



# Plan of Management

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## Willala Aboriginal Area

Willala Aboriginal Area Community Conservation Area Zone 2



# Willala Aboriginal Area Plan of Management

**NSW National Parks and Wildlife Service**

**January 2013**

**This plan of management was adopted by the Minister for the Environment on 16<sup>th</sup> January 2013.**

## **Acknowledgements**

The NPWS acknowledges that this reserve is in the traditional country of the Gamilaraay Aboriginal people.

This plan of management was prepared by staff of the Northern Plains Region of the NSW National Parks and Wildlife Service (NPWS) in consultation with the Gawambaraay Pilliga Co-management Committee.

Artwork by Michael Horne. Photography by Michael Murphy (NPWS).

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## FOREWORD

Willala Aboriginal Area is situated on the eastern edge of the Pilliga forest approximately 70 kilometres east of Baradine, and covers an area of 1,347 hectares. It was reserved in 2005 under the *Brigalow and Nandewar Community Conservation Area Act 2005* because of its significant Aboriginal cultural heritage values.

The reserve is managed under a Memorandum of Understanding with the Gawambaraay Pilliga Co-management Committee. The committee includes Elders and Aboriginal community representatives from Baradine, Coonabarabran, Gunnedah, Gwabegar, Narrabri and Pilliga.

The reserve contains land that is of high cultural significance to local Aboriginal communities and a range of Aboriginal sites, including etchings, hand stencils, ochre quarries, grinding grooves and stone artefact scatters. It also contains sites of historic heritage value, including a section of the Pilliga Dog Proof Fence. Sixteen threatened animal species, three threatened plant species and two endangered ecological communities have also been recorded in the reserve.

A draft plan of management for Willala Aboriginal Area was placed on public exhibition from 25<sup>th</sup> May until 27<sup>th</sup> August 2012. The submissions received were carefully considered before adopting this plan.

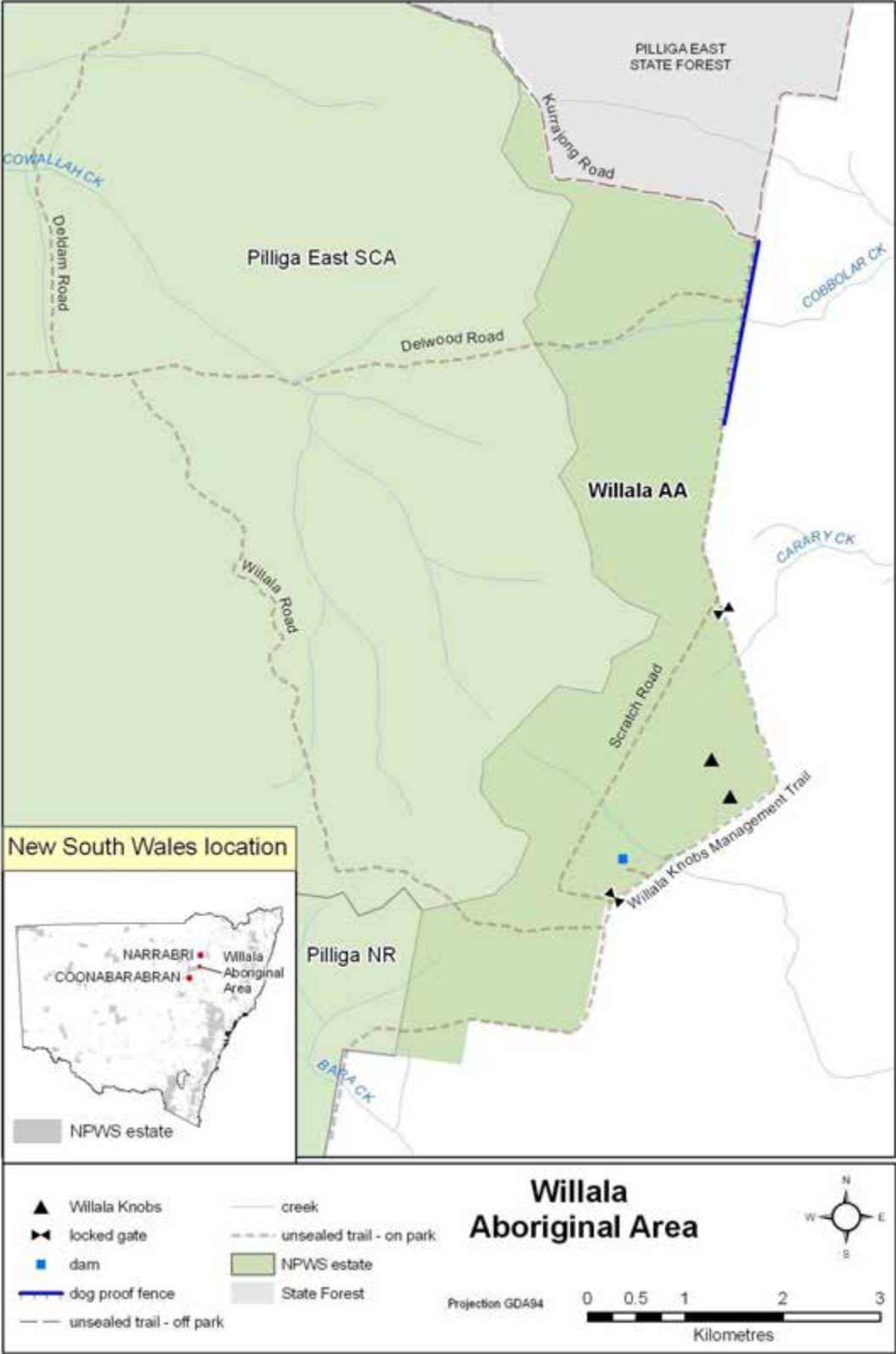
The plan contains a number of actions to achieve the NSW 2021 goal to protect our natural environment, including actions to assist the recovery of threatened species and communities, continued control of weeds and pest animals, especially feral goats, and implementation of the reserve fire management strategy. The plan also provides for low key recreation activities such as walking, cycling, driving and enjoyment of the natural and cultural heritage values.

This plan of management establishes the scheme of operations for Willala Aboriginal Area. In accordance with section 73B of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.



**Robyn Parker MP**  
**Minister for the Environment**

# MAP OF WILLALA ABORIGINAL AREA



## 1. LOCATION, GAZETTAL AND REGIONAL CONTEXT

Willala Aboriginal Area (also referred to in this plan as “the reserve”) is located on the eastern edge of the Pilliga forest approximately 70 kilometres east of Baradine and 26 kilometres west of Boggabri, in northern inland NSW. The Pilliga forest is the largest surviving area of forest and woodland in NSW west of the Great Dividing Range. The reserve is 1347 hectares in area and was gazetted in December 2005 because of its significant Aboriginal cultural heritage values. Prior to gazettal the reserve was part of Pilliga East State Forest and was managed by Forests NSW as a commercial forest.

The reserve is within the geographical area of the Narrabri local government area and is zoned *1(a) – General Rural* in the Narrabri Local Environmental Plan (1992). It is within the area of the Namoi Catchment Management Authority and the Red Chief Local Aboriginal Land Council.

Willala Aboriginal Area is on the eastern edge of the Pilliga sub-region in the Brigalow Belt South Bioregion. It is one of the reserves established under the *Brigalow and Nandewar Community Conservation Area Act 2005* (BNCCA Act) and as such forms part of a chain of reserves stretching the length of the Brigalow Belt South Bioregion in NSW.

The reserve was originally gazetted under the name Pilliga East Aboriginal Area. In October 2010 the name was officially changed to Willala Aboriginal Area. Willala is the name of several prominent geographic features in the local landscape, including the Willala Knobs and Willala Hills within the reserve, and is thought to be of local *Gamilaraay* language origin.

Willala Aboriginal Area is bounded by Pilliga Nature Reserve and Pilliga East State Conservation Area to the west and Pilliga East State Forest to the north. To the east of the reserve are the Liverpool Plains, today a richly productive agricultural area. Private properties abut the reserve to the east and south and are primarily used for grazing and cropping.

## 2. MANAGEMENT CONTEXT

### 2.1 LEGISLATIVE AND POLICY FRAMEWORK

The management of the community conservation area is in the context of a legislative and policy framework, primarily the *National Parks and Wildlife Act 1974* (NPW Act) and Regulation, the Community Conservation Area Agreement developed under the BNCCA Act, the *Threatened Species Conservation Act 1995* (TSC Act) and the policies of the National Parks and Wildlife Service (NPWS).

Other legislation, strategies and international agreements may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979* may require assessment of environmental impact of works proposed in this plan. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) may apply in relation to actions that impact on matters of National Environmental Significance, such as migratory and threatened species listed under that Act.

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted a plan, the plan must be carried out and no operations may be undertaken within the Willala Aboriginal Area except in accordance with the plan. This plan will also apply to any future additions to the park. 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

### Community Conservation Areas

Community conservation areas are established under the BNCCA Act. This Act provides for four dedicated management zones of which zones 1, 2 and 3 relate to land reserved under the NPW Act as a national park, Aboriginal area or a state conservation area respectively. Land in zones 1, 2 and 3 are managed consistent with the management principles set out in the NPW Act.

### Aboriginal Area

Zone 2 community conservation areas are reserved as an Aboriginal Area under the NPW Act to protect and conserve areas associated with a person, event or historical theme, or containing a building, place, feature or landscape of natural or cultural significance to Aboriginal people, or of importance in improving public understanding of Aboriginal culture and its development and transitions. Under the Act (section 30K), Zone 2 community conservation areas are therefore managed to:

- conserve natural values, buildings, places, objects, features and landscapes of cultural value to Aboriginal people in accordance with the cultural values of the Aboriginal people to whose heritage the buildings, places, objects, features or landscapes belong;
- conserve natural and other cultural values;
- allow use of the Aboriginal area by Aboriginal people for cultural purposes;
- promote public appreciation and understanding of the area's natural and cultural values and significance where appropriate; and
- provide for appropriate research and monitoring, in accordance with the cultural values of the Aboriginal people.

Zone 2 community conservation areas are places that have been identified as having special significance to Aboriginal people. The primary purpose of Aboriginal areas is the conservation of Aboriginal heritage.

## 2.3 STATEMENT OF SIGNIFICANCE

Willala Aboriginal Area is considered to be of significance for:

- Aboriginal Heritage Values: The reserve is of high cultural significance to local Aboriginal communities. A range of Aboriginal sites have been recorded and local families maintain a strong contemporary connection.
- Historic Heritage Values: The reserve contains sites of historic heritage value including a section of the Pilliga Dog Proof Fence (of state-level significance) and historical graffiti (of local significance).
- Biological Values: The reserve is known to support 16 animal species, three plant species and two ecological communities listed as threatened under the TSC Act, as well as another eight animal species of regional conservation concern.
- Research/Education Values: The reserve contains a sub-fossil deposit of mammal remains which is an important resource for scientific research.



## 2.4 SPECIFIC MANAGEMENT DIRECTIONS

Management of Willala Aboriginal Area will focus on the protection of Aboriginal and historic heritage values, supporting ongoing Aboriginal cultural association and the protection of significant fauna, flora and vegetation communities.

Major strategies to achieve these objectives are:

- Cooperative management of the reserve with local Aboriginal communities through the Gawambaraay Pilliga Co-management Committee (GPCC);
- Supporting appropriate use of the reserve by local Aboriginal communities for cultural purposes through the GPCC;
- Protection of cultural heritage places with community involvement, in particular from members of local Aboriginal communities;
- On-going fire management so that people and property are protected from wildfire and reserve values are maintained;
- On-going control of pests and weeds with a focus on those species likely to have an adverse effect on significant reserve values; and
- Supporting research into the reserve's natural and cultural values.

## 3. VALUES

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

### 3.1 GEOLOGY, LANDSCAPE AND HYDROLOGY

The underlying geology of Willala Aboriginal Area is Pilliga Sandstone, a medium to very coarse-grained quartzose sandstone of Jurassic age. The soil is predominantly a coarse-grained sandy soil with a high susceptibility to erosion. The reserve has an undulating terrain with a number of low rocky hills and knolls, many featuring shallow caves and overhangs, and an elevation ranging from 370-480 metres above sea level. Prominent scenic landscape features include the Willala Knobs and Willala Hills. The undulating terrain in this part of the Pilliga forest contrasts with the flat sand plains of the northern and western Pilliga.

The reserve is located on the western margin of the Coxs Creek subcatchment of the Namoi River. The majority of this subcatchment has been cleared for agriculture. The minor ephemeral streams occurring in the reserve drain in a generally easterly direction.

### 3.2 ABORIGINAL HERITAGE

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

Willala Aboriginal Area was gazetted on the basis of its significant Aboriginal cultural values. The reserve is part of the *Gawambaraay* dialect area in *Gamilaraay* Aboriginal Country and is within the area of the Red Chief Local Aboriginal Land Council.

The prominent sandstone hills and outcrops and the close proximity to the rich resources of the Liverpool Plains contributed to the cultural importance of the land now comprising Willala Aboriginal Area in traditional times.



**Photo 1: View over the Liverpool Plains from Willala Knobs, Willala Aboriginal Area**

A variety of Aboriginal sites have been recorded within the reserve, including etched rock art featuring *dhinawan* (emu) and *wan.guy* (wallaby) footprints, hand stencil ochre rock art, ochre quarries, grinding grooves and stone artefact scatters. Many of these sites are associated with prominent rock outcrops. A major axe grinding groove site in the reserve is the largest known in the Pilliga forest. Not all known sites have been formally recorded and there is a high likelihood for additional sites to be found. Aboriginal sites are highly valued physical evidence of traditional use of the land by generations of *Gamilaraay* people.



**Photo 2: etched rock art of *dhinawan* (emu) tracks, Willala Aboriginal Area**



**Photo 3: etched rock art of *wan guy* (wallaby) tracks, Willala Aboriginal Area**



**Photo 4: hand stencil in ochre, Willala Aboriginal Area**



**Photo 5: grinding grooves, Willala Aboriginal Area**

Local Aboriginal communities maintain a strong contemporary connection to the reserve. The Trindall-Reid-Miller-Horne family from the Boggabri Aboriginal community lived and worked in the forest for many generations, working in sleeper cutting camps and as doggers along the dog fence, collecting firewood and food and breaking horses. Descendants of the family live today in Boggabri, Gunnedah and Narrabri.





*"I was born in Boggabri in 1933 – one of twins. My mother was Linda Hope Trindall. She taught us about our family and how we lived. Mum's aunty was Emily Reid – she was a full blood. We lived in Miller's shack and 'Boeyaba' (on freehold property east of Willala Aboriginal Area) when I was young. We didn't have a lot. If you had two matching socks you were considered flash. We walked all over there to get tucker. We knew where it was and we knew what time to get it. You gotta know the season when they come."*

Aunty Delma Miller: March 2011

*"I grew up working in the Pilliga –sleeper cutting, bee keeping, farm work – I worked for some good people. It's a peaceful place and we knew it backwards. We were always hunting and gathering in the scrub – pigs, emu eggs, goats, porcupines, ducks, pigeons, bugglies, bobby cod and all sorts of bush medicine. I got material from the scrub for my art too – wood to make clap sticks, boomerangs and didgeridoos, bark and ochre for painting and emu feathers and porcupine quills as well. I found artefacts, caves and rock art too that are special to our people. It's a blood feeling I have with this land. It's a spiritual thing."*

Mick Horne, Gawambaraay Pilliga Co-management Committee representative: March 2011



*"That's my family's country out there. My great grandfather on my mother's side used to live out there. My great grandfather on my father's side used to break horses and cut sleepers in the Pilliga. When I was growing up my family used to talk about Aboriginal sites. I think it's really important to look after all these sites – where they are."*

Robert "Budge" Miller, Gawambaraay Pilliga Co-management Committee representative: March 2011

The Coonamble Aboriginal community also has a connection to Willala Aboriginal Area. The Pilliga Forest Aboriginal Management Committee was formed to provide advice to Forests NSW on management of the state forests of the Pilliga to protect Aboriginal heritage values. Uncle Doug Fernando, a representative from the Coonamble community, suffered a fatal fall during a meeting of the committee at Willala Knobs (at that time part of Pilliga East State Forest) in February 2002. A plaque at the site commemorates Uncle Doug's contribution to the protection of the significant Aboriginal cultural heritage values of the Willala area.

Cooperative management of the reserve today occurs through the Gawambaraay Pilliga Co-management Committee under a Memorandum of Understanding with the NPWS. This committee was formed in 2002 and now has co-management responsibility for Pilliga Nature Reserve, Dandry Gorge Aboriginal Area and Ukerbarley Aboriginal Area as well as Willala Aboriginal Area. The committee includes Elders and community representatives from Baradine, Coonabarabran, Gunnedah, Gwabegar, Narrabri and Pilliga working together with local NPWS staff. The committee provides an avenue for pro-active and sustained involvement of local Aboriginal communities in the management and cultural use of these reserves. The success of the co-management arrangements depends on mutual respect and valuing the contribution of both traditional knowledge and park management knowledge in protecting this part of *Gamilaraay* Country. The primary focus of the committee is the protection, identification and recording of Aboriginal cultural heritage values in the reserves and supporting the continued connection with Country of local Aboriginal communities. Under the terms of the Memorandum of Understanding, the NPWS will support sustainable and appropriate use of cultural resources in the reserve by local Aboriginal communities and will provide assistance to the co-management committee in applying for relevant licences or consents under the NPW Act.

The area of the reserve east of Scratch Road, including the Willala Knobs, was fenced as an Occupation Permit for stock grazing prior to gazettal. In consultation with the Gawambaraay Pilliga Co-management Committee this fence has been maintained and locked gates installed on Willala Knobs Management Trail to control public access, particularly unauthorised vehicle entry to this area, and provide greater protection to significant Aboriginal sites and other values located in this area of the reserve. A basic walking track (Australian Standard Class 4-5) has been constructed at Willala Knobs to assist local Aboriginal communities wishing to visit Aboriginal sites for cultural purposes.

Opportunities exist for co-operative involvement of local Aboriginal people in Aboriginal site identification and protection, walking track maintenance and implementation of other reserve management activities.

### **3.3 HISTORIC HERITAGE**

Pastoralists associated with the early European settlement of the Liverpool Plains and other areas adjacent to the Pilliga forest experienced frequent problems with dingoes. Individual landowners bordering the Pilliga forest constructed dog-proof fencing in an effort to protect their stock from predation. In 1939 the NSW government made unemployment relief funds available for repairs to the dog proof fencing and in the 1940s coordinated works were undertaken to repair and link up individual property dog fencing to provide a continuous dog proof fence around the eastern and northern edges of the Pilliga forest (Rolls 1982; Brooks 2002). Professional hunters known as 'doggers' were employed to poison, trap and shoot dingoes along the fence (High Ground Consulting 2008). By the 1960s the fence was no longer under coordinated management and maintenance reverted to individual landowners. Surviving sections of the fence are considered of state-level historic heritage significance, representing national, state and regional heritage themes (High Ground Consulting 2008). Surviving sections along the eastern boundary of Willala Aboriginal Area include examples of both early lace type fencing (dating from the late 19<sup>th</sup> century) and later wire netting

fencing (early 20<sup>th</sup> century) (High Ground Consulting 2008). Opportunities exist for cooperation with reserve neighbours to conserve and maintain example sections of historic fencing.

Graffiti etched into the surface of rock outcrops at several sites in the reserve provide a record of visits to the area by local communities during the late 19<sup>th</sup> to mid 20<sup>th</sup> centuries. Some of the names recorded relate to local farming families still residing in the area, such as the Donaldson family, who have been part of the local farming community since 1879 (Jan Donaldson pers. comm. December 2010). Conservation of this graffiti as locally significant historic heritage items is appropriate but will be challenging. The soft nature of the rock (making it easy to etch) also means that in most locations, particularly exposed sites, historic graffiti is readily weathered and lost. Retention of historic graffiti is also likely to encourage additional (modern) graffiti.

### 3.4 NATIVE PLANTS

Willala Aboriginal Area and other NPWS reserves in the Pilliga landscape conserve significant examples of the largest remaining area of native forest and woodland west of the Great Dividing Range in NSW. The reserve's vegetation reflects its location on the eastern edge of the Pilliga forest on the margin of the more fertile Liverpool Plains.

Vegetation mapping of the reserve was completed in 2011 and included establishment of permanent monitoring plots in all identified vegetation communities (Hunter 2011). Ten vegetation communities were identified. The predominant community is a shrubby woodland of broad-leaved ironbark (*Eucalyptus fibrosa*), brown bloodwood (*E. trachyphloia*) and black cypress pine (*Callitris endlicheri*). Additional communities present include various woodland associations of Dwyer's red gum (*E. dwyeri*), narrow-leaved ironbark (*E. crebra*), scribbly gum (*E. racemosa* ssp. *rossii*), red stringybark (*E. macrorhyncha*), rough-barked apple (*Angophora floribunda*), white cypress pine (*Callitris glaucophylla*) and motherumbah (*Acacia cheelii*). The Atlas of NSW Wildlife (OEH 2013) includes records of 192 native flora species from the reserve

Two vegetation communities with restricted distributions in the reserve are of particular conservation significance. A box woodland community identified as white box (*E. albens*) - white cypress pine - grey box (*E. moluccana*) - yellow box (*E. melliodora*) woodland (community 2a) by Hunter (2011) (about 20 hectares within the reserve) includes areas with a grassy understorey. These areas are recognised and protected as an endangered ecological community under the TSC Act as White Box – Yellow Box – Blakely's Red Gum Community and under the EPBC Act as White Box – Yellow Box – Blakely's Red Gum Grassy Woodland or derived native grassland (white box grassy woodland). A dry rainforest dominated by red ash (*Alphitonia excelsa*) and wilga (*Geijera parviflora*) (about 1.5 hectares within the reserve) is a very restricted and fragmented community and forms part of the Semi-Evergreen Vine Thicket community of the Brigalow Belt and Nandewar Bioregion listed as an endangered ecological community under the TSC Act and EPBC Act (Benson *et al.* 2010; Hunter 2011) (dry rainforest). Both communities occur on the eastern margin of the reserve and extend onto adjacent freehold land. In addition, three flora species listed under the TSC Act have been recorded in the reserve (Table 1).

### 3.5 NATIVE ANIMALS

Willala Aboriginal Area provides important habitat for a range of native fauna species increasingly rare on the western slopes of NSW, such as declining woodland birds, reptiles and small mammals. The Atlas of NSW Wildlife (OEH 2013) includes records of 124 native fauna species from the reserve: five frogs, 18 reptiles, 80 birds and 21 mammals. A basic

systematic survey of vertebrate fauna in Willala Aboriginal Area was done in October 2009 (DECCW 2010a), as part of a regional biodiversity monitoring strategy (DECC 2009). A total of 108 species were recorded, with the results providing baseline data for ongoing monitoring.

Sixteen vertebrate species listed under the TSC Act have been recorded in or within one kilometre of the reserve (Table 1), of which one species, the brush-tailed rock-wallaby (*Petrogale penicillata*), is considered to now be locally extinct.

**Table 1. Threatened communities and species recorded in or near Willala Aboriginal Area**

Common name	Scientific name	Status *
<b>Ecological communities</b>		
Box Woodland	White Box <i>Eucalyptus albens</i> -Yellow Box <i>Eucalyptus melliodora</i> -Blakely's Red Gum <i>Eucalyptus blakelyi</i> woodland	Endangered #
Dry Rainforest	Semi Evergreen Vine Thickets of the Brigalow Belt and Nandewar Bioregions	Endangered #
<b>Flora</b>		
Large-leafed Monotaxis	<i>Monotaxis macrophylla</i>	Endangered
Scrambling Lignum	<i>Muehlenbeckia costata</i>	Endangered
	<i>Rulingia procumbens</i>	Vulnerable #
<b>Fauna</b>		
Barking Owl	<i>Ninox connivens</i>	Vulnerable
Bush Stone-curlew	<i>Burhinus grallarius</i>	Endangered
Glossy Black-cockatoo	<i>Calyptorhynchus lathami</i>	Vulnerable
Turquoise Parrot	<i>Neophema pulchella</i>	Vulnerable
Diamond Firetail	<i>Stagonopleura guttata</i>	Vulnerable
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnis victoriae</i>	Vulnerable
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	Vulnerable
Speckled Warbler	<i>Pyrrholaemus sagittata</i>	Vulnerable
Varied Sittella	<i>Daphoenositta chrysoptera</i>	Vulnerable
Brush-tailed Rock-wallaby	<i>Petrogale penicillata</i>	Vulnerable #
Eastern Pygmy-possum	<i>Cercartetus nanus</i>	Vulnerable
Koala	<i>Phascolarctos cinereus</i>	Vulnerable
Pilliga (Delicate) Mouse	<i>Pseudomys pilligaensis</i>	Vulnerable #
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	Vulnerable
Corben's Long-eared Bat	<i>Nyctophilus corbeni</i>	Vulnerable #
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	Vulnerable #

\* Status under TSC Act.

# Denotes species or community also listed as nationally threatened under the EPBC Act.

Of the threatened species and communities listed in Table 1, recovery plans or draft recovery plans have been prepared for the barking owl, bush stone-curlew, brush-tailed rock-wallaby and koala. Recovery actions for other species and communities are included in the Priorities Action Statement, which will be used to guide management of threatened species and communities in the reserve.

Another seven bird species found in the reserve are of regional conservation concern in Australia's temperate woodlands: the emu (*Dromaius novaehollandiae*), peaceful dove (*Geopelia striata*), jacky winter (*Microeca fascinans*), eastern yellow robin (*Eopsaltria australis*), rufous whistler (*Pachycephala rufiventris*), apostlebird (*Struthidea cinerea*) and double-barred finch (*Taeniopygia bichenovii*) (Reid 1999; Traill and Duncan 2000). The common wombat (*Vombatus ursinus*) population in the reserve is considered of regional conservation significance as the species is rare and close to the western edge of its distribution in the Pilliga forest. A pair of peregrine falcons (*Falco peregrinus*) nests in the reserve. The walking track constructed at Willala Knobs is in close proximity to this nest, which is situated close to ground level. Annual nest monitoring has been initiated and this section of track is closed from September to December each year given the nest's particular susceptibility to disturbance. Another pair of falcons nest nearby immediately adjacent to the reserve.

Invertebrate fauna diversity in Willala Aboriginal Area and the broader Pilliga landscape has not been comprehensively assessed. A survey of the molluscs of the Pilliga landscape (Murphy and Shea in prep.) identified a rich land snail and aquatic mollusc fauna. Species found in Willala Aboriginal Area include the camaenid land snail *Galadistes pilligaensis* which is endemic to the Pilliga forest and nearby forest areas.

### 3.6 VISITOR USE

NPWS parks and reserves provide a range of visitor opportunities. The NPWS aims to ensure that visitors enjoy, experience and appreciate the parks while park values are conserved and protected.

Willala Aboriginal Area provides opportunities for low key, self-reliant nature based recreational opportunities such as bushwalking, cycling or driving on roads and bird watching. The reserve provides these opportunities in a natural western slopes setting which includes open forest and woodlands.

The reserve generally experiences low levels of visitation, related to its remote location and small size. There are no visitor facilities provided in the reserve and visitors are predominantly members of the local Aboriginal community. Opportunities exist to promote self-guided vehicle tour routes incorporating the reserve.

The reserve is accessed from the west via Delwood Road in Pilliga East State Conservation Area or from the north via forestry roads in Pilliga East State Forest. Public vehicle access is not permitted in Pilliga Nature Reserve to the south (NPWS 2003). Willala Aboriginal Area is approximately 28 kilometres from the Newell Highway via Delwood Road. Public vehicle access to the reserve is suited to four wheel drive vehicles only.

Delwood Road, Scratch Road and Willala Road (known locally as Willala Trail) are roads within the reserve which are generally open for appropriate public use, though they may be closed for management reasons (DECCW 2010b). Willala Knobs Management Trail (refer map) is closed to public vehicle access. This area of the reserve contains a high number of significant, fragile or sensitive cultural and/or natural values (refer section 3.2 Aboriginal Heritage). In addition, this road includes relatively steep sections which are easily damaged



by vehicle use during wet weather. Vehicle access to Willala Knobs Management Trail is controlled by fencing and locked gates. A basic walking track (Australian Standard Class 4-5) has been constructed at Willala Knobs to assist local Aboriginal communities wishing to visit Aboriginal sites for cultural purposes. This area may be accessed by the public as part of a licensed guided tour.

Horse riding is not considered an appropriate activity within the reserve due to the highly erosive soils and the potential for weed introduction. There is no known history of recreational horse riding in the reserve. Extensive opportunities for horse-riding exist in Pilliga East State Forest immediately north of the Willala Aboriginal Area.

The impacts of visitor use on the reserve will be monitored.

### 3.7 RESEARCH

The reserve is a valuable benchmark resource as part of the largest remaining area of native forest in inland NSW. It supports populations of native flora and fauna declining in many parts of the NSW western slopes.

The reserve contains a sub-fossil deposit of mammal remains associated with an old owl roost site. Preliminary assessment of this deposit identified a range of mammal species no longer found in the region and described the site as being of outstanding quality (Ford 2010). A list of the native rodents identified from the deposit to date (Table 2 – from Ford 2010) illustrates the value of the site in relation to research into historical changes in regional fauna.

**Table 2. Native rodents from owl roost deposit in Willala Aboriginal Area**

Common name	Scientific name	Status
White-footed Rabbit-Rat	<i>Conilurus albipes</i>	Extinct
Fawn-footed Melomys	<i>Melomys cervinipes</i>	Regionally extinct
Hopping Mouse	<i>Notomys</i> sp.	Regionally extinct
Plains Rat	<i>Pseudomys australis</i>	Regionally extinct
Pilliga (Delicate) Mouse	<i>Pseudomys pilligaensis</i>	Vulnerable
Desert Mouse	<i>Pseudomys desertor</i>	Regionally extinct
Eastern Chestnut Mouse	<i>Pseudomys gracilicaudatus</i>	Regionally extinct
Bush Rat	<i>Rattus fuscipes</i>	Regionally extinct
Swamp Rat	<i>Rattus lutreolus</i>	Regionally extinct
Pale Field Rat	<i>Rattus tunneyi</i>	Regionally extinct

## 4. ISSUES

### 4.1 WEEDS AND PEST ANIMALS

The most significant weed in the reserve is prickly pear (*Opuntia* spp.), occurring as scattered populations throughout the reserve. Prickly pear is listed as a class 4 noxious weed under the *Noxious Weeds Act* 1993. A chemical control program is currently in place. Additional weed species are generally restricted to disturbed margins and adjacent to trails. Control of weeds in endangered ecological communities in the reserve is a particular priority.

The most significant pest animals are the goat (*Capra hircus*) and red fox (*Vulpes vulpes*). Goats occur as scattered populations throughout the reserve while the fox is widespread throughout the reserve.

Feral goats are of key concern in the reserve because of their impact on natural and cultural values, particularly those associated with rock outcrops. Goats regularly occupy rock overhangs and caves in the reserve resulting in degradation and damage to Aboriginal rock art sites, historic graffiti sites and the identified sub-fossil research site. Goats graze on native flora and have been identified as a threat to the threatened dry rainforest community (Benson *et al.* 2010; Hunter 2011). They also impact on neighbouring agricultural enterprises and are likely to have been at least in part responsible for the loss of the brush-tailed rock-wallaby from the local area, through competition for food and shelter. Aerial culling programs targeting feral goats have been undertaken in the reserve in the past; however, given the large size of the Pilliga forest it is not cost effective to extend control over the entire area and therefore reinvasion can occur quickly (DECC 2007). Alternative goat control strategies need to be investigated. Steel-mesh flooring has been installed at two Aboriginal rock art sites in the reserve in an attempt to deter goat activity and is currently being monitored.

Foxes are of key concern because of their predation on small mammals and ground-nesting birds, particularly threatened species such as the Pilliga mouse (*Pseudomys pilligaensis*) and bush stone-curlew (*Burhinus grallarius*). A baiting control program is currently in place, aimed at reducing the threat of predation on these species.

Another pest species of growing concern is the pig (*Sus scrofa*), which occurs as scattered populations throughout the reserve. Feral pig numbers fluctuate over time in response to seasonal conditions, and are of concern because they disturb and degrade native vegetation, prey on ground-nesting birds, impact on neighbouring agricultural enterprises and provide a basis for illegal hunting activities. Opportunities exist for cooperation with neighbours and the North West Livestock Health & Pest Authority in the control of feral pigs. Control programs for feral pigs will need to be designed to avoid adverse impacts on the local wombat population.

Additional pest species in the reserve include the European rabbit (*Oryctolagus cuniculus*) and cat (*Felis catus*). Rabbits occur as isolated populations restricted to a small area of the reserve, generally along the eastern margin adjacent to agricultural lands, while cats are likely to occur throughout the reserve. There is currently no effective control mechanism in place for feral cats.

The NPWS Northern Plains Region has prepared a pest management strategy (DECC 2007) which includes priorities and actions to control weeds and pest animals on parks and reserves within the region.

## 4.2 FIRE MANAGEMENT

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

Fire is a natural feature of many environments and is essential for the survival of some plant communities. However, inappropriate fire regimes can lead to loss of particular plant and animal species and communities, and high frequency fires have been listed as a key threatening process under the TSC Act.

Fire management is one of the key issues for Willala Aboriginal Area. The Pilliga forest, particularly the eastern Pilliga, is characterised by large fire events, exceeding over 100 000 hectares on a number of occasions. The majority of Willala Aboriginal Area was burnt in an intense wildfire in 2006 and is below the minimum frequency threshold (i.e. burnt too frequently) for the vegetation communities present. Frequent fire has been identified as a threat to the endangered dry rainforest community (Benson *et al.* 2010, Hunter 2011). Too frequent and/or too intense fire events are also a significant threat to native fauna in the reserve. Of particular concern is the unsustainable loss of old growth forest elements (large hollow-bearing trees and recruitment trees) which provide a critical resource for threatened hollow-dependent fauna such as the barking owl (*Ninox connivens*), glossy black-cockatoo (*Calyptorhynchus lathami*), brown treecreeper (*Climacteris picumnis*) and Corben's long-eared bat (*Nyctophilus corbeni*). The historic dog proof fence is also vulnerable to fire.

A map-based fire management strategy has been prepared for the eastern Pilliga reserves including Willala Aboriginal Area (OEH 2011). The fire management strategy 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. An aim of the strategy is to prevent large scale fire events exceeding 20 000 ha (OEH 2011). In the short term, the strategy aims to protect the reserve from wildfire as far as possible, until such time as vegetation communities are within frequency thresholds.

Any proposed hazard reduction programs, ecological burning proposals and management trail works are discussed in cooperation with other fire agencies through the Narrabri Bush Fire Management Committee.

## 4.3 CLIMATE CHANGE

Climate change has been listed as a key threatening process under the TSC Act. Projections of future changes in climate for NSW include higher temperatures, increasing sea levels and water temperatures, elevated CO<sub>2</sub>, more intense but possibly reduced annual average rainfall, increased temperature extremes and higher evaporative demand. These changes are likely to lead to greater intensity and frequency of fires, more severe droughts, reduced river runoff and water availability, regional flooding, increased erosion and ocean acidification. A key consideration for Willala Aboriginal Area in relation to climate change is the potential for increased fire impacts.

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

endangered dry rainforest community, already restricted to small fragmented areas, has been identified as being at particular risk from climate change (Benson *et al.* 2010).

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

The challenges of climate change to native flora and fauna are likely to be particularly severe on the state's western slopes, where extensive clearing over the last two centuries has left only small populations of many native species in isolated habitat fragments within an agricultural landscape. As the largest surviving area of native forest in this part of the state, the Pilliga forest will play a crucial role in the response to climate change.

#### **4.4 UNAUTHORISED ACTIVITIES**

Unauthorised activities impacting upon reserve values include vehicle-based hunting with dogs and etching of graffiti on rock outcrops. Both activities impact on natural and/or cultural values and are prohibited in Aboriginal areas and other NPWS parks and reserves under the NPW Act. The reserve is included in routine patrols and law enforcement operations by local NPWS staff.

#### **4.5 APIARY LICENCES**

Apiary use was established in Willala Aboriginal Area prior to gazettal and has continuing rights as an existing interest. Ten occupied apiary grid areas previously licensed by Forests NSW cover the reserve. The NPWS Bee Keeping Policy (NPWS 2002) aims to balance the environmental management objectives of national parks and other reserves with the needs of the apiary industry. The European honeybee (*Apis mellifera*) can have adverse impacts on some native plants and animals (Paton 1996) including poor flower pollination and competition with native nectar feeders.

While no problems are currently known in the reserve, hive sites may cause unacceptable environmental impacts or user conflicts in the future. Where needed, NPWS will aim to negotiate relocation of hives.

As part of the NPWS licensing process apiarists in Willala Aboriginal Area are being transferred from the grid-based Forests NSW system to a site-based NPWS system. All negotiated apiary sites are located adjacent to existing park roads to enable access, preferably on sites previously used for apiary.

## 5. REFERENCES

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## 6. IMPLEMENTATION

Current Situation	Desired Outcomes	Management Response	Priority*
<p><b>6.1 Aboriginal Cultural Heritage</b></p> <p>Several significant Aboriginal sites have been recorded, including both etched and ochre Aboriginal art sites and the largest known grinding groove site in the Pilliga forest. These sites are at risk from feral goats and vandalism. Not all known sites have been recorded and there is a high potential for additional sites to be found.</p> <p>The Boggabri/Gunnedah/Narrabri Aboriginal communities maintain a strong contemporary connection to the reserve. A basic walking track has been constructed at Willala Knobs to assist local Aboriginal communities wishing to visit Aboriginal sites for cultural purposes.</p> <p>The Gawambaraay Pilliga Co-management Committee provides an avenue for ongoing Aboriginal involvement in park management. There are opportunities for contracting or casual employment of local Aboriginal people to undertake or assist with reserve management programs.</p>	<p>Aboriginal sites and values are identified and protected.</p> <p>Aboriginal people are involved in management of the reserve, particularly but not limited to Aboriginal cultural values.</p> <p>Ongoing use of the reserve for appropriate Aboriginal cultural activities is encouraged and supported.</p> <p>Negative impacts on Aboriginal heritage values are stable or diminishing.</p> <p>Understanding of the Aboriginal cultural values of the reserve is improved.</p>	<p>6.1.1 Work co-operatively with the Gawambaraay Pilliga Co-management Committee in the management of the reserve, including providing opportunities for Aboriginal community participation in management programs.</p> <p>6.1.2 Encourage and support use of the reserve by local Aboriginal communities for sustainable and appropriate cultural activities in accordance with the Gawambaraay Pilliga Co-management Committee Memorandum of Understanding.</p> <p>6.1.3 Undertake a cultural assessment prior to all proposed works with the potential to impact on Aboriginal heritage values.</p> <p>6.1.4 Establish regular monitoring of the condition of Aboriginal etched and ochre art sites and undertake protection works as necessary.</p> <p>6.1.5 Undertake survey work to identify and record previously unrecorded Aboriginal sites in the reserve.</p>	<p>High/ Ongoing</p> <p>High/ Ongoing</p> <p>High/ Ongoing</p> <p>High</p> <p>Medium</p>

Current Situation	Desired Outcomes	Management Response	Priority*
<p><b>6.2 Historic Heritage</b></p> <p>The Pilliga dog proof fence, dating from the late 19<sup>th</sup> to early 20<sup>th</sup> century, has been identified as an item of state-level historic heritage significance. A conservation management strategy for the fence has been prepared (High Ground Consulting 2008), recommending state heritage register listing.</p> <p>Historic graffiti, dating from the late 19<sup>th</sup> to mid 20<sup>th</sup> centuries, records recreational use of the area by local families and is of local historic heritage significance. This historic graffiti is at risk from vandalism and feral goats.</p>	<p>Historic features are appropriately conserved and managed.</p> <p>Negative impacts on historic heritage values are stable or diminishing.</p> <p>Understanding of the historic heritage values of the park is improved.</p>	<p>6.2.1 Implement the conservation management strategy for the Pilliga dog proof fence including maintaining and conserving sections in the reserve identified for active conservation in co-operation with reserve neighbours.</p> <p>6.2.2 Undertake a cultural assessment prior to all proposed works with the potential to impact on historic sites.</p> <p>6.2.3 Establish regular monitoring of the condition of historic graffiti sites, including monitoring of the impact of modern graffiti, and undertake management works as necessary.</p>	<p>High/ Ongoing</p> <p>High/ Ongoing</p> <p>Medium</p>
<p><b>6.3 On-park Ecological Conservation</b></p> <p>Small areas of endangered white box grassy woodland and dry rainforest communities occur within the reserve. Frequent fire and grazing by feral goats have been identified as key threats to the reserve's vegetation.</p> <p>Permanent vegetation plots were established as part of the vegetation survey of the reserve by Hunter (2011).</p> <p>One hundred and twenty five fauna species have been recorded within the reserve and 16 threatened fauna species have been recorded within or in close proximity to the reserve. Frequent fire and feral pests have been identified as key threats to the reserve's fauna.</p>	<p>Native plant and animal species and communities are conserved.</p> <p>Structural diversity and habitat values are restored in areas subject to past logging and grazing practices.</p> <p>Management actions are based on scientific data.</p> <p>The effects of climate</p>	<p>6.3.1 Implement relevant strategies in the Priorities Action Statement and recovery plans for threatened species and communities and threat abatement plans.</p> <p>6.3.2 Undertake appropriate assessment prior to all proposed works with the potential to impact on threatened species and other significant biological values.</p> <p>6.3.3 Map the extent of endangered ecological communities within the reserve.</p> <p>6.3.4 Resurvey a representative sample of permanent vegetation plots as per the Northern Plains Region Biodiversity Monitoring Strategy to monitor possible changes to vegetation communities. This is to include plots within white box grassy woodland and dry rainforest</p>	<p>High/ Ongoing</p> <p>High/ Ongoing</p> <p>Medium</p> <p>Medium</p>



Current Situation	Desired Outcomes	Management Response	Priority*
<p>Further surveys are needed to identify additional likely species and to monitor the status of fauna populations and vegetation communities.</p> <p>Climate change may significantly affect biodiversity by changing the population size and distribution of species, modifying community composition, and altering the geographical extent of habitats and ecosystems.</p>	<p>change on natural systems are reduced.</p>	<p>endangered ecological communities.</p> <p>6.3.5 Repeat vertebrate fauna surveys as per the Northern Plains Region Biodiversity Monitoring Strategy to monitor possible changes to fauna present.</p> <p>6.3.6 Maintain annual monitoring of breeding by peregrine falcons in the reserve and implement appropriate management actions.</p>	<p>Medium</p> <p>Ongoing</p>
<p><b>6.4 Visitor Use and Services</b></p> <p>The reserve provides opportunities for low key recreation such as walking, cycling, driving and enjoyment of natural and cultural heritage values.</p> <p>Use of the reserve must be carefully managed because of its small size, remote location and significant Aboriginal heritage values.</p> <p>Promotion of visitor understanding and appreciation of the values of the reserve is important for minimising damaging activities and maximising visitor enjoyment.</p> <p>Willala Knobs Management Trail is closed to public access to protect fragile values in this area of the reserve. Access may be permitted by local Aboriginal community groups and licensed tours.</p> <p>Current inappropriate use of the reserve includes hunting and vandalism. Horse riding and camping are also considered inappropriate uses.</p>	<p>Visitor use is appropriate and ecologically sustainable.</p> <p>Negative impacts of visitors on park values are stable or diminishing.</p>	<p>6.4.1 Driving and cycling will be permitted in the reserve on Delwood Road, Scratch Road and Willala Trail. Willala Knobs Management Trail is closed to public access to protect this area.</p> <p>6.4.2 In accordance with the Co-management MOU, the NPWS will consult with the Co-management Committee concerning any applications for commercial tour operators in the reserve. A standard condition will be included in any commercial tour operator's licence that opportunities are provided for employment of local Aboriginal people as tour guides.</p> <p>6.4.3 A self-drive tour brochure will be developed including the reserve, providing interpretive and minimal impact use information.</p> <p>6.4.4 Bushwalking will be permitted. Use of vehicles (including bicycles) off roads/trails, horse riding, unauthorised camping and fires will not be permitted. No visitor facilities will be provided apart from the Aboriginal community walking track at Willala Knobs.</p>	<p>High/ Ongoing</p> <p>Medium/ Ongoing</p> <p>Low</p> <p>Ongoing</p>

Current Situation	Desired Outcomes	Management Response	Priority*
<p>Opportunities exist for local Aboriginal communities to run or participate in licensed commercial tour operations in the reserve.</p> <p>A variety of visitor facilities and recreational opportunities are provided in other reserves in the area.</p>			
<p><b>6.5 Community Programs and Education</b></p> <p>Conservation and management of the state-significant Pilliga dog proof fence bordering part of the reserve requires co-operation with neighbours.</p> <p>Areas of endangered white box grassy woodland and dry rainforest communities on neighbouring properties significantly complement the limited occurrence of these communities within the reserve.</p> <p>Local community support for reserve management programs is important.</p>	<p>Cooperation with reserve neighbours in management of the reserve.</p> <p>Reserve neighbours support conservation of significant native vegetation near the reserve.</p> <p>The local community is aware of the significance of the reserve and of reserve management programs.</p>	<p>6.5.1 Liaise with neighbours to encourage the appropriate conservation of the dog proof fence and the retention and appropriate management of key habitats adjacent to the reserve, including areas of semi-evergreen vine thicket and white box grassy woodland.</p> <p>6.5.2 Organise media releases, educational material and contact with neighbours and community organisations based on reserve management issues.</p>	<p>Medium</p> <p>Low/ Ongoing</p>

Current Situation	Desired Outcomes	Management Response	Priority*
<p><b>6.6 Weeds and Pest Animals</b></p> <p>The most significant weed in the reserve is the prickly pear, occurring as scattered populations throughout the reserve.</p> <p>Key pest animals are goats, impacting on both cultural and natural heritage values, and foxes, impacting on natural heritage values. There are scattered goat populations throughout the reserve while foxes are widespread throughout the reserve.</p> <p>Additional pest species include the pig, European rabbit and cat.</p> <p>A Pest Management Strategy has been prepared for the Northern Plains Region and is being implemented.</p> <p>Alternative goat control strategies need to be investigated.</p>	<p>Introduced plants and animals are controlled and where possible eliminated.</p> <p>Negative impacts of weeds on reserve values are stable or diminishing.</p> <p>Negative impacts of pest animals on reserve values are stable or diminishing.</p> <p>Pest control programs undertaken where appropriate in co-operation with community.</p>	<p>6.6.1 Continue weed and pest animal control programs as outlined in the Regional Pest Management Strategy and work cooperatively with North West Livestock Health and Pest Authority, Narrabri Shire Council and reserve neighbours in implementing weed and pest animal control programs.</p> <p>6.6.2 Investigate alternate or additional strategies to control feral goats and reduce their impact on cultural and natural values.</p> <p>6.6.3 Monitor for noxious and significant environmental weeds and treat any new outbreaks.</p>	<p>High/ Ongoing</p> <p>High</p> <p>Ongoing</p>

Current Situation	Desired Outcomes	Management Response	Priority*
<p><b>6.7 Fire Management</b></p> <p>Fire is a natural feature of many environments but inappropriate fire regimes can lead to loss of particular plant and animal communities. High frequency fires have been listed as a key threatening process under the TSC Act.</p> <p>The majority of the reserve is below the minimum frequency threshold (i.e. burnt too frequently) for the vegetation communities present. Assets in the reserve that are vulnerable to fire include the threatened dry rainforest community, old growth elements (large hollow-bearing trees and recruitment trees) and hollow-dependent threatened fauna in eucalypt forest and woodland and the historic dog proof fence.</p> <p>A map-based Fire Management strategy was prepared for the Pilliga East reserves including Willala Aboriginal Area in 2009. Strategic Fire Advantage zones have been identified along Delwood Road and along Scratch Road south of Delwood Road. The objective of this zone is to reduce fire intensity in locations to assist containment of wildfires, by maintaining the Overall Fuel Hazard at less than High rating.</p> <p>The remainder of the reserve has been identified as a Land Management zone. Apart from the overriding legislative objective of protecting life and property, the primary objective for this zone is to conserve biodiversity and protect cultural heritage.</p>	<p>Life, property and natural and cultural values are protected from fire.</p> <p>Fire regimes are appropriate for conservation of native plant and animal communities.</p> <p>Negative impacts of fire on natural and cultural heritage values are stable or diminishing.</p>	<p>6.7.1 Implement the Pilliga East Fire Management Strategy for the reserve.</p> <p>6.7.2 Participate in the Narrabri-Moree Bush Fire Management Committee. Maintain cooperative arrangements with local RFS brigades and fire control officers, Forests NSW and surrounding landowners in regard to fuel management and fire suppression.</p> <p>6.7.3 Maintain regular control of regrowth along sections of Pilliga dog proof fence identified for active conservation and protect the fence from fire.</p>	<p>High/ Ongoing</p> <p>High/ Ongoing</p> <p>High/ Ongoing</p>

Current Situation	Desired Outcomes	Management Response	Priority*
<p><b>6.8 Infrastructure and Maintenance</b></p> <p>Roads exist to facilitate access for management activities. Both sheet and gully erosion are active in sections of the reserve associated with existing roads, particularly in steeper areas.</p> <p>Entry signage is in place on all public vehicle entry points.</p> <p>A dam used as a water source for fire-fighting is located within the reserve.</p> <p>There are ten occupied apiary grids covering the reserve.</p> <p>Six out of eight reserve neighbours have boundary fencing.</p>	<p>Management facilities and operations adequately serve management needs and have minimal impact.</p> <p>Infrastructure and assets are routinely maintained.</p>	<p>6.8.1 Maintain all roads (as shown on the map) and maintain reserve entry signage. Monitor erosion and undertake remedial action as needed.</p> <p>6.8.2 Maintain the fence and gates excluding unauthorised vehicle entry to Willala Knobs Management Trail to protect fragile values in this area and prevent damage to road.</p> <p>6.8.3 Maintain the Aboriginal community walking track at Willala Knobs to Australian Standard Class 4-5 (a basic track). The track heads will remain 30-50 metres in from Willala Knobs Management Trail to reduce the risk of unauthorised access and vandalism.</p> <p>6.8.4 Willala Lease dam will be retained as a fire fighting water supply and maintained as required.</p> <p>6.8.5 Allow apiary licenses to be renewed in accordance with NPWS policy, with apiary sites to be located within 20 metres of existing park roads open to the public, preferably at sites previously occupied for apiary.</p> <p>6.8.6 Encourage construction and maintenance of effective boundary fencing with neighbouring properties to prevent domestic stock incursions and determine strategies to exclude stock where boundary fencing is difficult. Fencing assistance may be provided in accordance with NPWS policy.</p>	<p>High/ Ongoing</p> <p>High/ Ongoing</p> <p>High/ Ongoing</p> <p>Ongoing</p> <p>Ongoing</p> <p>Ongoing</p>

Current Situation	Desired Outcomes	Management Response	Priority*
<p><b>6.9 Research</b></p> <p>The reserve provides opportunities for research including archaeological investigation of Aboriginal pre-history, investigation of historical changes in regional small mammal fauna and biological and ecological studies. Information from relevant research can assist reserve management.</p>	<p>Research appropriate to the management objectives of the reserve is supported.</p> <p>Information from research assists management of reserve values.</p>	<p>6.9.1 External research proposals in the reserve will be considered for approval by the NPWS in the context of the management purposes and principles for the reserve and in discussion with the Gawambaraay Pilliga Co-management Committee.</p> <p>6.9.2 Encourage archaeological research into Aboriginal sites associated with caves and shelters to assess age of sites, identify details of traditional lifestyle and provide management recommendations.</p> <p>6.9.3 Encourage research at the sub-fossil deposit site to provide information concerning long-term changes in regional fauna and contribute to a better understanding of likely future climate change impacts.</p> <p>6.9.4 Encourage research into natural values to assist ecological management. This may include research into invertebrate fauna diversity, ecology of threatened species and communities and the impact of fire and climate change on flora and fauna.</p>	<p>Medium/ Ongoing</p> <p>Low</p> <p>Low</p> <p>Low</p>

\* **High** priority activities are those imperative to achievement of the objectives and desired outcomes. They must be undertaken in the near future to avoid significant deterioration in natural, cultural or management resources.

**Medium** priority activities are those that are necessary to achieve the objectives and desired outcomes but are not urgent.

**Low** priority activities are desirable to achieve management objectives and desired outcomes but can wait until resources become available.

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



