



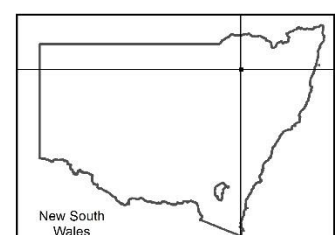
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Draft Plan of Management



Bobbiwaa Parks

Incorporating Bobbiwaa State Conservation Area,
Couradda National Park, Killarney State Conservation Area
and Moema National Park



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This publication is for discussion and comment only. Publication indicates the proposals are under consideration and are open for public discussion. Provisions in the final plan of management may not be the same as those in this draft plan.

Acknowledgments

OEH acknowledges the Bobbiwaa parks are in the traditional Country of the Gamilaroi People (also known as the Gomeroi or Gamilaraay People).

This plan of management was prepared by staff of NSW National Parks and Wildlife Service (NPWS), part of OEH. For additional information or any inquiries about this plan of management or the Bobbiwaa parks, contact the NPWS Barwon Area Office, 1/100 Maitland Street, Narrabri NSW 2390 or by telephone on (02) 6792 7300.

Front cover image: White cypress – white bloodwood vegetation community, Bobbiwaa State Conservation Area. Photo credit: J Hatch, NPWS.

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Phone: 131 555 (environment information and publications requests)
Phone: 1300 361 967 (national parks, climate change and energy efficiency information and publications requests)
Fax: (02) 9995 5999
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Have your say

We want to know what you think about this draft plan. Your knowledge may help us manage the Bobbiwaa parks more effectively.

To give us feedback on the draft plan you can send a written submission by:

-  using the online submission form at <https://engage.environment.nsw.gov.au/consult>
-  emailing it to npws.parkplanning@environment.nsw.gov.au
-  posting it to Manager Planning Evaluation and Assessment, PO Box 95, Parramatta NSW 2124.

Written submissions must be received by **21 May 2018**.

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- Tell us how we can make the plan better. You may want to tell us what you know about the park or how you or other people use and value it.
- We are happy to hear any ideas or comments you may have and will consider them all, but please be aware that we cannot always include all information or ideas in the final plan.

What happens to your feedback?

- Step 1: Your submission is part of the process of making this draft plan final. At the close of the public exhibition period we consider all submissions and prepare a submissions report.
- Step 2: We provide the relevant Advisory Committee and the National Parks and Wildlife Advisory Council with the draft plan, all of the submissions and the submissions report. They then consider the documents, make comments on the plan or suggest changes, and provide advice to the Minister for the Environment.
- Step 3: The Minister considers the plan, submissions and any advice, makes any necessary changes and decides whether to adopt the plan under the *National Parks and Wildlife Act 1974*.

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Bobbiwaa Parks Draft Plan of Management

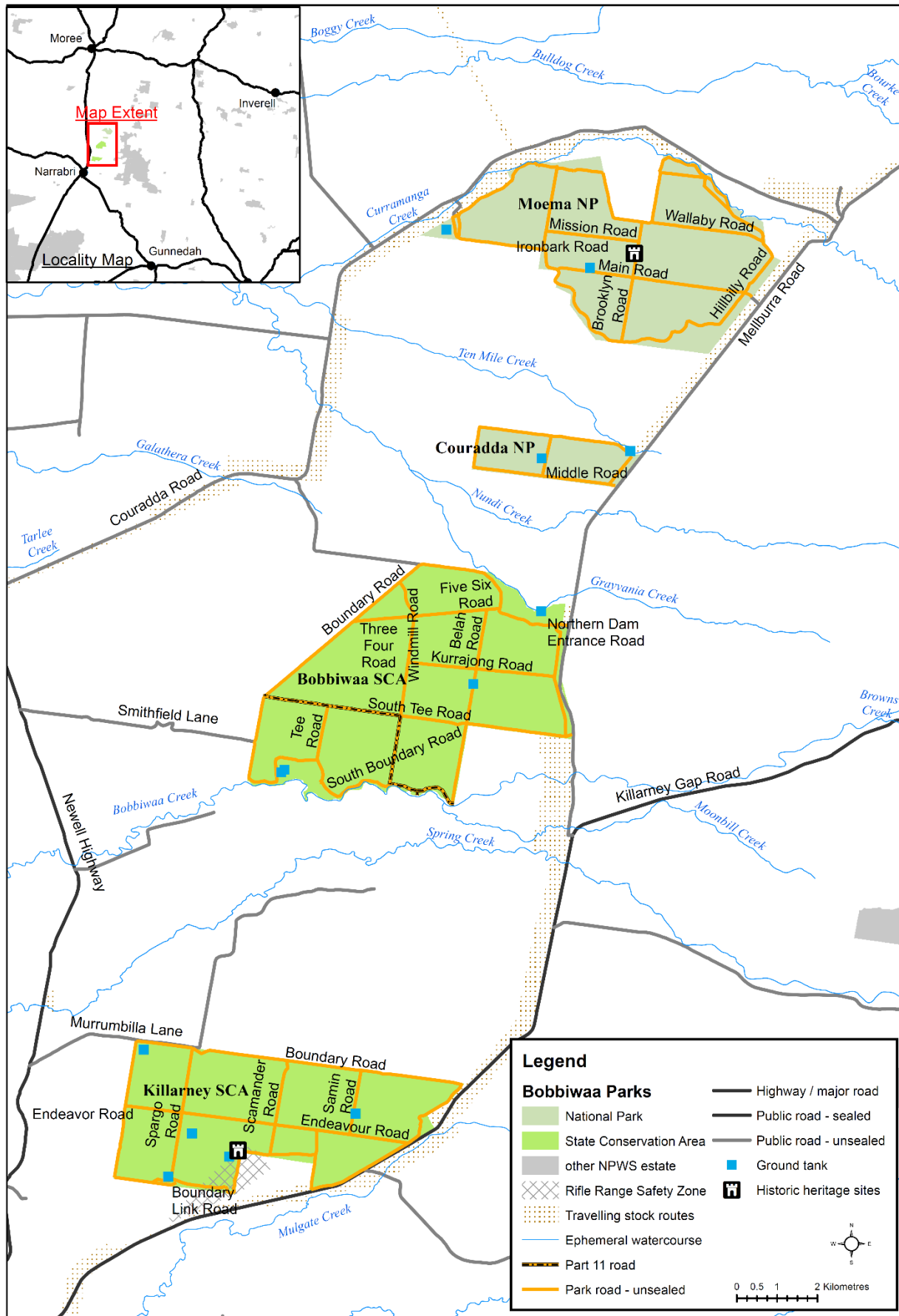


Figure 1: Bobbiwaa Parks – overview and locality

1. Introduction

1.1 Location, reservation and regional context

Features	Description
Location	The Bobbiwaa parks include Killarney and Bobbiwaa state conservation areas and Couradda and Moema national parks (collectively referred to as 'Bobbiwaa parks' or the 'parks' in this plan). The parks are located on the basalt slopes of the Nandewar Range, between 12 and 33 kilometres north-east of Narrabri, on the north-west slopes of New South Wales. See Figure 1.
Reservation date	1 December 2005
Area and previous tenure	The parks collectively cover a total area of 6928 hectares. Prior to 2005, the parks were state forests managed for the commercial production of cypress pine and ironbark. The areas and former names of the individual parks are shown in Table 1. They were reserved as a result of the Brigalow Belt South and Nandewar western regional assessments and consequent decision by the NSW Government to create new reserves under the <i>Brigalow and Nandewar Community Conservation Area Act 2005</i> .

Table 1: Makeup of the Bobbiwaa Parks

Park	Area (ha)	Previous tenure
Bobbiwaa State Conservation Area	2692	Bobbiwaa State Forest No. 416 (dedicated in 1917, 1920 and 1936)
Couradda National Park	360	Couradda State Forest No. 159 (dedicated in 1914)
Killarney State Conservation Area	1858	Killarney State Forest No.195 (dedicated in 1917)
Moema National Park	2018	Moema State Forest No. 551 (dedicated in 1917 and 1963).

The area covered by this plan includes unreserved lands which are vested in the Minister under Part 11 of the *National Parks and Wildlife Act 1974*. These Part 11 lands incorporate roads used by neighbouring landowners to access their landholdings (see Section 5.2). Although these lands do not form part of the reserved area of the parks, their management is guided by this plan.

The names of the parks are linked to early European settlement of the area. Bobbiwaa was one of the outstations on the original Narrabry Run, Killarney was the name of the pastoral run which included Killarney Gap, and Moema was the name of the original station to the south of the park. Couradda takes its name from nearby Mount Couradda to the south-east, which was named by Thomas Mitchell in 1832.

Regional context	
Biogeographic region	The parks form part of a chain of reserves stretching the length of the Brigalow Belt South and Nandewar bioregions. The Brigalow Belt South Bioregion has been extensively cleared and, before 2005, had only 2.91% of its area in conservation reserves (Thackway & Cresswell 1995). As a result of the western regional assessments, this figure increased to 8.66%. The parks have been grouped under the one plan due to their close biogeographical association that covers both the Northern Basalts and Northern Outwash subregions of the Brigalow Belt South Bioregion.
Surrounding land use	The Bobbiwaa parks provide important islands of remnant vegetation and habitat linkages in a highly cleared and fragmented landscape. Surrounding land uses are mainly grazing and broadacre cropping. A travelling stock route runs almost the full length of the eastern boundaries of the parks and also along part of the northern boundary of Moema National Park. See Figure 1.
Other authorities	The parks are located within the areas of the Narrabri Local Aboriginal Land Council, North West Local Land Services and Narrabri Shire Council.

1.2 Statement of significance

The parks are of local and regional significance due to the following values:

Biological values

- The parks form part of a chain of vegetated fragments that together form an important wildlife corridor for native plants and animals between the Brigalow Belt South and Nandewar bioregions.
- The parks contain many threatened animal and plant species and three threatened ecological communities, including Carbeen Open Forest, Myall Woodland and Brigalow.

Aboriginal heritage

- The parks contain important evidence of occupation and use by Aboriginal people. The parks are currently part of the lands subject to the Gomeroi Native Title claim which is yet to be determined.

Shared heritage

- The parks contain several sites of local historical significance that are linked to early European settlement and previous forestry and grazing activity. This includes log dumps, a grave and memorial, stockyards, a water tank and other infrastructure associated with pastoral land use.

2. Management context

2.1 Legislative and policy framework

The management of community conservation areas in New South Wales is in the context of the legislative and policy framework of the NSW National Parks and Wildlife Service (NPWS), primarily the National Parks and Wildlife Act and Regulation, the Community Conservation Area Agreement developed under the Brigalow and Nandewar Community Conservation Area Act 2005, the *Biodiversity Conservation Act 2016* and NPWS policies.

Other legislation, strategies and international agreements may also apply to management of the parks. In particular, the NSW *Environmental Planning and Assessment Act 1979* may require assessment of the environmental impacts of works proposed in this plan. The NSW *Heritage Act 1977* may apply to the excavation of known archaeological sites or sites with potential to contain historic archaeological relics. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* may apply in relation to actions that impact matters of national environmental significance, such as migratory and threatened species listed under that Act.

Under section 72A of the National Parks and Wildlife Act, a single plan may be prepared for a combination of related protected areas. Killarney State Conservation Area, Bobbiwaa State Conservation Area, Couradda National Park and Moema National Park are considered together in this plan because they have similar ecosystems, management issues and geographic context.

A plan of management is a statutory document under the National Parks and Wildlife Act. Once the Minister has adopted a plan, the plan must be carried out and no operations may be undertaken within the parks except in accordance with the plan. This plan will also apply to any future additions to the parks. Should management strategies or works be proposed in future that are not consistent with this plan, an amendment to this plan will be required.

2.2 Management purposes and principles

Community conservation areas

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

Zone 1 national parks

Zone 1 community conservation areas, including Couradda and Moema national parks, are reserved as national parks under the National Parks and Wildlife Act to protect and conserve areas containing outstanding or representative ecosystems, natural or cultural features or landscapes or phenomena that provide opportunities for public appreciation and inspiration, and sustainable visitor or tourist use and enjoyment.

Under section 30E of the National Parks and Wildlife Act, Zone 1 community conservation areas are managed to:

- conserve biodiversity, maintain ecosystem functions, protect geological and geomorphological features and natural phenomena, and maintain natural landscapes
- conserve places, objects, features and landscapes of cultural value

- protect the ecological integrity of one or more ecosystems for present and future generations
- promote public appreciation and understanding of the area's natural and cultural values
- provide for sustainable visitor or tourist use and enjoyment that is compatible with the conservation of natural and cultural values
- provide for sustainable use (including adaptive re-use) of any buildings or structures or modified natural areas having regard to conservation of natural and cultural values
- provide for appropriate research and monitoring.

The primary purpose of Zone 1 community conservation areas is to conserve nature and cultural heritage. In doing so, opportunities are provided for appropriate and sustainable recreation.

Zone 3 state conservation areas

Zone 3 community conservation areas, including Bobbiwaa and Killarney state conservation areas, are reserved under the National Parks and Wildlife Act to protect and conserve areas that:

- contain significant or representative ecosystems, landforms or natural phenomena or places of cultural significance
- are capable of providing opportunities for sustainable visitor use and enjoyment, the sustainable use of buildings and structures, or research
- are capable of providing opportunities for uses permitted under other provisions of the National Parks and Wildlife Act.

Under section 30G of the Act, Zone 3 community conservation areas are managed to:

- conserve biodiversity, maintain ecosystem functions, protect natural phenomena and maintain natural landscapes
- conserve places, objects and features of cultural value
- provide for the undertaking of uses permitted under other provisions of the National Parks and Wildlife Act (including uses permitted under section 47J such as mineral exploration and mining), having regard to the conservation of the natural and cultural values of the state conservation area
- provide for sustainable visitor use and enjoyment that is compatible with conservation of the area's natural and cultural values and with uses permitted in the area
- provide for sustainable use (including adaptive re-use) of any buildings or structures or modified natural areas having regard to conservation of the area's natural and cultural values and with other uses permitted in the area
- provide for appropriate research and monitoring.

Land is reserved as a state conservation area where mineral values do not allow for reservation under another category. The National Parks and Wildlife Act requires a review of the classification of state conservation areas every 5 years in consultation with the Minister administering the *Mining Act 1992*. The review considers whether each state conservation area should or should not be reserved as either a national park or nature reserve. Reviews were undertaken in 2008 and 2013 in which the status of Bobbiwaa and Killarney state conservation areas remained unchanged.

Subject to the outcome of future reviews, Bobbiwaa and Killarney state conservation areas may become national parks. Meanwhile, the management of the state conservation areas will be guided by the management principles for national parks as far as possible.

2.3 Specific management directions

In addition to the general principles for the management of national parks and state conservation areas (see Section 2.2), management of the Bobbiwaa parks will focus on protecting vegetation communities, threatened species and Aboriginal heritage while encouraging low-impact recreational use.

Existing authorised uses, including the safety zone of the neighbouring rifle range and access to neighbouring private property, will continue.

Efforts will be made to involve the community in the management and protection of the natural and cultural values of the parks.

3. Values

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

3.1 Geology, landforms and hydrology

The adjacent Nandewar Range is the eroded remnant of an enormous shield volcano formed 21 to 17 million years ago. The basement rocks of the range include basalt derived from volcanic activity and sandstone and clayey sands that have been weathered and deposited from higher elevations. Overlying these basement rocks is a mixture of gravel, sand, siltstone and clay soils resulting in undulating to rolling sandstone ridges (SFNSW 2005; Ward et al. 1999), which vary in altitude from 260 to 360 metres above sea level.

Streams originating in the Nandewar Range carrying basalt and sandstone sediments have created widespread alluvial deposits extending west through the parks (Ward et al. 1999). A range of soil types are present which reflect this origin and predominantly include shallow lithosols, sand-on-clay solodic soils and siliceous sands, with massive red and yellow podosol earths found in parts of Killarney State Conservation Area. Iron-bearing concretions are common, with large plates of ironstone found at the ground surface and at shallow depth derived from the sandstone. Coarse cracking clay brown loams are evident in Moema National Park, Bobbiwaa State Conservation Area, and along Curramanga, Bobbiwaa, Ten Mile and Nundi creeks. Strips of deep black cracking clays occur predominantly on the boundaries with cleared agricultural land. Oakvale loamy sands are found in the western parts of Moema National Park and Bobbiwaa State Conservation Area (Ward et al. 1999).

The fertile black soils and grey clays of the plains are valued for their agricultural productivity, but retain only small native vegetation remnants. The parks provide important ecosystem functions to the surrounding and downstream catchments in terms of water quality, biodiversity and conservation. The parks contain ephemeral drainage lines feeding into Bobbiwaa Creek in the Namoi catchment; and Grayvania, Ten Mile and Curramanga creeks in the Gwydir catchment. There are no natural permanent waterbodies in the Bobbiwaa parks.

Issues

- A general increase in surface runoff across the landscape, driven by changes in surrounding land use and corresponding increases in ephemeral stream and gully erosion, is a threat to biodiversity and water quality. Watercourse and gully erosion is locally significant at numerous locations where runoff enters Bobbiwaa State Conservation Area and Moema National Park.
- Soil erosion associated with the road network and creek crossings can cause localised damage to roads during high rainfall, and silt may enter adjacent waterways.
- Numerous drains carrying water and sediment enter the parks from adjacent public roads.

Desired outcomes

- Landscape and catchment values are protected.

- Soil erosion in the parks is minimised, and the water quality and health of streams in the parks is improved.

Management response

3.1.1 Ensure all works in the parks consider and mitigate erosion potential.

3.1.2 Monitor watercourse and gully erosion where runoff enters Bobbiwaa and Moema national parks and undertake remedial actions if needed to minimise erosion.

3.2 Native plants

The original and remnant vegetation across much of the NSW north-west slopes is predominantly dry sclerophyll woodland and floodplain woodland (Keith 2004). Seven broader vegetation associations have been identified within the Bobbiwaa parks (Hunter et al. 2007a–d); these are described in Appendix A.

The vegetation in Killarney and Bobbiwaa state conservation areas is dominated by a range of species including white cypress pine (*Callitris glaucophylla*), wilga (*Geijera parviflora*), hickory (*Acacia leiocalyx*), black cypress pine (*Callitris endlicheri*), narrow-leaved ironbark (*Eucalyptus crebra*), bulloak (*Allocasuarina luehmannii*) and dirty gum (*Eucalyptus chloroclada*) (Hunter et al. 2007a, c). The understorey in these areas has a variety of herbs and grasses, and a shrub layer most commonly of urn heath (*Melichrus urceolatus*) and Deane's wattle (*Acacia deanei*).

The majority of these components are also found in Couradda National Park with the inclusion of a significant motherumbah (*Acacia cheelii*) overstorey with a mid-storey layer of Deane's wattle, native olive (*Notelaea microcarpa*) and currant bush (*Carissa ovata*) (Hunter et al. 2007b).

Moema National Park contains the same core species with the inclusion of significant areas of silver-leaved ironbark (*Eucalyptus melanophloia*) and Dwyer's red gum (*Eucalyptus dwyeri*), and riparian areas containing river oak (*Casuarina cunninghamiana*) and river red gum (*Eucalyptus camaldulensis*) (Hunter et al. 2007d).

The parks provide important habitat linkages between the Brigalow Belt South and Nandewar bioregions. However, the area surrounding the parks has been extensively cleared, which has resulted in a high loss of biodiversity and fragmentation of habitat in the region, increasing the value of the parks as part of a wildlife corridor (NPWS 2002). The former Namoi Catchment Management Authority identified retention and restoration of native vegetation in the Namoi as a key catchment target because much of the grazing land in the catchment has been partially cleared of the overstorey (NCMA 2007). In many places, native vegetation has been significantly over-cleared relative to land capability, and often only one component (either the overstorey or the grasses) remains. Management of the parks will aim to allow vegetation communities to restore and maintain their structural complexity by natural means.

The parks contain three threatened ecological communities listed under the Biodiversity Conservation Act, two of which are also listed under the Environment Protection and Biodiversity Conservation Act (see Table 2). All of these communities are listed as endangered. The woodlands dominated by belah (*Casuarina cristata*) in the state conservation areas are also considered regionally significant as they are poorly conserved and of concern (Hunter et al. 2007a, c).

Table 2: Threatened ecological communities recorded in the Bobbiwaa parks

Threatened ecological community	Status		Park
	BC Act	EPBC Act	
Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions	E		Killarney SCA
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray–Darling Depression, Riverina and NSW South Western Slopes bioregions ^A	E	E	Bobbiwaa SCA, Couradda NP and Moema NP
Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains bioregions ^B	E	E	Moema NP

BC Act: Biodiversity Conservation Act; EPBC Act: Environment Protection and Biodiversity Conservation Act.
E = endangered

^A Listed as Weeping Myall Woodlands Endangered Ecological Community (EEC) under the EPBC Act.

^B Listed as Brigalow (*Acacia harpophylla* dominant and co-dominant) EEC under the EPBC Act.

Numbers of recorded plant species in the parks are:

- Bobbiwaa State Conservation Area 235
- Moema National Park 217
- Killarney State Conservation Area 192
- Couradda National Park 156.

Several of these are threatened (see Table 3).

Table 3: Threatened plants recorded in the Bobbiwaa parks

Common name	Scientific name	Status		Park
		BC Act	EPBC Act	
A sedge	<i>Cyperus conicus</i>	E		Killarney SCA
Native milkwort	<i>Polygala linariifolia</i>	E		Killarney SCA
Spiny peppergrass	<i>Lepidium aschersonii</i>	V	V	Bobbiwaa SCA

Source: *BioNet Atlas* 2017b

BC Act: Biodiversity Conservation Act; EPBC Act: Environment Protection and Biodiversity Conservation Act.
E = endangered; V = vulnerable.

Strategies for the recovery of threatened species, populations and ecological communities have been set out in a statewide *Biodiversity Conservation Program* (OEH 2017a, formerly known as the *Threatened Species Priorities Action Statement*). These actions are currently prioritised and implemented through the *Saving our Species* program which aims to maximise the number of threatened species that can be secured in the wild in New South Wales for 100 years (OEH 2013b). Individual recovery plans may need to be prepared for threatened species listed under the Environment Protection and Biodiversity Conservation Act.

The *Biodiversity Conservation Program* identifies strategies and actions to promote the recovery of threatened species, populations and ecological communities and manage key threatening processes.

The following recovery actions are relevant to threatened species and communities recorded in the Bobbiwaa parks:

- Conduct weed and pest animal control in areas containing spiny peppercress and monitor regeneration of the vegetative community.
- Conduct integrated weed control in Myall Woodland EEC.
- Use best management practice standards to control priority weed or pest animal species in the Brigalow EEC to encourage regeneration in Brigalow remnants.
- Control spiny burr grass (*Cenchrus longispinus* and *C. incertus*), buffel grass (*Cenchrus ciliaris*) and pear species (*Opuntia* spp.) in the Carbeen Open Forest EEC.

Issues

- All the parks were former state forests and have experienced some degree of selective logging activity and disturbance from grazing and ringbarking. As a result, little old-growth woodland remains. Species diversity and structure of vegetation communities have also been impacted but are expected to change over time now that forestry activities have ceased.
- The most significant threats to overall vegetation structure and health are weed infestations, erosion caused by increased runoff from surrounding cleared land, inappropriate fire regimes and use of vehicles off formed roads. In particular, too-frequent fire is a threat to the belah woodland, the Brigalow co-dominant community, motherumbah overstorey, and the belah – Pilliga box assemblage. Conversely, species such as western rosewood (*Alectryon oleifolius*) found in Couradda National Park require disturbance such as fire to produce root suckers and rarely regenerate from seed (see Section 4.2).
- The existence of dense cypress regrowth may present a threat to vegetation diversity, however, management actions to address regrowth may also have negative impacts on other native plant and animal species. No active interventions are proposed.
- Some riparian areas reserved as park are currently fenced out of the parks as a result of a 'give and take' alignment where fencing does not accurately reflect the actual boundary but is based on practical factors including topography and flood prone areas.
- Areas of Myall Woodland EEC in Bobbiwaa State Conservation Area and Couradda National Park are currently fenced into neighbouring properties as a result of previous grazing permits issued when it was a state forest (see Section 5.2). These areas are being grazed and little weed management is occurring (see Section 4.1).
- On the western boundary Moema National Park there is a previously cleared and cropped area which has the potential to be rehabilitated to Myall Woodland EEC. The Brigalow EEC in Moema National Park is poorly structured and limited to a very small area of that park.
- Spiny peppercress has been recorded in Bobbiwaa State Conservation Area and requires further investigation to confirm its extent and population health.

Desired outcomes

- Significant plants and ecological communities are conserved.
- Negative impacts on threatened species and ecological communities are minimised.
- Structural diversity and habitat values are restored in areas subject to past logging and grazing practices.

Management response

- 3.2.1 Implement relevant recovery actions in the *Biodiversity Conservation Program* for threatened plant species, populations and communities occurring in the parks.
- 3.2.2 Undertake systematic biodiversity surveys to enhance the knowledge base for plants and vegetation communities in the parks, including threatened species and ecological communities.
- 3.2.3 Investigate management options to regenerate Myall Woodland EEC within disturbed areas of Moema National Park in collaboration with North West Local Land Services.
- 3.2.4 Encourage the natural regeneration of degraded vegetation subjected to previous clearing and other disturbances, and supplement with weed control, site preparation and revegetation programs where possible.

3.3 Native animals

The parks form an important wildlife corridor with other remnant vegetation on private property, riparian areas, travelling stock routes, state forest and nearby parks. The woodland ecosystem in this corridor provides valuable breeding and foraging habitat for a variety of birds, mammals and reptiles in an otherwise heavily modified environment.

Native animal surveys were undertaken in the parks during the Brigalow Belt South Western Regional Assessment. While no formal surveys have been completed since this time, survey and monitoring of the parks' animal populations will be directed by the Northern Plains Region Biodiversity Monitoring Strategy (OEH 2016d).

Although only limited surveys of native animals have been undertaken in the parks, the area is known to provide essential habitat for a variety of threatened and significant native animals. NSW *BioNet Atlas* (OEH 2017b) has species records for 176 birds, 27 reptiles, 23 mammals (including 10 bats), and 8 amphibians within the parks. Seventeen threatened species have been recorded (see Table 4).

Table 4: Threatened animals recorded in the Bobbiwaa parks

Common name	Scientific name	Status	
		BC Act	EPBC Act
Reptiles			
Pale-headed snake	<i>Hoplocephalus bitorquatus</i>	V	
Birds			
Barking owl	<i>Ninox connivens</i>	V	
Brown treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	V	
Dusky woodswallow	<i>Artamus cyanopterus cyanopterus</i>	V	
Hooded robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	V	
Little eagle	<i>Hieraaetus morphnoides</i>	V	
Little lorikeet	<i>Glossopsitta pusilla</i>	V	
Masked owl	<i>Tyto novaehollandiae</i>	V	

Common name	Scientific name	Status	
		BC Act	EPBC Act
Painted honeyeater	<i>Grantiella picta</i>	V	
Speckled warbler	<i>Chthonicola sagittata</i>	V	
Turquoise parrot	<i>Neophema pulchella</i>	V	
Varied sittella	<i>Daphoenositta chrysoptera</i>	V	
Mammals			
Corben's long-eared bat	<i>Nyctophilus corbeni</i>	V	
Eastern bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	V	
Koala	<i>Phascolarctos cinereus</i>	V	V
Squirrel glider	<i>Petaurus norfolcensis</i>	V	
Yellow-bellied sheath-tail-bat	<i>Saccolaimus flaviventris</i>	V	

Source: *BioNet Atlas* 2017b

BC Act: Biodiversity Conservation Act; EPBC Act: Environment Protection and Biodiversity Conservation Act.

V = vulnerable

As for native plants, strategies for the recovery of threatened animal species and populations are set out in the statewide *Biodiversity Conservation Program* (previously known as the *Threatened Species Priorities Action Statement*), and the strategies are currently prioritised and implemented through the *Saving Our Species* program. Individual recovery plans may also be prepared for threatened species to consider management needs in more detail.

Issues

- For those species recorded in the parks, priority actions include the preservation of habitat, survey and mapping, control of introduced plants and animals, community and landholder awareness and education, and implementing appropriate fire regimes.
- Predation by pest animals such as foxes and cats is a key threat to ground dwelling and other native mammals and birds (see Section 4.1).
- Many birds and mammals recorded in the parks require tree hollows for dens or roosting, or rely on native vegetation as a food source. High intensity or frequent fires result in destruction of tree hollow habitat and food trees. Fires during mating season also adversely impact population succession (see Section 4.2). Although not recorded in the parks, the glossy black-cockatoo is one such species that is threatened as a result of inappropriate fire regimes, as fire can destroy nesting sites and its foraging habitat of bullock thickets which occur in the park.
- Inappropriate activities (e.g. too frequent fire and firewood collection) cause degradation of natural values, including threatened species habitats, ecosystem function and stream health.
- The Northern Plains Region Biodiversity Monitoring Strategy (OEH 2016d) provides a framework for monitoring.

Desired outcomes

- The habitat and populations of all threatened animal species are protected and maintained.

- Negative impacts on threatened animals are minimised.
- Structural diversity and habitat values are restored in degraded areas.

Management response

3.3.1 Implement relevant recovery actions in the *Biodiversity Conservation Program* for threatened animal species and populations occurring in the parks.

3.3.2 Conduct native animal surveys as outlined in the Northern Plains Region Biodiversity Monitoring Strategy to monitor changes in threatened species populations, pest species and the impacts of management and visitation.

3.4 Aboriginal heritage

The parks are generally accepted, by contemporary Aboriginal people, as belonging to the lands of the Gamilaroi (also spelt Gamileroi, Gomeroi, Gamilaraay, Kamilaroi) Nation. The land, water, plants and animals 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 Country are inseparable and need to be managed in an integrated manner across the landscape.

The parks lie within the boundaries of the Narrabri Local Aboriginal Land Council. They are also part of the area subject to the Gomeroi People Native Title Claim (NC11/6) which is yet to be determined.

Aboriginal sites are places with evidence of Aboriginal occupation or are related to other aspects of Aboriginal culture. They are important as evidence of Aboriginal history and as part of the culture of local Aboriginal people. A number of cultural sites are known to exist in the parks including modified (scarred) trees, artefact scatters and resource sites (food, shelter, tools etc.). However, there has not been a comprehensive Aboriginal heritage survey of the parks and it is highly likely that additional Aboriginal sites exist.

The first documented contact between the Gamilaroi People and Europeans in the vicinity of the parks was on 19 December 1831 by Major Thomas Mitchell, Surveyor General for New South Wales, during his first expedition to the Liverpool Ranges. Some escaped convicts were known to have lived in the area with Aboriginal people prior to this date (Mitchell 1839). Mitchell made several references during his journey that 'the country seemed on fire all around us' (Mitchell 1839). Fire is thought to have been used not only for fire-stick farming but also to threaten the early explorers (O'Rourke 1995). The expedition made further contact with local Aboriginal people on 3 January 1832 at a site now in Killarney State Conservation Area. As with Aboriginal people throughout Australia, the coming and settlement by Europeans led to loss of traditional hunting grounds, conflict and deaths over stock, and demoralisation from foreign diseases, especially smallpox. By 1855, the Gamilaroi were described as being wholly dependent on white settlers (O'Rourke 1995).

Aboriginal use of the land now within the parks is believed to have been significant judging from historical records and by the number of sites recorded in the general area. Known trading routes followed the numerous creeks entering the Namoi River floodplain from the high country to the south and east with the land surrounding Narrabri, an important trading and ceremonial location (O'Rourke 1997).

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

The facilitation of cultural activities 'on Country' and traditional use of resources is an important part of Aboriginal communities maintaining connection to Country and culture.

Issues

- No comprehensive surveys have been undertaken in the parks for sites of Aboriginal cultural significance. Cultural heritage surveys have only been undertaken in locations where works are proposed and it is likely that additional Aboriginal cultural heritage is present within the parks.
- The key threats to Aboriginal cultural heritage include loss of knowledge in the community, and loss of sites due to fire, and the use of machinery during infrastructure development and maintenance, fire control and mineral exploration.

Desired outcomes

- Aboriginal places and values are identified, recorded and protected.
- Aboriginal people are involved in management and interpretation of the Aboriginal cultural values of the parks.
- Impacts on Aboriginal cultural heritage values are minimised.
- Understanding of the cultural values of the parks is improved.

Management response

- 3.4.1 Continue to consult and involve the Narrabri Local Aboriginal Land Council, the Gomeroi Traditional Owners group and other relevant Aboriginal community members and organisations in managing and interpreting the parks, including managing Aboriginal sites and places, and natural and cultural values.
- 3.4.2 Undertake a survey and cultural assessment before all works with the potential to impact Aboriginal sites or values.
- 3.4.3 Encourage cultural activities within the parks and support community access to Country for cultural purposes.

3.5 Shared heritage

Heritage places and landscapes are made up of living stories as well as connections to the past that individuals and communities have inherited and wish to conserve for current and future generations, and can include natural resources, objects, customs and traditions. Cultural heritage comprises places and items that may have historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance. NPWS conserves the significant heritage features of the parks and reserves that it manages.

John Oxley was the first non-Aboriginal man to enter Gamilaroi Country, crossing the Breeza Plains south of present-day Gunnedah to Tamworth in 1818. Subsequent expeditions by Major Thomas Mitchell in 1831–32 passed through what are now Killarney and Bobbiwaa state conservation areas.

Not long afterwards, in 1934, Pat Quinn and Andrew Doyle took up the Narrabry squatters run on behalf of Cyrus Doyle, a successful farmer of the Upper Hunter region. The name 'Narrabry' is thought to be derived from the Gamilaroi word '*nurraburaɪ*' (Milliss 1992). The run was reported to cover 200 square miles (518 square kilometres), bordering the Namoi River for 7 miles (11 kilometres) and with a similar frontage along the Narrabri Creek. The run included Killarney Gap, and Bobbiwaa and Spring creeks, and was used for wool and cattle production for much of its early history. Outstations were established where favourable pastures and water

could be found including on Spring Creek, Mulgate Creek and Bobbiwaa Creek. Rumours also persisted during early settlement of the 'Convicts of Gourada' in the vicinity of the modern-day peak of 'Couradda', living in the same fashion as the notorious George 'the Barber' Clarke, an escaped convict. Clarke was the first to encourage Mitchell to explore the north-west in search of the 'Kindur' (River) and inland sea (Mitchell 1839, O'Rourke 1995).

In 1857 Doyle moved his original Nurrabry Head Station from Doctors Creek in Narrabri to a new location on the Killarney Gap Road approximately 2 kilometres south of Killarney State Conservation Area. This was subsequently renamed Killarney following the proclamation of Narrabri as a town in 1859 (NWC 1933).

The parks were all previously state forest and dedicated wholly or partly between 1914 and 1936. These areas were selectively harvested for white cypress pine and ironbark, and grazed by cattle under occupation permits. Timber from these forests was milled on site and locally in Narrabri for the building and railway industry (SFNSW 2005).

Evidence of past land use includes disused log dumps, tree stumps, forestry road signs, quarries, old logging trails, stockyards and dams. In Killarney State Conservation Area, the remains of a single wooden trough adjacent to a bore casing can be found on Boundary Link Road (see Figure 1). Quarry sites previously used for road construction can be found on Spargo Road and Boundary Road in Killarney State Conservation Area.

Bobbiwaa State Conservation Area contains remnants of pastoral history including a stockyard, windmill and tank stand. The recent memorial for John Steel Lowe and grave for 'Barky Lowe' (his dog) are found on the boundary between Bobbiwaa State Conservation Area and Mellburra Road.

Two additional sites were identified during the Brigalow Belt South Western Regional Assessments as being of historical significance (DIPNR 2002). These were the Moema Dam on Brooklyn Road in Moema National Park (see Figure 1) and a logging site in Couradda National Park, although the logging site has not been located to date due to regrowth in the park. Moema National Park also contains an area that was previously cleared and cropped, which is understood to be the site of the school on Moema Station (J Bardon, local landholder, April 2009 pers. comm.). An official Bureau of Meteorology recording site was located in Moema State Forest from August 1938 until January 1955; it is understood to have been associated with a forest camp but its location has not been determined (BOM 2010).

Issues

- There is little information on the shared heritage values of the parks or their historic use.

Desired outcomes

- Significant historic features are appropriately identified, recorded, conserved and managed.
- Negative impacts on historic heritage values are minimised.
- Understanding of the cultural values of the parks is improved.

Management response

3.5.1 Identify and record shared heritage sites and assess their significance.

3.5.2 Protect and manage shared heritage features and values according to their significance.

3.5.3 Undertake a survey and cultural assessment before all works with the potential to impact shared heritage sites and places.

3.6 Visitor use

NPWS parks provide a range of visitor opportunities. NPWS aims to ensure that visitors enjoy, experience and appreciate parks at the same time as conserving and protecting park values.

The Bobbiwaa parks provide opportunities for nature appreciation and low-key recreation activities such as bushwalking, picnicking and birdwatching. The long stretches of sandy roads also lend themselves to cycling and horse riding. There are no formed walking tracks or visitor facilities, and none are proposed.

Public access to each of the Bobbiwaa parks is available from the Newell Highway and Couradda Road to the west, and Mellburra Road to the east. The level of visitation to the Bobbiwaa parks is currently low as most visitors are attracted to the wider range of visitor experiences available in Mount Kaputar National Park to the south-east. However, one of the disused quarries in Killarney State Conservation Area is visited regularly when full of water for catching yabbies (known locally as craw-bobbing). There are no permanent water bodies in the parks available for fishing.

All park roads shown on Figure 1 are available for public vehicle access, cycling and horse riding. Due to heavy clay soils, park roads may be closed to visitor access following heavy rain.

Approximately 50 hectares of land near the southern boundary of Killarney State Conservation Area is occupied by a regulated safety zone for the Narrabri Rifle Range on neighbouring land (see Figure 1, Fire Range Safety Zone). Signage has been erected to advise visitors and staff of the zone and its hours of operation (see also Section 5.2).

Camping

Self-supported bush camping is allowed in the Bobbiwaa parks. There are no designated camping areas and no amenities will be provided. Campers must provide everything to support themselves including drinking water, and must take all rubbish out of the park for disposal.

The removal of woody debris, dead wood and dead trees has been identified as having a significant negative impact on habitat availability and ecosystem functioning and is listed as a key threatening process under the Biodiversity Conservation Act (NSW SC 2003b). However, campers are allowed to collect fallen timber for campfires while camping. Campfires are not allowed during park fire bans which are generally imposed during the bush fire danger period (October to March) and must be observed.

Horse riding

Horse riding is a popular recreational activity that has cultural associations for many Australians. The NPWS *Strategic Directions for Horse Riding in NSW National Parks* (OEH 2012b) provides a framework to improve riding opportunities in NSW parks. Consistent with demand, and in accordance with current NPWS policy, horse riding is permitted on all park roads in each of the parks as shown on Figure 1.

Cycling

In accordance with NPWS policy and the *Sustainable Mountain Biking Strategy* (OEH 2011) cycling is permitted on all park roads within the Bobbiwaa parks.

The NPWS mountain biking policy allows for single-tracks to be provided to meet demand for certain mountain biking experiences where this activity is consistent with park values and where it can be accommodated sustainably. As at 2017 there is insufficient demand for the consideration of single-tracks in the Bobbiwaa parks.

Group activities

Group activities can provide opportunities for people who would otherwise not be able to experience the parks and can promote environmental understanding and support for conservation. Large groups can, however, have an environmental impact and can restrict opportunities for independent visitors.

Non-commercial large-scale organised group activities require consent under the National Parks and Wildlife Regulation, and organised group activities of a commercial nature require licensing under the National Parks and Wildlife Act. All activities must be consistent with the parks' management principles and be compatible with their natural and cultural heritage values. Applications will be assessed in accordance with relevant NPWS policies and procedures.

Bobbiwaa State Conservation Area and Moema National Park have the potential to be study sites for educational and scientific research as two endangered ecological communities are known to occur within their boundaries. Communication with neighbours, community groups and other agencies regarding the values of the parks and proposed conservation programs will help raise public awareness of the values and encourage cooperation regarding management programs.

Killarney State Conservation Area is used occasionally by the Narrabri State Emergency Service and Volunteer Rescue Association for navigation training purposes.

Issues

- In the past, the local community used the Bobbiwaa parks for various purposes that are no longer permitted, including firewood collection, trail bike riding and hunting. There is a low incidence of these and other illegal uses occurring in the parks from time to time.

Desired outcomes

- Visitor use is appropriate and ecologically sustainable, and organised group visits are encouraged, subject to limits on numbers and other consent conditions if necessary to minimise impacts.
- Visitor opportunities encourage appreciation and awareness of the parks values and need for conservation.
- The local community is aware of the significance of the parks and management programs.

Management response

- 3.6.1 Allow public vehicle access on all roads within the parks as shown on Figure 1. Off-road public access by vehicles, trail bikes, machinery or any other form of motorised transport is not permitted.
- 3.6.2 Allow bushwalking, horse riding and cycling on all park roads shown on Figure 1. Off-road horse riding and cycling are not permitted.
- 3.6.3 Allow self-supported bush camping throughout the parks subject to monitoring of visitor impacts. In the event unacceptable impacts on park values occur as the result of bush camping, NPWS will consider limiting bush camping to specific locations.
- 3.6.4 Monitor visitor use of the Killarney State Conservation area quarry for freshwater yabby fishing, including damage to vegetation and soil erosion at the water's edge. Visitor access to the quarry may be limited if unacceptable environmental damage occurs.

- 3.6.5 Monitor the parks for illegal activities such as hunting, rubbish dumping, off-road trail bike riding and firewood collection. Liaise with NSW Police, neighbours and other relevant stakeholders when necessary to assist in managing illegal activities.

4. Threats

4.1 Pests

Pest species are plants, animals and pathogens that have negative health, environmental, economic and social impacts; commonly they are introduced species. Pests can have impacts across the range of park values, including impacts on biodiversity, cultural heritage, catchment and scenic values.

NPWS prepares regional pest management strategies which identify pest species and priorities for control, including relevant actions listed in the *Biodiversity Conservation Program* (see Sections 3.2 and 3.3), threat abatement plans, and other strategies such as the NSW *Biodiversity Priorities for Widespread Weeds* (DPI & OEH 2011) and the *NSW Biosecurity Strategy 2013–2021* (DPI 2013).

The NPWS pest management strategy for Northern Inland (OEH 2012a) identifies pest species and priority programs for the Bobbiwaa parks. The overriding objective of the pest management strategy is to minimise adverse impacts of introduced species on biodiversity and other park and community values while complying with legislative responsibilities. The strategy also identifies where other site- or pest-specific plans or strategies are needed to provide a more detailed approach. These programs and their priority will be regularly reviewed, and emerging threats will be incorporated. Major pest species known to occur in the parks are listed in Table 5.

Table 5: Major pest plants and animals in the Bobbiwaa parks

Name	Extent and impacts
Weeds	
Mother of millions (<i>Bryophyllum</i> spp.) ^{R, T}	Localised occurrences in Killarney SCA, Bobbiwaa SCA and Moema NP. Poisonous to stock. Reproduces vegetatively in large numbers making control difficult.
Spiny burr grass (<i>Cenchrus longispinus</i> & <i>C. incertus</i>)	Localised extent in Bobbiwaa SCA. Pioneer plant of disturbed sandy soils. May affect recreational activities such as bushwalking and camping.
African boxthorn (<i>Lycium ferocissimum</i>) ^{N, S}	Scattered in Killarney SCA and Moema NP. Highly invasive; spread by birds and foxes. Dense thickets provide refuge for feral animals including rabbits, foxes and pigs. Outcompetes and displaces native vegetation.
Tiger pear (<i>Opuntia aurantiaca</i>) ^{N, R}	On western boundary of Killarney SCA and Bobbiwaa SCA. Dispersed by stock, native animals and floodwater. Known invader of lowland grassland and grassy woodland.
Prickly pear (<i>Opuntia</i> spp.) ^{N, S}	Widely scattered throughout the parks. Restricts access for recreation, management and wildlife movement. Large stands hinder regeneration of native plants, particularly smaller shrubs and ground plants.
Bathurst burr (<i>Xanthium spinosum</i>)	Scattered extent in disturbed locations and areas subject to flooding. Generally found along watercourses and drainage lines. Fruits float and are readily dispersed in water.

Name	Extent and impacts
Noogoora burr (<i>Xanthium occidentale</i>)	Scattered extent in disturbed areas. Burrs spread by floodwater and feral animals. Seeds and seedlings are poisonous and thick burr patches eliminate almost all other species. Potential to leave areas of soil exposed to erosion.
Pest animals	
Wild dogs (<i>Canis lupus</i> subspp.) ^P	Widespread but in low abundance in the region and attacks to livestock are uncommon. May help to reduce herbivores which contribute to total grazing pressure. May suppress abundance of cats and foxes with potential benefits for native ground-dwelling mammals and ground-nesting birds. Predation by feral dogs may have significant direct impacts on threatened species such as koalas. Listed as key threatening process on the BC Act (NSW SC 2009).
Feral pigs (<i>Sus scrofa</i>) ^{P, T}	Widespread. Disturb soils and habitats through selective feeding, trampling and digging for invertebrates and underground parts of plants. Reduce water quality in streams and pools. Prey on native birds, reptiles, frogs, soil invertebrates and newborn lambs. Compete with native animals for food resources, reduce crop yields, damage fences, compete with stock for feed and transmit disease. Listed as key threatening process on BC Act (NSW SC 2004) and EPBC Act (TSSC 2001b).
European red foxes (<i>Vulpes vulpes</i>) ^{P, T}	Widespread. Prey on native animals, particularly medium-sized (450–5000g) ground-dwelling and semi-arboreal mammals, ground-nesting birds and freshwater turtles. Listed as key threatening process on BC Act (NSW SC 1998) and EPBC Act (DoE 2009). Threat abatement plan in place (OEH 2010).

Source: OEH 2012a.

^N = Weed of National Significance.

^S = State-level priority (North West LLS 2017).

^R = Regional priority weed (North West LLS 2017).

^P = Declared pest under Local Land Services Act 2013.

^T = Threat abatement plan approved for this species at national level (DoE 2015).

BC Act: Biodiversity Conservation Act; EPBC Act: Environment Protection and Biodiversity Conservation Act.

Current priorities for control of pests in the regional pest management strategy include feral pigs, to protect the habitat of the threatened spiny peppercreep, and foxes. NPWS also monitors for the occurrence of other pests such as goats and deer. Generally speaking, the dry conditions and absence of permanent water in the Bobbiwaa parks are reflected in a low occurrence of vertebrate pests and pests such as pigs become more noticeable after rain events. The presence of artificial water points in the parks also has the potential to contribute to the persistence of pest species.

Pig baiting programs have been undertaken, both independently and in cooperation with neighbours and North West Local Land Services, with some success in all parks. The proximity

of residential properties to Killarney State Conservation Area limits the use of poisoned baits for pest management, and alternative methods have been used in this park.

The priority weed species listed in Table 5 are controlled in the parks by spraying. Additional weeds occur to those listed, and are monitored to assess their potential to impact park values. Additionally, control programs may be carried out in some parks in conjunction with higher priority control programs for other weed species (OEH 2012a).

Use of roads through Killarney and Bobbiwaa state conservation areas to transport farm implements, harvesting equipment and stock to nearby properties has the potential to introduce weed species and pathogens to the parks. Native vegetation communities in the park are also susceptible to invasion by exotic perennial grasses from the surrounding agricultural landscape. This is listed as a key threatening process under the Biodiversity Conservation Act (NSW SC 2003a).

The *Biosecurity Act 2015* and regulations provide specific legal requirements for the prevention, eradication or containment of state-level priority weeds. These requirements apply equally to both public and privately owned land. A regional strategic weed management plan prepared under the Biosecurity Act identifies those pest plants that are being prioritised for management action, investment and compliance effort within the North West Local Land Services region (North West LLS 2017). These priorities will be implemented via the relevant NPWS pest management strategy.

Desired outcomes

- Pest plants and animals are controlled and where possible eliminated from the parks.
- Negative impacts of weeds, pests, pathogens and disease on the parks' natural and cultural values are minimised.
- Pest control programs are undertaken where appropriate through cooperative weed and pest control programs with park neighbours, relevant authorities and stakeholders.

Management response

- 4.1.1 Manage pest animals and plants in line with the pest management strategies relevant to the parks.
- 4.1.2 Participate in cooperative pest animal and weed control programs with neighbours, relevant authorities and stakeholders where appropriate.
- 4.1.3 Monitor the occurrence and extent of pest species to inform future revisions to the NPWS regional pest management strategy.
- 4.1.4 Liaise with neighbours regarding the potential for weed spread from farm machinery traversing the parks, and monitor the impacts.
- 4.1.5 Investigate the need for ground tanks and consider decommissioning where not required to meet NPWS management requirements.

4.2 Fire

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

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

The occurrence of fire in the Bobbiwaa parks is low because the native vegetation communities typically lack a flammable ground layer to carry a fire. It is only when a layer of ephemeral grasses develops due to successive seasons of wetter than average rainfall, that fuel loads in the understorey present a fire risk.

When managed for commercial timber production, fire was actively suppressed in the former state forests. As a result, the majority of the parks are long unburnt. Of the four parks, only Bobbiwaa State Conservation has experienced wildfire, with small-scale fires ignited by lightning strikes in 2004 (affecting 5 hectares), 2012 (affecting less than 1 hectare), 2013 (1.8 hectares) and 2014 (18.4 hectares). Since reservation, NPWS has introduced hazard reduction burning in the parks in accordance with the fire management strategies for the parks.

Separate fire management strategies describing the preferred management approach for each park have been prepared and are regularly updated (OEH 2015, 2016a-c). The strategies outline the known fire history of the park, key assets within and adjoining the park (including sites of natural and cultural heritage value), fire management zones and fire control advantages such as management trails and water supply points. They also contain fire regime guidelines for conserving the parks' vegetation communities. Due to the absence of major infrastructure, the majority of the Bobbiwaa parks are identified as land management zones in which the objective is to conserve biodiversity and protect cultural heritage by applying biodiversity thresholds based on vegetation community types. Fire planning aims to retain old-growth forest and tree hollows, promote a mix of age classes in canopy species, and encourage structural complexity to provide for a diversity of habitat features.

The parks contain a number of threatened species, habitats and vegetation communities that are at risk from inappropriate fire regimes including:

- the threatened glossy black-cockatoo's preferred food source bullock, which occurs in Killarney and Bobbiwaa state conservation areas and Moema National Park
- spiny peppergrass, which occurs in Bobbiwaa State Conservation Area
- Carbeen Open Forest EEC in Killarney and Bobbiwaa state conservation areas
- belah – poplar box forest containing Brigalow EEC in Moema National Park
- hollow-bearing trees needed by hollow-dependent species such as cockatoos, possums and gliders.

The loss of hollow-bearing trees, and removal of dead wood and dead trees, is listed as a key threatening process under the Biodiversity Conservation Act (NSW SC 2007).

Traditional fire practices of the Gamilaroi People have not been well-researched and are therefore poorly understood. The traditional owners are likely to have had burning regimes which promoted seasonal plant resources and hunting, and kept access corridors open. Aboriginal cultural heritage is sensitive to fire and fire suppression activities. Sites such as stone artefacts, scarred trees and tools can be threatened directly by fire and through the construction of fire trails and use of fire suppression machinery such as dozers and tractors.

NPWS maintains cooperative arrangements with surrounding landowners and the Rural Fire Service and is actively involved with the Narrabri–Moree Bush Fire Management Committee. Cooperative arrangements include fire planning, fuel management and information sharing.

Hazard reduction programs, ecological burning proposals and fire trail works are discussed with the bushfire management committee.

Desired outcomes

- Negative impacts of fire on life, property and the environment are minimised.
- The potential for spread of bushfires on, from or into the parks is minimised.
- Fire regimes are appropriate for the conservation of native plant and animal communities.

Management response

- 4.2.1 Implement the fire management strategy for each park including maintaining boundary breaks and water points, suppressing unplanned fires, rehabilitating areas disturbed by fire suppression operations to minimise soil erosion, and undertaking appropriate hazard reduction and ecological burns. Update the strategies as required.
- 4.2.2 Participate in the Narrabri–Moree Bush Fire Management Committee and maintain cooperative arrangements with local Rural Fire Service brigades and fire control officers, other fire authorities and surrounding landowners in regard to fuel management and fire suppression.
- 4.2.3 Manage the parks to protect biodiversity in accordance with the identified fire regimes and thresholds in the fire management strategies. This includes, where possible, excluding fire from bullock thickets and spiny peppercreep, Carbeen Open Forest EEC, belah – poplar box forest containing Brigalow EEC vegetation and riparian areas.
- 4.2.4 Rehabilitate areas disturbed by fire suppression operations as soon as practical after the fire.

4.3 Climate change

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

The latest information on projected changes to climate is from the NSW and ACT Regional Climate Modelling (NARClm) project (OEH 2014). The climate projections for 2020–39 are described as ‘near future’; projections for 2060–79 are described as ‘far future’. The snapshot shown in Table 6 is for the New England North West Region which includes the Bobbiwaa parks (OEH 2014).

Projections of the far-future changes in climate for this region by 2060–79 include an increase in rainfall in autumn but a decrease in winter. In Narrabri, hot days of above 35°C are projected to increase by an average of 20–30 days per year by 2079. Cold nights of below 2°C are projected to decrease by an average of 5–10 days (OEH 2014). These changes are likely to lead to greater intensity and frequency of fires, more severe droughts (with reduced river runoff and water availability for extended periods), and increased severity of storms, leading to regional flooding and increased erosion.

Table 6: New England North West Region climate change snapshot

Projected temperature changes	
Maximum temperatures are projected to increase in the near future by 0.4–1.0°C	Maximum temperatures are projected to increase in the far future by 1.9–2.7°C
Minimum temperatures are projected to increase in the near future by 0.5–1.0°C	Minimum temperatures are projected to increase in the far future by 1.6–2.7°C
The number of hot days will increase	The number of cold nights will decrease
Projected rainfall changes	
Rainfall is projected to decrease over most of the region in winter	Rainfall is projected to increase in autumn
Projected Forest Fire Danger Index changes	
Average fire weather is projected to increase in summer, spring and winter	Severe fire weather days are projected to increase in summer and spring

Source: OEH 2014.

These changes in physical conditions are likely to have considerable impacts for native ecosystems. Climate change may significantly affect biodiversity by changing the size of populations and distribution of species, modifying species composition, and altering the geographical extent of habitats and ecosystems. Species most at risk are those unable to migrate or adapt, particularly those with small population sizes or with slow growth rates.

The potential impact of climate change on the Bobbiwaa parks is difficult to assess since it depends on the compounding effects of other pressures, particularly barriers to migration and pressure from feral animals. Highly cleared and fragmented ecosystems, such as those on the NSW north-west slopes surrounding the Bobbiwaa parks, are likely to be at greater risk than more intact ecosystems.

Programs to reduce the pressures arising from other threats, such as habitat fragmentation, invasive species, bushfires and pollution, will help reduce the severity of the effects of climate change (see Sections 4.1, 4.2 and 4.4).

Desired outcomes

- The effects of climate change on natural systems and the parks' values are minimised.

Management response

4.3.1 Continue existing fire, pest, and weed programs to increase the ability of the parks to cope with future disturbances, including climate change.

4.4 Isolation and fragmentation

The parks provide important habitat linkages between the Brigalow Belt South and the Nandewar bioregions. However, the area surrounding the parks has been extensively cleared, which has resulted in a high loss of biodiversity and fragmentation of habitat in the region, increasing the value of the parks as part of a wildlife corridor (NPWS 2002). Long-term conservation of biodiversity depends on the protection, enhancement and connection of remaining habitat across the landscape, and incorporation of vegetation on both public and private lands. Minimal vegetation links exist between the parks and the adjacent Mount Kaputar National Park, with Bobbiwaa State Conservation Area having the most significant link through adjacent private property. The parks are connected by travelling stock routes containing largely poor quality remnant vegetation.

The size of the parks and their fragmentation from other areas of natural bush are major threats to habitat values. The small size of Couradda National Park, in particular, makes it susceptible to a single, large catastrophic event such as a fire and any further fragmentation should be avoided.

Maintaining and enhancing the integrity of remaining habitats within the parks and, where possible, linking this to adjacent forest remnants and riparian areas is important in ensuring the long-term viability of the parks' biological values.

Desired outcomes

- The integrity and condition of wildlife habitat in the Bobbiwaa parks as part of a regional corridor for wildlife movement are maintained.

Management response

- 4.4.1 Encourage neighbouring landholders to maintain and enhance the integrity of native vegetation on land in the vicinity of the parks to improve the connectivity of wildlife habitat across the landscape.

5. Management operations and other uses

5.1 NPWS management facilities and operations

Roads

NPWS maintains a network of roads in each of the Bobbiwaa parks for park management purposes such as fire-fighting and pest control. All roads within the parks are available for public vehicle use and there are no designated management trails. At the time of reservation, all roads within the parks were vested with the Minister administering the National Parks and Wildlife Act under Part 11 of the Act to ensure continued access to neighbouring properties. As the majority of these roads were not required for sole or continuing access, all but a few have since been incorporated in the respective parks (see Section 5.2, Neighbour access).

Ground tanks

There are 13 ground tanks in the Bobbiwaa parks, which are available for fire-fighting and pest control. They also provide a source of water for native animals and a focus for visitors. As the tanks also contribute to the persistence of pest animals, NPWS will rationalise the network of ground tanks and decommission those that are excess to requirements.

Quarries

There are two disused quarry sites on sandstone ridges in the southern section of Killarney State Conservation Area. They formerly provided material for road construction and maintenance but neither quarry has potential to provide further rock resources for park use. Natural regeneration by native vegetation has stabilised the sites, although there is some potential for erosion after rain events where surfaces are exposed.

Desired outcomes

- Management facilities and operations adequately serve management needs and have minimal impact on park values.
- Infrastructure and assets are well maintained
- Soil erosion in the parks is minimised.

Management response

- 5.1.1 Monitor the condition of the road and trail network and mitigate erosion as required. Maintain all roads as shown on Figure 1 to the standard required in the fire management strategies for the parks.
- 5.1.2 Maintain water points in accordance with the fire management strategies for the parks subject to the outcomes of a review of ground tanks (see 4.1.5).
- 5.1.3 Monitor the potential for erosion of former quarries in Killarney State Conservation Area and implement mitigation measures where necessary.

5.2 Non-NPWS uses

Travelling stock reserves

Travelling stock reserves adjoin the Bobbiwaa parks along most of the length of Mellburra Road and to the north of Moema National Park along Couradda Road (as shown on Figure 1). These reserves are Crown land and were originally established in the late 1880s for moving livestock on the hoof and as supplementary grazing areas. North West Local Land Services is responsible for maintaining these reserves.

In intensively farmed and fragmented landscapes, travelling stock reserves may contain rare vegetation communities or plant species and can potentially add to biodiversity values where they adjoin NPWS-managed parks. In the event that land within any of the travelling stock reserves in the vicinity of the parks becomes available, consideration will be given to adding them to the parks.

Boundary issues

A number of minor boundary encroachments occur in the Bobbiwaa parks.

Along the eastern boundary of Bobbiwaa State Conservation Area, sections of Mellburra Road and associated mitre drains depart from the defined road reserve onto the park. This land is vested in the Minister under Part 11 of the National Parks and Wildlife Act.

Some small patches of Myall Woodland EEC in Bobbiwaa State Conservation Area and Couradda National Park are currently fenced into neighbouring properties. This has come about as the result of former occupation permits issued for grazing when the parks were managed as state forest and fencing was aligned to avoid boggy ground.

Boundary fencing varies from new condition to non-existent, and in places does not prevent stock coming into the parks from travelling stock routes, private property and public roads. Straying livestock is an ongoing issue that is managed cooperatively between NPWS and park neighbours.

Mining and exploration

Being within the northern Gunnedah Basin, the region has a history of coal and coal seam gas exploration, with significant coal mining and gas extraction developments occurring to the south of Narrabri around Gunnedah, the Pilliga and Maules Creek. Exploration for minerals and petroleum, as well as mining and petroleum production are permissible uses within state conservation areas.

All of Killarney and most of Bobbiwaa state conservation areas are contained within a 7915 square-kilometre petroleum title (PEL 238) held by Santos Pty Ltd (DPE n.d.). This title has been renewed several times and interest in coal seam gas is likely to continue into the foreseeable future.

The NSW Department of Planning – Division of Resources and Energy is the lead authority for mining and petroleum activities, including mineral exploration and mine site rehabilitation. NPWS and the department work together to ensure that exploration and production proposals in state conservation areas comply with all statutory requirements, including any necessary environmental impact assessments and approvals.

Narrabri Rifle Club

Narrabri Rifle Club holds an existing interest under Section 187 of the National Parks and Wildlife Act over approximately 50 hectares in the southern portion of Killarney State Conservation Area (see Figure 1). This area is part of a regulated safety zone required for the operation of the rifle range on land adjoining the park. The safety zone is signposted and shooters using the rifle range have no need to enter the safety zone on park. A risk assessment completed for the safety zone determined that the risk to park users associated with the safety zone is low.

Neighbour access

Sections of road within Bobbiwaa State Conservation Area are vested in the Minister under Part 11 of the National Parks and Wildlife Act to allow continued access for neighbouring

landholders. This includes parts of South Boundary Road, Windmill Road and South Tee Road (see Figure 1).

These roads do not form part of the reserved area of the park but their management is subject to this plan, the National Parks and Wildlife Regulation and the requirements of the Environmental Planning and Assessment Act.

Desired outcomes

- Non-NPWS uses have minimal impact on natural and cultural values.
- Boundary anomalies are rectified.

Management response

- 5.2.1 Seek to have land in travelling stock reserves (if no longer required) added to the parks where it would be beneficial to park values.
- 5.2.2 Maintain fences, gates and appropriate signage along travelling stock routes, and liaise with adjoining landholders to encourage the construction and maintenance of effective boundary fences to exclude stock from the parks. If necessary, and subject to available resources, enter into boundary fencing agreements in accordance with NPWS policy.
- 5.2.3 Liaise with park neighbours to rectify boundary fence encroachments in accordance with NPWS policy. Give priority to encroachments which involve significant vegetation such as threatened ecological communities and other sensitive conservation values.
- 5.2.4 Ensure applications for mining and exploration in Killarney and Bobbiwaa state conservation areas are subject to environmental impact assessment before decisions are made about approval.
- 5.2.5 Maintain the rifle range safety zone signs in Killarney State Conservation Area in accordance with NPWS policy.

6. Implementation

This plan of management establishes a scheme of operations for the Bobbiwaa parks.

Activities identified in the plan are listed in the table below; relative priorities are allocated against each activity as follows:

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

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

Table 7: Priority of management responses

Action No.	Management response	Priority
3.1 Geology, landforms and hydrology		
3.1.1	Ensure all works in the parks consider and mitigate erosion potential.	Ongoing
3.1.2	Monitor watercourse and gully erosion where runoff enters Bobbiwaa and Moema national parks and undertake remedial actions if needed to minimise erosion.	Ongoing
3.2 Native plants		
3.2.1	Implement relevant recovery actions in the <i>Biodiversity Conservation Program</i> for threatened plant species, populations and communities occurring in the parks.	Ongoing
3.2.2	Undertake systematic biodiversity surveys to enhance the knowledge base for plants and vegetation communities in the parks, including threatened species and ecological communities.	Medium
3.2.3	Investigate management options to regenerate Myall Woodland EEC within disturbed areas of Moema National Park in collaboration with North West Local Land Services.	Medium
3.2.4	Encourage the natural regeneration of degraded vegetation subjected to previous clearing and other disturbances, and supplement with weed control, site preparation and revegetation programs where possible.	Ongoing
3.3 Native animals		
3.3.1	Implement relevant recovery actions in the <i>Biodiversity Conservation Program</i> for threatened animal species and populations occurring in the parks.	Ongoing
3.3.2	Conduct native animal surveys as outlined in the Northern Plains Region Biodiversity Monitoring Strategy to monitor changes in threatened species populations, pest species and the impacts of management and visitation.	Medium

Action No.	Management response	Priority
3.4 Aboriginal heritage		
3.4.1	Continue to consult and involve the Narrabri Local Aboriginal Land Council, the Gomeroi Traditional Owners group and other relevant Aboriginal community members and organisations in managing and interpreting the parks, including managing Aboriginal sites and places, and natural and cultural values.	Ongoing
3.4.2	Undertake a survey and cultural assessment before all works with the potential to impact Aboriginal sites or values.	Ongoing
3.4.3	Encourage cultural activities within the parks and support community access to Country for cultural purposes.	Ongoing
3.5 Shared heritage		
3.5.1	Identify and record shared heritage sites and assess their significance.	Ongoing
3.5.2	Protect and manage shared heritage features and values according to their significance.	Ongoing
3.5.3	Undertake a survey and cultural assessment before all works with the potential to impact shared heritage sites and places.	Ongoing
3.6 Visitor use		
3.6.1	Allow public vehicle access on all roads within the parks as shown on Figure 1. Off-road public access by vehicles, trail bikes, machinery or any other form of motorised transport is not permitted.	Ongoing
3.6.2	Allow bushwalking, horse riding and cycling on all park roads shown on Figure 1. Off-road horse riding and cycling are not permitted.	Ongoing
3.6.3	Allow self-supported bush camping throughout the parks subject to monitoring of visitor impacts. In the event unacceptable impacts on park values occur as the result of bush camping, NPWS will consider limiting bush camping to specific locations.	Ongoing
3.6.4	Monitor visitor use of the Killarney State Conservation Area quarry for freshwater yabby fishing, including damage to vegetation and soil erosion at the water's edge. Visitor access to the quarry may be limited if unacceptable environmental damage occurs.	Ongoing
3.6.5	Monitor the parks for illegal activities such as hunting, rubbish dumping, off-road trail bike riding and firewood collection. Liaise with NSW Police, neighbours and other relevant stakeholders when necessary to assist in managing illegal activities.	Ongoing
4.1 Pests		
4.1.1	Manage pest animals and plants in line with the pest management strategies relevant to the parks.	Ongoing
4.1.2	Participate in cooperative pest animal and weed control programs with neighbours, relevant authorities and stakeholders where appropriate.	Ongoing
4.1.3	Monitor the occurrence and extent of pest species to inform future revisions to the NPWS regional pest management strategy.	Ongoing
4.1.4	Liaise with neighbours regarding the potential for weed spread from farm machinery traversing the parks, and monitor the impacts.	Ongoing
4.1.5	Investigate the need for ground tanks and consider decommissioning where not required to meet NPWS management requirements.	Medium

Action No.	Management response	Priority
4.2 Fire management		
4.2.1	Implement the fire management strategy for each park, including maintaining boundary breaks and water points, suppressing unplanned fires, rehabilitating areas disturbed by fire suppression operations to minimise soil erosion, and undertaking appropriate hazard reduction and ecological burns. Update the strategies as required.	Ongoing
4.2.2	Participate in the Narrabri–Moree Bush Fire Management Committee and maintain cooperative arrangements with local Rural Fire Service brigades and fire control officers, other fire authorities and surrounding landowners in regard to fuel management and fire suppression.	Ongoing
4.2.3	Manage the parks to protect biodiversity in accordance with the identified fire regimes and thresholds in the fire management strategies. This includes, where possible, excluding fire from bullock thickets and spiny peppergrass, Carbeen Open Forest EEC, belah – poplar box forest containing Brigalow EEC vegetation, and riparian areas.	Ongoing
4.2.4	Rehabilitate areas disturbed by fire suppression operations as soon as practical after the fire.	Medium
4.3 Climate change		
4.3.1	Continue existing fire, pest, and weed programs to increase the ability of the parks to cope with future disturbances, including climate change.	Ongoing
4.4 Isolation and fragmentation		
4.4.1	Encourage neighbouring landholders to maintain and enhance the integrity of native vegetation on land in the vicinity of the parks to improve the connectivity of wildlife habitat across the landscape.	Low
5.1 NPWS management facilities and operations		
5.1.1	Monitor the condition of the road and trail network and mitigate erosion as required. Maintain all roads as shown on Figure 1 to the standard required in the fire management strategies for the parks.	Ongoing
5.1.2	Maintain water points in accordance with the fire management strategies for the parks subject to the outcomes of a review of ground tanks (see 4.1.5).	Medium
5.1.3	Monitor the potential for erosion of former quarries in Killarney State Conservation Area and implement mitigation measures where necessary.	Low
5.2 Non-NPWS uses		
5.2.1	Seek to have land in travelling stock reserves (if no longer required) added to the parks where it would be beneficial to park values.	Medium
5.2.2	Maintain fences, gates and appropriate signage along travelling stock routes, and liaise with adjoining landholders to encourage the construction and maintenance of effective boundary fences to exclude stock from the parks. If necessary, and subject to available resources, enter into boundary fencing agreements in accordance with NPWS policy.	Ongoing
5.2.3	Liaise with park neighbours to rectify boundary fence encroachments in accordance with NPWS policy. Give priority to encroachments which involve significant vegetation such as threatened ecological communities and other sensitive conservation values.	Ongoing
5.2.4	Ensure applications for mining and exploration in Killarney and Bobbiwaa state conservation areas are subject to environmental impact assessment before decisions are made about approval.	Ongoing

Action No.	Management response	Priority
5.2.5	Maintain the rifle range safety zone signs in Killarney State Conservation Area in accordance with NPWS policy.	High

Appendix A: Plant communities

Killarney State Conservation Area

Much of the park is characterised by white cypress pine, hickory, black cypress pine, narrow-leaved ironbark, bulloak and dirty gum. The communities described and their status are:

Plant community	Reservation status
Bulloak – white cypress pine	Currently reserved across its range within the local bioregions.
White cypress pine – narrow-leaved ironbark	Occurrences including carbeen (<i>Corymbia tessellaris</i>) are listed as Carbeen Open Forest EEC under the Biodiversity Conservation Act
White cypress pine – carbeen	Occurrences of carbeen are listed as Carbeen Open Forest EEC under the Biodiversity Conservation Act
Belah – Pilliga box	Should be considered as poorly conserved and 'of concern' but is not currently listed as threatened
Black cypress pine – dirty gum	Not of concern, currently reserved across its range within the local bioregions
Dwyer's gum – white cypress pine	Not of concern, currently reserved across its range within the local bioregions

Source: Hunter et al. (2007c)

Bobbiwaa State Conservation Area

Much of the park is characterised by white cypress pine, wilga, hickory, bulloak and dirty gum. The communities described and their status are:

Plant community	Reservation status
White cypress – white bloodwood	Currently reserved across its range within the local bioregions
Belah – poplar box	Should be considered as poorly conserved and 'of concern' but is not currently listed as threatened
White pine – wilga	Includes Carbeen Open Forest EEC under the Biodiversity Conservation Act
White pine – bulloak	Currently reserved across its range within the local bioregions
River red gum – apple	Reserved well across its range, though the quality of stands is often poor, should still be considered a community of concern though is not threatened
Myall – whitewood	Myall Woodland EEC under the Biodiversity Conservation Act and Weeping Myall Woodlands EEC under the Environment Protection and Biodiversity Conservation Act

Source: Hunter et al (2007a)

Couradda National Park

Overall the character of the vegetation within the park can be described as dominated by white cypress pine and motherumbah in the overstorey with a mid-storey layer of Deane's wattle, native olive and currant bush, and a herb layer of various grasses (such as *Aristida* spp., *Austrostipa scabra* and *Microlaena stipoides*), berry saltbush (*Einadia hastata*), rock fern (*Cheilanthes sieberi*) and Australian stonecrop (*Crassula sieberiana*). The park has been disturbed by selective logging, thinning, grazing and ringbarking. The communities described and their status are:

Plant community	Reservation status
White pine – poplar box	Currently reserved across its range within the local bioregions
Belah	Should be considered as poorly conserved and 'of concern' but is not currently listed as threatened
Motherumbah – Dwyer's gum	Currently reserved across its range within the local bioregions
Smooth-barked apple – white pine	Currently reserved across its range within the local bioregions
Myall	Myall Woodland EEC under the Biodiversity Conservation Act and Weeping Myall Woodlands EEC under the Environment Protection and Biodiversity Conservation Act

Source: Hunter et al. (2007b)

Moema National Park

Overall the character of the vegetation within the park can be described as being dominated by white cypress pine, wilga and silver-leaved ironbark with an understorey of a variety of herbs and grasses, particularly slender bamboo grass (*Austrostipa verticillata*), lantern bush (*Abutilon oxycarpum*), speargrass (*Austrostipa scabra*), weeping grass (*Microlaena stipoides*), threeawn speargrass (*Aristida vagans*) and climbing saltbush (*Einadia nutans*), with a taller shrub layer most commonly of native olive (*Notelaea microcarpa*), wild orange (*Capparis mitchellii*), Deane's wattle and shiny-leaved canthium (*Psydrax odorata*). The park has been disturbed up until recently by selective logging, thinning, grazing and wholesale clearing. The communities described and their status are:

Plant community	Reservation status
Derived grassland	If weeping myall (<i>Acacia pendula</i>) regeneration occurs this could become an endangered ecological community type
White pine	Currently reserved across its range within the local bioregions
White pine – silver-topped stringybark	Currently reserved across its range within the local bioregions
River oak – river red gum	Reserved well across its range, though the quality of stands is often poor, so it should still be considered 'of concern' but is not threatened
Belah	Should be considered as poorly conserved and 'of concern' but is not currently listed as threatened; areas including and dominated by <i>Acacia harpophylla</i> are listed as endangered
Myall	Myall Woodland EEC under the Biodiversity Conservation Act and Weeping Myall Woodlands EEC under the Environment Protection and Biodiversity Conservation Act
White pine – Dwyer's gum	Not of concern, currently reserved across its range within the local bioregions

Source: Hunter et al (2007d)

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