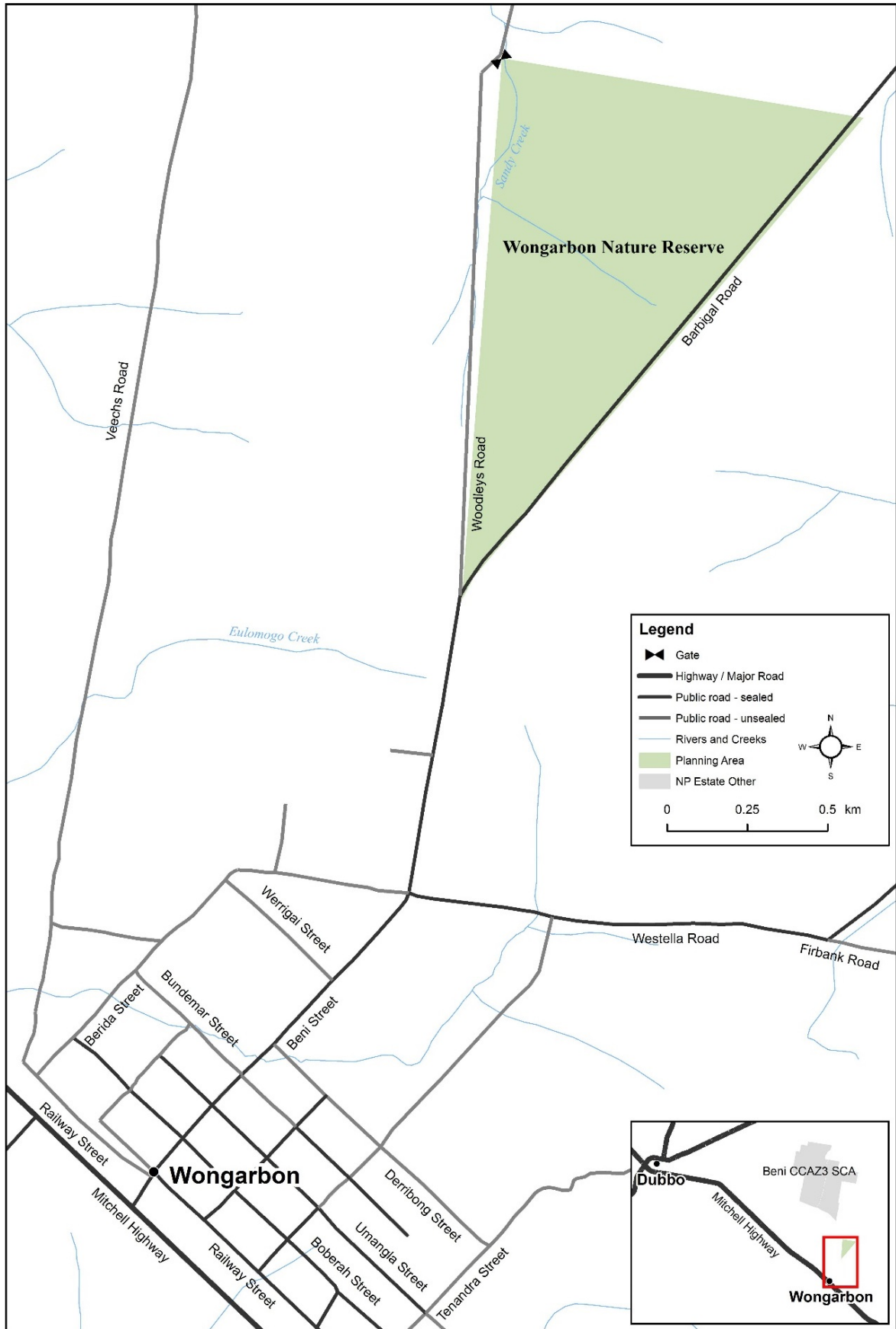


Figure 1: Wongarbron Nature Reserve

1. Introduction

1.1 Location, reservation and regional setting

Features	Description
Wongarbron Nature Reserve	
Location	Wongarbron Nature Reserve (referred to as 'the reserve' in this plan) is located one kilometre north of the village of Wongarbron and approximately 15 kilometres south-east of Dubbo in the central west of New South Wales. It is close to Beni State Conservation Area and forms part of the headwaters of Sandy Creek, and of the intermittent watercourse (see Figure 1). The reserve is bounded to the west by Woodleys Road, to the east by Barbigal Road and to the north by a Crown road reserve.
Area	99 hectares
Reservation date	24 September 1965
Previous tenure	In 1897 the lands now comprising Wongarbron Nature Reserve were reserved as part of the 'temporary common' for the town of Murrumbidgee (which was later renamed Wongarbron). In 1925 a forest reserve was gazetted over 59 hectares (145 acres) of the land and in 1931 the remaining 40 hectares (100 acres) were gazetted as a timber reserve. In 1965 these lands were dedicated as a faunal reserve, named 'Wongarbron Nature Reserve', under the <i>Faunal Protection Act 1948</i> . All faunal reserves became nature reserves on commencement of the <i>National Parks and Wildlife Act 1974</i> .
Regional context	
Biogeographic region	<p>The reserve lies in the Talbragar Valley subregion of the Brigalow Belt South Bioregion (DSEWPaC 2012).</p> <p>The reserve forms part of a regional network of reserves including Beni State Conservation Area, Goonoo National Park and State Conservation Area, and Coolbaggie Nature Reserve all to the north; and Goobang National Park to the south.</p>
Surrounding land use	The lands to the north and west of the reserve are predominantly cleared for sheep and cattle grazing and dryland cropping. To the south and east, lands are also cleared, with a higher intensity of land use associated with smaller holdings.
Other authorities	The reserve is located within the administration areas of Dubbo Local Aboriginal Land Council, Central West Local Land Services and Dubbo Regional Council.

1.2 Statement of significance

Wongarbon Nature Reserve is significant for its biological and landscape values.

Biological values

- The reserve protects important remnant native vegetation in a highly cleared landscape.
- The reserve contains White Box – Yellow Box – Blakely's Red Gum Woodland ecological community, listed as endangered under the NSW *Biodiversity Conservation Act 2016* and as critically endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.
- The reserve supports two threatened woodland bird species, the grey-crowned babbler (*Pomatostomus temporalis temporalis*) and the brown treecreeper (*Climacteris picumnus victoriae*), both listed as vulnerable under the Biodiversity Conservation Act.

Landscape values

- In 1978 Wongarbon Nature Reserve was listed on the Register of the National Estate (now the non-statutory Australian Heritage Database) because it is an important remnant of the original temperate woodland vegetation in the largely cleared central western slopes of New South Wales, and thus forms a significant refuge for native animals.

2. Management context

2.1 Legislative and policy framework

The management of nature reserves in New South Wales is in the context of the legislative and policy framework of the National Parks and Wildlife Service (NPWS) — primarily the National Parks and Wildlife Act and Regulation, the Biodiversity Conservation Act and NPWS policies. Other legislation, international agreements and charters may also apply to management of the area. In particular, the NSW *Environmental Planning and Assessment Act 1979* may require assessment and mitigation of the environmental impacts of works proposed in this plan. The NSW *Heritage Act 1977* may apply to the excavation of known archaeological sites or sites with the potential to contain historical archaeological relics. The Commonwealth Environment Protection and Biodiversity Conservation Act may apply in relation to actions that impact matters of national environmental significance, such as migratory species and threatened species listed under that Act.

A plan of management is a statutory document under the National Parks and Wildlife Act. Once the Minister has adopted the plan, no operations may be undertaken in relation to the lands to which the plan relates unless the operations are in accordance with this plan. This plan will also apply to any future additions to Wongarbron Nature Reserve. Should management strategies or works be proposed in future that are not consistent with this plan, an amendment to the plan will be required.

2.2 Management purposes and principles

Nature reserves are reserved under the National Parks and Wildlife Act to protect and conserve areas containing outstanding, unique or representative ecosystems, species, communities or natural phenomena. Under section 30J of the Act, nature reserves are managed to:

- conserve biodiversity, maintain ecosystem functions, and protect geological and geomorphological features and natural phenomena
- conserve places, objects, features and landscapes of cultural value
- promote public appreciation, enjoyment and understanding of the reserve's natural and cultural values
- provide for appropriate research and monitoring.

The primary purpose of nature reserves is to conserve nature. Nature reserves differ from national parks in that they do not have the provision of visitor use as a management principle.

2.3 Specific management directions

In addition to the general principles for the management of nature reserves, the management of Wongarbron Nature Reserve will focus on the protection of the threatened species and ecological communities present in the reserve, as well as protecting the reserve's integrity in a highly cleared landscape. Strategies to achieve these objectives are:

- the control and, where possible, eradication of introduced plant and animal species
- the protection of water catchment values
- the management of fire to protect life and assets, and conserve biodiversity
- the provision of opportunities for self-reliant nature-based recreation in a natural setting consistent with the protection of the area's natural and cultural values
- the maintenance of relationships with neighbours and other organisations.

3. Values

This plan aims to conserve both natural and cultural values of Wongarbon Nature Reserve. The location, landforms and plant and animal communities of an area have determined how it has been used and valued by both Aboriginal and non-Aboriginal people. These values may be attached to the landscape as a whole or to individual components, for example, to plant and animal species used by Aboriginal people. To make this plan clear and easy to use, various aspects of natural heritage, cultural heritage, threats and ongoing use are dealt with individually, although these features are interrelated.

3.1 Geology, landscape and hydrology

Wongarbon Nature Reserve lies within the Pilliga Sandstone stratigraphic unit of the Surat Basin, part of the Great Australian Basin. The Pilliga Sandstone consists almost entirely of a medium to very coarse-grained, well sorted, quartzose sandstone and dates from the Jurassic–Cretaceous (65 to 205 million years old). Very minor interbeds of mudstone, siltstone and fine-grained sandstone occur sporadically in the unit, which is typically very porous and may contain up to 95% quartz. Rounded chert and quartzite pebbles are common, as is iron staining (RACAC 2002).

The reserve is within the Talbragar Valley subregion of the Brigalow Belt South Bioregion (DSEWPaC 2012). Although the reserve lies on the southern edge of the bioregion, the soils in the reserve are more closely aligned with the NSW South Western Slopes Bioregion subregion of Talbragar – Upper Macquarie terrace sands and gravels of the upper slopes Mitchell landscape (Mitchell 2002). These soils contain sandy quaternary alluvial sediments on the floodplains and terraces of the Talbragar River with a general elevation of 350 to 500 metres and local relief of 30 to 40 metres. Red-brown and red-yellow earthy sands with some yellow texture-contrast soils occur on the valley margins. Within the bioregion, river red gums (*Eucalyptus camaldulensis*) are found along the channels with yellow box (*E. melliodora*), rough-barked apple (*Angophora floribunda*) and white cypress pine (*Callitris glaucophylla* – previously *C. columellaris*) on the plain (Mitchell 2002).

The reserve lies 385 to 400 metres above sea level in a predominantly flat landscape. In general, the topography can be described as gently undulating with low ridges and narrow sub-alluvial floodplains associated with the Talbragar River and its drainage lines. The reserve is the highest point in the local landscape and forms part of the headwaters of Sandy Creek which flows north-west through the reserve, then through Beni State Conservation Area to the Talbragar River.

Issues

- Runoff into a drainage line next to Woodleys Road, which flows into Sandy Creek, is causing channelling and erosion along the western boundary of the reserve.

Desired outcomes

- Soil erosion is minimised and existing areas of erosion are stabilised.

Management response

- 3.1.1 Work with Dubbo Regional Council to stabilise and repair erosion along Woodleys Road.

3.2 Native plants and animals

A complete floristic survey has not been conducted in Wongarbon Nature Reserve. However, Doug Benson of the Royal Botanic Gardens conducted a brief vegetation survey of the reserve in 1979. Eighty-seven native plant species were recorded and two distinct vegetation

communities were described. No regionally significant or threatened plant species have been recorded in the reserve.

The more common and widespread community is Ironbark – Bulloak – Black Cypress Pine Woodland, which occurs across the reserve with the exception of five hectares in the north-east corner. Benson's survey described the reserve as having a dominant woodland vegetation of ironbarks (mugga ironbark *Eucalyptus sideroxylon* and narrow-leaved ironbark *E. crebra*) with grey box (*E. microcarpa*) and fuzzy box (*E. conica*) of about 10 to 12 metres in height. Smaller trees including bulloak (*Casuarina luehmannii*), black cypress pine (*Callitris endlicheri*) and white cypress pine ranging from 0.5–1 metre to 3–4 metres high were also present. A low open shrub layer, commonly including *Dillwynia juniperina* and spreading bush pea (*Pultenaea microphylla*) and less commonly including box-leaved wattle (*Acacia buxifolia*), native cherry (*Exocarpos cupressiformis*) and wedge-leaf hop-bush (*Dodonaea viscosa* subsp. *cuneata*), was also noted. Ground cover was described as open with small shrubs, graminoids, herbs, orchid species and ferns (Benson 1979).

The five hectares of the reserve's north-east corner is recognised as White Box – Yellow Box – Blakely's Red Gum Woodland Endangered Ecological Community listed under the Biodiversity Conservation Act (commonly referred to as Box–Gum Woodland EEC). This community conforms with the definition of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community as listed under the Environment Protection and Biodiversity Conservation Act. The reserve is included on the Grassy Ecosystems Conservation Management Network's register of Box–Gum Woodlands public sites (Grassy Ecosystems CMN 2010) in recognition of the occurrence of this community in the reserve. In the Benson report, the area is described as being a poorly drained depression with white box (*E. albens*), river red gum and Blakely's red gum (*E. blakelyi*) with a denser ground cover containing barbed wire grass (*Cymbopogon refractus*), winter apple (*Myoporum debile*), kidney weed (*Dichondra repens*) and other grasses and forbs (Benson 1979).

In 1978 Wongarbron Nature Reserve was listed on the Register of the National Estate (now the non-statutory Australian Heritage Database) for being 'an important remnant of the original temperate woodland vegetation from the central western slopes of New South Wales which forms a significant fauna refuge' (DoE n.d.).

No systematic native animal surveys have been conducted in the reserve, but at least 55 native animal species have been recorded, including:

- one reptile — the red-bellied black snake (*Pseudechis porphyriacus*)
- two mammals — the common ringtail possum (*Pseudocheirus peregrinus*) and the eastern grey kangaroo (*Macropus giganteus*)
- 52 birds, including two threatened bird species: the grey-crowned babbler and the brown treecreeper.

No amphibians have been recorded in the reserve (OEH 2012a).

Table 1 summarises the status of the threatened species and ecological communities found in the reserve.

The grey-crowned babbler and the brown treecreeper inhabit open eucalypt woodlands and forests, including Box–Gum Woodlands, usually with an open grassy understorey. Both species forage for insects in trees and on the ground among fallen timber and leaf litter. The maintenance of these key habitat components is an important consideration in the management of the reserve. Collection of wood for fires is therefore not an appropriate activity in the reserve because it removes important foraging habitat for these threatened species as well as many other ground-foraging species.

Table 1: Threatened species and ecological communities recorded in the reserve

Common name	Scientific name	BC Act status	EPBC Act status
Grey-crowned babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	V	–
Brown treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	V	–
White Box – Yellow Box – Blakely’s Red Gum Woodland ecological community		E	CE

BC Act = Biodiversity Conservation Act.

EPBC Act = Environment Protection and Biodiversity Conservation Act.

V = vulnerable, E = endangered, CE = critically endangered.

The grey-crowned babbler has a laborious flight pattern, preferring to hop to the top of a tree and glide down to the next one, and therefore it is generally unable to cross large open areas such as paddocks and other cleared expanses (OEH 2012c). Declines of the brown treecreeper have occurred in remnant vegetation fragments smaller than 300 hectares that have been isolated or fragmented for more than 50 years (OEH 2012b). In light of these issues and the fact that Wongarbon Nature Reserve is a small, isolated reserve in a highly fragmented and cleared landscape, maintaining connectivity with other woodland patches is a key consideration in the management of the reserve.

Strategies for the recovery of threatened species, populations and ecological communities have been set out in the statewide *Biodiversity Conservation Program* (OEH 2017). These actions are currently prioritised and implemented through the *Saving our Species* program which aims to maximise the number of threatened species that can be secured in the wild in New South Wales for 100 years (OEH 2013b). Individual recovery plans may also be prepared for threatened species to consider management needs in more detail.

The grey-crowned babbler and brown treecreeper have been assigned to the landscape species management stream under the *Saving our Species* program. This means these birds are distributed across relatively large areas and are subject to threatening processes that generally act at the landscape scale (e.g. habitat loss or degradation) rather than at distinct locations. However, there are priority recovery actions relevant to both species that can be implemented in the reserve, including:

- protect hollow-bearing dead and live trees, and stumps and fallen timber
- protect habitat and allow regeneration of potential habitat
- increase remnant size and connectivity of isolated woodland patches in the landscape.

Priority actions relevant to conservation of the Box–Gum Woodland EEC in the reserve include:

- undertake control of pest plants and animals (see Section 4.1)
- protect live and dead standing trees and leave fallen timber on the ground
- map and mark remnants of the EEC for future identification and reference
- retain and, where necessary, establish connective links between remnants that act as ‘stepping stones’ for both plants and animals to aid in pollen and seed dispersal.

Issues

- Information about plant and animal communities and populations of threatened species is limited.
- Inappropriate activities in the reserve (e.g. firewood collection and bushrock removal) are degrading the habitat values of the reserve, impacting on threatened species and ecological communities.
- Other threats include the impacts of introduced species, including predation on threatened species by pest animals and invasion by weeds such as exotic grasses and creepers (see Section 4.1).
- Since the 1979 vegetation survey, some localised weed infestations have occurred within the Ironbark – Bullock – Black Cypress Pine Woodland, and Coolatai grass (*Hyparrhenia hirta*) has invaded the Box–Gum Woodland EEC (see Section 4.1).
- The condition of the Box–Gum Woodland EEC in the reserve has not been formerly assessed and reserve-specific conservation management requirements have not been defined.
- Poor connectivity across the landscape is a long-term issue for this reserve (see Section 4.3).

Desired outcomes

- Negative impacts on threatened species and communities are minimised.
- Knowledge of natural values is adequate to inform the management and protection of species and communities.
- The habitat and populations of threatened species in the reserve are protected and maintained or enhanced.
- Structural diversity and habitat values are maintained throughout the reserve and restored in degraded areas.

Management response

- 3.2.1 Implement relevant recovery actions in the *Biodiversity Conservation Program* and recovery plans for threatened plants, animals and ecological communities present in the reserve.
- 3.2.2 Conduct systematic plant and animal surveys in the reserve.
- 3.2.3 Encourage and support threatened species surveys in the reserve, including population monitoring.
- 3.2.4 Assess the condition of the Box–Gum Woodland EEC, undertake ongoing condition monitoring, and prepare and implement a site management plan.
- 3.2.5 Engage the local community in the management of the reserve by promoting appropriate use and providing education to deter inappropriate activities such as firewood and bushrock collection.

3.3 Aboriginal connections to Country

Aboriginal communities have an association and connection to the land. The land, water, plants and animals within the landscape are central to Aboriginal spirituality and contribute to Aboriginal identity. Aboriginal communities associate natural resources with the use and enjoyment of foods and medicines, caring for the land, passing on cultural knowledge, kinship

systems and strengthening social bonds. Aboriginal heritage and connection to nature are inseparable and need to be managed in an integrated manner across the landscape.

Wongarbron Nature Reserve lies within the traditional Country of the Wiradjuri People and forms part of the cultural landscape associated with traditional use and occupation of their Country. Access to public reserves, such as Wongarbron Nature Reserve, is one way in which Aboriginal people may continue their connection with Country and provide opportunities for the teaching and maintenance of traditional and contemporary cultural practice.

There are no recorded Aboriginal sites in the reserve, however, the presence of sites a short distance away within Beni State Conservation Area suggests that sites are likely to be found within the reserve if a cultural survey were undertaken. Such sites are evidence of Aboriginal occupation or are related to aspects of Aboriginal culture. Aboriginal use and association with Country in or near the reserve requires further consultation with Wiradjuri People.

Although the NSW Government has legal responsibility for the protection of Aboriginal sites and places, NPWS acknowledges the right of Aboriginal people to make decisions about their own heritage. Aboriginal communities will be consulted and involved in managing Aboriginal sites, places and related issues; and in promoting and presenting Aboriginal culture and history.

NPWS supports non-commercial cultural use of wild resources, such as medicinal plants and bush tucker, subject to NPWS policies and licensing. Within the reserve, the quandong (*Santalum acuminatum*) is likely to have been used traditionally as a food plant.

The reserve lies in the Dubbo Local Aboriginal Land Council administrative area.

Issues

- There is a need for greater engagement with Aboriginal people in the management of Country.

Desired outcomes

- Aboriginal places and values are identified and protected.
- Aboriginal people have the opportunity to engage in the management of the reserve.
- Understanding of the Aboriginal cultural values of the reserve is improved.

Management response

- 3.3.1 Consult and involve relevant Aboriginal community organisations in managing the values of the reserve.
- 3.3.2 Conduct a survey, together with local Aboriginal communities, for Aboriginal sites in the reserve.
- 3.3.3 Provide opportunities for Aboriginal people to access Country, to maintain, renew or develop cultural practices and associations.
- 3.3.4 Permit cultural resource use where this is in accordance with NPWS policy and legislation.

3.4 Shared heritage

Heritage places and landscapes are made up of living stories as well as connections to the past that individuals and communities have inherited and wish to conserve for current and future generations, and can include natural resources, objects, customs and traditions. Cultural heritage comprises places and items that may have historical, scientific, cultural, social,

archaeological, architectural, natural or aesthetic significance. NPWS conserves the significant heritage features of the parks and reserves that it manages.

In 1897 the lands now comprising Wongarbron Nature Reserve were reserved as part of the 'temporary common' for the gazetted town of Murrumbidgee (later renamed Wongarbron). In 1925 a forest reserve was gazetted over 145 acres (59 hectares), with the remaining 100 acres (40 hectares) gazetted as a timber reserve in 1931 (LPI 2012). In 1965 these Crown reserves were dedicated as a faunal reserve under the Fauna Protection Act, known as 'Wongarbron Nature Reserve', for the purpose of the protection and care of native animals, the propagation of native animals and the promotion of the study of native animals. In the following year, the reserve gained additional protection through its declaration as a 'wildlife district'. Along with the other faunal reserves, Wongarbron Nature Reserve became a nature reserve under the National Parks and Wildlife Act when that Act commenced in January 1975.

There are no recorded historic heritage sites within the reserve, however, there is potential to identify sites relating to the forestry history and the use of the reserve as a common (OEH 2012d). Potential sites include a number of bottle dumps throughout the reserve and an area in the reserve's north-east that has been previously disturbed and cleared, and may have once been used as a borrow pit for local road building and other activities.

Issues

- There may be unrecorded historic sites within the reserve.
- There is limited knowledge about the historic heritage values of the reserve.

Desired outcomes

- Historic features within the reserve are identified and protected.
- Understanding of the historic heritage values of the reserve is improved.

Management response

- 3.4.1 Record and assess potential historic sites and manage them in accordance with their significance.
- 3.4.2 Undertake a thematic history and assessment of the historic heritage values of the reserve.

3.5 Visitor use

NPWS parks and reserves provide a range of visitor opportunities. NPWS aims to ensure that visitors enjoy, experience and appreciate parks at the same time as conserving and protecting park values. The primary purpose of nature reserves is to conserve nature, and while these reserves are managed to promote enjoyment and understanding of their natural and cultural values, visitor use is not a management principle of nature reserves.

Wongarbron Nature Reserve generally experiences low levels of visitation. There are no visitor facilities in the reserve and there is no public vehicle access. Pedestrian access to the reserve is via a gate at the north-west corner of the reserve off Woodleys Road.

Appropriate activities for the reserve include low-impact, self-reliant, nature-based activities such as birdwatching and nature appreciation. The reserve also provides opportunities for educational and research activities, and is known to be used occasionally by local interest groups for nature study. Areas of particular interest include observation of woodland birds and habitats, and the ecology and management of Box–Gum Woodland EEC.

Horse riding and cycling in the reserve are not considered appropriate due to the small size of the reserve, lack of any trails or roads suitable for riding. The prohibition of these activities in this reserve is consistent with NPWS policies, the NPWS *Strategic Directions for Horse Riding in NSW National Parks* (OEH 2012f) and the *Sustainable Mountain Biking Strategy* (OEH 2011). Overnight camping and campfires are not permitted.

Issues

- The reserve is small and therefore the risk of negative impacts by inappropriate use is increased.

Desired outcomes

- Visitor opportunities encourage appreciation and awareness of the reserve's values and their conservation.
- Visitor use of the reserve is appropriate and ecologically sustainable.
- Negative impacts on reserve values are minimised.

Management response

- 3.5.1 Provide opportunities for passive, nature-based activities in the reserve.
- 3.5.2 Continue to support use of the reserve by groups for education and nature study.
- 3.5.3 Communicate the values and appropriate uses of the reserve to the public through community education, signage and regular staff patrols.

4. Threats

4.1 Pests

Pest species are organisms that have negative health, environmental, economic and social impacts. Commonly they are introduced species. Pests can have impacts across the range of park values, including impacts on biodiversity, cultural heritage, catchment and scenic values. Pest species can have significant impacts on biodiversity in three main ways: through modification of species richness, species abundance and species composition. These impacts can have detrimental results for sensitive ecosystems such as those in the parks.

The Biosecurity Act 2015 and its regulations provide specific legal requirements for the response, management and control of biosecurity risks, including weeds and pest animals. These requirements apply equally to public and privately-owned land. Under this framework, Local Land Services (LLS) has prepared regional strategic weed management plans and regional strategic pest animal management plans for each of its 11 regions, including the Central West Region (Central West LLS 2017, Central West LLS 2018).

The LLS plans identify priority weeds and pest animals in each of the regions, plus the appropriate management response for the region (i.e. prevention/alert, eradication, containment or asset protection). These priorities will be implemented via the relevant NPWS pest management strategy.

NPWS prepares regional pest management strategies which identify the operations and control actions undertaken by NPWS to meet the priorities from regional strategic pest and weed management plans. This also includes other important programs such as the Biodiversity Conservation Program (see Section 3.2). The overriding objective of the NPWS regional pest management strategies is to minimise adverse impacts of introduced species on biodiversity and other park and community values while complying with legislative responsibilities. These strategies are regularly updated. Reactive programs may also be undertaken in cooperation with neighbouring land managers, in response to emerging issues.

The NPWS regional pest management strategy for Northern Plains Region (OEH 2012e) identifies pest species and priority programs for this reserve. The strategy also identifies where other site- or pest-specific plans or strategies need to be developed to provide a more detailed approach. Pest species recorded in the reserve are listed in Table 2 and discussed below.

The reserve has a high edge-to-area ratio leading to increased risk of infestation by new pest species or reinfestation of pests that have been eradicated (see Section 4.3). There is also ongoing potential for vertebrate pest populations to increase in response to seasonal conditions.

Coolatai grass

Coolatai grass was introduced from Africa to north-west New South Wales to stabilise soil in the 1940s and is now known to occur in all states of Australia except Tasmania. It is a highly invasive perennial tussock grass that displaces native ground cover, preventing the germination and establishment of native trees and shrubs. The seeds are very sticky and are spread easily by adhering to animals and vehicles. When established Coolatai grass will withstand considerable drought and fire pressures, and when it dries off the biomass creates a higher fuel load than native species which results in more-intense fires. Control can be undertaken via either physical removal or chemical treatment (DPI 2015b; OEH 2012e).

Invasion of native plant communities by exotic perennial grasses, such as Coolatai grass, is listed as a key threatening process under the Biodiversity Conservation Act (NSW SC 2003). In Wongarbon Nature Reserve, Coolatai grass has spread from the road reserve to the north-east into the Box–Gum Woodland EEC. Mapping and monitoring of the extent of Coolatai grass in

Wongarbon Nature Reserve will be undertaken to enable the effectiveness of the control program to be determined and any new incursions identified.

Table 2: Pest species recorded in Wongarbon Nature Reserve

Common name	Scientific name	Comment
Weeds		
Coolatai grass ^R	<i>Hyparrhenia hirta</i>	Population is located in the Box–Gum Woodland EEC. Distribution of the grass is pegged out on the ground. Invasion is occurring from the road reserve and cooperative control is currently being undertaken with Dubbo Regional Council with the aim of eradication.
Mother-of-millions ^R	<i>Bryophyllum</i> spp.	A small infestation (1 hectare) off Woodleys Road. Invasion is occurring from the road reserve and cooperative control is currently being undertaken with Dubbo Regional Council with the aim of eradication.
Bridal creeper ^R	<i>Asparagus asparagoides</i>	Newly emerged threat. One individual plant was identified and treated. The reserve is being monitored to identify any other individuals.
Prickly pear ^R	<i>Opuntia stricta</i>	Isolated population. Control is being undertaken with the aim of eradicating this weed from the reserve.
African boxthorn ^O	<i>Lycium ferocissimum</i>	Opportunistic control is being undertaken within the reserve.
Paterson's curse	<i>Echium plantagineum</i>	Isolated infestation along the northern boundary. Control is being undertaken with the aim of eradication.
Pest animals		
Brown hare / European rabbit ^P	<i>Lepus capensis</i> / <i>Oryctolagus cuniculus</i>	Populations are low within grassy communities. No observable impacts on natural values. No control is being undertaken.
Feral cat ^P	<i>Felis catus</i>	Predicted to occur. Control is limited.
Feral pig ^P	<i>Sus scrofa</i>	No population observed in the reserve. Control will be implemented as required and in accordance with the regional pest management strategy.
Red fox ^P	<i>Vulpes vulpes</i>	Populations are low within the reserve. Control is limited due to the proximity of residences.

^R Regional priority weeds (Central West LLS 2017).

^O Other regional weeds (Central West LLS 2017).

^P Regional priority pest species (Central West LLS 2018)

Mother-of-millions

Mother-of-millions originated in Madagascar and was introduced to Australia as a garden plant. It is a drought-resistant succulent that grows well on lighter soils and establishes into dense mats that displace and outcompete native plant species for resources. It reproduces both from seed and vegetatively, with each leaf producing a large number of plantlets. Control can be carried out either via physical removal, burning, herbicide application or a combination of these methods (DPI 2015c; OEH 2012e).

In Wongarbon Nature Reserve, mother-of-millions occurs as a small isolated infestation along the western edge of the reserve, adjacent to Woodleys Road. Control programs aim to remove this infestation from the reserve. The infestation will be mapped and monitored to determine the efficacy of the current control program.

Bridal creeper

Bridal creeper is a native of South Africa that was introduced as an ornamental plant. It grows in warm temperate regions and favours fertile, well-drained soils, commonly occurring on roadsides, vacant land and disturbed bushland close to habitation. It is a climbing perennial herb that grows to three metres high and produces underground tubers and sticky red berries. Bridal creeper is spread through the movement of tubers from earthworks and birds consuming berries and excreting viable seed. The dense canopy of climbing stems and foliage that it develops outcompete other vegetation including native species. The underground tubers become a dense mat that limit root growth of other vegetation and can also prevent seedling establishment (CRC for Australian Weed Management 2003; DPI 2014a; OEH 2012e).

Invasion and establishment of exotic vines and scramblers, such as bridal creeper, is listed as a key threatening process under the Biodiversity Conservation Act (NSW SC 2006).

A single bridal creeper plant was identified in 2011 in the reserve and is believed to have originated from dumped garden clippings. This plant was eradicated from the reserve in 2011 and ground inspections occur regularly to ensure no further plants arise.

Prickly pear

Prickly pear grows well in both exposed and semi-shaded situations. Clumps of prickly pear grow densely, forming an impenetrable barrier and can provide harbour for pest animals such as rabbits. They can spread short distances when segments and fruit drop to the ground and take root. Control is by biological control agents including cochineal and cactoblastis, and by chemical control (OEH 2012e).

The reserve contains an isolated and scattered population of prickly pear. The population does not appear to be increasing or spreading and is being treated with the aim of eradicating it from the reserve.

African boxthorn

African boxthorn is a native shrub from South Africa that was introduced as an ornamental plant. It grows on all soil types but establishes best on lighter soils, particularly along dry creek beds and is more prevalent on the well-drained soils of slopes and plains. African boxthorn is an aggressive invader of pastures, roadsides, reserves, remnant bushland and waterways. It forms an impenetrable, spiny thicket that inhibits the movement of animals and provides a haven for feral animals. The establishment of the shrubs may also change the structure of grassy communities to more shrubby communities and may lead to elevated fuel loads. African boxthorn fruit is commonly eaten by foxes and birds, which then spread its seeds. Plants also shoot readily from broken roots. Control is carried out by mechanical removal or herbicide application that requires follow-up treatment, and treated areas must be monitored for regrowth from root fragments or germinating seedlings (DPI 2015a).

Minor infestations of African boxthorn have been identified and treated in the reserve. Monitoring for reinfestation is occurring and control will be undertaken as required.

Paterson's curse

Paterson's curse (also known as Salvation Jane) is native to Europe and Africa, and was introduced to Australia in 1850. It has a wide tolerance to soils and climates. The plant compromises natural habitat values by crowding out and suppressing native vegetation. Control is by either physical removal, biological control, herbicide application or a combination of these methods (DPI 2014b).

An isolated infestation of Paterson's curse was found in the reserve along the northern boundary. The infestation is being treated with the aim of eradicating it from the reserve.

Desired outcomes

- Coolatai grass is eradicated from the Box–Gum Woodland EEC.
- Mother-of-millions, prickly pear, African boxthorn, bridal creeper, Coolatai grass and Paterson's curse are eradicated and prevented from re-establishing in the reserve.
- Establishment of new weed species populations in the reserve is prevented.
- Impacts of pest plants and animals on reserve values are minimised.

Management response

- 4.1.1 Manage pest species in line with pest management strategies relevant to the reserve.
- 4.1.2 Maintain the eradication program for Coolatai grass in the Box–Gum Woodland EEC and work cooperatively with Dubbo Regional Council to eradicate the species on adjacent land.
- 4.1.3 Maintain control programs for mother-of-millions, prickly pear, African boxthorn, bridal creeper, Coolatai grass and Paterson's curse until all mature plants in the reserve have been eradicated; and treat new outbreaks as a priority.
- 4.1.4 Maintain vigilance in monitoring for new weed species in the reserve and treat new outbreaks as a priority.
- 4.1.5 Seek the cooperation of neighbours in implementing pest control programs.
- 4.1.6 Maintain cooperative arrangements for pest species control with Central West Local Land Services and Dubbo Regional Council.

4.2 Fire

The primary objectives of NPWS fire management are to protect life, property, community assets and cultural heritage from the adverse impacts of fire, while also managing fire regimes in parks and reserves to maintain and enhance biodiversity. NPWS also assists in developing fire management practices that contribute to conserving biodiversity and cultural heritage across the landscape, and implements cooperative and coordinated fire management arrangements with other fire authorities, neighbours and the community (OEH 2013a).

Fire is a natural feature of many environments and is essential for the survival of some plant communities. Inappropriate fire regimes can, however, lead to loss of particular plant and animal species and communities, and high frequency fires have been listed as a key threatening process under the Biodiversity Conservation Act (NSW SC 2000a).

The fire history of Wongarbon Nature Reserve is well known and documented since 1966, with only one prescribed burn having been undertaken in 2005. This fire burned 3.95 hectares along the southern section of the eastern boundary of the reserve within the Ironbark – Bulloak – Black Cypress Pine Woodland community. This prescribed burn was conducted in cooperation with local Rural Fire Service brigades to remove windrowed timber along the boundary.

Fire risk within the ironbark and white cypress communities, which dominate the reserve, is considered low due to a lack of ground and elevated fuels. Although communities of cypress pine and bull oak will generate significant fuels from leaf fall, the arrangement of fuels will preclude these areas from burning under most conditions. The forests of the reserve are eucalypt-dominated and are adapted to fire. However, high frequency fire can result in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition (NSW SC 2000a). This is a particular issue in areas where structural diversity has been affected by other unauthorised activities, such as firewood collection.

The risk of fire entering the reserve is considered low. Roads running along the eastern and western boundaries of the reserve separate it from adjacent properties. To the north and outside the reserve, grazing of grassland fuels will reduce the risk of fire coming onto the reserve from other tenures.

In the adjacent area to the north, assets vulnerable to damage by fire include built structures such as houses and structures associated with dryland grazing and cropping enterprises. Within the reserve, three identification/regulatory signs and boundary fencing are the only infrastructure vulnerable to fire damage.

A fire management strategy, which defines the fire management approach for the reserve, has been prepared and is updated periodically. The *Wongarbon Nature Reserve Fire Management Strategy* (OEH 2012g) outlines the recent fire history of the reserve, key assets within and adjoining the reserve including sites of natural and cultural heritage value, fire management zones and fire control advantages such as management trails and water supply points. It also contains fire regime guidelines for conservation of the reserve's vegetation communities.

NPWS maintains cooperative arrangements with surrounding landowners and the Rural Fire Service and is actively involved with the Orana Bush Fire Management Committee. Cooperative arrangements include fire planning, fuel management and information sharing. Hazard reduction programs, ecological burning proposals and fire trail works are submitted annually to the bush fire management committee.

Desired outcomes

- Life, property and natural and cultural values are protected from fire.
- The potential for spread of fire from or into the reserve is minimised.
- Fire regimes are appropriate for conservation of native plant and animal communities.

Management response

- 4.2.1 Implement the fire management strategy for Wongarbon Nature Reserve and update it as required.
- 4.2.2 Work cooperatively with the neighbouring landholder to the north of the reserve to minimise the risk of fires spreading to or from the reserve.
- 4.2.3 Continue to be involved in the Orana Bush Fire Management Committee and maintain cooperative arrangements with local Rural Fire Service brigades and surrounding landowners in regard to fuel management and fire suppression.

4.3 Fragmentation and isolation

The reserve lies within the Talbragar Valley subregion of the Brigalow Belt South Bioregion (DSEWPaC 2012). This subregion, with less than 5% protected in reserves, is considered to be underrepresented in the national reserve system (DSEWPC 2012). Threats to values within the bioregion include increasing fragmentation of native vegetation, grazing pressure, vegetation clearing and invasion by exotic plant species. Increasing urbanisation is a particular threat within the Talbragar Valley subregion, with high pressures associated with subdivision and intensification of land use.

The area surrounding Wongarbon Nature Reserve has been extensively cleared, which has resulted in a high loss of biodiversity and fragmentation of habitat in the region. As Wongarbon Nature Reserve is a small, relatively isolated reserve in a highly fragmented landscape, this makes it vulnerable to significant losses from a single, large, catastrophic event such as a fire. In such an event, native animals within the reserve may be unable to find refuge and may become locally extinct. Small plant populations within the reserve may also be lost in a single event. The isolation of the reserve will limit capacity for natural recolonisation of native species of plants and animals.

Fragmented and narrow roadside vegetation currently provides the only potential links between Wongarbon Nature Reserve and other vegetated reserves in the area. These strips of vegetation, however, lack the connectivity and extent required to act as suitable wildlife movement corridors. Lack of suitable wildlife corridors linking the reserve to other naturally vegetated areas decreases the ability of species to migrate between areas and thus reduces the exchange of genetic material between individuals. This lack of genetic exchange may result in decreased fitness of some species in the reserve and hence their ability to cope with changes in the environment.

A high edge-to-area ratio for the reserve causes increased edge effects and provides a large boundary from which disturbances and pest plants and animals can impact and enter the reserve. The edge effects may prevent some species from using the reserve due to a lack of adequate areas of core habitat, that is, habitat which is free from disturbances such as noise, light, traffic and other human disturbances.

Long-term conservation of biodiversity depends on the protection, enhancement and connection of remaining habitat across the landscape, incorporating vegetation remnants on both public and private lands. Maintaining the integrity of the remaining habitat within the reserve and, where possible, linking this to adjacent areas of vegetation to facilitate wildlife corridors is important in ensuring the long-term viability of the reserve's biological values.

Desired outcomes

- Connectivity between the reserve and other areas of vegetation is improved.
- The integrity and condition of available habitat in the reserve is enhanced to enable it to better withstand environmental changes and catastrophic events.
- Edge effects and disturbances to the reserve are minimised where possible.

Management response

- 4.3.1 Work cooperatively with the local community, neighbours and local authorities to maintain, enhance or create wildlife corridors linking Wongarbon Nature Reserve with other reserves.
- 4.3.2 Maintain vigilance in preventing pests, weeds, wildfire and other negative impacts and activities from entering the reserve.

4.4 Climate change

Human-induced climate change is listed as a key threatening process under the Biodiversity Conservation Act (NSW SC 2000b) and the associated loss of habitat is listed under the Environment Protection and Biodiversity Conservation Act (TSSC 2001).

The latest information on projected changes to climate are from the NSW and ACT Regional Climate Modelling (NARClim) project (OEH 2014). The climate projections for 2020–2039 are described as ‘near future’, and projections for 2060–2079 are described as ‘far future’. The snapshot shown in Table 3 is for the Central West and Orana Region which includes Wongarbon Nature Reserve (OEH 2014).

Table 3: Climate change snapshot for Central West and Orana Region

Projected temperature changes	
Maximum temperatures are projected to increase in the near future by 0.4–1.0°C	Maximum temperatures are projected to increase in the far future by 1.8–2.7°C
Minimum temperatures are projected to increase in the near future by 0.5–0.9°C	Minimum temperatures are projected to increase in the far future by 1.5–2.6°C
The number of hot days (i.e. > 35°C) will increase	The number of cold nights (i.e. < 2°C) will decrease
Projected rainfall changes	
Rainfall is projected to decrease in spring	Rainfall is projected to increase in autumn
Projected Forest Fire Danger Index changes	
Average fire weather is projected to increase in summer, spring and winter	Severe fire weather days is projected to increase in summer, spring and winter

Source: OEH (2014).

The projected increases in temperature, number of hot days and severe fire weather days combined with the decreases in spring rainfall are likely to influence bushfire frequency and intensity across the region, extending the fire season.

The projected hotter and drier conditions are also likely to alter biodiversity and ecosystem processes, and the overall productivity of many ecosystems is likely to decline. Effects are likely to be most intense where existing pressures are exacerbated, such as in small, isolated and fragmented habitats like Wongarbon Nature Reserve. Reduced vegetation cover, caused by poorer growing conditions, is likely to leave many soils vulnerable to increased erosion and this risk is likely to be exacerbated by heavy downpours during more frequent and intense storms (DECCW 2010). Some significant pests and weeds are likely to increase, impacting on many ecological communities (DECCW 2010).

Climate change may also significantly affect native biodiversity by changing the size of populations and the distribution of native plants and animals, and altering the geographical extent and species composition of ecosystems. Some native species are likely to be reduced in numbers, contract in range and be lost from some localities altogether, while some hardier species are likely to persist. Species most at risk are those unable to migrate or adapt, particularly those with small population sizes or with slow growth rates. Within the reserve and surrounding areas this is of particular significance due to the high level of isolation and fragmentation of remnant vegetation. However, the magnitude of these impacts also depends on the compounding effects of other pressures, such as competition from and predation by pest animals.

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

Desired outcomes

- The effects of climate change on natural systems are minimised.
- The impacts of climate change on the reserve's threatened species and endangered ecological community are minimised.

Management response

- 4.4.1 Continue existing fire, pest, weed and erosion management programs to increase the reserve's ability to cope with future disturbances, including climate change.

5. Management operations and other uses

5.1 Management facilities and operations

In the past the reserve has been used for the collection of firewood, dumping of rubbish, horse and trail bike riding and dog walking, all of which have contributed to the degradation of the natural values of the reserve. Recent management actions, such as the installation of new fencing and pedestrian gates, signage and regular patrols of the reserve, have reduced occurrences of these activities.

A forested Crown road reserve is adjacent to the northern boundary of the reserve. A fence lies to the north of the road reserve, effectively fencing the road reserve into the nature reserve. NPWS will seek to have the road reserve included into the reserve. The fence is located on private property to the north of the Crown road reserve.

Boundary fencing

The fences along the roadsides on the eastern and western boundaries of the reserve are old and in poor condition. Installing replacement fencing on these boundaries will help protect the reserve from illegal and inappropriate activities such as firewood collection. There is also significant undermining of the western boundary fence caused by erosion from the adjacent road reserve (see Section 3.1).

Access and facilities

A locked gate at the north-west corner of the reserve off Woodleys Road facilitates NPWS access into the reserve for management purposes, however, there is no network of trails maintained in the reserve. The reserve may be accessed by pedestrians using this gate but no visitor facilities are provided (see Section 3.5).

Dams

There are no dams and no natural surface water in the reserve. Dams required for firefighting purposes are located on nearby properties and are indicated on the fire management strategy (see Section 4.2).

Signage

There are identification and regulatory signs at the southern corner of the reserve and at the entry gate at the north-west corner off Woodleys Road. A very old identification sign, in fair condition, also exists on the eastern boundary adjacent to Barbical Road.

Issues

- Some boundary fencing is in poor condition and unable to protect the reserve from illegal and inappropriate activities.

Desired outcomes

- Boundary fencing effectively protects the reserve from illegal and inappropriate activities.
- Inappropriate and illegal activities are minimised.

Management response

- 5.1.1 Establish and maintain reserve identification signage and fencing along the boundaries with public roads. Replace boundary fencing which is in poor condition.
- 5.1.2 Seek to include the Crown road reserve into the nature reserve.

6. Implementation

This plan of management establishes a scheme of operations for Wongarbon Nature Reserve.

Identified activities for implementation are listed in Table 4.

Relative priorities are allocated against each activity as follows:

- **High** priority activities are imperative to achieve the plan's objectives and desired outcomes, and must be undertaken in the near future to avoid significant deterioration in natural, cultural or management resources.
- **Medium** priority activities are necessary to achieve the plan's objectives and desired outcomes but are not urgent.
- **Low** priority activities are desirable to achieve the plan's objectives and desired outcomes but can wait until resources become available.
- **Ongoing** activities are undertaken on an annual basis or in response to an issue that arises.

This plan of management does not have a specific term and will stay in force until amended or replaced in accordance with the National Parks and Wildlife Act.

Table 4: List of management responses

No.	Management response	Priority
3.1 Geology, landscape and hydrology		
3.1.1	Work with Dubbo Regional Council to stabilise and repair erosion along Woodleys Road.	Medium
3.2 Native plants and animals		
3.2.1	Implement relevant recovery actions in the <i>Biodiversity Conservation Program</i> and recovery plans for threatened plants, animal and ecological communities present in the reserve.	Ongoing
3.2.2	Conduct systematic plant and animal surveys in the reserve.	Low
3.2.3	Encourage and support threatened species surveys in the reserve, including population monitoring.	Ongoing
3.2.4	Assess the condition of the Box–Gum Woodland EEC, undertake ongoing condition monitoring, and prepare and implement a site management plan.	Medium
3.2.5	Engage the local community in the management of the reserve by promoting appropriate use and providing education to deter inappropriate activities such as firewood and bushrock collection.	Ongoing
3.3 Aboriginal connections to Country		
3.3.1	Consult and involve relevant Aboriginal community organisations in managing the values of the reserve.	Ongoing
3.3.2	Conduct a survey, together with local Aboriginal communities, for Aboriginal sites in the reserve.	Low
3.3.3	Provide opportunities for Aboriginal people to access Country, to maintain, renew or develop cultural practices and associations.	Medium

No.	Management response	Priority
3.3.4	Permit cultural resource use where this is in accordance with NPWS policy and legislation.	Ongoing
3.4 Historic heritage		
3.4.1	Record and assess potential historic sites and manage them in accordance with their significance.	Medium
3.4.2	Undertake a thematic history and assessment of the historic heritage values of the reserve.	Low
3.5 Visitor use		
3.5.1	Provide opportunities for passive, nature-based recreation in the reserve.	Ongoing
3.5.2	Continue to support use of the reserve by groups for education and nature study.	Ongoing
3.5.3	Communicate the values and appropriate uses of the reserve to the public through community education, signage and regular staff patrols.	Medium
4.1 Pests		
4.1.1	Manage pest species in line with pest management strategies relevant to the reserve.	Ongoing
4.1.2	Maintain the eradication program for Coolatai grass in the Box–Gum Woodland EEC and work cooperatively with Dubbo Regional Council to eradicate the species on adjacent land.	High
4.1.3	Maintain control programs for mother-of-millions, prickly pear, African boxthorn, bridal creeper, Coolatai grass and Paterson’s curse until all mature plants in the reserve have been eradicated; and treat new outbreaks as a priority.	Ongoing
4.1.4	Maintain vigilance in monitoring for new weed species in the reserve and treat new outbreaks as a priority.	Ongoing
4.1.5	Seek the cooperation of neighbours in implementing pest control programs.	Ongoing
4.1.6	Maintain cooperative arrangements for pest species control with Central West Local Land Services and Dubbo Regional Council.	Ongoing
4.2 Fire		
4.2.1	Implement the fire management strategy for Wongarbon Nature Reserve and update it as required.	Ongoing
4.2.2	Work cooperatively with the neighbouring landholder to the north of the reserve to minimise the risk of fires spreading to or from the reserve.	Ongoing
4.2.3	Continue to be involved in the Orana Bush Fire Management Committee and maintain cooperative arrangements with local Rural Fire Service brigades and surrounding landowners in regard to fuel management and fire suppression.	Ongoing

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No.	Management response	Priority
4.3 Fragmentation and isolation		
4.3.1	Work cooperatively with the local community, neighbours and local authorities to maintain, enhance or create wildlife corridors linking Wongarbon Nature Reserve with other reserves.	Low
4.3.2	Maintain vigilance in preventing pests, weeds, wildfire and other negative impacts and activities from entering the reserve.	Ongoing
4.4 Climate change		
4.4.1	Continue existing fire, pest, weed and erosion management programs to increase the reserve's ability to cope with future disturbances, including climate change.	Ongoing
5.1 Management facilities and operations		
5.1.1	Establish and maintain reserve identification signage and fencing along the boundaries with public roads. Replace boundary fencing which is in poor condition.	Ongoing/ Low
5.1.2	Seek to include the Crown road reserve into the nature reserve.	Low

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