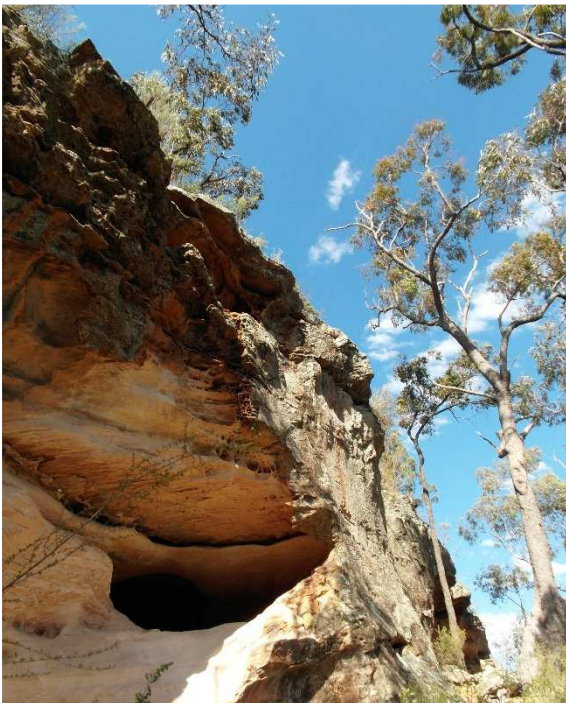
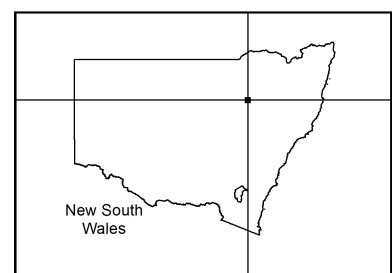


Plan of Management



Pilliga Nature Reserve

July 2015



This plan of management was adopted by the Minister for the Environment on 26 May 2003. It was amended in accordance with the NSW *National Parks and Wildlife Act 1974* on 28 July 2015. This plan combines the 2003 plan with the amendments adopted in July 2015.

Acknowledgments

This plan of management was prepared by staff of the Coonabarabran Area in consultation with the Local Advisory Committee.

Photographs of Sandstone Cave and a Pilliga Posy (*Brachycome formosa*) by Anthony O'Halloran.

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**ISBN 978-1 76039-126-3
OEH 2015/0615**

Foreword

This plan of management for the Pilliga Nature Reserve was first adopted by the former Minister for the Environment, Bob Debus, on 26 May 2003.

Pilliga Nature Reserve is located between Coonabarabran and Narrabri on the north-west slopes of the Great Dividing Range. The nature reserve is approximately 80,000 hectares in size and adjoins significant areas of state forest.

Pilliga Nature Reserve is rich in landforms, geomorphological features and diverse soil types and provides a large unpolluted catchment contributing to the Namoi and Castlereagh river systems.

The plants in the park are representative of those found in the area known as the Pilliga Scrub, although not all plant communities of the Pilliga Scrub are protected in the park. The park provides habitat for a wide range of native plants and animals, including 32 threatened species.

Section 73B of the *National Parks and Wildlife Act 1974* (NPW Act) provides that the Minister may amend a plan of management, consistent with the procedures specified under the NPW Act. These procedures include the public exhibition of draft amendments for at least 45 days, and referral of the plan amendment and submissions to the relevant Regional Advisory Committee and the National Parks and Wildlife Advisory Council for consideration and advice.

Proposed amendments to the plan of management were placed on public exhibition from 4 January to 4 March 2013, attracting one submission that raised four issues. The submission was carefully considered before adopting these amendments.

Amendments to the plan of management include provisions that acknowledge Aboriginal co-management arrangements with local Aboriginal communities through the Gawambaraay Pilliga Co-management Committee. Other amendments include improved environmental outcomes for visitor management at the Sandstone Caves and enhanced fire management through road improvements.

This plan of management with adopted amendments contains the scheme of operations for Pilliga Nature Reserve. In accordance with section 73B of the NPW Act this plan of management is hereby adopted.



Mark Speakman
Minister for the Environment

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1. Introduction

The *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for all national parks and nature reserves. A plan of management is a legal document that outlines how the area shall be managed in the years ahead.

The procedures for the adoption of a plan of management for a nature reserve are specified in the Act:

- Where a plan of management has been prepared, the Director-General is required to refer the plan to the National Parks and Wildlife Advisory Council for its consideration and advice.
- The Director-General is then required to submit the plan to the Minister, together with any comments or suggestions of the Advisory Council.
- The Minister may adopt the plan with or without alterations as the Minister thinks fit, or may refer it back to the Director-General and Advisory Council for further consideration.

Once the Minister has adopted a plan, no operations may be undertaken within the Pilliga Nature Reserve except in accordance with the plan.

Although not a requirement under the National Parks and Wildlife Act, this plan was placed on public exhibition for three months from 12 April until 9 July 2001. The exhibition of the plan of management attracted eight submissions which raised 13 issues. All comments received were referred to the Advisory Council with this plan for their consideration and advice to the Minister.

For further information on this plan of management or on Pilliga Nature Reserve, contact the Local NPWS office at 50-58 Wellington Street, Baradine (PO Box 105, Baradine NSW 2396) or by phone on (02) 6843 4011.

2 Management context

2.1 Nature Reserves

Reserving areas for nature conservation as a general purpose was introduced into Australia with the establishment of Royal National Park, south of Sydney, in 1879.

Fauna reserves in New South Wales were first established under the Fauna Protection Act of 1948. Under the National Parks and Wildlife Act 1967, fauna reserves were reclassified as nature reserves. The 1967 Act was replaced by the National Parks and Wildlife Act 1974.

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 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; and
- provide for appropriate research and monitoring.

Nature reserves differ from national parks in that they do not have as a management principle to provide for visitor use.

2.2 Values of the Pilliga Nature Reserve

2.2.1 Location and regional context

This plan relates to all lands reserved as Pilliga Nature Reserve (herein referred to as the Reserve) which comprises a total area of 80,239 hectares as of July 2000. The bulk of the Reserve consists of a large continuous block, however, there are three areas of the Reserve in the south west that are separated from the main block by privately owned land (refer Figure 1, page 5).

The Reserve is located on the south western edge of the North Western Slopes, with the current boundaries located approximately 30 kilometres north east of Coonabarabran, 65 kilometres south west of Narrabri, 22 kilometres east of Baradine and 31 kilometres north west of Mullaley. The Reserve is within the three local government areas of Coonabarabran, Narrabri and Gunnedah.

Land adjoining the Reserve to the north and west is administered by State Forests for a variety of purposes including timber production and bee keeping. These areas provide continuous uninterrupted habitat. Areas surrounding the fragments of the Reserve to the south are predominantly privately owned and consist of a mosaic of predominantly remnant native bushland and small areas of cleared land. To the east of the Reserve, areas adjacent to the boundary are partly cleared and partly vegetated. Further again to the east are the rich alluvial Liverpool Plains producing wheat, cotton, sorghum and providing grazing for domestic stock.

The Reserve is part of the area commonly referred to as the Pilliga Scrub or Pilliga Forest which is the largest remaining dry sclerophyll forest west of the Great Dividing Range in New South Wales. The large size of the Reserve is an important and significant contribution to state wide conservation objectives.

The area comprising the Reserve is listed on the Register of the National Estate (File Number 1/02/175/0001, Australian Heritage Commission). Included in the Statement of Significance are references to “.....sufficiently large representative sample of sandstone woodland ecosystem over a viable area.....”, “.....significant species diversity.....”, “.....important research site.....”.

2.2.2 Geomorphological and landscape values

The geology of the Reserve is dominated by the Pilliga Sandstone which outcrops occasionally as small peaks and escarpments in the central and eastern sections of the Reserve and as steeper gorges and gullies in the south west. Some rock outcrops and soils derived from the Purlewaugh beds occur in the creek lines in the south west sections of the Reserve.

The soils of the Reserve are variable ranging from very thin sandy topsoils and skeletal rocky soils to more complex earthy sands with uniform soil profiles sometimes with dispersible clay subsoils. Generally the topsoils are free draining, of low fertility and sandy except where the Purlewaugh beds are exposed, where the soils are slightly more fertile. Subsoils are often poorly drained.

The topography of the Reserve generally consists of low relief undulating sandy country punctuated by occasional rocky sandstone outcrops with low sandstone cliffs. Landforms in the south west are more steep and rugged with occasional deep gorges. The landforms of the Reserve are a unique feature providing a sense of the vastness of the landscape and occasional vistas from high points. For example the Nandewar Ranger and Mt Kaputar are visible from the top of the Sandstone Caves knoll.

The Reserve conserves a range of landforms, geomorphological units and soil types typical of the Pilliga Sandstone geology. The large size of the Reserve provides a large unpolluted catchment area, which assists in maintaining high water quality in the Namoi catchment. In addition the Reserve is a major recharge area of the Great Artesian Basin.

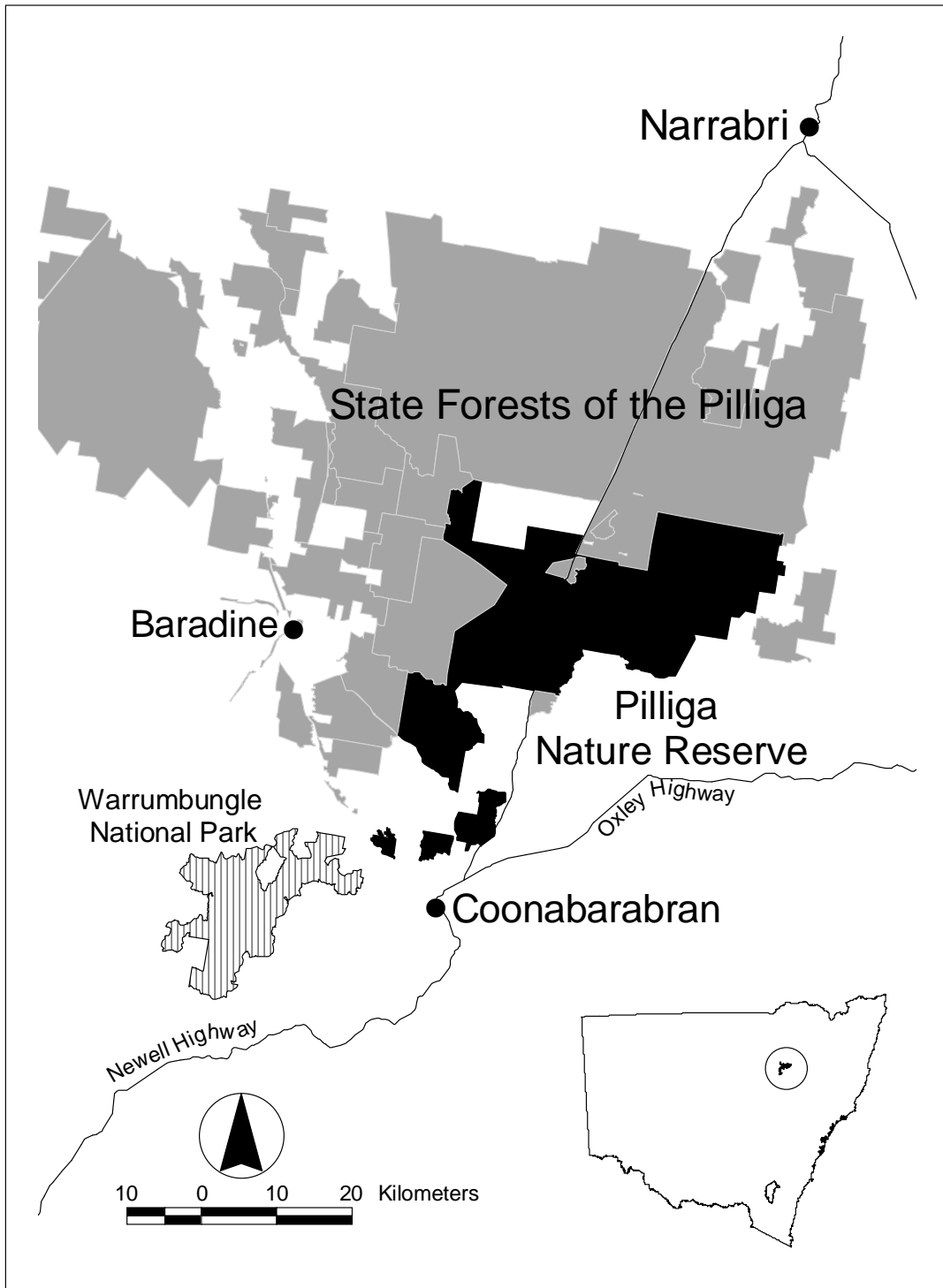


Figure 1 Location of Pilliga Nature Reserve

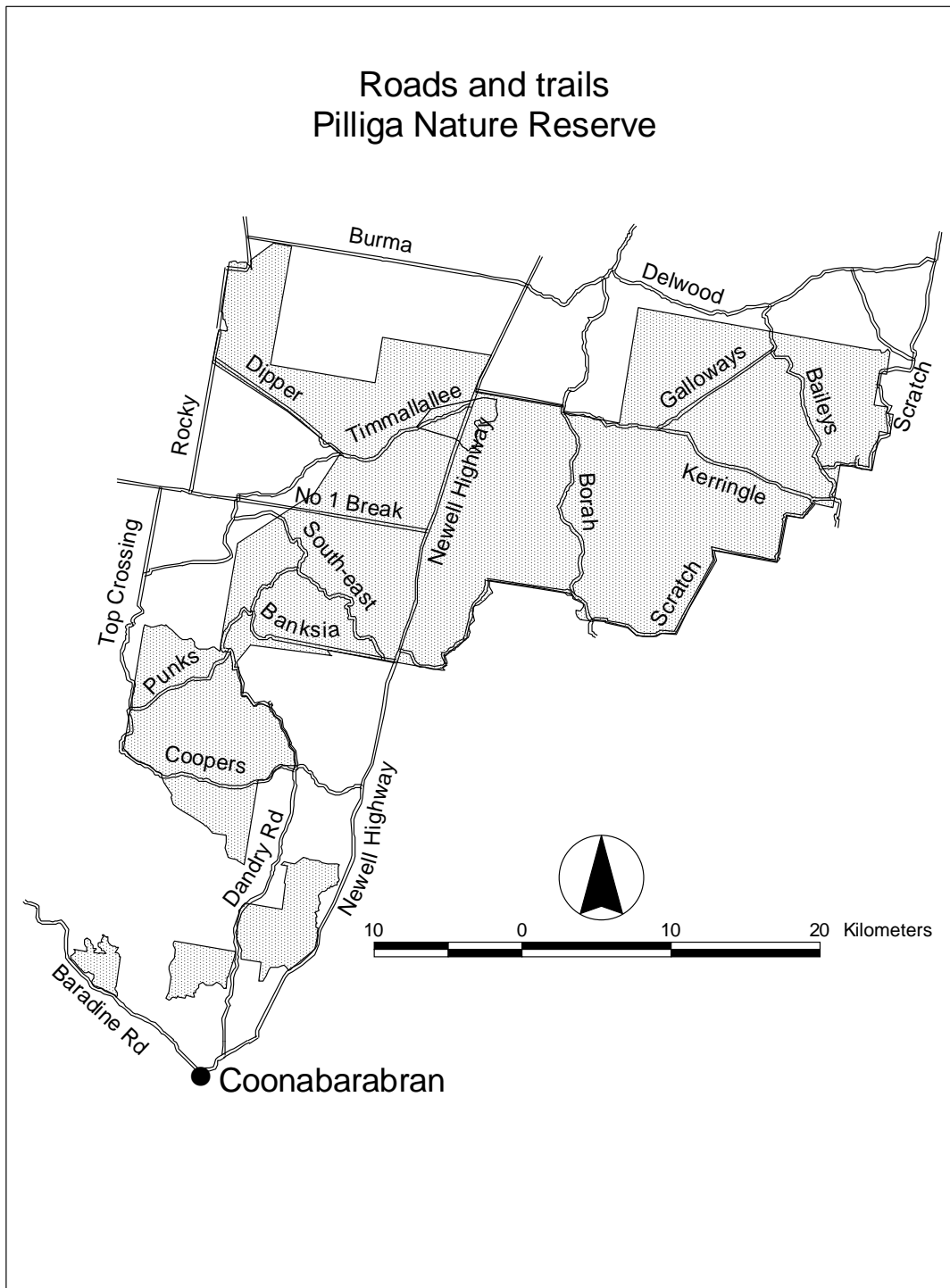


Figure 2 Main tracks of the Pilliga Nature Reserve

2.2.3 Biological values

Flora

The flora of the Reserve is representative of the flora in the area known as the Pilliga Scrub, although not all vegetation types of the Pilliga Scrub are conserved within the Reserve. Vegetation patterns within the Reserve reflect strong associations with soil type, aspect, topography, fire history and drainage patterns. The Reserve currently contains 181 identified vegetation types. These vegetation types generally have affinities with vegetation communities of the botanical divisions of the central west slopes and north west slopes and plains. It is likely that some of these vegetation communities are not conserved elsewhere. Dominant species in most vegetation communities include Eucalyptus, Angophora and Callitris species. The major vegetation structural types are open forest, woodland, and occasional shrubland communities.

Although a few basic flora lists exist, few flora surveys have been conducted within the Reserve. To date 533 native species have been identified within the Reserve however this number will probably increase with further survey work. Three plant threatened species have been found within the Reserve. With changes in taxa and further surveys the number of recorded threatened and endemic species found in the Reserve is expected to increase.

The flora of the Reserve also includes a number of plant species more typically associated with either the moist coastal areas e.g. *Banksia marginata* or the drier inland areas of New South Wales e.g. *Chenopod* spp. There are also a number of species e.g. *Angophora leiocarpa* that are at the furthestmost known limit of their geographical range.

Fauna

The Reserve provides a wide range of habitats for a range of fauna types. From limited surveys to date at least 33 native mammal species (including 16 bat species), 7 introduced mammal species, 144 bird species, 27 reptile species and at least 10 amphibian species have been recorded in the Reserve.

At least 29 threatened fauna species are known to occur or to have occurred within the Reserve and these are listed in Table 6. A number of species present in the Reserve are also listed as endangered in the Commonwealth's Environment Protection and Biodiversity Conservation Act 1999 including the Pilliga Mouse, Swift Parrot, Malleefowl, and Regent Honeyeater.

It is highly likely that a range of fauna species e.g. Rufous Bettong, are at the limit of their known distribution within the reserve or adjacent areas. Further research and survey is required to determine the conservation status and distribution of most fauna species in the Reserve and adjacent areas.

The large size of the Reserve and its connection to adjacent forest make the Reserve an important habitat for a wide range of threatened species including nomadic species such as the Regent Honeyeater. The Reserve and surrounding areas also provide viable habitat for and contain a large population of Koalas.

Pilliga Nature Reserve is connected to the nearby Warrumbungle National Park via a corridor up to 10 kilometres wide of predominantly forested private lands. As only about 25 per cent of these private lands have been cleared, the remaining bushland

provides almost continuous habitat for species moving between the two conservation areas. The Reserve and the adjacent state forest and private lands together cover an area of over 500,000 hectares, the largest tract of inland plains forest remaining in New South Wales. The connectivity of these areas increases the conservation value of each and assists in the maintenance of habitat and biodiversity in the three areas.

2.2.4 Scientific research and education

The Reserve has a very high value for a wide range of scientific research and education projects. The extent of the area, its relationship to the adjacent state forests and proximity to Warrumbungle National Park via the wildlife corridor provide an outstanding opportunity for the study of a wide range of topics.

To date a limited amount of information has been collected on the reserves ecosystems and this data provides a reference base for further research. Its large size, headwaters catchment and context within adjacent forested areas offers the opportunity for extensive ecological investigation in the future.

The Reserve provides a range of education opportunities due to the potential capacity to observe natural heritage in a quiet and undisturbed environment. The Reserve has been used over the years predominantly by university groups, however, opportunities exist for the use of the Reserve by a wider range of educational organisations for educational purposes.

2.2.5 Cultural heritage

The Pilliga was previously occupied by the Kamilaroi people and there is increasing evidence of widespread use and occupation being discovered in the area. A diverse range of site types including grinding grooves, rock engravings and rock art, has been recently discovered, one of which is potentially a site of major regional significance. The Reserve and adjacent areas are of high significance to the contemporary Aboriginal population in the region and interest in the custodianship and management of the Reserve is growing amongst the local Aboriginal community. The Reserve is considered to be an important and valuable resource of Aboriginal culture as there has been minimal human disturbance to sites due to difficult access.

Little is currently documented of the European historic heritage of the Reserve other than references to previous logging and sleeper cutting activity and a few minor relics of early attempts to introduce agricultural development to the area. There is evidence of early attempts at agriculture in abandoned blocks to the north of the reserve. These blocks and the signs of previous occupation are becoming overgrown with regenerating native vegetation and engender a strong sense of the struggle faced by early European pioneers in the area.

2.2.6 Wilderness values

The Reserve and adjacent areas fulfil the requirements of the *Wilderness Act 1987* such that the Reserve has been identified as a part of a wilderness area, although it had not been declared a wilderness area at the date of preparation of this plan of management. The identification of the area as wilderness is a result of the area meeting the wilderness identification criteria specified in Section 6(1) of the Wilderness Act. That is, the area is:

- a) together with its plant and animal communities in a state that has not been substantially modified by humans and their works or is capable of being restored to such a state;
- b) of sufficient size to make its management in such a state feasible; and
- c) capable of providing opportunities for solitude and appropriate self-reliant recreation.

While the identified wilderness is under consideration for declaration, no actions will be taken which would reduce the value of the area as wilderness or pre-empt the Governments decision as to whether or not to declare Pilliga as wilderness.

The Pilliga Wilderness, if declared, will be managed in accordance with Section 9 of the Wilderness Act and NPWS Field Management Policies to:

- a) to restore (if applicable) and to protect the unmodified state of the area and its plant and animal communities;
- b) to preserve the capacity of the area to evolve in the absence of significant human interference; and
- c) to permit opportunities for solitude and appropriate self-reliant recreation.

3. Objectives of Management

3.1. Specific objectives for Pilliga Nature Reserve

In addition to the general objectives for nature reserves (refer section 2.1), the following specific objectives will apply to Pilliga Nature Reserve:

- The protection of the Reserve as a significant area representative of the Pilliga vegetation types.
- Management of identified wilderness areas so as to protect the unmodified state of the area, to protect the capacity of the area to evolve without human interference and to permit opportunities for solitude and self-reliant recreation.
- The protection and maintenance of the ecological processes, ecological dynamics and structural integrity of the vegetation types and associations.
- Manage fire to protect life and property, to prevent species extinctions and population declines, and to protect cultural heritage.
- Control of pest species such that their impact on native flora and fauna, and neighbouring agricultural enterprises are minimised.
- Provision of opportunities for scientific research and environmental education that are compatible with the conservation objectives.

3.2. Overall strategy

Pilliga Nature Reserve shall be primarily managed to protect its high wilderness, ecological and landscape values. To achieve these objectives, the following broad strategies shall apply to management of the Reserve:

- The Fire Management Plan for the Reserve will be implemented, to improve management of fire and its impacts on the natural and cultural values of the Reserve;
- Native flora and fauna of the Reserve will be protected through the ongoing control of introduced pest species;
- Consultation will be undertaken with the local community, especially neighbours, and other stakeholders as required to ensure that the community are involved in achieving the objectives of this plan of management;
- Any development or activity in or near the Pilliga Nature Reserve that may compromise the objectives and intent of this plan of management will be opposed; and
- Research and education opportunities within Pilliga Nature Reserve will be encouraged, with an emphasis on research which will provide further information that will improve future management and understanding of the Reserve's natural and cultural values.

4. Policies and framework for management

This chapter contains the policies and framework for the management of Pilliga Nature Reserve together with relevant background information. Policies are summarised under the following section headings:

- 4.1 Nature conservation
- 4.2 Cultural heritage
- 4.3 Use of the area

The policies established in this plan of management provide the framework for future management of Pilliga Nature Reserve over the next five to ten years.

Where not specifically provided for in this plan, management of Pilliga Nature Reserve shall be in accordance with the National Parks and Wildlife Act and with general NPWS policies.

4.1. Nature conservation

Nature conservation covers all aspects of the natural environment including geology and soils, water quality, native plants and animals and the relationship between these. For convenience, management of landscape values, introduced species and fire are also considered in this section.

4.1.1. Geology, landform and soils

The geology of the Reserve is dominated by the Pilliga sandstone laid down during the Jurassic period (130-190 million years ago) which is underlain by the silty sandstone and clay shales of the Purlewaugh beds. Due to the low undulating topography most of the parent material is obscured at the surface by relatively deep tertiary and quaternary alluvial and colluvial deposits. Occasional outcrops of sandstone occur in the east, while significant areas of rock outcropping occur in the west and south west of the Reserve. Occurrences of remnant volcanic parent material within the Reserve have yet to be recorded and documented.

The Pilliga sandstone unit consists of poorly sorted conglomerates, quartz-lithic sandstones and occasional shales. The sandstone is iron rich and siliceous, with frequent bands of rounded quartz pebble inclusions. Iron compounds tend to be concentrated along joints in the sandstone.

The soils in the Reserve are predominantly earthy sands or sandy loams and topsoils are usually of low fertility except where the Purlewaugh beds are exposed producing slightly more fertile soils. Clay subsoils are common and are frequently of low permeability and sodic. Thus the soils are usually highly dispersible when wet. The geology and soils of the Reserve have only been documented at 1:250,000 scale thus there are opportunities for further research and documentation.

Erosion is recognised as a naturally occurring process in the Reserve. Due to the naturally low levels of leaf mulch (compared to coastal areas), soils in the Reserve are vulnerable to erosion. Soils are particularly vulnerable to erosion after large fire events, especially when post fire periods coincide with months of high rainfall.

The Reserve is a large catchment contributing to a number of watercourses. The main watercourses in the Reserve are Dandry Creek, Yaminbah Creek and Borah Creek. These are tributaries of other watercourses, which in turn flow predominantly

into the Namoi River, with tributaries of the southern sections of the reserve flowing into the Castlereagh catchment.

The NPWS recognises the importance of unpolluted catchments to contribute to effective Total Catchment Management.

Policies

- Land systems and the natural geological features of the Reserve shall be protected.
- Erosion is recognised as a naturally occurring process. Where erosion has been accelerated by human activity or is threatening significant habitats or other values, appropriate control measures may be undertaken.
- All works undertaken in the Reserve shall be designed and undertaken in a manner that minimises vegetation removal and soil erosion.
- The NPWS supports the principles of Total Catchment Management and shall liaise with local government and other authorities to maintain and improve water quality of the catchments contained within the Reserve.
- Mining is not permitted in the Reserve.
- Gravel extraction solely for Reserve management purposes is permitted with the approval of the Director, Western Directorate.

Strategies

- Areas where soil erosion has occurred on management trails shall be recorded and soil conservation measures shall be implemented where required, in accordance with Department of Land and Water Conservation guidelines.
- Data on soils and their characteristics shall be collected and mapped for the purpose of improving management trail maintenance.
- A management trail maintenance guideline shall be prepared that outlines best practice procedures for mitigation and control of erosion damage.

4.1.2. Native vegetation

The flora of the Reserve is representative of the flora in the area known as the Pilliga Scrub, although not all vegetation types are conserved within the Reserve. The flora of the Reserve is diverse with 533 species having been recorded to date. Vegetation patterns within the Reserve reflect associations with soil type, aspect, topography and drainage patterns. Species composition and vegetation structure in the Reserve are dynamic, changing in response to fire events in the short term and changes to herbivory and climate in the longer term (Norris 1991).

Table 1. Common canopy species found within the Pilliga Nature Reserve.

Scientific Name	Common Name
<i>Callitris endlicheri</i>	Black cypress
<i>Eucalyptus crebra</i>	Narrow-leaved ironbark
<i>E. macrorhyncha</i>	Stringybark
<i>E. sideroxylon</i>	Mugga ironbark
<i>E. blakelyi</i>	Blakely's red gum
<i>E. rossii</i>	Scribbly gum
<i>E. fibrosa</i>	Broad Leafed Ironbark
<i>E. chloroclada</i>	Dirty gum
<i>E. dwyeri</i>	Dwyer's red gum
<i>Corymbia trachyphloia</i>	Brown bloodwood
<i>Angophora floribunda</i>	Rough barked apple
<i>Allocasuarina leuhmannii</i>	Bulloak

Table 2. Associated canopy species found within the Pilliga Nature Reserve.

Scientific Name	Common Name
<i>Eucalyptus albens</i>	White box
<i>E. melliodora</i>	Yellow box
<i>E. populnea</i>	Bimble box
<i>E. pilliga</i>	Pilliga box
<i>E. dealbata</i>	Tumbledown gum

Ironbark species and Black Cypress are typically found on ridges and side slopes of hills on low fertility sandy soils. Where soils are slightly more fertile e.g. richer red loams, mugga ironbark occurs. White Box is found on soils that have been deposited on slopes by erosion of volcanic flows and these occur in very small areas principally in the south west and east periphery of the Reserve. Species typically found along watercourses and creek flats include Rough Barked Apple, Blakely's Red Gum, and occasionally Yellow Box. *Angophora leiocarpa* is found in valley creekside woodlands in the east of the Reserve and is at the western edge of its geographic range in the Reserve. Occasional mallee forms of eucalypts occur in association with lateritic soils.

The shrub and groundcover stratum in the vegetation communities within the Reserve are very variable in structure and species composition ranging from open grassy understorey to dense shrubby understorey with shrubs up to 4 metres high. Common shrub and groundcover species include *Acacia spp*, *Allocasuarina spp*, *Cassinia arcuata*, *Brachycome spp*, *Brachyloma daphnoides*, *Calotis cuneifolia*, *Calytrix tetragona*, *Daviesia spp*, *Dianella revoluta*, *Dillwynia spp*, *Gahnia aspera*, *Hibbertia obtusifolia*, *Leucopogon spp*, *Melichrus urceolatus*, *Persoonia sericea*, *Pomax umbellata*, *Pultenaea spp*, *Styphelia triflora*, *Swainsona spp*, and many *Poaceae* genera and species.

A recent acquisition, Schmidt's block, has a cleared area that requires revegetation. A small area of the block was cleared by bulldozer in preparation for subdivision prior to acquisition. The vegetation of the cleared area consists of a *Eucalyptus albens* vegetation community, which is considered to be of very high conservation value.

There are a number of significant plant species in the Reserve including Red Ash (*Alphitonia excelsa*), which is nearing the western limit of its distribution, and Smooth Barked Apple (*Angophora leiocarpa*) which is at the south west limit of its distribution. There are also small areas of White Box (*Eucalyptus albens*) often with a grassy understorey in the Reserve. To date three threatened plant species are known to occur in the Reserve and these are listed in Table 3 below. It is likely that with further surveys and research, more threatened species will be found within the reserve.

Broad vegetation communities in Pilliga Nature Reserve were described and mapped by Hunter (2011). Some of the vegetation communities include areas considered representative of three ecological communities listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Hunter 2011) (see Table 3).

Table 3: Threatened plant species and communities found within Pilliga Nature Reserve.

Scientific name	Common name	Conservation status (TSC Act)
Flora species		
<i>Rulingia procumbens</i>	Dwarf Kerrawang	Vulnerable #
<i>Swainsona murrayana</i>	Slender Darling-pea	Vulnerable #
<i>Tylophora linearis</i>	Narrow-leaved Tylophora	Vulnerable #
Ecological communities		
Carex sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast bioregions	Carex sedgeland	Endangered
Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar bioregions	Dry rainforest	Endangered #
White Box – Yellow Box– Blakely's Red Gum woodland	Box-gum woodland	Endangered #

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

The Reserve forms part of the largest remaining dry sclerophyll forest in New South Wales and as such is an important area for the conservation of native vegetation on the North West Slopes.

The vegetation of the Reserve is strongly influenced by fire and therefore the management of fire and native vegetation is closely related. Impacts of fire on cypress pine can significantly change the composition of a vegetation community in a relatively short period.

The vegetation of the Reserve is thought to have been significantly modified in some areas due to changed fire regimes and herbivore activity over the last 200 years. However, some opinions are that the vegetation is relatively unmodified with only

small areas having been selectively logged prior to dedication in 1967. Some changes to the vegetation are most likely to have occurred due to grazing and disturbance by domestic and feral animals, changed fire regimes and logging however the scale and direction of change are debateable.

Further surveys and considerable research studies are needed to increase knowledge of vegetation of the Reserve particularly of plant assemblages and species that have been inadequately surveyed in the Reserve.

Policies

- Vegetation shall be managed such that the ecological processes and the structural dynamics of the ecosystems within the Reserve are preserved.
- Research into the abundance, distribution and management needs of rare and threatened plant species shall be encouraged and supported. Information gained shall be utilised in any works undertaken, particularly fire and pest management.
- Native vegetation shall be managed to maximise habitat values for native fauna species. Particular notice of the needs of threatened fauna species shall be taken into account.
- Co-operation of adjoining land holders and other authorities shall be sought to implement Reserve Management strategies.
- Active participation of the community in vegetation management shall be promoted and supported.
- Only locally indigenous plant species shall be used if revegetation works in the Reserve are required.
- Fire is recognised as a significant factor in the management of vegetation in the Reserve and shall be considered in concert with other vegetation management strategies.

Strategies

- A revegetation plan and strategy shall be drawn up for the revegetation of Schmidt's block.
- Research into the management of structural diversity may be undertaken and utilised in determining fire prescriptions that promote and maintain structural diversity in the Reserve.
- Surveys shall be undertaken to develop a comprehensive inventory of flora in the Reserve. Active participation of the community in flora surveys shall be encouraged.
- Records and information of native flora shall be entered onto the NPWS wildlife Atlas.
- Occurrences, distribution and abundance of threatened plant species shall be surveyed for and recorded. All works undertaken within the Reserve shall be carried out in such a way so as to minimise disturbance to these species unless prescribed disturbance is identified as being necessary to maintain a species.
- Research into the management needs of any rare and threatened plant species shall be encouraged and supported. Information gained shall be utilised in any

works undertaken, particularly fire management and development of recovery plans.

- Recovery plans for threatened species occurring within the Reserve shall be implemented.

4.1.3. Introduced vegetation

Introduced plants are those which are not locally indigenous to the Reserve or surrounding areas. Introduced plants are of concern as they impact on the integrity and conservation values of the Reserve.

To date 60 species of introduced plants have been identified as being present within the Reserve. Most of these species are currently considered to not be a threat to the ecological integrity of the Reserve due to their minor distribution, poor invasive capability and minor ecological impact. Due to relatively low levels of human access and activity, the relatively poor soils and extreme dry periods experienced in the Reserve, introduced plants are not widespread. Most of the introduced plant species are confined to watercourses, management trails and exposed edges of the Reserve.

Weeds of current concern in the Reserve and their proposed control methods are listed in table 4 below.

Table 4. Weed species of current concern and their proposed control methods.

Scientific name	Common name	Control methods
<i>Opuntia stricta</i>	Prickly Pear	Regular re-introduction of biological controls e.g. cochineal and cactoblastis
<i>Salix spp</i>	Willow	Cut and poison with glyphosate
<i>Cenchrus longispinus</i>	A Spiny Burr Grass	Remove by hand and/or spray with glyphosate
<i>Cenchrus incertus</i>	A Spiny Burr Grass	Remove by hand and/or spray with glyphosate
<i>Xanthium occidentale</i>	Noogoora Burr	Hand removal or herbicide
<i>Rubus spp</i>	Blackberry	Cut and poison with glyphosate

Policies

- Introduced plants shall be controlled and where practical eliminated from the Reserve.
- Management of weeds within the Reserve shall aim to minimise the impacts of introduced species on native plant communities and habitats, and to prevent spread to neighbouring properties.
- Priorities for weed control shall be based on the protection of threatened plant species, declared noxious weeds and weeds with current small distribution and high potential for further invasion and ecological impacts.
- Biological control shall be utilised in preference to chemical controls where possible. Herbicide shall only be used where other methods may not be efficient and/or effective.

Strategies

- Locations and distributions of introduced plants shall be recorded for future management purposes.
- The Pilliga Nature Reserve Pest Management Strategy shall be regularly updated in response to new information, changing priorities, control methods and available resources.
- Weeds shall be controlled as resources permit with targeted control being prioritised based on the protection of threatened plant species, declared noxious weeds and weeds with current small distribution and high potential for further invasion and ecological impacts.
- Co-operation of adjoining landholders and other authorities shall be sought to implement integrated plant pest management strategies.

4.1.4. Native animals

The Reserve contains habitat for a high diversity of native fauna species with at least 144 bird, 33 mammal, 27 reptile and 10 amphibian species recorded in surveys to date. The Reserve is significant in being part of the largest continuous inland forest in NSW providing substantial areas of habitat for many fauna species. This vast area provides suitable habitat for permanent resident species as well as nomadic and migratory species. The habitat of the Reserve is predominantly continuous on most boundaries with viable habitat on adjacent land tenures.

The majority of Pilliga Nature Reserve is within the lowland catchment of the Namoi River and the aquatic ecological community in most of the reserve is part of an endangered ecological community listed under the NSW *Fisheries Management Act 1994* (FM Act). The “Lowland Darling aquatic ecological community” listing includes all native fishes and aquatic invertebrates in the lowland catchments of the Darling and tributary rivers. Pilliga Nature Reserve, together with the broader Pilliga forest, protects some of the few remaining well-vegetated lowland stream catchments in the region and, despite the frequent scarcity of surface water and limited freshwater habitats present, supports a rich and relatively intact aquatic macro-invertebrate community including yabbies, shrimps, freshwater snails and mussels (Murphy 2011, Murphy and Shea in prep.).

Table 5. Common native fauna species identified within the Pilliga Nature Reserve.

Scientific name	Common name
Mammals	
<i>Antechinus flavipes</i>	Yellow Footed Antechinus
<i>Chalinolobus dwyeri</i>	Large Pied Bat
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat
<i>Eptesicus vulturnus</i>	Little Forest Eptesicus
<i>Macropus giganteus</i>	Eastern Grey Kangaroo
<i>Macropus rufogriseus</i>	Red-necked Wallaby
<i>Nyctophilus gouldii</i>	Gould's Long-eared Bat
<i>Nyctophilus timoriensis</i>	Greater Long-eared Bat
<i>Pseudomys pilligaensis</i>	Pilliga Mouse
<i>Scotorepens balstoni</i>	Western Broad-nosed Bat
<i>Scotorepens greyii</i>	Little Broad-nosed Bat
<i>Wallabia bicolor</i>	Swamp Wallaby
Birds	
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater
<i>Acanthiza apicalis</i>	Inland Thornbill
<i>Acanthiza nana</i>	Yellow Thornbill
<i>Barnardius barnardi</i>	Mallee Ringneck
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo
<i>Climacteris leucophaea</i>	White-throated Treecreeper
<i>Colluricincla harmonica</i>	Grey Shrike-thrush
<i>Cracticus torquatus</i>	Grey Butcherbird
<i>Eopsaltria australis</i>	Eastern Yellow Robin
<i>Gerygone fusca</i>	Western Gerygone
<i>Glossopsitta concinna</i>	Musk Lorikeet
<i>Glossopsitta pusilla</i>	Little Lorikeet
<i>Lichenostomus leucotis</i>	White-eared Honeyeater
<i>Malurus cyaneus</i>	Superb Blue Wren
<i>Malurus lamberti</i>	Variiegated Wren
<i>Neophema pulchella</i>	Turquoise Parrot
<i>Pachycephala rufiventris</i>	Rufous Whistler
<i>Pardalotus punctatus</i>	Spotted Pardalote
<i>Phaps chalcoptera</i>	Common Bronzewing
<i>Philemon corniculatus</i>	Noisy Friarbird
<i>Platycercus eximius</i>	Eastern Rosella
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler
<i>Rhipidura fuliginosa</i>	Grey Fantail
<i>Smicronis brevirostris</i>	Weebill
<i>Strepera graculina</i>	Pied Currawong
Reptiles	
<i>Amphibolurus nobbi</i>	Nobbi
<i>Ctenotus robustus</i>	Striped Skink
<i>Morethia boulengeri</i>	Boulenger's Skink
<i>Egernia striolata</i>	Tree Skink
<i>Heteronotia binoei</i>	Bynoe's Gecko
<i>Varanus gouldii</i>	Gould's Goanna

Scientific name	Common name
<i>Diplodactylus vittatus</i>	Wood Gecko
Amphibians	
<i>Limnodynastes ornatus</i>	Ornate Burrowing Frog
<i>Limnodynastes tasmaniensis</i>	Spotted grass frog
<i>Limnodynastes terraereginae</i>	Northern Banjo Frog
<i>Litoria caerulea</i>	Green Tree Frog
<i>Litoria latopalmata</i>	
<i>Litoria peronii</i>	Peron's Tree Frog
<i>Litoria rubella</i>	Desert Tree Frog
<i>Pseudophryne bibroni</i>	Bibrons toadlet

Small populations of waterbirds are found on the few permanent water holes within the Reserve. In years of good rainfall the variety of species expands. Species commonly found in the Reserve include Wood Duck (*Chenonetta jubata*), Little Black Cormorant (*Phalacrocorax sulcirostris*), White-faced Heron (*Ardea novaehollandiae*) and Masked Plover (Lapwing) (*Vanellus miles*).

The Sandstone Caves have in the past been a favoured nesting area for the Peregrine Falcon (*Falco peregrinus*). The breeding period for the Peregrine Falcon is between late August and early November. Although the area has not recently been utilised by this species, it contains ideal nesting opportunities and potential habitat for foraging purposes.

There are a number of threatened fauna species which have been recorded in the Reserve which are listed as Endangered under Schedule 1, or Vulnerable under Schedule 2, of the *Threatened Species Conservation Act 1995*.

Table 6: Threatened animal species and communities recorded in or within 1 kilometre of Pilliga Nature Reserve.

Common name	Scientific name	Conservation status (TSC Act or FM Act)
Fauna species		
Malleefowl	<i>Leipoa ocellata</i>	Endangered #
Australasian Bittern	<i>Botaurus poiciloptilus</i>	Endangered
Black-breasted Buzzard	<i>Hamirostra melanosternon</i>	Vulnerable
Little Eagle	<i>Hieraaetus morphnoides</i>	Vulnerable
Square-tailed Kite	<i>Lophoictinia isura</i>	Vulnerable
Barking Owl	<i>Ninox connivens</i>	Vulnerable
Masked Owl	<i>Tyto novaehollandiae</i>	Vulnerable
Bush Stone-curlew	<i>Burhinus grallarius</i>	Endangered
Glossy Black-cockatoo	<i>Calyptorhynchus lathami</i>	Vulnerable
Little Lorikeet	<i>Glossopsitta pusilla</i>	Vulnerable
Turquoise Parrot	<i>Neophema pulchella</i>	Vulnerable
Brown Treecreeper (eastern subspecies)	<i>Climateris picumnis victoriae</i>	Vulnerable
Speckled Warbler	<i>Chthonicola sagittata</i>	Vulnerable
Regent Honeyeater	<i>Anthochaera phrygia</i>	Endangered #
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	Vulnerable
Varied Sittella	<i>Daphoenositta chrysoptera</i>	Vulnerable
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	Vulnerable
Flame Robin	<i>Petroica phoenicea</i>	Vulnerable
Diamond Firetail	<i>Stagonopleura guttata</i>	Vulnerable
Spotted-tailed Quoll	<i>Dasyurus maculates</i>	Vulnerable
Koala	<i>Phascolarctos cinereus</i>	Vulnerable #
Eastern Pygmy-possum	<i>Cercartetus nanus</i>	Vulnerable
Squirrel Glider	<i>Petaurus norfolcensis</i>	Vulnerable
Burrowing Bettong (mainland) *	<i>Bettongia lesueu graii</i>	Presumed Extinct #
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	Vulnerable
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	Vulnerable #
Corben's Long-eared Bat	<i>Nyctophilus corbeni</i>	Vulnerable #
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	Vulnerable
Pilliga (Delicate) Mouse	<i>Pseudomys pilligaensis</i>	Vulnerable #
Ecological communities		
Lowland Darling River aquatic ecological community	Aquatic ecological community in the natural drainage system of the lowland catchment of the Darling River	Endangered

denotes species also listed as nationally threatened under the EPBC Act.

* skeletal material collected at the Sandstone Caves in 1985.

The conservation of native animal populations and species is dependent on the maintenance of suitable habitat which in the Reserve is strongly influenced by fire

frequency and intensity. Currently little is known of the distribution and abundance of most threatened species in the Reserve and adjacent areas. In addition some species, e.g. Malleefowl, are now considered to have become extinct locally in the last decade despite being previously present in the large conservation area of the Reserve. Other threatened species are so poorly known that it is not possible to ascertain the current and previous conservation status of such species without further research and survey. Therefore management impacts on these species are largely unknown.

The Reserve is connected to Warrumbungle National Park by a wildlife corridor consisting mostly of private forested lands. This enhances the conservation values of each of these areas.

Knowledge of the distribution, abundance and species composition of the native fauna in the Reserve is currently poor and would be significantly enhanced by further survey work.

Policies

- The full range of native animal species within the Reserve shall be conserved and the extinction, local or otherwise, of threatened and other species shall be mitigated against by active research and appropriate management.
- Programs and management strategies designed to improve management of and assist threatened species shall be given priority.
- Activity by peregrine falcons at the Sandstone Caves will be monitored and seasonal closure of the area to public visitation during the August to November breeding season will be implemented if nesting activity is detected.

Strategies

- Undertake fauna surveys in the Reserve to increase knowledge of species composition, abundance, distribution and ecology within the Reserve.
- Research shall be encouraged into the status, distribution and management needs of animal species within the Reserve, with greatest priority given to threatened species and to Peregrine Falcons.
- Research opportunities shall be promoted and academic and research institutions shall be encouraged to base appropriate research projects in the Reserve.
- Populations of threatened species that are identified within the reserve shall be assessed for their long term population viability. Management recommendations outlined in threatened species recovery plans shall be implemented.

4.1.5. Introduced animals

Introduced animal species have detrimental impacts on the conservation values of the Reserve. Introduced animals impact on native plant and animal species directly, such as by predation, and indirectly through competition for resources. They also have potential to spread exotic diseases to domestic livestock on adjacent properties. Goats impact on cultural values of the Reserve, and cause significant damage to Aboriginal sites due to the delicate nature of the sandstone with which these sites are usually associated.

There are eleven species of introduced animals known to occur in the Reserve (refer table 7 below).

Table 7. Introduced fauna species found within the Pilliga Nature Reserve.

Scientific name	Common name
<i>Vulpes vulpes</i>	Fox
<i>Capra hircus</i>	Goat
<i>Sus scrofa</i>	Pig
<i>Felis catus</i>	Cat
<i>Oryctolagus cuniculus</i>	Rabbit
<i>Lepus capensis</i>	Hare
<i>Mus musculus</i>	House Mouse
<i>Rattus rattus</i>	Black Rat
<i>Equus caballus</i>	Horse
<i>Apis mellifera</i>	European Honey bee
<i>Bos taurus</i>	Cattle

The distribution and abundance of these animals in the Reserve is currently unknown.

The occurrence of stock wandering into the Reserve from adjacent properties has been alleviated through a cooperative approach between neighbours and NPWS. This has been developed through the implementation of fencing agreements and fencing assistance provided by NPWS.

Of the known pest species, foxes, cattle, pigs and goats are currently actively controlled although the effectiveness of current control programs is unknown. Control consists of fox baiting, occasional pig trapping and aerial shooting of goats.

The use of conservation areas by apiarists is a contentious issue. The apiary industry has traditionally enjoyed access to sites, especially coastal heathlands and some eucalypt forests, which are important to honey production and maintenance of hives. However, conservationists maintain that the European honey bee is an exotic species, that they have adverse impacts on native biota and should be excluded from national parks.

A recent review of the impacts of honeybees on native plants and animals concluded that introduced honeybees can have negative, positive or neutral impacts on native plants and animals, depending on the type and abundance of native species present, the climate or season, the number of hives in an area and the frequency with which the sites are used.

The apiary sites on NPWS-managed land generally occur as a result of transfer or acquisition of land from other land tenures for inclusion in the park network. As a

result of this existing interest, apiarists are permitted continued restricted access to some reserves managed by the National Parks and Wildlife Service.

NPWS policy on beekeeping allows existing sites to continue, but does not allow any new, or additional sites to be created. The NPWS will also recognise the rights of existing licence holders of beekeeping sites in areas proposed for reservation in the future. Sites may be transferred to other family members, or, when an apiary business is sold, to the person who has purchased the business. It is NPWS policy that to protect wilderness values, sites within lands declared as wilderness under the Wilderness Act 1987 will be relocated to alternative sites on the edge of, or outside of, declared wilderness. Relocation of sites is undertaken according to a protocol identified in the policy and occurs in consultation with relevant apiarists. In some areas this may involve other public land managers.

Apiarists using sites on NPWS estate sign an agreement which specifies conditions under which the sites are to be managed and operations conducted.

Policies

- Introduced animals shall be controlled in line with the strategies developed, and implemented in line with regional priorities and resource availability. Control programs shall be designed to minimise impact on non-target species and, where appropriate, shall be undertaken in cooperation with adjoining Rural Lands Protection Boards, neighbours and other authorities.
- Control of feral goats shall focus on areas where they have caused or have the potential to cause damage to Aboriginal sites, or threatened or vulnerable native plant species.
- Control of foxes and other introduced animals shall focus on known threatened species habitat, and areas which contribute to large scale programs involving neighbours.
- Research shall be encouraged that provides information that may assist in the future control of pest species.
- Licensed apiarists shall continue to be permitted to use management trails to access their hive sites. Management of existing apiary sites in the Reserve shall be consistent with current NPWS policy.
- All apiary sites within areas identified as wilderness under the Wilderness Act 1987 will be relocated to alternative sites on the edge of, or outside of, declared wilderness.
- Domestic animals are not permitted in the Reserve
- Pest control methods will be continually monitored and new methods trialled to improve efficiency and effectiveness of pest control strategies.

Strategies

- Carry out surveys and documentation of the abundance, distribution and impacts of introduced animals within the Reserve.
- Where appropriate, cooperative pest species management programs shall be pursued in cooperation with adjoining state forests, Rural Lands Protection Boards, neighbours and other relevant authorities.
- Carry out introduced animal controls as Regional priorities and resources permit.

- Biological control methods shall be considered in the Reserve as they are developed and approved for release, and following an assessment of potential impacts of the biological control on the natural environment.
- The Pest Management Strategy for Pilliga Nature Reserve will be reviewed annually and specific actions identified and implemented.

4.1.6. Fire management

Fire is an essential feature of the environment of the Reserve and plays an important role in determining the composition and structure of its plant and animal communities. The primary objectives of fire management are to protect life and property, and to maintain and manage the ecological diversity of plant and animal communities in the Reserve.

The Reserve is a fire prone area. Traditional fire management practices of Aborigines in the Pilliga are unknown and poorly understood. It is likely, however, that Aborigines had burning regimes to some extent if only to encourage grazing areas, regeneration of bioresources, or to keep corridors open for travel. From research gathered elsewhere in NSW, it is likely that fire regimes have changed since European occupation.

The size of fires in the Pilliga Scrub has exceeded 100,000 hectares on several occasions and fires have the potential to travel up to 40 kilometres in one day. The majority of large fire events have started west of the Newell Highway and have been caused by lightning strikes. However, there is very little available data on the size, frequency and other factors of fires prior to about the 1950's.

Fire management practices in the Reserve shall aim to create a mosaic, in which the diverse vegetation types of the Reserve are maintained at different stages of regeneration after fire.

A major objective of fire management activities in the Reserve is to prevent fire escaping from the Reserve. It is important during any fire operation to ensure firefighter safety, environmental heritage protection, achieve long term fire management requirements and cost effectiveness.

To achieve fire management objectives in a large fire prone area such as the Pilliga, an approach which encompasses all landscape values including those outside the Reserve, must be taken. In addition a cooperative approach between fire management agencies is required to effectively control fires in the Reserve.

Further research into the relationships between fire and plant and animal communities is needed as these relationships are not currently fully understood.

A Fire Management Plan has been adopted for the Reserve. This plan incorporates the policies and procedures detailed in the National Parks and Wildlife Service's *Fire Management Manual* and the *Pilliga Nature Reserve Plan of Management*.

Fire management trails in the Reserve can get very boggy and some existing management trails were constructed along water courses making them hazardous for use during fire suppression operations. It is not uncommon for vehicles to become bogged during fire operations creating potentially life threatening situations.

Fire management activities may adversely impact on apiary sites in the Reserve. These impacts may be the result of wildfire or hazard reduction activities. Hazard reduction activities may impact on flowering vegetation.

The following policies and strategies provide a framework for the management of fire in the Reserve.

Policies

- Fire management in the Reserve shall be part of a landscape approach for the whole Pilliga including the Reserve, adjacent forestry areas, private land and Vacant Crown Land.
- The fire management objectives of the NPWS in Pilliga Nature Reserve are:
 - to prevent the occurrence of human caused unplanned bushfires on the reserve
 - to suppress unplanned bushfires on the reserve
 - to minimise the potential for the spread of bushfires on, from, or into the reserve
 - to protect from bushfires, persons and property on, or immediately adjacent to, the reserve
 - to manage bushfires to avoid the extinction of all native species which are known to occur naturally within the reserve
 - to protect from damage by bushfires all Aboriginal sites, historic places and culturally significant features known to exist within the reserve
 - to work co-operatively with neighbours and rural fire brigades in managing fire in and adjacent to the reserve
 - to prevent single large fire events greater than 20,000 hectares
 - to implement fire suppression strategies which will encourage effective and safe containment of wildfires

Strategies

- Keep wildfires under 20,000 hectares.
- Establish strategic fire management zones along southern and eastern boundaries, Newell Highway and key fire management trails which shall assist in containing and limiting the spread of fire, and from which prescribed burning will be conducted to assist the control of wildfires.
- Develop and implement guidelines for fire suppression strategies which differentiate between broad fuel types and seasonal and weather conditions.
- Develop guidelines which allow for:
 - early withdrawal to predetermined control lines when the fire is rapidly spreading and severe fire weather is forecast;
 - extending the fire area by tying into recently burnt areas and adjacent control lines if an appropriate time since the last fire has lapsed, and moderate weather conditions are forecast;
 - minimising the fire area if the time since the last fire is below an acceptable period.

- extending the area of fires during moderate conditions in order to meet conservation or fuel management objectives
- Conduct prescribed burning which is responsive to weather conditions, and which shall reduce the potential for wild fires escaping from the Reserve
- Further research into the relationships and interactions between fire, flora, fauna and the broader landscape shall be encouraged.
- Maintain all currently designated fire management trails. Some fire management trails may be closed from time to time when weather conditions make them impassable and potentially hazardous.
- Research shall be encouraged into fuel accumulation and fire ecology.
- Neighbours and local bushfire captains shall be consulted prior to hazard reduction activities and where possible, when undertaking fire suppression activities in the Reserve.
- Apiarists shall be contacted and consulted regarding sites in the Reserve which may be impacted by hazard reduction activities and, where possible, when undertaking fire suppression activities in the Reserve.
- The road and trail network will be maintained and upgraded as required to support management operations. This may include such works as the upgrading of the creek crossing on Airlands Trail at Yaminbah Creek to provide more reliable access to the eastern half of the reserve for fire management purposes whilst maintaining fish passage requirements.

4.2. Cultural heritage management

4.2.1. Aboriginal heritage

Cooperative management of the reserve today occurs through the Gawambaraay Pilliga Co-management Committee under a Memorandum of Understanding with NPWS. Co-management arrangements commenced in 2002 and this committee now has co-management responsibility for Pilliga Nature Reserve, Dandry Gorge Aboriginal Area, Ukerbarley Aboriginal Area and 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 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, 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.

A number of Aboriginal sites have been recorded in the Reserve. Site types include hand stencils, grinding grooves, emu and kangaroo track engravings and artefacts.

The Reserve is part of the traditional area of the Kamilaroi people and is considered to be rich in Aboriginal cultural heritage.

A large number of Aboriginal sites known to exist in the Reserve have yet to be recorded and assessed.

The majority of Aboriginal sites in the Reserve are associated with sandstone outcrops. Due to the soft nature of sandstone these sites are particularly susceptible to damage caused by goats, wind and water erosion and vandalism. The Sandstone Caves site has suffered extensive damage caused by vandalism which impacts on the significance of the site.

Policies

- The Gawambaraay Pilliga Co-management Committee will be consulted regarding management of Aboriginal sites and associated values in the Reserve. These associated values shall encompass flora, fauna and landscape values and shall not be restricted to physical Aboriginal archaeological evidence.
- All work proposed for the Reserve shall be preceded by an inspection for Aboriginal sites and shall have regard for potential impact on Aboriginal heritage values. Where sites are located, an Aboriginal Heritage Assessment shall be carried out prior to works commencing.
- Aboriginal people shall be permitted to carry out approved activities in the Reserve that are related to the maintenance of traditional links to the land. Any such activities must comply with the objectives and policies of this plan and any relevant legislation, and be approved by the Aboriginal co-management committee.
- The provisions of the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter) (Australia ICOMOS 1999) shall guide management decisions for both Aboriginal and non-Aboriginal sites.

Strategies

- Survey and recording of Aboriginal sites in the Reserve shall be carried out with priority given to existing known Aboriginal sites.
- Undertake a study into the future use and management of the Sandstone Caves in consultation with the Aboriginal co-management committee (refer section 4.3.2).
- All Aboriginal sites will be managed to ensure their long term preservation in consultation with the Aboriginal co-management committee.
- Work co-operatively with the Aboriginal co-management committee in the management of the reserve, including providing appropriate opportunities for Aboriginal community participation in management programs.
- Encourage and support use of the reserve by local Aboriginal communities for sustainable and appropriate cultural activities in accordance with the Aboriginal co-management Memorandum of Understanding.

4.2.2. Historic places

The Pilliga area has a relatively extensive European history dating from John Oxley's exploration of the area in 1818. Despite the many major fires that have occurred in

the area since European settlement in the 1830s there is still visible evidence of this history remaining. Agricultural settlement in the Pilliga area was attempted on a number of occasions however few were successful in maintaining a viable lifestyle due to the infertile soils and harsh climatic conditions. The remains of European heritage evoke a strong sense of the futility of attempting agriculture in this area during the early days of settlement.

The remains of some dwellings still exist within the Reserve, such as the remains on the southern bank of Borah Creek up stream of Salisbury Waterhole. The remains of a number of fence lines are still visible, as are the stumps and sleeper dumps that remain from past timber industry activity.

Policies

- The provisions of the Australian Charter for the Conservation of Places of Cultural Significance (the Burra Charter) shall guide management decisions for historic places. Provisions of other guiding documents e.g. Heritage Management Guidelines, shall be also guide management decisions relating to historic places as and when such documents become available.

Strategies

- Historic remains found in the Reserve shall be assessed for their significance and, where appropriate, conservation plans shall be prepared.

4.3. Use of the Pilliga Nature Reserve

4.3.1. Promotion and interpretation

One of the main purposes of a nature reserve is the promotion of the appreciation and enjoyment of wildlife, natural environments and natural phenomena. The Reserve is unique in its size, landscape and the flora and fauna it contains. It is the second largest nature reserve in New South Wales, which enhances its viability as a conservation area. Promotion and interpretation of the values of the Reserve shall raise awareness of the contribution that the Reserve makes to the region and to State-wide conservation.

Signs are currently located within the Reserve boundaries and are not often visible from main roads adjacent to the Reserve. There is currently no interpretive material about the Reserve available to the public.

Policies

- Understanding and appreciating the natural and cultural values of the Reserve by the public shall be promoted. The following themes shall be emphasised in interpretation programs:
 - the importance of the Reserve for the conservation of a number of threatened and biogeographically significant flora and fauna species;
 - the value of the Reserve as an area rich in Aboriginal cultural heritage;
 - the importance of responsible public use in maintenance of the natural and cultural heritage.
- Information shall be provided about the values of the Reserve and educational opportunities by means such as an educational brochure, media releases, neighbour newsletters and direct staff contact with user groups.

- Opportunities for educational activities shall be promoted in the Reserve as part of the NPWS Discovery program, where appropriate.

Strategies

- Investigate and develop appropriate interpretive material in co-operation with the Aboriginal co-management committee to promote an appreciation of the values of the Reserve.
- Carry out an assessment of requirements for signage. Recommendations from that assessment shall be implemented in the Reserve.

4.3.2. Public use

Many recreational activities are incompatible with the purpose of a nature reserve, however there are recreational activities which are considered to be consistent with the intent of this plan such as day bushwalking and bird watching. However the large size of the Reserve, its extreme weather conditions, fire prone vegetation, lack of permanent water and mostly flat landscape, can make recreational activities potentially hazardous.

Due to the highly erodible soils, excessive vehicle use, particularly during or immediately following wet weather, adversely impacts on natural and cultural values and damages roads, often making them impassable for necessary operations such as fire suppression activities. It is not uncommon for vehicles to become bogged in the Reserve in apparently dry conditions.

Several private properties are only accessible along Sandstone Caves Road. Agreements are in place to allow access to these properties.

No 1 Break Road has traditionally been used by the public to travel from Baradine to the Newell Highway. The first 8.2 kilometres of No 1 Break Rd is part of the Reserve. The long term use of this road as through access shall be permitted to continue. The road will therefore need to be maintained in a safe trafficable condition which imposes higher than normal maintenance costs on the NPWS.

Recreational activities involving domestic animals have detrimental effects on the conservation values of the Reserve such as spreading of weeds through horse manure and predation on native animals by dogs.

The Sandstone Caves has traditionally been visited by locals and tourists alike. This visitation has occasionally resulted in vandalism and other adverse impacts on the natural and cultural significance of the site. There is presently a car parking area at the Sandstone Caves site and visitation is intermittent and unguided.

Policies

- Approved low key recreational opportunities such as self-reliant day bushwalking will be permitted in the Reserve.
- Due to the nature of the area and for safety reasons, overnight bushwalking and camping shall not be permitted except where permission is given by the Local NPWS office for the purpose of educational or research activities.
- Wood fires are not permitted in the Reserve.
- Horses, dogs and other domestic animals are not permitted in the Reserve.
- Owners of “Redbank”, “Sandbank” and “Anchor”, their guests and service providers are permitted to use Yaminbah-Sandstone Caves Road to access these properties.
- Public vehicular access will continue to be permitted along No 1 Break Road.
- Public vehicular access will be permitted along Sandstone Caves Road as far as the Sandstone Caves subject to continued public access being permitted to the Sandstone Caves.
- Public access to the Sandstone Caves will continue to be permitted subject to monitoring and assessment of the severity of negative impacts on the site resulting from public visitation.
- No other vehicle access, including quad bikes and motor cycles, will be permitted except for emergency access, and management or research purposes with permission of NPWS.

Strategies

- Boundary and regulatory signage be provided where appropriate.
- Appropriate signage shall be installed in the Reserve to educate the public about the Reserve’s natural and cultural values.
- Educational opportunities in the Reserve shall be incorporated into the annual NPWS Discovery program subject to resources available to carry out these activities. This shall include activities which promote appreciation of the natural and cultural values of the Reserve and the surrounding forests.
- An assessment of the use and costs of maintenance of No 1 Break shall be carried out. This assessment shall investigate opportunities for joint management and cost sharing with other Government agencies.
- Undertake a study into the future use and management of the Sandstone Caves. The study should include:
 - Protection of the biological and geological values of the caves and surrounding environment
 - Impacts of visitation
 - Protection of the cultural values of the caves
 - Community value of the caves
 - Provision of interpretive signage and

- Maintenance and improvement of the track network.
- Construct a toilet adjacent to the Sandstone Caves walking track with necessary vehicle maintenance access. Monitor visitation levels at the Sandstone Caves and adjust management of the area as necessary to avoid or minimise adverse impacts.

4.3.3. Research

Opportunities for scientific research in the Reserve are high. The extent of the area, the current lack of knowledge of the Reserve's native species, its relationship to the adjacent state forest and proximity to Warrumbungle National Park via the forested corridor, provide opportunities for research.

A limited amount of information has been collected on the ecosystems of the Reserves and this data provides a reference base for further research. The large size of the Reserve, headwaters catchment and separation from surrounding rural land offers the opportunity for in depth ecological investigation in the future. In particular, the Reserve and its fire history allows for research on the effects of fire intensity and frequency on flora and fauna species.

Research in the Reserve is essential to improve understanding of the natural and cultural values and ecological processes in the Reserve.

Policies

- The Reserve shall be available for appropriate and approved research projects.
- Research in identified wilderness areas shall be approved and implemented in accordance with wilderness management policies
- Researchers shall be encouraged to design programs that shall provide information which is directly useful for the management of the Reserve
- Liaison shall be maintained with researchers to obtain as much mutual information and assistance as possible. The results of research shall be required to be provided to the managers of the area as part of their licence conditions.
- Research structures and long term markers must be placed in locations which shall minimise their visual impact and be removed upon completion of the research.
- The results of any research shall be required to be provided to the Local NPWS office on completion of the project/s.

Strategies

- A prospectus shall be prepared as a guide to preferred research topics in the Reserve. These shall include topics which are directly relevant to the management of the Reserve including the relationship of fire, and plant and animal communities, threatened species research, research into Peregrine Falcons, environmental management and related projects.

5. Plan implementation

This plan of management is part of a system of management planning developed by the National Parks and Wildlife Service. The system includes the National Parks & Wildlife Act, management policies, established conservation and recreation philosophies and strategic planning at corporate, regional and area levels.

The orderly implementation of this plan shall be undertaken within the annual programs of the Services Coonabarabran Area. Priorities, determined in the context of Area and Regional strategic planning, shall be subject to the availability of necessary staff and funds and to any special requirements of the Director-General or Minister.

Area programs are subject to ongoing review, within which, works and other activities carried out in the Coonabarabran Area are evaluated in relation to the objectives laid out in this plan.

The environmental impact of all development proposals shall continue to be assessed at all stages of the development and any necessary investigations undertaken in accordance with established environmental procedures.

Section 81 of the Act requires that this plan shall be carried out and given affect to, and that no operations shall be undertaken in relation to Pilliga Nature Reserve unless they are in accordance with this plan. However, if after adequate investigation, operations not included in this plan are found to be justified, this plan may be amended in accordance with section 73B of the Act.

As a guide to the orderly implementation of this plan, relative priorities for activities identified in the plan are summarised in the following table.

Actions	Priority	Plan reference
Record soil erosion on management trails and implement soil conservation measures	High	4.1.1
Collect and record data on soils	Low	4.1.1
Prepare management trail maintenance guidelines	High	4.1.1
Prepare and implement a revegetation plan for Schmidt's block	High	4.1.2
Undertake surveys of vegetation in the Reserve with the involvement of the local community.	High	4.1.2
Record occurrences of threatened plant species.	High	4.1.2
Record locations and distributions of introduced plants	High	4.1.3
Implement introduced plants control methods (ongoing)	High	4.1.3, 4.1.5

Actions	Priority	Plan reference
Liaise with neighbours and relevant authorities to implement introduced plant management strategies.	High	4.1.3
Undertake fauna surveys in the Reserve.	High	4.1.4
Undertake research into the status, distribution and management needs of fauna species in the Reserve.	High	4.1.4
Activity by peregrine falcons at the Sandstone Caves will be monitored and seasonal closure of the area to public visitation during the August to November breeding season will be implemented if nesting activity is detected.	High	4.1.4
Assess populations of threatened species for long term viability and contribute to development of management recommendations as required.	High	4.1.4
Carry out surveys and documentation of introduced animals within the Reserve.	Medium	4.1.5
Carry out introduced animal control	High	4.1.5
Investigate and consider appropriate biological control methods for the suppression of introduced animal and plant species.	Medium	4.1.5
Review annually the Pest Management Strategy for Pilliga Nature Reserve.	High	4.1.5
Implement the recommendations of the PNR fire management plan including development of strategic fire management zones.	High	4.1.6
Develop fire management strategies for different fuel types and seasonal and weather conditions	Medium	4.1.6
Conduct prescribed burning operations to reduce potential for wild fires escaping from the Reserve, and for ecological purposes	High	4.1.6
Consult with relevant agencies and stakeholders prior to hazard reduction burns and during wildfire suppression operations where possible	High	4.1.6
Maintain all currently designated fire management trails.	High	4.1.6
The road and trail network will be maintained and upgraded as required to support management operations. This may include such works as the upgrading of the creek	High	4.1.6

Actions	Priority	Plan reference
crossing on Airlands Trail at Yaminbah Creek to provide more reliable access to the eastern half of the reserve for fire management purposes whilst maintaining fish passage requirements.		
Work co-operatively with the Aboriginal co-management committee in the management of the reserve, including providing appropriate opportunities for Aboriginal community participation in management programs.	High	4.2.1
All Aboriginal sites will be managed to ensure their long term preservation in consultation with the Aboriginal co-management committee.	High	4.2.1
Survey for and record Aboriginal sites in the Reserve.	High	4.2.1
Undertake a study into the future use and management of the Sandstone Caves in consultation with the Aboriginal co-management committee.	High	4.2.1, 4.3.2
Encourage and support use of the reserve by local Aboriginal communities for sustainable and appropriate cultural activities in accordance with the Aboriginal co-management Memorandum of Understanding.	High	4.2.1
Document and assess historic places in the Reserve and where appropriate prepare conservation plans.	Low	4.2.2
Investigate and develop appropriate interpretive material in co-operation with the Aboriginal co-management committee to promote an appreciation of the values of the Reserve.	Medium	4.3.1
Carry out an assessment of requirements for signage.	Medium	4.3.1
Construct a toilet adjacent to the Sandstone Caves walking track with necessary vehicle maintenance access. Monitor visitation levels at the Sandstone Caves and adjust management of the area as necessary to avoid or minimise adverse impacts.	High	4.3.2
Provide boundary and regulatory signage.	Medium	4.3.2
Install appropriate interpretive signage.	Low	4.3.2
Incorporate recreational and educational activities in the Reserve into the NPWS <i>Discovery</i> program.	Medium	4.3.2

Actions	Priority	Plan reference
Assess the public use and maintenance costs of No 1 Break investigating opportunities for joint management and cost sharing with other Government agencies.	High	4.3.2
Prepare a prospectus which outlines preferred topics for research into the Reserve.	Low	4.3.3

6. References

- Australia ICOMOS (1999) *Charter for the Conservation of Places of Cultural Significance (The Burra Charter)*. Australia ICOMOS Inc.
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7. Suggested reading

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