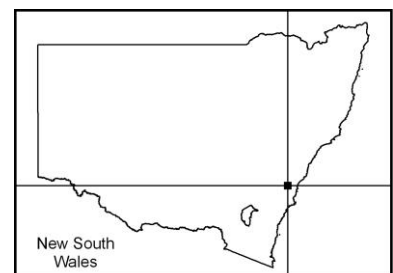




Plan of Management



Bargo River State Conservation Area



Plan of Management Bargo River State Conservation Area

NSW National Parks and Wildlife Service

October 2015

This plan of management was adopted by the Minister for the Environment on 21 October 2015.

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For additional information or any inquiries about this park or plan of management, contact the NPWS Nattai Area Office, PO Box 7305, Mt Annan NSW 2567 or by telephone on (02) 4632 4500.

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Office of Environment and Heritage
59–61 Goulburn Street, Sydney NSW 2000
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Phone: (02) 9995 5000 (switchboard)

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

TTY: (02) 9211 4723

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Foreword

Bargo River State Conservation Area was established in 2007 and covers 1970 hectares. It is situated in the Southern Highlands near the towns of Hill Top, Colo Vale and Yerrinbool.

Bargo River State Conservation Area provides habitat for a range of plants and animals, including threatened species. The park is an integral component of a regional biodiversity corridor between the Woronora Plateau in the east and the Nattai Plateau in the west. The park is well vegetated and protects water quality in the upper reaches of the Bargo River. Aboriginal people have strong cultural associations with the river landscape.

The New South Wales *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each state conservation area. A draft plan of management for Bargo River State Conservation Area was placed on public exhibition from 18 March 2013 to 24 June 2013. The submissions received were carefully considered before adopting this plan.

The plan contains a number of actions to protect our natural environment, including providing for protection of threatened species and communities, targeted threatened species fauna surveys, control of pest plants and animals, and fire management to protect biodiversity.

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

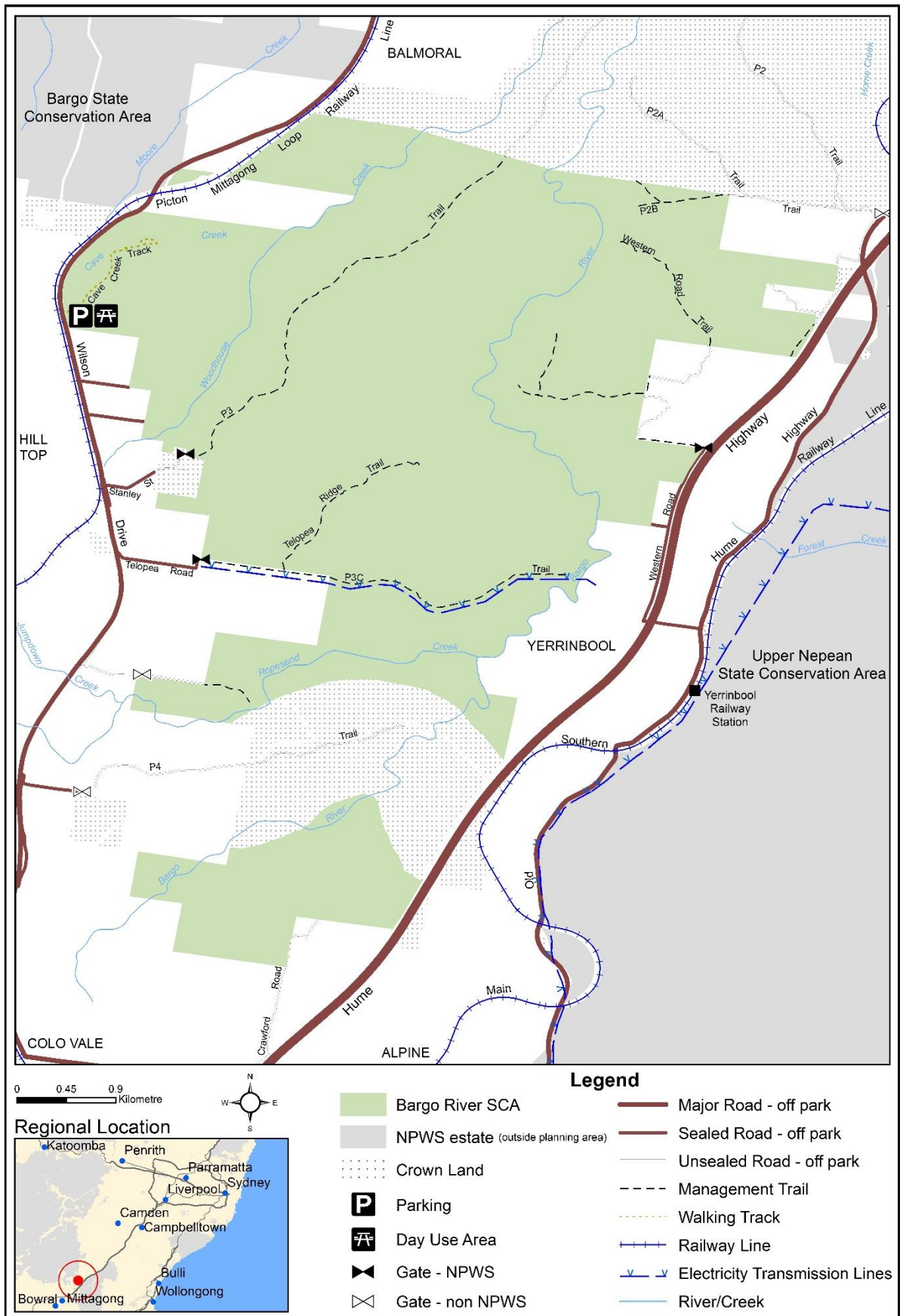


Mark Speakman
Minister for the Environment

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Map 1: Bargo River State Conservation Area



1. Introduction

1.1 Location, gazettal and regional setting

Features	Description
Location	Bargo River State Conservation Area (referred to as ‘the park’ in this plan) is located in the Southern Highlands of New South Wales and is surrounded by the towns of Hill Top, Colo Vale and Yerrinbool. The park extends over much of the upper catchment of the Bargo River.
Area	1970 hectares in two sections separated by a 1 kilometre wide corridor of Crown land. The northern section of the park is 1786 hectares and the southern section is 184 hectares. The park includes approximately 8 kilometres of the bed of the Bargo River.
Reservation date	16 February 2007
Previous tenure	Crown land administered by the Department of Lands, now Department of Primary Industries – Lands (DPI Lands)
Regional context	
Biogeographic region	The park lies in the Sydney Basin Bioregion. It is an important component of a regional biodiversity corridor that connects the Illawarra escarpment and Woronora Plateau in the east with the Nattai Plateau and the Blue Mountains in the west.
Surrounding land use	Within 1–2 kilometres of the park are the large conservation reserves of Upper Nepean State Conservation Area (to the east) and Bargo State Conservation Area (to the west). Immediately adjacent to the park is a mosaic of Crown land, small rural holdings including grazing and orchard enterprises, and semi-rural villages. North of the park is rugged gorge country of various tenure.
Other authorities	Bargo River State Conservation Area is located within the areas of the Illawarra Local Aboriginal Land Council, South East Local Land Services and Wingecarribee Shire Council.

1.2 Statement of significance

Bargo River State Conservation Area is significant for its natural and cultural values, including:

Landscape and catchment values

The park protects a large proportion of the upper reaches of the Bargo River subcatchment (part of the Hawkesbury Nepean Catchment). This area of the subcatchment is well vegetated and the river is considered to be in 'near intact' condition, providing a high quality aquatic habitat with no artificial barriers to fish passage (HNCMA 2007).

Biological values

The park is an integral component of the Southern Blue Mountains to Woronora Regional Pathway, the only remaining vegetated connection between the large areas of extant vegetation on the Woronora Plateau and the Nattai Plateau (and ultimately the southern Blue Mountains) (DECC 2007b, DEC 2005).

Within the pathway two critical native animal linkages have been identified, with the Bargo Linkage being one of the most important native animal habitat linkages in the Greater Southern Sydney Region (DECC 2007b). The linkage enables the gene flow of native animal species that are sparsely distributed across the landscape, the repopulation of areas by a species when local extinction occurs, and seasonal movements of a range of species. The other linkage, Cumberland Koala Linkage, provides suitable habitat connecting the four koala populations of greater southern Sydney (DECC 2007b).

The park contains a range of plant communities within a small geographical area, which support threatened plant species such as the hairy geebung (*Persoonia hirsuta*) and Mittagong geebung (*Persoonia glaucescens*). A number of other threatened and regionally significant plant species are known in the vicinity and are likely to exist in the park. The park contains areas of two endangered ecological communities, namely Shale/Sandstone Transition Forest and Southern Highlands Shale Woodlands.

Four threatened native animal species have been recorded in the park, the gang-gang cockatoo (*Callocephalon fimbriatum*), scarlet robin (*Petroica boodang*), sooty owl (*Tyto tenebricosa*) and the koala (*Phascolarctos cinereus*). Predictive modelling has determined that suitable habitat exists in the park for a much larger range of native animals, including the endangered broad-headed snake (*Hoplocephalus bungaroides*).

Aboriginal heritage values

Aboriginal people have cultural associations with the landscape of the Bargo River deriving from a long pre-contact history, historical interactions during settlement and contemporary attachments. The physical evidence of Aboriginal use of the landscape (such as campsites and art sites), stories and mythology, cultural resources and the landscape itself provide strong cultural links with the past for the present day Aboriginal community.

Recreation values

The park provides opportunities for self-reliant and low impact recreation.

2. Management context

2.1 Legislative and policy framework

State conservation areas in New South Wales are managed in the context of a legislative and policy framework, primarily the *National Parks and Wildlife Act 1974* (NPW Act) and Regulation, the *Threatened Species Conservation Act 1995* (TSC Act) and the policies of the NSW National Parks and Wildlife Service (NPWS).

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

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted a plan it must be carried out and only operations in accordance with the plan can be undertaken. This plan will also apply to any future additions to Bargo River State Conservation Area. An amendment will be required if future management strategies or proposed works are not consistent with this plan.

2.2 Management purposes and principles

State conservation areas

State conservation areas are reserved under the NPW 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 or tourist 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 Act.

Under the Act (section 30G), state 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 NPW 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 or tourist 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 reuse) 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 primarily where mineral values preclude reservation as another category. The NPW Act requires a review of the classification of state

conservation areas every five years in consultation with the Minister administering the *Mining Act 1992*. The classification was reviewed in 2008 and 2013, and the status of Bargo River State Conservation Area remained unchanged.

In the long term it is intended that Bargo River State Conservation Area will become a national park, and therefore its management will also be guided by the management principles for national parks.

2.3 Specific management directions

In addition to the general principles for the management of state conservation areas (see section 2.2) and national parks, management of Bargo River State Conservation Area will focus on:

- protecting the range of plant and animal communities in the park, with particular attention to minimising further fragmentation, enhancing connectivity to other remnants, and maintaining populations of threatened or regionally significant species and communities
- recognising and protecting traditional and contemporary Aboriginal cultural heritage, landscape and spiritual values in consultation with the local Aboriginal community
- encouraging research into the natural and cultural values of the park that contributes to management and understanding of the area's values
- providing opportunities for self-reliant and low impact recreation
- providing interpretive and educational opportunities to assist visitor understanding and enjoyment of the park and promote appropriate visitor behaviour.

3. Values

This plan aims to conserve both natural and cultural values of Bargo River State Conservation Area. The location, landforms and plant and animal communities of an area determine 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 the document clear and easy to use, various aspects of natural heritage, cultural heritage, threats and ongoing use are dealt with individually but their interrelationships are recognised.

3.1 Geology, landscape and hydrology

The Bargo River State Conservation Area lies at the interface between the Nattai Plateau and the Woronora Plateau, two of the major dissected sandstone plateaux of the Sydney Basin Bioregion. The park landscape is hilly to mountainous with an elevation range of 360 to 630 metres.

The geology in the park is predominantly Hawkesbury Sandstone formed in the Triassic period (Stroud et al. 1985). This geology generates a coarse-grained sandy soil (Hawkesbury Unit) that is very infertile and often shallow and rocky (Hazelton & Tille 1990). Hawkesbury Unit soils present an extreme erosion hazard. On some of the higher sections of the park, where slopes are less than 10 per cent, the Hawkesbury Sandstone is overlaid by the Mittagong Formation, comprising alternating bands of shale and fine grained sandstones (DEC 2004a). The soils in these areas are of the Lucas Heights Unit and are slightly enriched when compared with the Hawkesbury Unit soils (Hazelton & Tille 1990). Small areas of sandy alluvium can be found along the creek lines and a small area of the Gynea soil profile has been mapped in the north-east of the park.

The park lies within the 13,700 hectare Bargo River subcatchment of the Hawkesbury-Nepean Catchment and includes approximately 8 kilometres of the bed of the Bargo River. The Bargo River is approximately 32 kilometres long, arising just south of the park near Colo Vale and flowing generally south-west to north-east until its confluence with the Nepean River near Tahmoor. The river and its tributaries have carved the sandstone tableland, forming valleys and gorges and spectacular erosional features including waterfalls and cascades and long, still pools. The gullies and gorges of the subcatchment, particularly downstream of Mermaid's Pools, are among the steepest in New South Wales. A number of creeks join the river as it flows generally unrestricted until it meets the Picton Weir approximately half-way along the length of the river. The upper reaches of the river are considered to be in 'near intact' condition, providing high quality aquatic habitat and no artificial barriers to fish passage (HNCMA 2007).

Issues

The topography and geology of the subcatchment has limited the extent of agriculture and settlement around the river and its tributaries. However, small towns and rural enterprises have developed along the ridges of the catchment boundary and neighbour the park on its eastern, southern and western boundaries. While the upper reaches of the Bargo River are considered to be in 'near intact' condition, drainage lines from these settlements make their way into the creeks that feed the Bargo River. This drainage is a potential threat to river health through the introduction of nutrients, sedimentation and exotic plant species. An action plan has been prepared to deliver catchment-wide programs in river health, biodiversity and soil (HNCMA 2006). NPWS will support the Local Land Services to deliver programs that seek to maintain the condition of the upper Bargo River.

As Hawkesbury Unit soils are prone to erosion, exposed areas, such as management trails, can increase sediment run-off into the drainage system and subsequently impact silting and water quality. An extensive network of trails existed prior to the reservation of the park. A number of these trails are not required for management purposes and are now dormant. To reduce erosion potential, entry to these dormant trails should be closed by brush matting and the trails regenerated if necessary. Dormant trails may be reopened if required for fire management purposes. Trails required for management purposes have been designated in the [Bargo River State Conservation Area Reserve Fire Management Strategy](#) and are reflected in Map 1 of this plan.

There are active coal mining licences in the Bargo River catchment to the north of the park. There are no records of mining in the park, however there is a record of an exploratory coal bore hole (DM Wollongong DDH 10) (Sherwin & Holmes 1985), and a current coal title (AUTH 278) extends over a portion of the western section of the park.

Underground coal extraction by longwall mining started near the Bargo River, close to Tahmoor in 1991 (MSEC 2006). Longwall mining can cause subsidence, and the park lies partly within the Bargo Mine Subsidence District. There is currently no known subsidence in the park, or any other known risks to park values as a result of longwall mining, however north of the park subsidence from longwall mining may impact the Bargo River and its habitats (NSW Scientific Committee 2005). This potential threat was recognised with the declaration of 'Alteration of habitat following subsidence due to longwall mining' as a key threatening process under the TSC Act (NSW Scientific Committee 2005).

Desired outcomes

- Landscape and catchment values are protected.
- Improved water quality resulting from a reduction in nutrients and sediments entering waterways in the Bargo River catchment

Management response

- 3.1.1 Work with consent and determining authorities to mitigate any impacts of local developments on park values.
- 3.1.2 Trails not designated for management purposes will be closed by brush matting and regenerated if necessary.
- 3.1.3 Prepare and implement a cyclical maintenance program for all management trails, to maintain access and minimise erosion.
- 3.1.4 Support the South East Local Land Services to assess and monitor the health of the Bargo River and its tributaries within the park.

3.2 Native plants

The Bargo River State Conservation Area lies at the interface between the Nattai Plateau and the Woronora Plateau. The park is a major component of the Southern Blue Mountains to Woronora Regional Pathway, the only remaining vegetated connection between the large areas of extant vegetation on the Woronora Plateau and the Nattai Plateau (and ultimately the southern Blue Mountains) (DECC 2007b; DEC 2005). The Woronora Regional Pathway extends from Aylmerton (in the south) to Thirlmere (in the north) along the entire Bargo River catchment and along the Nepean River upstream of its confluence with the Bargo River.

The park's native vegetation communities were defined and mapped in 2003 (DEC 2004a) using a combination of aerial photograph interpretation and systematically collected floristic data. This identified 11 native vegetation communities (Table 1 and Appendix A). Woodland is

the most widespread vegetation type with Nepean Enriched Sandstone Woodland (48 per cent of the park) and Exposed Burratorang Sandstone Shrub Woodland (15 per cent) on ridges throughout the park. On the slopes are forest communities including Sheltered Sandstone Blue-leaved Stringybark Forest and Nattai Sandstone River Peppermint Forest. Deep in the gullies, in the most protected aspects, are small patches (total of 6 hectares) of Sandstone Warm Temperate Rainforest.

Two small areas on the perimeter of the park are subcomponents of endangered ecological communities listed under the TSC Act, namely Highlands Shale Tall Open Forest (5 hectares) which is part of the Southern Highlands Shale Woodland in the Sydney Basin Bioregion, and Transitional Shale Dry Ironbark Forest (6 hectares) which is part of the Shale/Sandstone Transition Forest (DEC 2004a). A small patch (0.93 hectares) of Rock Plate Heath-mallee, a regionally significant community, occurs just north of Hill Top (DEC 2004a).

Table 1: Vegetation communities in Bargo River State Conservation Area
(Source: DEC 2004a)

Vegetation community	Location, description* and hectares mapped	Conservation significance
RAINFOREST		
Sandstone Warm Temperate Rainforest	Located deep in the gullies, in the most protected aspects (e.g. at Cave Creek). The canopy is dominated by coachwood (<i>Ceratopetalum apetalum</i>), lilly pilly (<i>Acmena smithii</i>), sassafras (<i>Doryphora sassafras</i>) and grey myrtle (<i>Backhousia myrtifolia</i>). The understorey is dominated by fern species including gristle fern (<i>Blechnum cartilagineum</i>). Mapped area: 6 hectares.	
Sandstone Riparian Scrub	Found in gully line habitats on Hawkesbury Sandstone, often as a small linear strip less than 10 metres wide. Water gums (<i>Tristania laurina</i> , <i>T. neriifolia</i>) are a prominent feature. Includes a dense cover of ferns (<i>Sticherus flabellatus</i> var. <i>flabellatus</i> and <i>Gleichenia microphylla</i>) and some rushes (<i>Schoenus melanostachys</i>). Mapped area: 2 hectares.	
TALL FOREST		
Nepean Gorge Moist Forest	Found in deeply dissected gorges and valleys. Often a very tall forest dominated by river peppermint (<i>Eucalyptus elata</i>) with obvious rainforest trees such as cedar wattle (<i>Acacia elata</i>), New South Wales Christmas-bush (<i>Ceratopetalum gummiferum</i>), coachwood and rough tree-fern (<i>Cyathea australis</i>). Includes a shrubby understorey and a dense cover of ferns. A small area of this community has been mapped near Cave Creek. Mapped area: 2 hectares.	
Nattai Sandstone River Peppermint Forest	A tall forest community occurring on sheltered creek lines and lower slopes. River peppermint is particularly indicative of this community together with a diverse and abundant understorey of fern and vine species. Mapped area: 195 hectares.	

Vegetation community	Location, description* and hectares mapped	Conservation significance
Highlands Shale Tall Open Forest (Form C)	Found in the south-west of the park near Colo Vale on basalt and shale soils. Tall open grassy forest with a canopy dominated by Blaxland's stringybark (<i>E. blaxlandii</i>), coast grey box (<i>E. bosistoana</i>), forest red gum (<i>E. tereticornis</i>) and ribbon gum (<i>E. viminalis</i>). Small trees and shrubs are sparse or absent but may include black wattle (<i>Acacia melanoxylon</i>) and tree violet (<i>Melicytus dentatus</i>). A dense ground cover of grasses and herbs is typical. Mapped area: 5 hectares.	EEC^: Southern Highlands Shale Woodland in the Sydney Basin Bioregion
OPEN FOREST		
Sheltered Sandstone Blue-leaved Stringybark Forest	Common on the mid and upper slopes throughout the park, this community exhibits a canopy dominated by red bloodwood (<i>Corymbia gummifera</i>), blue-leaved stringybark, Sydney peppermint (<i>E. piperita</i>) and grey gum (<i>E. punctata</i>). Shrubs and small trees include narrow-leaved geebung (<i>Persoonia linearis</i>), blueberry ash (<i>Elaeocarpus reticulatus</i>), <i>Leucopogon lanceolatus</i> var. <i>lanceolatus</i> and <i>Astrotricha latifolia</i> . Mapped area: 369 hectares.	
Transitional Shale Dry Ironbark Forest	Occurs on the eastern edge of the park near Yerrinbool, where the shale soils of the Cumberland Plain interface with the sandstone geologies of the Mittagong and Hawkesbury formations. The canopy is dominated by ironbarks (<i>E. fibrosa</i> , <i>E. paniculata</i> subsp. <i>paniculata</i> and <i>E. crebra</i>) and stringybarks (<i>E. globoidea</i> and <i>E. eugenioides</i>) and the groundcover is distinctly grassy. Mapped area: 6 hectares.	EEC^: Shale/Sandstone Transition Forest Endangered under the EPBC Act.
WOODLAND		
Nepean Enriched Sandstone Woodland	Found on ridges throughout the park, this community is a moderately tall forest woodland occurring on soils derived from the Mittagong formation. Red bloodwood and stringybarks (<i>E. globoidea</i> and <i>E. oblonga</i>) occur consistently in the canopy, while the shrub layer includes hairpin banksia (<i>Banksia spinulosa</i> var. <i>spinulosa</i>), spiny bossiaea (<i>Bossiaea obcordata</i>), broad-leaved geebung (<i>Persoonia levis</i>) and sunshine wattle (<i>Acacia terminalis</i>). Mapped area: 943 hectares.	
Exposed Burratorang Sandstone Shrub Woodland	A widespread community, growing on the sandstone sediments of the upper slopes. It features a low, open canopy dominated by Sydney peppermint, red bloodwood and stringybarks. Characteristic of this community is the well-developed heath and shrub stratum comprising hairpin banksia, slender tea tree (<i>Leptospermum trinervium</i>), broad-leaved hakea (<i>Hakea dactyloides</i>) and mountain devil (<i>Lambertia formosa</i>). The ground cover is sparse. Mapped area: 289 hectares.	

Vegetation community	Location, description* and hectares mapped	Conservation significance
Rocky Sandstone Heath Woodland	Occurs on rocky cliff edges, exposed slopes and rock plates on Hawkesbury Sandstone. The community is characterised by a low, open canopy of small stunted trees. The sparse tree layer often features silvertop ash (<i>E. sieberi</i>) or Sydney peppermint and can also include smooth-barked apple (<i>Angophora costata</i>), yellow bloodwood (<i>Corymbia eximia</i>) or hard-leaved scribbly gum (<i>E. sclerophylla</i>). The scattered heath layer is dominated by Proteaceae species and the groundcover is sparse and dry. Mapped area: 134 hectares.	

HEATHS

Rock Plate Heath-mallee	Occurs on massive rock plates and outcrops covered with skeletal sandy soils. The community is characterised by dense heath dominated by heath-leaved banksia (<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>), slender tea tree, scrub she-oak (<i>Allocasuarina distyla</i>), dwarf she-oak (<i>A. nana</i>) and broad-leaved hakea. Mapped area: 1 hectare north of Hill Top.	Regionally significant (DECC 2004a)
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* Ground survey of vegetation communities in Bargo River State Conservation Area has been very limited. Accordingly, vegetation community descriptions include characteristic species across the study area and do not necessarily infer these species have been recorded in Bargo River State Conservation Area.

^ ECC = Endangered Ecological Community

There has not been a comprehensive vegetation survey of the park however over 340 native plant species have been recorded (OEH 2014), including two threatened plant species. A number of other significant species are considered likely to occur as they are present in the catchment or nearby areas and there is suitable habitat in the park (see Table 2). As well, it is possible that the threatened small-flower grevillea (*Grevillea parviflora* subsp. *parviflora*), exists in the park as specimen records exist for *Grevillea parviflora* (not identified to sub-species level).

Table 2: Threatened and significant plant species in the Bargo River State Conservation Area, the Bargo River subcatchment and within 2 kilometres of the park

(Source: OEH 2014; DEC 2004a)

Common name	Scientific name	Conservation status	Occurrence
Mittagong geebung	<i>Persoonia glaucescens</i>	*Endangered +Vulnerable ^2V	Recorded in the park
Hairy geebung	<i>Persoonia hirsuta</i>	*Endangered +Endangered ^3KCi	Recorded in the park
Winged everlasting	<i>Ozothamnus adnatus</i>	^3KC-	Recorded in the park
Records from outside of Bargo River State Conservation Area			
Bynoe's wattle	<i>Acacia bynoeana</i>	*Endangered + Vulnerable ^3VC-	Recorded in the catchment
Narrow-leaved mallee ash	<i>Eucalyptus apiculata</i>	^3RC-	Recorded within 2 km of the park

Common name	Scientific name	Conservation status	Occurrence
	<i>Gonocarpus longifolius</i>	^3RC-	Recorded in the catchment
Native cranberry	<i>Lissanthe sapida</i>	^3RCa	Recorded in the catchment
Needle geebung	<i>Persoonia acerosa</i>	*Vulnerable +Vulnerable ^2VC-	Recorded in the catchment
Bargo geebung	<i>Persoonia bargoensis</i>	*Endangered +Vulnerable ^2V	Recorded in the catchment
Brown pomaderris	<i>Pomaderris brunnea</i>	*Endangered +Vulnerable ^2VC-	Recorded in the catchment

* = Status under TSC Act

+ = Status under EPBC Act

^ = Denotes species listed as a Rare or Threatened Australian Plant (RoTAP) by Briggs and Leigh (1996). Codes:

2 = Geographic range is Australia <100 km

3 = Geographic range in Australia >100 km

V = Vulnerable species at risk of disappearing from the wild over a long period

R = Rare

K = Poorly Known

C = Reserved. At least one population in National Park or other proclaimed reserve(s)

a = Adequately reserved

i = Inadequately reserved

- = Reserved population size is not adequately known

A further three species in the park (*Hemigenia cuneifolia*, *Hovea speciosa*, *Bertya pomaderroides*) are considered to be uncommon and of local interest (Fairley 2008). The potential for further discoveries of threatened species is high due to the small number of park surveys, the variety of vegetation communities, the varied matrix of topography and geology, and the presence of suitable habitat.

Issues

Strategies for the recovery of threatened species, populations and ecological communities have been set out in the NSW *Threatened Species Priorities Action Statement* (DECC 2007a). These actions are currently prioritised and implemented through the Saving our Species program which aims secure the maximum number of threatened species in the wild in New South Wales for 100 years (OEH 2013b). Individual recovery plans may also be prepared for threatened species to consider management needs in more detail. The *Priorities Action Statement* commits NPWS to undertake recovery actions for the threatened species and the endangered ecological communities in the park.

The two endangered ecological communities in the park (Shale/Sandstone Transition Forest and Southern Highlands Shale Woodland) are threatened by increased fragmentation resulting from clearing for urban and rural development. Shale/Sandstone Transition Forest is one of a group of forest and woodland communities in the Greater Southern Sydney Region that has been collectively defined as Grassy Box Woodland fauna habitat (DECC 2007b).

This habitat is the highest priority native animal habitat in the region, providing key habitat for at least 18 priority native animal species of conservation concern and other species that are thought to be locally extinct. The Greater Southern Sydney study has shown that smaller isolated remnants of this habitat are no longer used by animals that are sensitive to

fragmentation (DECC 2007b). Protecting these vegetation communities, and connecting their remnants, is particularly important for maintaining biodiversity in the park and adjacent areas. Accordingly the endangered ecological communities in the park should be assessed for site based threats, and threat abatement measures should be implemented as necessary.

Shale/Sandstone Transition Forest is also threatened by the loss of species composition if the area is repeatedly subjected to fires (NSW Scientific Committee 2000b). Accordingly, the fire management strategy prescribes fire frequency thresholds and operational guidelines to protect biodiversity in Shale/Sandstone Transition Forest (and the other vegetation communities of the park).

While there has not been a comprehensive native plant survey to establish the distribution of the threatened hairy geebung in the park, the species has been recorded close to park management trails. The hairy geebung is particularly threatened by habitat degradation from weed invasion, inappropriate fire regimes, bushrock removal (NSW Scientific Committee 1999) and uncontrolled vehicle access. The Saving our Species program identified that the plant requires site-based management to secure it from extinction in New South Wales, and this park has been recognised as one of the key sites for its management (OEH 2013b). Management measures introduced to protect this species include prohibiting public vehicle access to management trails and bush camping adjacent to fire trails, and implementing trail maintenance and fire management regimes that consider this species.

The Mittagong geebung grows in woodland and dry sclerophyll forest, with the preferred topography being ridges, plateaus and upper slopes. Like most geebung, this species seems to benefit from the reduced competition and increased light on disturbance margins such as roadsides. As these plants are killed by fire, and recruitment is solely from seed, particular consideration must be given during the planning and undertaking of road and trail maintenance and fire management activities.

The small-flower grevillea grows in sandy or light clay soils, usually over thin shales, in a range of vegetation types. The species often occurs in open, slightly disturbed sites such as along tracks or management trails. This species should be given particular consideration during the planning and undertaking of fire management activities, bush regeneration, roadside management, weed control, fencing and sign installation.

The small rural enterprises and residential settlements lying at the head of drainage lines make the park particularly susceptible to the introduction of agricultural, garden escape and roadside weeds.

Desired outcomes

- Knowledge of threatened and significant plant species in the park and their ecology and habitat requirements is improved.
- Populations of significant plant species and ecological communities are conserved.
- Negative impacts on threatened and significant species are minimised.
- Vegetation corridors and linkages between communities are protected and maintained.

Management response

- 3.2.1 Implement the relevant strategies in the *Priorities Action Statement* and recovery plans for threatened species, populations and ecological communities present in the park.
- 3.2.2 Engage specialist staff to survey and map the endangered ecological communities and threatened plant species known to be present or likely to be present in the park, and identify any threats. Update the regional pest management strategy as required.

- 3.2.3 Engage specialist staff to develop and implement site-specific threat abatement measures as necessary for endangered ecological communities and threatened plant and animal species. If necessary, revise fire regimes prescribed in the fire management strategy.
- 3.2.4 Prohibit public vehicle access to management trails and ensure the protection of hairy geebung, Mittagong geebung and the habitat for these species during any trail management activities.
- 3.2.5 Encourage land owners/managers and public utilities and their contractors to develop and implement site awareness and protection procedures for threatened species when undertaking weed control, hazard reduction, road, trail or easement maintenance.

3.3 Native animals

The park is an integral component of two critical native animal linkages (or areas of habitat which facilitate the movement of particular native animal species or groups of species). The Bargo Linkage consists of sandstone vegetation enabling native animals that use sandstone habitat to move between the southern Blue Mountains and the Woronora. The linkage is important for gene flow of native animals that are sparsely distributed across the landscape, for repopulation of areas by a species when local extinction occurs and for seasonal movements of wide ranging species.

The Cumberland Koala linkage follows the enriched sandstone and shale soils that dominate the edge of the Cumberland Plain and provides a connection of suitable habitat between the four koala populations of greater southern Sydney (DECC 2007b). The linkage is important to maintain genetic diversity and prevent local extinction.

A large range of native animals are known to occur in the Bargo River catchment with over 202 native vertebrate species recorded including 28 species of frog, 24 reptiles, 122 birds and 24 mammals (OEH 2014). Of these species 34 are listed as threatened (see Appendix B) under the TSC Act. These records provide a good understanding of the value of the broader catchment for native animals; however, as there have been no comprehensive park surveys the list does not reflect the full range of animal species likely to occur (DECCW 2010a; DEC 2004b). Notwithstanding this limitation, four native animal species listed under the TSC Act have been recorded in the park (see Table 3). Predictive modelling shows that suitable habitat exists in the park for a much larger range of native animals, including threatened species such as the endangered broad-headed snake. This species has been recorded just north of the park and is considered to be a high conservation priority in the region (DECC 2007b).

Table 3: Threatened native animal species recorded in Bargo River State Conservation Area
(Source: OEH 2014)

Common name	Scientific name	TSC status	EPBC status
Gang-gang cockatoo	<i>Callocephalon fimbriatum</i>	Vulnerable	-
Scarlet robin	<i>Petroica boodang</i>	Vulnerable	-
Sooty owl	<i>Tyto tenebricosa</i>	Vulnerable	-
Koala	<i>Phascolarctos cinereus</i>	Vulnerable	Vulnerable

Suitable habitat has been mapped in the park for at least 11 species of conservation concern (see Table 4) and these species rely on the remnant vegetation of the Bargo Linkage for their survival in the Greater Southern Sydney Region (DECC 2007b). A number of other species of conservation significance are predicted to use of the Bargo Linkage as habitat, while not necessarily relying on it as a linkage. It is important to recognise that a large number of more

common species also rely on vegetated corridors and habitat linkages such as the Bargo Linkage and the Cumberland Koala Linkage. Retaining connections that benefit species of conservation concern will help ensure the survival of an entire assemblage of vertebrate and invertebrate species.

Table 4: Species of conservation concern^A that are likely to rely on the Bargo Linkage for their survival in the Greater Southern Sydney Region (Source: DECC 2007b, p. 115)

Common name	Scientific name	TSC Act status	EPBC Act status	Conservation priority in Greater Southern Sydney Region
Rosenberg's goanna	<i>Varanus rosenbergi</i>	Vulnerable	-	Moderate
Gang-gang cockatoo	<i>Callocephalon fimbriatum</i>	Vulnerable	-	Lower
Glossy black cockatoo	<i>Calyptorhynchus lathami</i>	Vulnerable	-	Lower
Turquoise parrot	<i>Neophema pulchella</i>	Vulnerable	-	Moderately high
Masked owl	<i>Tyto novaehollandiae</i>	Vulnerable	-	High
Powerful owl	<i>Ninox strenua</i>	Vulnerable	-	Lower
Spotted-tail quoll	<i>Dasyurus maculatus</i>	Vulnerable	Endangered	High
Greater glider	<i>Petauroides volans</i>	Endangered population ^B	-	Lower
Koala	<i>Phascolarctos cinereus</i>	Vulnerable	Vulnerable	High
Squirrel glider	<i>Petaurus norfolcensis</i>	Vulnerable	-	High
Large-eared pied bat	<i>Chalinolobus dwyeri</i>	Vulnerable	Vulnerable	High

^A Species of conservation concern are described as species warranting particular attention in the Greater Southern Sydney Region and include species listed as Vulnerable or Endangered under the TSC Act, native animals considered to be at risk of declines or extinction, species that are a focus of land management activities such as pests, and species that are of interest for inclusion in cultural heritage studies in the region (DECC 2007b).

^B Greater Glider population in the Eurobodalla local government area

The pools, riffles and occasional sandy beds of the Bargo River provide potential breeding habitat for the Macquarie perch (*Macquaria australasica*) which is listed as endangered under the *NSW Fisheries Management Act 1994* and the EPBC Act (EcoLogical Australia 2010).

Issues

A review across NPWS reserves of the biodiversity survey priorities in the Sydney Basin Bioregion (DECCW 2010a) ranked the native animal survey effort for this park as poor. Most of the current animal species records are for areas alongside management trails. Information about species present in other areas is very limited. Some of the value of the park for native animals can be inferred from records from nearby areas and predictive habitat modelling, however systematic native animal surveys are required to develop a comprehensive picture of the native animals, including threatened species that use and depend on this park.

The *Priorities Action Statement* (DECC 2007a) includes detailed actions for all species listed in Table 3, and a recovery plan has been prepared for the koala (DECC 2008a) and the sooty owl (as part of the NSW Recovery Plan for the Large Forest Owls: Powerful Owl (*Ninox strenua*),

Sooty Owl (*Tyto tenebricosa*) and Masked Owl (*Tyto novaehollandiae*) (DEC 2006). Applicable actions from the *Priorities Action Statement* should be implemented in the park.

Bushrock, loose rocks on rock or soil surfaces, is often illegally collected for landscaping. In the natural environment, bushrock provides habitat for many plants and animals. Animals use rocks and rock environments for shelter, to hide from predators, find food, avoid extreme weather and escape bushfires. Bushrock is also known to provide egg-laying sites for reptiles. 'Bushrock removal' is a declared threat (NSW Scientific Committee 1999) to native animal species that occur or potentially occur in the park, including the endangered broad-headed snake. Prohibiting public vehicle access to management trails (see management response 5.1.1) and protecting habitat during trail management activities will assist in maintaining potential habitat for species that use bushrock.

Tree hollows, dead wood and dead trees provide essential habitat for a variety of native animals and are important to the functioning of many ecosystems. Removing dead wood can result in a loss of habitat, disruption of ecosystem process and soil erosion. 'Loss of hollow-bearing trees' and 'Removal of dead wood and dead trees' have been listed as key threatening processes under the TSC Act (NSW Scientific Committee 2007; NSW Scientific Committee 2003). These processes pose a threat to some native animals that occur or potentially occur in the park, including the gang-gang cockatoo, sooty owl, scarlet robin and broad-headed snake.

To the east of the park, the Hume Highway bisects the Bargo Linkage and forms a barrier to native animal movement. Bird and bat species that use the linkage are able to cross the highway, however for other native animal species such as the koala, crossing this road is much more difficult (DECC 2007b). A number of measures could be implemented to improve the ability of native animals to cross the Hume Highway and move through the Bargo Linkage (see management response 3.3.5).

Desired outcomes

- Knowledge of the threatened and significant animal species and their ecology and habitat requirements is improved.
- The habitat and populations of threatened and significant animal species are protected and maintained, including dead wood and large hollow-bearing trees.
- Negative impacts on native animal species are minimised.
- Key native animal movement linkages, including the Bargo Linkage and Cumberland Koala Linkage, are protected and enhanced.

Management response

- 3.3.1 Implement relevant strategies in the *Priorities Action Statement* and recovery plans for threatened species, populations and ecological communities present in the park.
- 3.3.2 Engage specialist staff to undertake systematic native animal surveys across the park, including targeted surveys for threatened species.
- 3.3.3 Protect bushrock habitats during trail management activities to ensure maintenance of potential habitat for the broad-headed snake and other species dependent on bushrock.
- 3.3.4 Liaise with neighbouring land owners and managers (including Wingecarribee Shire Council, DPI Lands, and Roads and Maritime Services) to encourage and support the maintenance of landscape scale vegetation corridors (e.g. Bargo Linkage and Cumberland Koala Linkage) as effective corridors for native animal movement.

3.3.5 Encourage investigation into native animal underpasses and overpasses for the Hume Highway in areas that are known (or predicted via habitat modelling) to be key crossing points for priority threatened species.

3.4 Aboriginal connections to Country

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 nature are inseparable and need to be managed in an integrated manner across the landscape.

Aboriginal sites are places with evidence of Aboriginal occupation or that are related to other aspects of Aboriginal culture. The physical evidence of Aboriginal use of the landscape (such as campsites and art sites), stories and mythology, cultural resources and the landscape itself provide strong cultural links with the past for the present day Aboriginal community.

The Bargo River lies in Country used traditionally by the Dharawal¹ and Gundungurra² people. Bargo River State Conservation Area is within the boundaries of the Illawarra Local Aboriginal Land Council and lies within in area of land over which there is a registered Native Title claim (NC97/7) under the *Native Title Act 1993* that has not yet been determined.

Issues

The limited surveying of the area has recorded a small number of Aboriginal sites in the park, including an art site. The area is likely to contain other occupation sites. Aboriginal artwork can be found along the Bargo River gorge to the north of the park. Aboriginal sites in the park are potentially at risk from management activities such as the use of heavy machinery for fire suppression.

The area's Aboriginal storylines, such as the story of Migadan the spirit of the river, often extend across the landscape of the river catchment, beyond the boundaries of the park and over various land tenures. The Bargo River gorge (north of the park) is an important part of the mythology of the local people. A number of other Aboriginal storylines have their origins in the Bargo River area.

While NPWS has a legal responsibility for the protection of Aboriginal sites and places under the NPW Act, it acknowledges the right of Aboriginal people to make decisions about their own heritage. It is therefore policy that Aboriginal communities be consulted and involved in the management of Aboriginal sites, places and related issues, and the promotion and presentation of Aboriginal culture and history.

Desired outcomes

- Aboriginal sites, places and cultural values in the park are identified and protected, and are considered in the context of a broader Aboriginal landscape.
- Aboriginal people are involved in management of the Aboriginal cultural values of the park.

¹ Also known as Tharawal / Dariwal (AIATSIS 2010). Other spellings: Turuwal (Ridley 1875, 1878); Thurrawal (Mathews and Everitt 1900, Mathews 1901a, 1901b, 1903, Capell 1970); Thur'rawal (Mathews 1902); Dharawal (Capell 1970, Eades 1976).

² Also known as Gundungura / Gandangara (AIATSIS 2010). Other spellings: Gundungurra (Mathews 1901a, 1903, Mathews and Everitt 1900, Capell 1970); Gun'dungur'ra (Mathews 1901a, 1902); Gun'-dung-ur'ra (Mathews & Everitt 1900).

- Understanding of the cultural values of the park is improved.

Management response

- 3.4.1 Consult and involve local Aboriginal communities, the Illawarra Local Aboriginal Land Council, other relevant Aboriginal community organisations and custodial families in the management of their Country, including the management of Aboriginal sites, places and cultural and natural values.
- 3.4.2 Undertake and support research into the Aboriginal heritage values of the park with local Aboriginal communities, the Illawarra Local Aboriginal Land Council, other relevant Aboriginal community organisations and custodial families.
- 3.4.3 Encourage the recording and mapping of the Aboriginal storylines of the Bargo River area. Acknowledge their significance to local Aboriginal people and work with the local Aboriginal community to protect the storylines.
- 3.4.4 Facilitate access to the park by Aboriginal people for traditional or cultural purposes and practices, and the celebration, sharing and development of cultural knowledge.
- 3.4.5 Recognise and acknowledge Aboriginal language and connection to Country in park signage and in public information.
- 3.4.6 Undertake an archaeological survey and cultural assessment, in consultation with the local Aboriginal community, prior to all works with the potential to impact on Aboriginal sites or values.
- 3.4.7 Collaborate with other land managers to encourage the protection of Aboriginal cultural values that are connected with the park but extend across the Bargo River catchment and various land tenures.

3.5 Historic heritage

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

European explorers arrived in the Bargo area in 1798. During this expedition the earliest known specimen of a lyrebird was taken near the Bargo River and the party also noted the presence of 'cullawine' (koala) and wombat (Chisolm 1955). In 1815 Governor Lachlan Macquarie crossed the Bargo River near its junction with the Nepean River (about 14 kilometres north-east of the park) during a visit to the Cowpastures (NPA 1995) and by this time John Oxley, the Surveyor-General of New South Wales, was running cattle near Bargo (NSW Heritage Office 2006). Picton township, which lies 17 kilometres to the north of the park, was first settled in 1821 and is one of Australia's oldest town settlements. The Bargo River provided the first water supply for the settlement (Vincent 2006).

With the opening of the Picton to Mittagong railway line in 1867, and the establishment of a railway siding in 1878 at Big Hill Upper (later called Hill Top), settlement of the local area began to expand (Wingecarribee Shire Council 2011). The railway line ran along the ridge to the west of what is now the park, but in 1919 the line was deviated through Yerrinbool to the east of the park, and this became the new route for the main southern railway line. The original Picton to Mittagong loop railway line is now partly disused. On the original railway line there is a deep cutting through Big Hill on the boundary of the park to the north of Hill Top. This cutting was for

many years the deepest in Australia. A nearby memorial celebrates the extraordinary manual effort required for its construction. After the new railway station opened in Yerrinbool in 1919, a sawmill was erected nearby in 1921, indicating a local timber industry existed. Settlement in the area was largely confined to the ridges along the original and new railways routes, with the area that was to become the park being encircled within these lines of settlement.

In the early 1900s eucalyptus oil was produced on a property near Ropesend Creek that is now adjacent to the park, south of Hill Top (Wingecarribee Shire Council 2011a). Eucalyptus leaves (commonly from *Eucalyptus smithii* and *E. radiata*) were sourced from the property and surrounding bushland areas, and trees were often coppiced to promote regrowth and aid the collection of leaves. It is likely that areas that are now in the park provided source material for oil production and/or the propagation of suitable species. Anecdotal reports from local residents suggest that tree stumps in the park are evidence of logging for timber production or firewood. The stumps may also be a remnant of the eucalyptus oil production process.

There are no recorded historic sites, structures or buildings in the park.

Desired outcomes

- Understanding of the cultural values of Bargo River State Conservation Area is improved.

Management response

3.5.1 Encourage and support research into the historic heritage of the Bargo River State Conservation Area. Record and assess any sites located and manage them in accordance with their assessed level of significance.

3.5.2 Encourage investigation into the heritage value of the Picton to Mittagong loop railway line including the Big Hill railway cutting which lies adjacent to the park boundary.

3.6 Visitor use

National parks provide a range of visitor opportunities. NPWS aims to ensure that visitors experience, enjoy and appreciate these parks while the natural and cultural values of the parks are conserved and protected.

Wilson Drive, which runs along the western boundary of the park, provides an alternative to the Hume Highway for tourist travel in the Southern Highlands. This route is promoted as the Thirlmere/Wollondilly Discovery Trail, one of the scenic driving routes making up the Greater Blue Mountains Drive (GBMD 2012). In the region, also accessible from the Greater Blue Mountains Drive, are a number of other NPWS parks, including the Thirlmere, Nattai and Blue Mountains national parks and the Burragorang, Bargo, Nattai and Yerranderie state conservation areas.

Close to the park, day use facilities are provided at Burragorang Lookout in Burragorang State Conservation Area, and lakes Werri-Berri and Couridjah in Thirlmere Lakes National Park. Facilities are also provided in reserves managed by the Sydney Catchment Authority at Warragamba, Cordeaux, Avon, Cataract and Nepean dams, at the Mount Annan Botanical Gardens, Wirrimbirra Sanctuary and a number of reserves managed by local government. Caravan parks and camping grounds with facilities are available nearby in Bargo, Mittagong, Oakdale and Camden. Bush camping is permitted in the Nattai National Park and Bargo, Burragorang, and Nattai state conservation areas outside the Schedule One Water Quality Protection Zone.

Bargo River State Conservation Area currently has few visitors. Use is generally limited to low impact, self-sufficient, nature-based recreation, such as picnicking, bird watching and bushwalking. The visitor facilities provided in the park include a picnic area at Cave Creek (with

tables, gas barbecues and a toilet), and a 2 kilometre return walking track from the picnic area down to the creek. The picnic area, which is accessed from Wilson Drive on the western boundary of the park, provides parking, and a pleasant picnic setting for visitors using the tourist drive.

No camping facilities are provided in the park, however low impact bush camping is possible. The management trails are used for bush walking and access to areas suitable for bush camping. In accordance with NPWS policy and the *Sustainable Mountain Biking Strategy* (OEH 2011c) cycling is permitted on management trails. Public vehicle access is not permitted on management trails in the park.

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 eight priority regions in New South Wales. The Metro South West Region, where the park is located, is not one of the priority regions. Horse riding is not suitable in the park as it has the potential to impact threatened species, including hairy geebung, and may contribute to accelerated erosion of trails. Furthermore, there is a lack of connectivity to existing horse trails in the region and limited access for horse floats.

Issues

The Cave Creek walking track was established before the gazettal of Bargo River State Conservation Area. The track was subsequently classified as a Class 4 Hiking Track under the Australian Standard (AS2156 Walking Tracks) (DECCW 2010c). This class of track enables visitors to explore a relatively undisturbed natural environment along a defined and distinct track with minimal facilities. Visitors can expect few encounters with others. This class of track is considered appropriate for current and likely future use at this location. While some sections of the track have been upgraded, additional work and ongoing maintenance is required to ensure all sections meet the standard for a Class 4 Hiking Track.

The location and extent of the management trail network in the park is restricted due to the area's terrain, and the limited management requirements. While the trails are effective for park management purposes, they provide limited opportunities for visitor use as they do not access key visitor destinations, form a looped network, or link to regional trails outside of the park. The trails are prone to erosion, although trails with low gradients are likely to withstand low to moderate frequency cycling and use by management vehicles. The condition of trails and surrounding areas will be monitored, and access will be restricted or maintenance regimes modified if necessary.

Two threatened plant species with habitats adjacent to management trails are potentially impacted by recreational activities, vehicles and trail maintenance activities (see Section 3.2). Some restrictions on use are already in place, however the potential impacts on threatened species by other recreational activities should be monitored and further controls or restrictions implemented if necessary.

Bush camping, particularly adjacent to management trails, can impact water quality and threatened plants and animals. Bush camping is only permitted if it is more than 200 metres from any creek or river, public road, walking track and management trail. Further restrictions may be imposed, or areas may be closed to bush camping, if unacceptable impacts become apparent.

Before gates were installed, unrestricted vehicle access to management trails saw an increase in rubbish dumping and other illegal activities in the park.

Expanding the Cave Creek day use and parking area, or creating other visitor facilities including additional walking tracks, is unnecessary given the current low number of visitors to this park and the facilities available in nearby parks.

Desired outcomes

- A range of opportunities are available for low impact recreational activities that encourage appreciation and awareness of the park's values.
- Visitor use is ecologically sustainable and provided within a regional context.
- Negative impacts on park values are minimised.

Management response

3.6.1 Provide and promote low impact recreational activities such as bush walking, bush camping, cycling and picnicking.

3.6.2 Upgrade and maintain the Cave Creek walking track to protect fragile environments and meet required standards for a Class 4 Hiking Track.

3.6.3 Allow low impact bush camping in the park provided it occurs more than 200 metres from any creek or river, public road, walking track and management trail. If necessary bush camping will be further restricted to minimise impacts on park values.

3.6.4 Permit cycling on management trails. Cycling is not allowed on walking tracks or off-trail. Impacts will be monitored and further controls or restrictions implemented if necessary.

3.6.5 Continue to provide day use facilities including parking, toilets and barbecues at Cave Creek day use area.

3.6.6 Public vehicle access, wood and charcoal fires, and horse riding are not permitted in the park.

3.7 Information and education

Visitor information assists in the protection of natural and cultural heritage, promotes support for conservation, and increases the enjoyment and satisfaction of visitors.

Information about the natural and cultural values of the park, and a walking track map, is currently provided on a sign at the Cave Creek picnic area.

Issues

The park's low visitor numbers are partly due to the lack of public awareness about the park and the opportunities it offers. There is limited identification signage in the local area and a lack of publicly available information about the park. Information for park visitors should be provided at the primary visitor access points, including the Cave Creek day use area and the P3 fire management trail entrance near Boronia Park, Hill Top. The information should be designed to:

- assist visitors to access the park, understand the recreational opportunities available and advise them of appropriate use
- interpret the natural and cultural heritage values of the Cave Creek area to increase visitor understanding and appreciation of the park.

Currently, there are no educational programs operating in the park, however there is an opportunity to develop small-scale guided and self-guided tours, and to contribute to local community events, publications and websites. The local Aboriginal community should be involved in the development of material and programs for interpretation, particularly concerning Aboriginal culture and heritage.

While there are no local volunteer programs to assist in park care, there is an opportunity to develop educational programs aimed at encouraging the local community to use and care for the park.

Desired outcomes

- The public's appreciation and awareness of the park's natural and cultural values is increased through community engagement, education and interpretation.
- The park is a useful educational resource for local schools, community organisations and the wider community.
- Management of neighbouring lands supports the protection of park values.

Management response

- 3.7.1 Encourage the development of small-scale educational opportunities in the park, particularly those which contribute to improved understanding of the park's natural and cultural heritage.
- 3.7.2 Involve the local Aboriginal community in the development of material and programs for interpretation of Aboriginal culture and heritage.
- 3.7.3 Maintain signage at the Cave Creek day use area to provide visitors with information about the natural and cultural values of the area and appropriate use of the park.
- 3.7.4 Install signage at the entrance to the P3 Fire Trail, and other trails as necessary, to provide basic information for visitors about park values and appropriate use of the park.
- 3.7.5 Communicate with park neighbours and the local community regarding park values and the conservation of these values through NPWS and local community events, publications, websites and other channels.
- 3.7.6 Foster and assist appropriate research which contributes to an improved understanding of the park's natural and cultural heritage.

4. Threats

4.1 Pests

Pests are species, most commonly introduced, which have negative health, environmental, economic and social impacts. Pests are among the greatest threats to biodiversity throughout Australia.

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

The NPWS Regional Pest Management Strategy 2012–17, Metro South West Region – A new approach for reducing impacts on native species and park neighbours (OEH 2012a) identifies pest species and priority programs for this park. The overriding objective of the strategy is to minimise the adverse impacts of introduced species on biodiversity and other park and community values, while complying with legislative responsibilities.

The strategy identifies where other site or pest-specific plans or strategies need to be developed, and where the effectiveness of pest control activities can be maximised through cooperative programs with neighbours, including the Local Land Services, other government agencies, local councils, regional pest committees, universities and community groups.

The strategy also acknowledges the most effective way to manage pest species is to prevent their initial incursion. Pest species have the ability to establish rapidly in new areas and require a timely and rapid response. Many pest species are already widely established in New South Wales, and their eradication across large areas is not achievable using existing control methods and resources. Priorities for the control of these species should be focussed on areas where the benefits of control will be greatest.

As pests have not been surveyed in Bargo River State Conservation Area, detailed information on the distribution and abundance of pest animals and weeds is not available. The regional pest management strategy will be updated annually as new information and priorities emerge.

Weeds

The park is susceptible to the introduction of agricultural, garden escape and roadside weeds.

A range of weed species are known to be present in the park, including noxious weeds, environmental weeds or weeds known to significantly impact threatened species and endangered ecological communities. These weed species include blackberry (*Rubus fruticosus*[#]), fireweed (*Senecio madagascariensis*[#]), serrated tussock (*Nassella trichotoma*^{*#}), pampas grass (*Cortaderia sp.*[#]), Noogoora burr (*Xanthium occidentale*[#]), lantana (*Lantana sp.*^{*#}), common prickly pear (*Opuntia stricta*[#]), Patterson's curse (*Echium sp.*[#]), crofton weed (*Ageratina adenophora*), fleabane (*Conyza albida*), inkweed (*Phytolacca octandra*), fennel (*Foeniculum vulgare*), fishbone fern (*Nephrolepis cordifolia*) and a number of thistles and exotic grasses (various species, many of them noxious) (DECC 2008b).

* Declared Weed of National Significance

Declared 'noxious' under the *Noxious Weed Act 1993*

- Declared 'pest' under the *Local Land Services Act 2013*

Invasion and establishment of exotic vines and scramblers has been declared a key threatening process and is identified as a particular threat to the Shale/Sandstone Transition Forest endangered ecological community (NSW Scientific Committee 2006). Insufficient information is currently available about threats to this plant community in the park. Shale/Sandstone Transition Forest in the park should be assessed for site-based threats (see Section 3.2).

Pest animals

Pest animals known or likely to occur in the park include the European red fox (*Vulpes vulpes*), wild dog (*Canis familiaris*), feral cat (*Felis catus*) and rabbit (*Oryctolagus cuniculus*) (DECC 2008b; DEC 2004b). The pest predators, fox, wild dog and feral cat, have the ability to affect populations of native animals, particularly medium sized ground-dwelling and semi-arboreal mammals, ground-nesting birds and freshwater turtles.

Foxes have also been implicated in the spread of a number of weed species such as blackberry. 'Predation by the European red fox' was declared a key threatening process in 1998 under the TSC Act and a threat abatement plan (Fox TAP) was prepared to establish long-term control programs in those areas where impacts on threatened and other native animals are greatest (OEH 2011a). While foxes are being controlled at priority sites across New South Wales to protect biodiversity, Bargo River State Conservation Area is not currently a priority site for fox control.

The park is in the area covered by the *Southern Highlands Wild Dog Management Plan* (Southern Highlands Wild Dog Working Group 2010). The plan seeks to minimise the impacts of wild dogs on livestock while ensuring the dingo and its function is conserved in core areas of public lands. As a key stakeholder, NPWS will continue to apply the plan and contribute to the Southern Highlands Wild Dog Working Committee.

The feral honeybee (*Apis mellifera*), although not currently known to be a particular problem in the park, may be a factor in the rarity of several types of geebung. This is because their pollen transport method makes effective pollination of geebungs unlikely (NSW Scientific Committee 2002a). 'Competition from feral honeybees *Apis mellifera* L.' has been declared a key threatening process (NSW Scientific Committee 2002a).

Plant pathogens

Cinnamon fungus (*Phytophthora cinnamomi*) is a soil-borne pathogen which infects a large range of plant species and in some circumstances may contribute to plant death where other stresses are present such as waterlogging, drought or wildfire (NSW Scientific Committee 2002b). While cinnamon fungus has not been recorded to date, there are species and communities in the park that it may adversely affect. The key threatening process declaration 'Infection of native plants by *Phytophthora cinnamomi*' (NSW Scientific Committee 2002b) includes small-flower grevillea, Bargo geebung, Mittagong geebung, hairy geebung and other threatened species.

Myrtle rust (*Uredo rangellii*) is a new and emerging threat to vegetation communities. The rust affects Myrtaceae plants including Australian natives like bottle brush (*Callistemon* spp.), tea tree (*Melaleuca* spp.) and eucalypts (*Eucalyptus* spp.). 'Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae' has been declared a key threatening process (NSW Scientific Committee 2011). The sheltered vegetation communities in the park which contain canopy species known to be susceptible to myrtle rust have the greatest potential to be infected (i.e. Sheltered Sandstone Blue-leaved Stringybark Forest, Nattai Sandstone River Peppermint Forest, Nepean George Moist Forest and Sandstone Warm Temperate Forest).

Desired outcomes

- Pest species posing a threat to park values are identified.

- Pest plants and animals are controlled and where possible eliminated.
- Negative impacts of pest plants and animals on park values are minimised.

Management response

- 4.1.1 Manage pest species in accordance with the regional pest management strategy and other relevant strategies. Give priority to protecting significant and threatened species and communities, areas with good potential for recovery, and emerging pest populations with a risk of spreading.
- 4.1.2 Conduct annual reviews of the prioritised pest programs in the regional pest management strategy, update the strategy if required, and develop and implement an annual pest control program for the park.
- 4.1.3 Seek the cooperation of neighbours and key stakeholders, including Roads and Maritime Services and NSW Trains, in implementing weed and pest control programs. Undertake control in cooperation with the Cumberland Livestock Health and Pest Authority, Wingecarribee Shire Council, South East Local Land Services, Southern Highlands Wild Dog Working Committee and the Southern Tablelands and South Coast Noxious Plants Committee.
- 4.1.4 Continue to apply the *Southern Highlands Wild Dog Management Plan* and contribute to the Wild Dog Working Committee.
- 4.1.5 Implement management protocols if it becomes evident that the feral honeybee (*Apis mellifera*) is having a negative impact on threatened geebung species in the park.
- 4.1.6 Implement NPWS management protocols developed for myrtle rust and cinnamon fungus in accordance with the regional pest management strategy.

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 loss of particular plant and animal species and communities. High frequency fires have been listed as a key threatening process under the TSC Act with Shale/Sandstone Transition Forest being one of the communities that is likely to suffer a loss of species composition if subject to repeated high frequency fires (NSW Scientific Committee 2000b).

The Rural Fire Service documented a fire history for the area before park gazettal. These maps show widespread wildfire west of the Bargo River in 1965 and again in 1972–73. A number of prescribed burns have been undertaken east of Hill Top and records suggest most areas east of the river have been subject to a prescribed burn or wildfire every 7 to 10 years since the late 1980s. The mapping of a hazard reduction burn in 2008 was the first fire mapping for this park by NPWS.

Built assets vulnerable to fire in the park include the Cave Creek day use area and the Endeavour Energy powerlines adjacent to the P3C fire trail. Vulnerable assets adjacent to the park include the small rural enterprises and residential settlements, as well as the villages of

Yerrinbool and Yanderra (to the east), Colo Vale (to the south) and Hill Top and Balmoral (to the west).

A [reserve fire management strategy](#) which defines the fire management approach for the park has been prepared (DECCW 2009). The strategy outlines the park's recent fire history, lists key assets and adjoining assets including sites of natural and cultural heritage value, and details fire control advantages such as management trails and water supply points. It also provides fire regime guidelines for conservation of the park's vegetation communities.

The strategy also defines zones which have specific fire management objectives and strategies. This includes a number of asset protection zones on the park boundary at Hill Top and Colo Vale. These zones protect human life, property and highly valued public assets and values. A program of asset protection zone maintenance will manage fire fuels (such as grass, bark, leaf litter and living vegetation) so they do not exceed the levels prescribed by the *NPWS Fire Management Manual* (OEH 2011b). Management activities include slashing and mowing, selective shrub clearing, trail construction and prescribed burning.

As well, strategic fire advantage zones have been defined in the park to the west and north of Yerrinbool and to the north of Hill Top. These provide strategic areas of fire protection advantage which will reduce the speed and intensity of bushfires, and reduce the potential for spot fires. These strategic zones also help contain bushfires to existing management boundaries. The management of these zones aims to achieve a mosaic fuel reduction pattern where overall fire fuel for the zone is below the prescribed level.

The remainder of the park is designated a land management zone. The primary aim of this zone is to manage bushfires to meet the conservation objectives for species, populations, habitats, or cultural heritage values which may be at risk of long-term damage as a result of inappropriate fire regimes.

The strategy also outlines a program of bushfire management and hazard reduction works that will be reviewed annually and implemented as required. These works may include fire trail maintenance, mechanical hazard reduction such as mowing and slashing, and prescribed burns to reduce fuel hazards in asset protection zones and strategic fire advantage zones. Where operationally required, fire may also be introduced to land management zones.

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

The fire management strategy will be reviewed annually. The first review will record fire history, update fire thresholds, assess the fire trail network and review asset protection zones and strategic fire advantage zones. Other changes to the strategy, such as amendment of the fire trail network and fire management zones, may be required after significant fire events or in response to new information or other developments.

Desired outcomes

- Life, property, community assets and the environment are protected from the adverse impacts of fire.
- The potential for spread of bushfires on, from, or into the park is minimised.
- Fire regimes are appropriate for conservation of native plant and animal communities.

Management response

4.2.1 Implement the fire management strategy for Bargo River State Conservation Area.

- 4.2.2 Annually review the strategy and revise fire history, fire thresholds, fire management zones, fire trail network and other information as required and in accordance with the *NPWS Fire Management Manual*.
- 4.2.3 Develop and implement an annual program of bushfire management and hazard reduction works consistent with the strategy.
- 4.2.4 Maintain overall fuel hazard in designated asset protection zones and strategic fire advantage zones so they do not exceed the prescribed levels in the *NPWS Fire Management Manual*.
- 4.2.5 Continue to be involved in the Wingecarribee Bushfire Management Committee and maintain cooperative arrangements with local Rural Fire Service brigades and surrounding landowners in regard to fuel management and fire suppression.
- 4.2.6 Where possible, protect large hollow-bearing trees (dead or alive) by suppressing fire in the canopy, avoiding felling hollow-bearing trees and slashing or raking around trees prior to hazard reduction burns.
- 4.2.7 Monitor the ability of native plants, particularly threatened species and ecological endangered communities, to recover between fires and review regimes where required.
- 4.2.8 Rehabilitate areas disturbed by fire suppression operations, including temporary track and controls lines, as soon as practical after fire.

4.3 Climate change

Anthropogenic climate change has been listed as a key threatening process under the TSC Act (NSW Scientific Committee 2000a). Changes in climate projected for the Illawarra region include higher temperatures, increasing sea levels and water temperatures, a likely increase in rainfall especially in summer, increased temperature extremes and higher evaporative demand (DECCW 2010b). These changes are likely to lead to greater intensity and frequency of fires, more severe droughts, reduced river runoff and water availability, regional flooding, increased erosion and ocean acidification.

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

Programs aimed at reducing the pressures from other threats, such as habitat fragmentation, invasive species, bushfires and pollution, will help reduce the severity of the effects of climate change. It is expected that landscape scale vegetation corridors, such as the Bargo Linkage, will become even more important for native animal dispersal and movement as the impacts of climate change transpire (see Section 3.3).

Desired outcomes

- The effects of climate change on natural systems are minimised.

Management response

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

4.3.2 Liaise with neighbouring land owners (including DPI Lands, and Roads and Maritime Services) to encourage and support the maintenance of landscape scale vegetation corridors (e.g. Bargo Linkage and Cumberland Koala Linkage) as effective corridors for native animal movement.

4.4 Isolation and fragmentation

The Bargo Linkage, an area of over 14,000 hectares of sandstone vegetation, provides a network of viable habitat for the movement of native animal species (see section 3.3). While Bargo River State Conservation Area is a key component of this linkage, other areas of forested land adjacent to the park, such as Crown land to the north which provides a connection to the Upper Nepean State Conservation Area, also make a significant contribution to the linkage (NPA 1995; DECC 2007b; DEC 2005). Strategies for protecting biodiversity corridors and native animal linkages in the region should be identified. These strategies may include adding available high conservation value Crown land to the park.

The park is comprised of two sections separated by a 1 kilometre wide corridor of Crown land. This Crown land was excluded from the original gazettal of the park to accommodate a future haul road from the proposed Mt Flora quarry near Colo Vale through to the Hume Highway. The road has not been constructed and these lands are currently well vegetated, however the construction and operation of a haul road will reduce vegetation and habitat connectivity between the sections of the park, particularly isolating the 184 hectares to the south. Construction work may also impact water quality in the Bargo River, and the proposed bridge across the river may affect the scenic and geological values of the area. NPWS involvement in the planning and environmental assessment process for the haul road, including the potential acquisition of available Crown land in the corridor, should optimize connectivity in the park and minimise environmental impacts to park values.

Although the park contributes to a significant native animal habitat linkage, it is bounded by small rural enterprises and residential settlements to the west, south and east and is subject to edge effects and barriers to native animal movement. As a result of these developments the park is vulnerable to incursion of non-native plant and animal species, predation by domestic animals, stormwater drainage, encroachments and unauthorised recreational activities. Cooperative arrangements with neighbours are important for the management of these potential impacts on park values.

Desired outcomes

- The negative impacts of isolation and fragmentation are reduced.
- Significant regional native animal habitat corridors are maintained and enhanced.
- Connectivity between the two sections of the park is protected and maintained.
- Water quality and scenic and geological values are protected.

Management response

4.4.1 Investigate the potential addition to Bargo River State Conservation Area of available high conservation value Crown land.

4.4.2 If construction of the Mt Flora Quarry haul road proceeds, provide input into the planning and management of the road to protect the park's values. Investigate opportunities to add available Crown lands in the corridor to the park.

5. Management operations and other uses

5.1 Management facilities and operations

Prior to its reservation as Bargo River State Conservation Area an informal network of vehicle trails existed in the Crown land reserve. Some of these trails were regularly used for fire management operations while other trails had no management purpose. During the preparation of the first fire management strategy (DECCW 2009) the tracks and trails were reviewed and a strategic fire management trail network was defined for the park (see Map 1). These fire management trails also provide access for other park management purposes.

The primary management trails in the park are the P3 fire trail which crosses north along the ridge from Boronia Reserve, Hill Top, exiting the northern boundary of the park and terminating at the end of the ridge, and the P3C fire trail which follows a powerline easement across the park between Hill Top and Yerrinbool. Other management trails enter the park from its boundaries.

Issues

The network of trails in the park is excess to management needs and is impacting park values. The first fire management strategy (DECCW 2009) identified the trails to be retained for fire management. Additional trails were identified as dormant and should be closed to management vehicle access (see management response 3.1.2). These trails should remain closed unless a future review of the fire management strategy recommends adding them to the strategic fire trail network.

Before reservation, there was unrestricted vehicle access to the informal trail network in the park. Gates at the entrance to management trails now only allow access by authorised vehicles.

Some designated management trails cross private property adjacent to the park boundaries. The current informal agreements with neighbours for access to the park for management purposes should be formalised.

Some sections of the roads and trails that access private properties may be within the park boundaries. Tenure for these trails should be confirmed and any trails on NPWS land should be closed to private property access unless they are consistent with the NPW Act and are the only practical access to the property. In such cases a right of way or licence for access may be required.

Desired outcomes

- Park infrastructure and assets are routinely maintained.
- Management facilities and operations adequately serve management needs and have minimal impact.
- Cooperative access arrangements with park neighbours are maintained.

Management response

5.1.1 Maintain closures on park boundaries to provide only authorised vehicles access to management trails.

5.1.2 Where management trails cross neighbouring private land, continue to liaise with neighbours and formalise agreements where necessary for NPWS management access to the park.

5.1.3 Confirm tenure of management trails providing access to private properties. Trails on NPWS land should be closed to private property access, unless they are consistent with the NPW Act. In such cases a right of way or licence should be issued.

5.2 Non-NPWS uses/operations

Mining and exploration

Mineral and petroleum exploration and production are permitted in state conservation areas. A small section of Bargo River State Conservation Area, in the west of the park near Hill Top, is covered by a coal title (AUTH 278) held by NSW Trade and Investment. A petroleum exploration licence (PEL 2) extends over the park.

NSW Trade and Investment is the lead authority for mining and petroleum activities, including mineral exploration and mine site rehabilitation. NPWS and NSW Trade and Investment work together to ensure that exploration and production proposals in state conservations areas comply with all statutory requirements, including any necessary environmental impact assessments and approvals.

Transmission lines

Endeavour Energy (formally Integral Energy Australia) has a powerline and easement crossing the park alongside the P3C management trail accessed from Telopea Rd, Hill Top. Endeavour Energy lines are managed in accordance with a protocol and consent (DECCW and Integral Energy 2009) under the NPW Regulation, enabling inspection, maintenance and emergency works.

The protocol, as agreed between Endeavour Energy and NPWS, aims to minimise the impacts of transmission lines, including the impacts from clearing or trimming vegetation, using herbicides, and maintaining access trails.

Issues

Mining and mineral exploration, and the maintenance of utility assets within the park, have the potential to impact on park values.

Desired outcomes

- Endeavour Energy transmission lines within the park are managed in accordance with the consent and protocol.
- Non-NPWS related uses and activities are managed to minimise impacts on park values.

Management response

5.2.1 Continue to liaise with Endeavour Energy regarding access and maintenance needs in accordance with the consent and protocol.

6. Implementation

This plan of management establishes a scheme of operations for Bargo River State Conservation Area. A plan of management is a statutory document under the *National Parks and Wildlife Act 1974*. Section 81 of the Act requires that this plan is carried out and given effect to, and that no operations are undertaken in Bargo River State Conservation Area unless they are in accordance with this plan. Implementation of this plan will be undertaken in the annual program of NPWS.

Activities identified for implementation are listed in Table 5. Relative priorities are allocated against each activity as follows.

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

The implementation of the plan will be monitored and its success in achieving the objectives will be assessed. This plan does not have a specific term and will stay in force until amended or replaced in accordance with the NPW Act. The plan applies to both the land currently reserved and to any future additions to Bargo River State Conservation Area.

Management response

6.1.1 Undertake regular reviews of progress in implementing the plan of management.

6.1.2 Undertake regular reviews of the park's environmental condition and management.

Table 5: Implementation table

Management response	Priority
3.1 Geology, landscape and hydrology	
3.1.1 Work with consent and determining authorities to mitigate any impacts of local developments on park values.	Ongoing/ Medium
3.1.2 Trails not designated for management purposes will be closed by brush matting and regenerated if necessary.	Medium
3.1.3 Prepare and implement a cyclical maintenance program for all management trails, to maintain access and minimise erosion.	Medium
3.1.4 Support the South East Local Land Services to assess and monitor the health of the Bargo River and its tributaries in the park.	Ongoing/ Low
3.2 Native plants	
3.2.1 Implement relevant strategies in the <i>Priorities Action Statement</i> and recovery plans for threatened species, populations and ecological communities present in the park.	High

Management response	Priority
3.2.2 Engage specialist staff to survey and map the endangered ecological communities and threatened plant species known to be present or likely to be present in the park, and identify any threats. Update the regional pest management strategy as required.	Low
3.2.3 Engage specialist staff to develop and implement site-specific threat abatement measures as necessary for endangered ecological communities and threatened native plants and animals. If necessary, revise fire regimes prescribed in the reserve fire management strategy.	High
3.2.4 Prohibit public vehicle access to management trails and ensure the protection of hairy geebung and Mittagong geebung and the habitat for these species during any trail management activities.	Ongoing/ High
3.2.5 Encourage land owners/managers and public utilities and their contractors to develop and implement site awareness and protection procedures for threatened species when undertaking weed control, hazard reduction, road, trail or easement maintenance.	Medium
3.3 Native animals	
3.3.1 Implement relevant strategies in the <i>Priorities Action Statement</i> and recovery plans for threatened species, populations and ecological communities present in the park.	High
3.3.2 Engage specialist staff to undertake systematic native animal surveys across the park, including targeted surveys for threatened species.	Medium
3.3.3 Protect bushrock habitats during trail management activities, to ensure maintenance of potential habitat for the broad-headed snake and other species dependent on bushrock.	Ongoing/ Medium
3.3.4 Liaise with neighbouring land owners (including DPI Lands, and Roads and Maritime Services) to encourage and support the maintenance of landscape scale vegetation corridors (e.g. 'Bargo Linkage' and 'Cumberland Koala Linkage') as effective corridors for native animal movement.	Medium
3.3.5 Encourage investigation into native animal underpasses and overpasses for the Hume Highway in areas that are known (or predicted via habitat modelling) to be key crossing points for priority threatened species.	Low
3.4 Aboriginal connections to Country	
3.4.1 Consult and involve local Aboriginal communities, the Illawarra Local Aboriginal Land Council, other relevant Aboriginal community organisations and custodial families in the management of their Country, including the management of Aboriginal sites, places and cultural and natural values.	Ongoing/ High
3.4.2 Undertake and support research into the Aboriginal heritage values of the park with local Aboriginal communities, the Illawarra Local Aboriginal Land Council, other relevant Aboriginal community organisations and custodial families.	High
3.4.3 Encourage the recording and mapping of the Aboriginal storylines of the Bargo River area. Acknowledge their significance to local Aboriginal people and work with the local Aboriginal community to protect the storylines.	High

Management response	Priority
3.4.4 Facilitate access to the park by Aboriginal people for traditional or cultural purposes and practices, and the celebration, sharing and development of cultural knowledge.	Ongoing/ Medium
3.4.5 Recognise and acknowledge Aboriginal language and connection to Country in park signage and in public information.	Medium
3.4.6 Undertake an archaeological survey and cultural assessment in consultation with local Aboriginal community, prior to all works with the potential to impact on Aboriginal sites or values.	Ongoing/ High
3.4.7 Collaborate with other land managers to encourage the protection of Aboriginal cultural values that are connected with the park but extend across the Bargo River catchment and various land tenures.	Medium
3.5 Historic heritage	
3.5.1 Encourage and support research into the historic heritage of the Bargo River State Conservation Area. Record and assess any sites located and manage them in accordance with their assessed level of significance.	Low
3.5.2 Encourage investigation into the heritage value of the Picton to Mittagong loop railway line including the Big Hill railway cutting which lies adjacent to the park boundary.	Low
3.6 Visitor use	
3.6.1 Provide and promote low impact recreational activities such as bush walking, bush camping, cycling and picnicking.	Ongoing/ Medium
3.6.2 Upgrade and maintain the Cave Creek walking track to protect fragile environments and meet required standards for a Class 4 Hiking Track.	High
3.6.3 Allow low impact bush camping in the park provided it occurs more than 200 metres from any creek or river, public road, walking track and management trail. If necessary bush camping will be further restricted to minimise impacts on park values.	Ongoing/ Medium
3.6.4 Permit cycling on management trails. Cycling is not allowed on walking tracks or off-trail. Impacts will be monitored and further controls or restrictions implemented if necessary.	Ongoing/ Medium
3.6.5 Continue to provide day use facilities including parking, toilets and barbecues, at Cave Creek day use area.	Ongoing/ High
3.6.6 Public vehicle access, wood and charcoal fires, and horse riding are not permitted in the park.	Ongoing/ High
3.7 Information and education	
3.7.1 Encourage the development of small-scale educational opportunities in the park, particularly those which contribute to improved understanding of the park's natural and cultural heritage.	Medium
3.7.2 Involve the local Aboriginal community in the development of material and programs for interpretation of Aboriginal culture and heritage.	Ongoing/ Medium

Management response	Priority
3.7.3 Maintain signage at the Cave Creek day use area to provide visitors with information about the natural and cultural values of the area and appropriate use of the park.	Medium
3.7.4 Install signage at the entrance to the P3 Fire Trail, and other trails as necessary, to provide basic information for visitors about park values and appropriate use of the park.	Low
3.7.5 Communicate with park neighbours and the local community regarding park values and the conservation of these values through NPWS and local community events, publications, websites and other channels.	Medium
3.7.6 Foster and assist appropriate research which contributes to an improved understanding of the park's natural and cultural heritage.	Medium
4.1 Pests	
4.1.1 Manage pest species in accordance with the regional pest management strategy and other relevant strategies. Give priority to protecting significant and threatened species and communities, areas with good potential for recovery and emerging pest populations with a risk of spreading.	Ongoing/ High
4.1.2 Conduct annual reviews of the prioritised pest programs in the regional pest management strategy, update the strategy if required and develop and implement an annual pest control program for the park.	High
4.1.3 Seek the cooperation of neighbours and key stakeholders, including Roads and Maritime Services and NSW Trains, in implementing weed and pest control programs. Undertake control in cooperation with the Cumberland Livestock Health and Pest Authority, Wingecarribee Shire Council, South East Local Land Services, Southern Highlands Wild Dog Working Committee and the Southern Tablelands and South Coast Noxious Plants Committee.	Medium
4.1.4 Continue to apply the <i>Southern Highlands Wild Dog Management Plan</i> and contribute to the Wild Dog Working Committee.	Ongoing/ Medium
4.1.5 Implement management protocols if it becomes evident that the feral honey bee (<i>Apis mellifera</i>) is having a negative impact on threatened geebung species in the park.	Ongoing/ Medium
4.1.6 Implement NPWS management protocols developed for myrtle rust and cinnamon fungus in accordance with the regional pest management strategy.	High
4.2 Fire	
4.2.1 Implement the fire management strategy for Bargo River State Conservation Area.	High
4.2.2 Annually review the strategy and revise fire history, fire thresholds, fire management zones, fire trail network and other information as required and in accordance with the <i>NPWS Fire Management Manual</i> .	High
4.2.3 Develop and implement an annual program of bushfire management and hazard reduction works consistent with the strategy.	High
4.2.4 Maintain Overall Fuel Hazard in designated asset protection zones and strategic fire advantage zones so they do not exceed the prescribed levels in the <i>NPWS Fire Management Manual</i> .	Ongoing/ High

Management response	Priority
4.2.5 Continue to be involved in the Wingecarribee Bushfire Management Committee and maintain cooperative arrangements with local Rural Fire Service brigades and surrounding landowners in regard to fuel management and fire suppression.	Ongoing/ High
4.2.6 Where possible, protect large hollow-bearing trees (dead or alive) by suppressing fire in the canopy, avoiding felling hollow-bearing trees and slashing or raking around trees prior to hazard reduction burns.	Ongoing/ Medium
4.2.7 Monitor the ability of native plants, particularly threatened species and ecological endangered communities, to recover between fires and review regimes where required.	Ongoing/ Medium
4.2.8 Rehabilitate areas disturbed by fire suppression operations, including temporary track and controls lines, as soon as practical after fire.	Ongoing/ Medium
4.3 Climate change	
4.3.1 Continue existing fire, pest and weed management programs to increase the park's ability to cope with future disturbances, including climate change.	Ongoing/ High
4.3.2 Liaise with neighbouring land owners (including DPI Lands, and Roads and Maritime Services) to encourage and support the maintenance of landscape scale vegetation corridors (e.g. Bargo Linkage and Cumberland Koala Linkage) as effective corridors for native animal movement.	Medium
4.4 Isolation and fragmentation	
4.4.1 Investigate the potential addition to Bargo River State Conservation Area of available high conservation value Crown land.	High
4.4.2 If construction of the Mt Flora Quarry haul road proceeds, provide input into the planning and management of the road to protect the park's values. Investigate opportunities to add available Crown lands in the corridor to the park.	High
5.1 Management facilities and operations	
5.1.1 Maintain closures on park boundaries to provide only authorised vehicles access to management trails	Ongoing/ High
5.1.2 Where management trails cross neighbouring private land, continue to liaise with neighbours and formalise agreements where necessary for NPWS management access to the park.	Medium
5.1.3 Confirm tenure of management trails providing access to private properties. Trails on NPWS land should be closed to private property access, unless they are consistent with the NPW Act. In such cases a right of way or licence should be issued.	Low
5.2 Non-NPWS uses/operations	
5.2.1 Continue to liaise with Endeavour Energy regarding access and maintenance needs in accordance with the consent and protocol.	Ongoing/ Medium
6.0 Implementation	
6.1.1 Undertake regular reviews of progress in implementing the plan of management.	Medium
6.1.2 Undertake regular reviews of the park's environmental condition and management.	Medium

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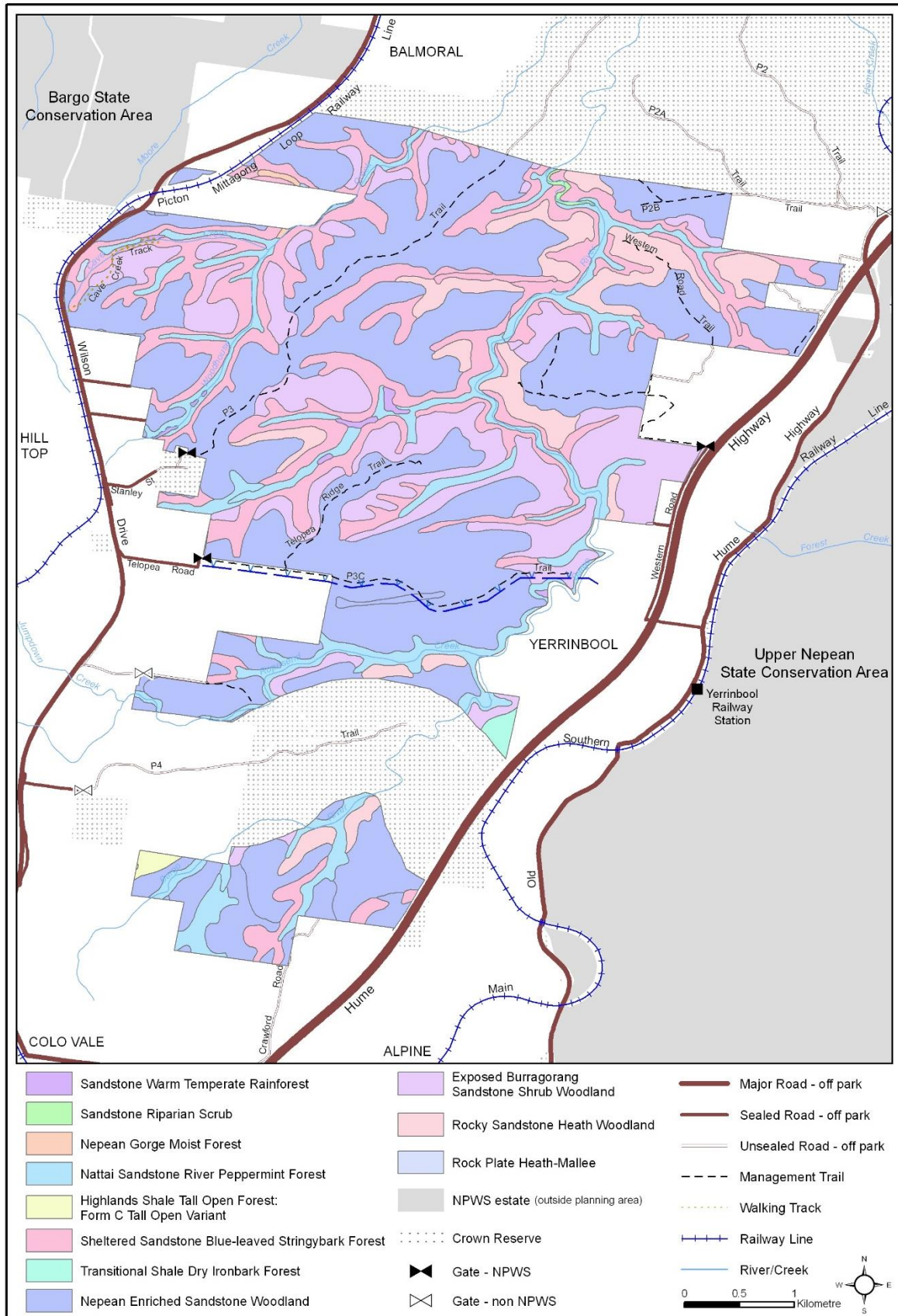
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Appendix A – Vegetation communities in Bargo River State Conservation Area



Source: DEC 2004a

Appendix B – Threatened animal species recorded in Bargo River catchment and/or within 2 kilometres of Bargo River State Conservation Area

Scientific name	Common name	NSW status	EPBC status	Comment
<i>Pseudophryne australis</i>	Red-crowned toadlet	V		
<i>Heleioporus australiacus</i>	Giant burrowing frog	V	V	
<i>Varanus rosenbergi</i>	Rosenberg's goanna	V		
<i>Hoplocephalus bungaroides</i>	Broad-headed snake	E1	V	
<i>Hieraaetus morphnoides</i>	Little eagle	V		
<i>Burhinus grallarius</i>	Bush stone-curlew	E1		
<i>Sterna fuscata</i>	Sooty tern	V	M	
<i>Callocephalon fimbriatum</i>	Gang-gang cockatoo	V		
<i>Calyptorhynchus lathami</i>	Glossy black-cockatoo	V		
<i>Glossopsitta pusilla</i>	Little lorikeet	V		
<i>Neophema pulchella</i>	Turquoise parrot	V		
<i>Ninox strenua</i>	Powerful owl	V		
<i>Tyto tenebricosa</i>	Sooty owl	V		
<i>Climacteris picumnus victoriae</i>	Brown treecreeper (eastern subspecies)	V		
<i>Melithreptus gularis gularis</i>	Black-chinned honeyeater (eastern subspecies)	V		
<i>Xanthomyza phrygia</i>	Regent honeyeater	E1	E	
<i>Daphoenositta chrysoptera</i>	Varied sittella	V		
<i>Melanodryas cucullata cucullata</i>	Hooded robin (south-eastern form)	V		
<i>Petroica boodang</i>	Scarlet robin	V		
<i>Petroica phoenicea</i>	Flame robin	V		
<i>Stagonopleura guttata</i>	Diamond firetail	V		

Scientific name	Common name	NSW status	EPBC status	Comment
<i>Dasyurus maculatus</i>	Spotted-tailed quoll	V	E	
<i>Dasyurus viverrinus</i>	Eastern quoll	E1		Locally extinct
<i>Phascolarctos cinereus</i>	Koala	V		
<i>Cercartetus nanus</i>	Eastern pygmy-possum	V		
<i>Petaurus norfolcensis</i>	Squirrel glider	V		
<i>Petaurus australis</i>	Yellow-bellied glider	V		
<i>Bettongia penicillata penicillata</i>	Brush-tailed bettong (south-East Mainland)	E4	X	
<i>Petrogale penicillata</i>	Brush-tailed rock-wallaby	E1	V	
<i>Mormopterus norfolkensis</i>	Eastern freetail-bat	V		
<i>Falsistrellus tasmaniensis</i>	Eastern false pipistrelle	V		
<i>Miniopterus schreibersii oceanensis</i>	Eastern bentwing-bat	V		
<i>Myotis macropus</i>	Southern myotis	V		
<i>Scoteanax rueppellii</i>	Greater broad-nosed bat	V		

Source: OEH (2014) *Atlas of NSW Wildlife*

NSW status codes (*Threatened Species Conservation Act 1995*):

- E1 = Endangered
- E4 = Extinct
- V = Vulnerable

EPBC status codes:

- X = Extinct (*Environment Protection and Biodiversity Conservation Act 1999*)
- E = Endangered (*Environment Protection and Biodiversity Conservation Act 1999*)
- V = Vulnerable (*Environment Protection and Biodiversity Conservation Act 1999*)
- M = Marine (*Environment Protection and Biodiversity Conservation Act 1999*)

