



Environment,
Climate Change & Water
National Parks & Wildlife Service



Cameron's Gorge Nature Reserve and State Conservation Area Plan of Management



**CAMERONS GORGE NATURE RESERVE AND STATE
CONSERVATION AREA**

PLAN OF MANAGEMENT

NSW National Parks and Wildlife Service

Part of the Department of Environment, Climate Change and Water (NSW)

August 2010

This plan of management was adopted by the Minister for Climate Change and the Environment on 2nd August 2010.

Acknowledgments

The National Parks and Wildlife Service (NPWS) acknowledges that this reserve is in the traditional country of the Wonnarua Aboriginal people.

This plan of management was prepared by the staff of the Hunter Region of the NPWS, part of the Department of Environment, Climate Change and Water.

Cover photographs by Antony von Crismar.

For additional information or any inquiries about this reserve or this plan of management, contact the NPWS Upper Hunter Area Office, 137 Kelly Street, Scone or by telephone on (02) 65402300.

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FOREWORD

Camerons Gorge Nature Reserve and State Conservation Area are located near Scone in the Upper Hunter valley. Camerons Gorge Nature Reserve has an area of 1,318 hectares and Camerons Gorge State Conservation Area has an area of 429 hectares.

Camerons Gorge Nature Reserve and State Conservation Area contain one of the best remaining vegetation corridors from the Great Escarpment west along the Liverpool Range to Coolah Tops. They conserve 13 different vegetation communities and 239 plant species, as well as 7 bird species and 1 mammal listed as vulnerable under the Threatened Species Conservation Act. Camerons Gorge Nature Reserve and State Conservation Area are part of the cultural landscape of the Wonnarua Aboriginal people.

The New South Wales *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each nature reserve and state conservation area. A draft plan of management for Camerons Gorge Nature Reserve and State Conservation Area was placed on public exhibition from 20th February until 25th May 2009. The submissions received were carefully considered before adopting this plan.

This plan contains a number of actions to achieve the State Plan priority to “Protect our native vegetation, biodiversity, land, rivers and coastal waterways”, including implementation of recovery actions for threatened species and ecological communities, targeted fauna surveys, and pest animal and weed control.

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

A handwritten signature in black ink, appearing to read 'Frank Sartor', is centered on the page.

Frank Sartor MP
Minister for Climate Change and the Environment

1. CAMERONS GORGE NATURE RESERVE AND STATE CONSERVATION AREA

Camerons Gorge Nature Reserve and State Conservation Area (referred to as “the planning area”) are located near Scone in the Upper Hunter valley north-west of Newcastle, approximately 10 kilometres east of the township of Wingen and 8 kilometres north-west of the township of Gundy. The nature reserve covers 1318 hectares and the state conservation area covers 429 hectares, totalling 1747 hectares.

The first 1280 hectares of Camerons Gorge Nature Reserve was gazetted on 13 November 1987. It was reserved due to its distinctive geological features. Two in holdings located north of the Pages River and totalling 38 hectares were added to the nature reserve on 8 February 2002. The State Conservation Area was reserved on 23 December 2005.

The planning area is significant because it contains one of the best remaining vegetation corridors from the Great Escarpment west along the Liverpool Range to Coolah Tops and, as such, is crucial to vegetation connectivity in northern NSW. The planning area is located within the NSW North Coast bioregion and is on the north-eastern border of the Sydney Basin. This contributes to the interesting mix of vegetation communities present. The nature reserve is also important for conserving a complex ecosystem occurring in the Cranky Corner Land System. This land system was described by the CSIRO in 1963 in their report on the Land of the Hunter Valley and it covers an area of about 230 square kilometres (Story 1963).

The planning area is relatively close to a number of other reserves. Those that occur within a 15 kilometre radius of the planning area include Towarri and Scone Mountain National Parks and Brushy Hill, Woolooma, Burning Mountain and Wingen Maid Nature Reserves.

The planning area is surrounded by large expanses of cleared agricultural lands. This leaves the planning area susceptible to edge impacts from weeds and pests.

The planning area is in the traditional country of the Wonnarua Aboriginal people and is within the Wanaruah Local Aboriginal Land Council, the Upper Hunter Shire Council and Hunter - Central Rivers Catchment Management Authority Areas.

2. MANAGEMENT CONTEXT

2.1. Legislative and Policy Framework

The management of Nature Reserves and State Conservation Areas in NSW is in the context of a legislative and policy framework, primarily the *National Parks and Wildlife Act 1974* (NPW Act), the NPW Regulation, the *Threatened Species Conservation Act 1995* (TSC Act) and the policies of the National Parks and Wildlife Service (NPWS). The policies are based on the legislative background and internationally accepted principles of park management. They relate to nature conservation, Aboriginal and historic heritage conservation, recreation, commercial use, research and communication.

Other legislation, international agreements and charters may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979* (EPA Act) may require the assessment and mitigation of the environmental impacts of works proposed in this plan. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) also applies in relation to actions that may impact on 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, no operations may be undertaken within Camerons Gorge Nature Reserve and State Conservation Area except in accordance with this plan. This plan will also apply to any future additions to Camerons Gorge Nature Reserve and State Conservation Area. Should management strategies or works be proposed or any additions to the planning area that are not consistent with the plan, an amendment to the plan will be required.

2.2. Management Purposes and Principles

2.2.1 Nature Reserves

Nature reserves are reserved under the NPW Act to protect and conserve areas containing outstanding, unique or representative ecosystems, species, communities or natural phenomena.

Under the Act (section 30J), nature reserves are managed to:

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

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

2.2.2 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; that are capable of providing opportunities for sustainable visitor use and enjoyment, the sustainable use of buildings and structures, or research; and that 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 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; and
- provide for appropriate research and monitoring.

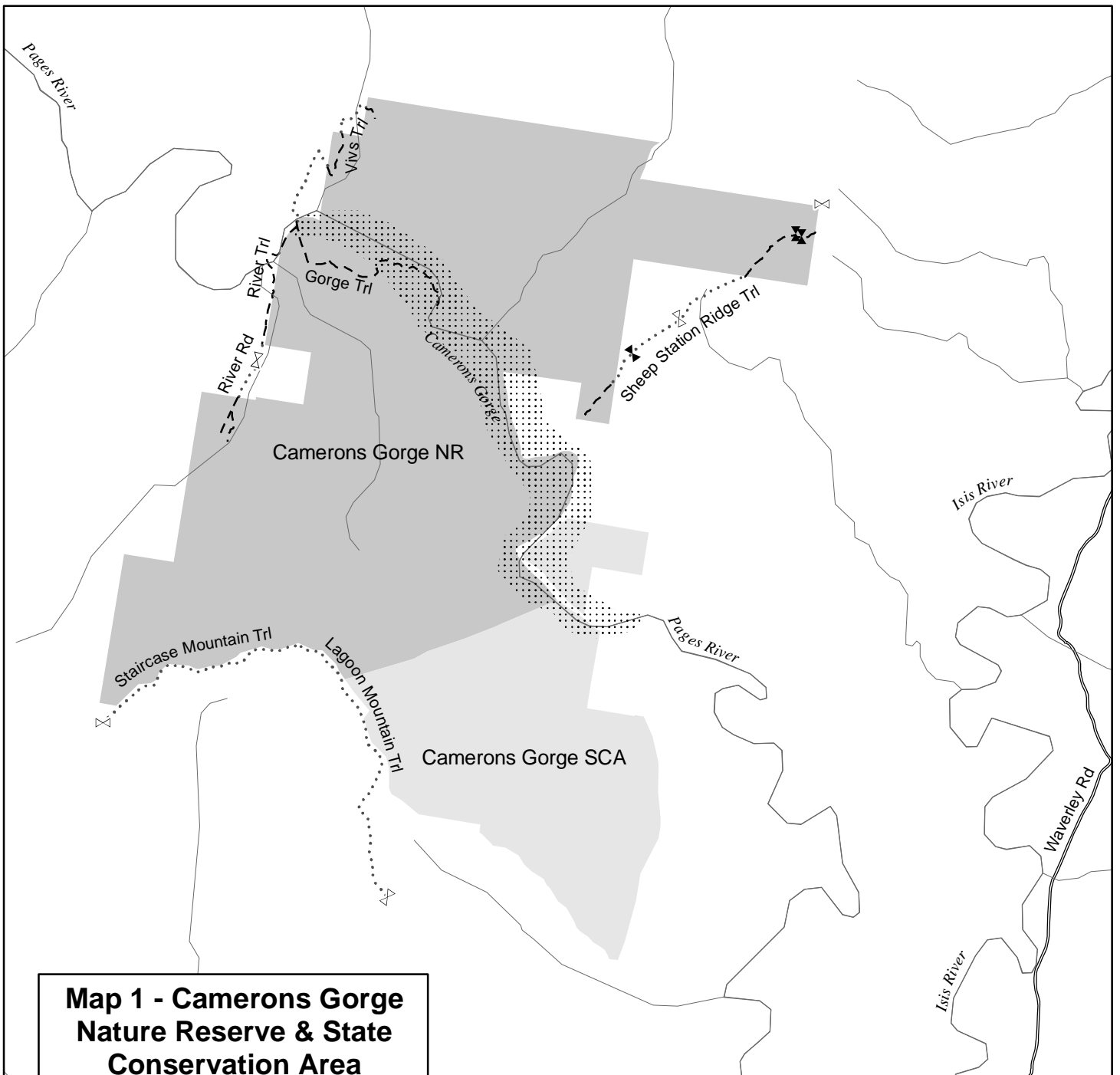
The NPW Act requires a review of the classification of state conservation areas every five years in consultation with the Minister administering the *Mining Act 1992*. In the long term, subject to the outcomes of future five year reviews, it is intended for Camerons Gorge State Conservation Area to become a nature reserve, and so management will also be guided by the management principles for nature reserves where possible. A review was undertaken in November 2008 in which the status of Camerons Gorge State Conservation Area remained unchanged.

2.3. Management Directions

The emphasis of this plan is the conservation of the natural and cultural values of the planning area.

The key management priority is conservation of the significant remnant vegetation of the area by:

- Implementing weed and pest control programs; and
- Implementation of the Reserve Fire Management Strategy.

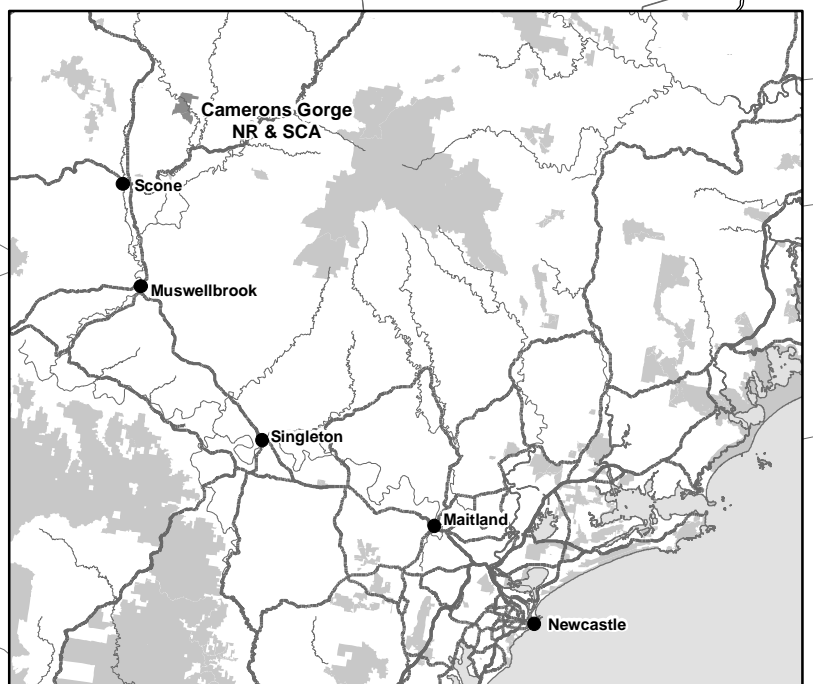
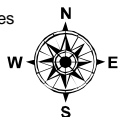
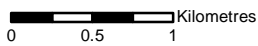


Map 1 - Camerons Gorge Nature Reserve & State Conservation Area

Legend

- ▶ NPWS Gate
- ⊗ Private Gate
- Public Access Roads
 - Sealed Road - off park
 - Unsealed Road - off park
- Non Public Access Roads
 - - Management Trail
 - ⋯ Private Road
 - Watercourse
- ⋯ Camerons Gorge
- Camerons Gorge NR
- Camerons Gorge SCA

Note: No public access is available to Camerons Gorge NR & SCA



3. VALUES OF THE RESERVE

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

3.1. Landform, Geology and Soils

The Pages River flows through the centre of the Camerons Gorge Nature Reserve, and drains south-east into the Isis River before flowing into the Hunter River.

The planning area has distinctive geological features with a prominent escarpment running north-south. The escarpment forms the eastern boundary of the Blacktop Horst. The horst is an elongated block of land covering about 2300 hectares and dipping up to 30 degrees to the west. It was uplifted in the late Tertiary period, during a time of massive uplift and land changes throughout eastern Australia. As the horst range rose, the Pages River continued to cut its course. Large benching and terraces of conglomerate and sandstone are exposed on the eastern slope above the river, which today crosses the horst in a deep valley. Basaltic lava remnants overly tilted planes of sandstone, conglomerate and glacial beds also occur. The uplift and tilting of these beds and their subsequent exposure provide a readily viewed example of the geological development of the area. Elevation ranges from approximately 900 metres on the high escarpment in the south to approximately 300 metres on the Pages River.

The geology of the planning area comprises folded and faulted sedimentary and volcanic rocks of the Carboniferous Seaham Formation, Currabubula Formation and Temi Formation that form part of the New England Orogen. The planning area lies close and to the east of the Hunter Mooki thrust fault which separates rocks of the New England Orogen from those of the Sydney Basin.

The majority of soils within the planning area are colluvial. These types of soils are affected by scree slopes, landslides and mass movements. This is exacerbated by the terrain of the area that is steep to very steep in many areas. Most of the soils are of low fertility, have high runoff rates and can be erosive (McInnes-Clarke 2002).

3.2. Native Plants

In 2008 NPWS commissioned a vegetation survey and mapping project of the planning area. Prior to this, vegetation records were based on a limited amount of survey work conducted as part of the Comprehensive Regional Assessment Aerial Photographic Interpretation (CRAFTI) floristic mapping project completed in 2001 as part of Comprehensive Regional Assessment (CRA) process for the Upper North East and Lower North East of NSW.

Under the TSC Act, Threatened Species Priorities Action Statements and recovery plans will be used to guide management of threatened species in the area.

3.2.1 Plant Communities

Thirteen vegetation communities were identified in the planning area (Ecological Australia 2008):

- White Box – Yellow Box – Blakely’s Red Gum Woodland a) and b);
- White Box – Yellow Box – Tumbledown Red Gum Woodland;
- Ironbark –Tumbledown Red Gum –White Box Woodland;
- Ironbark – White Box – Yellow Box Woodland;
- Rough-barked Apple Woodland;
- Rough-barked Apple – Blakely’s Red Gum – Yellow Box Woodland;
- Blakely’s Red Gum – Apple Box – Silver Top Stringybark Open Forest;
- Gum Vine – Rusty Fig Vine Thicket;
- Native Olive – Cypress Pine Open Woodland;
- Cassinia Scrub;
- Acacia Woodland; and
- Derived Grasslands.

White Box – Yellow Box – Blakely’s Red Gum Woodland that exhibits a shrubby woodland structural formation is the dominant vegetation community (the community) in the planning area. Small areas of the community occurring on the lower flats of the western margins of the planning area exhibit a grassy understorey that allows the community to meet the criteria for classification as Endangered Ecological Community (EEC) under the TSC Act and EPBC Act (Ecological Australia 2008).

3.2.2 Plant Species

There are records for 239 plant species in the planning area (Ecological Australia 2008). The planning area contains one species listed as a Rare or Threatened Australian Plant, seven regionally significant species, and one species that occurs beyond its known range (refer to Table 1). An additional regionally significant species has been recorded adjacent to the western boundary of the planning area.

Table 1. Significant plant species recorded in or near the planning area.

| Common name | Scientific name | Status |
|-----------------------|------------------------------|---|
| Tufted herb | <i>Lomandra patens</i> | ROTAP^ 2R |
| Ground cover | <i>Calotis lappulacea</i> | Regionally significant |
| Loosely tufted herb | <i>Carex incomitata</i> | Regionally significant |
| Sticky Cassinia | <i>Cassinia uncata</i> | Regionally significant |
| - | <i>Enneapogon nigricans</i> | Regionally significant |
| Herb | <i>Galium liratum</i> | Regionally significant |
| Fuzzweed | <i>Vittadinia sulcata</i> | Regionally significant |
| Tumbledown Red Gum | <i>Eucalyptus dealbata</i> | Regionally significant |
| Western Golden Wattle | <i>Acacia decora</i> | Regionally significant (recorded west of NR) |
| Blue Bottle-daisy | <i>Lagenophora stipitata</i> | Extension of range for Central Western Slopes |

Source: CRA/CRAFTI surveys, Ecological Australia 2008.

^ Denotes species listed as a Rare or Threatened Australian Plant according to Briggs and Leigh (1996).

2 = Restricted distribution with range extending over less than 100km.

R = Rare, but with no current identifiable threat.

3.3. Native Animals

The planning area supports important fauna populations including species and groups that have declined due to habitat loss and fragmentation. Fauna of the dry forest and woodland habitats, such as those occurring within the planning area, are generally under-represented in the NSW reserve system. These habitats require sensitive management and long term monitoring.

A total of 127 native vertebrate species have been recorded in the planning area (NPWS 2007). This includes seven bird species and one mammal listed as vulnerable under the TSC Act and one bird species listed as migratory under the EPBC Act, shown below in Table 2. Under the TSC Act, Threatened Species Priorities Action Statements and recovery plans will be used to guide management of threatened species in the area.

Table 2. Threatened and significant native animal species recorded in Camerons Gorge Nature Reserve and State Conservation Area.

| Common name | Scientific name | Legal Status |
|---|---|---------------------|
| Barking Owl | <i>Ninox connivens</i> | Vulnerable * |
| Brown Treecreeper (eastern subspecies) | <i>Climacteris picumnus victoriae</i> | Vulnerable * |
| Diamond Firetail | <i>Stagonopleura guttata</i> | Vulnerable * |
| Glossy Black-Cockatoo | <i>Calyptorhynchus lathami</i> | Vulnerable * |
| Grey-crowned Babbler (eastern subspecies) | <i>Pomatostomus temporalis temporalis</i> | Vulnerable * |
| Speckled Warbler | <i>Pyrrholaemus saggitatus</i> | Vulnerable * |
| Black-chinned Honeyeater | <i>Melithreptus gularis</i> | Vulnerable* |
| Squirrel Glider | <i>Petaurus norfolcensis</i> | Vulnerable* |
| White-Bellied Sea-Eagle | <i>Haliaeetus leucogaster</i> | Migratory species ^ |

* Status under TSC Act

^ Denotes migratory species listed under EPBC Act.

The Atlas of NSW Wildlife (NPWS 2007) lists many woodland birds as being recorded in the planning area. The presence of ironbark woodlands indicates the area is likely to contain habitat for the Regent Honeyeater (listed as endangered under the TSC Act) and other vulnerable woodland birds, such as the Hooded Robin and Painted Honeyeater. The general location of the planning area on the Liverpool Range and its inclusion in the broader scale corridor system also indicate that the area would be a refuge for a mix of western and eastern species.

The planning area contains known habitat for the regionally significant species, Bibron's or Brown Toadlet (*Pseudophryne bibronii*).

The presence of certain habitat allows for predictions about other vertebrate species that may be present in the planning area. The planning area supports high quality habitat for 10 threatened and significant species and lower quality habitat for 10 threatened and significant species.

Of the 10 species for which high quality habitat is present, one is endangered, four are vulnerable and five are regionally significant (Table 3).

Table 3. Threatened and significant native animal species that have predicted high quality habitat in Camerons Gorge Nature Reserve and State Conservation Area.

| Common name | Scientific name | Status |
|--------------------------|---------------------------------|------------------------|
| Bush Stone-curlew | <i>Burhinus grallarius</i> | Endangered* |
| Painted Honeyeater | <i>Grantiella picta</i> | Vulnerable* |
| Hooded Robin | <i>Melanodryas cucullata</i> | Vulnerable* |
| Common Bentwing-Bat | <i>Miniopterus schreibersii</i> | Vulnerable* |
| Grey-crowned Babbler | <i>Pomatostomus temporalis</i> | Vulnerable* |
| Yellow-tufted Honeyeater | <i>Lichenostomus melanops</i> | Regionally significant |
| Musk Lorikeet | <i>Glossopstita concinna</i> | Regionally significant |
| Pacific Baza | <i>Aviceda subcristata</i> | Regionally significant |
| Inland Broad-nosed Bat | <i>Scotorepens balstoni</i> | Regionally significant |
| Chestnut-rumped Hylacola | <i>Hylacola pyrrhopygia</i> | Regionally significant |

* Status under TSC Act

3.4. Aboriginal Heritage

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

The planning area is recognised as part of the traditional country of the Wonnarua people. The Wonnarua Upper Tribal Council (Native Title Claimants for Wonnarua people) and the Wanaruah Local Aboriginal Land Council identifies with an area that encompasses the planning area.

The pre-European Aboriginal use of the area is not well known. The Pages River and the presence of the permanent water are obvious factors that would have been important to the local Aboriginal groups. There has been only limited archaeological survey of the planning area. Two open camp sites with a number of artefacts were identified in 1983 during a survey for a proposed dam (Brayshaw 1983). The artefacts identified suggested that the sites dated to the Bondian period. This period refers to a certain type of tool making technology utilised from about 5,000 to 1,500 years ago. The stone artefacts were made from quartz, silcrete and basalt like material.

Early Aboriginal sites elsewhere in the Hunter Valley have been dated to over 20,000 years ago. Given the availability of water and animals, it is likely that the area would have provided resources to the local Aboriginal groups (NPWS 2000).

3.5. Historic Heritage

Prior to gazettal the planning area was Crown land managed under a variety of leases, predominantly for cattle grazing. The planning area was not subject to the intensive agricultural use that developed on the productive plains of the Upper Hunter and Liverpool areas due in part to its rugged terrain and remoteness (Bilton 1990). Much of the other land surrounding the planning area was ringbarked in the 1970s and then planted with wheat and lucerne. A map of the Colony of NSW dated 1837 shows no land grant for the planning area, and the earliest European parish map dated 1881 shows it as Crown land. This is also likely to be a function of the rugged terrain and remoteness of the planning area.

A rustic wooden hut exists near the western boundary of the planning area. Originally under ownership of a local cattleman and neighbour, the use and significance of the hut is unknown. Currently there is no known oral history documentation of the area.

3.6. Recreation

Public access to the planning area is not promoted. There are no recreational facilities and all access is through private property via 4WD tracks. Individuals from the public occasionally gain permission from the adjoining landholders to access the planning area for bushwalking, birdwatching and research.

Outdoor or natural area based tourist attractions and recreational areas within the Local Government Area include National Parks, State Forests and the nearby Lake Glenbawn. Towarri National Park located on the Middlebrook Road has camping and picnicking facilities with opportunities for low key recreational pursuits such as bush walking. To the east Barrington Tops National Park and State Conservation Area and State Forests provide a range of recreational pursuits, including 4-Wheel Driving, cycling and bushwalking. Burning Mountain Nature Reserve, located on the New England Highway just north of Scone, offers the unique opportunity for visitors to see a naturally burning coal seam. Lake Glenbawn State Park, located near the planning area, offers a range of water sport activities, fishing, camping and other recreational pursuits such as archery.

4. THREATS TO RESERVE VALUES

4.1. Pest Species

Evidence from regular annual baiting programs indicates that foxes exist in significant numbers in the planning area as well as the wider area. Predation by foxes is listed as a threatening process to native animals under the TSC Act and Commonwealth EPBC Act.

Wild dogs have been reported in the planning area and control programs have been undertaken in response to stock loss problems on neighbouring properties. Aerial

baiting programs have been carried out in the area in the past. Wild dogs can cause substantial losses to livestock and there is an expectation by rural communities that the impact of these animals be minimised.

Anecdotal evidence from neighbours indicates that pigs move through the gorge at certain times of the year. This is corroborated by areas of soil disturbance that have been caused by pigs feeding on roots along the river-bank. Pig trapping programs have been successful in previous years. Goats and rabbits have been noted sporadically within the area. Previous programs have had a considerable impact on these pest populations. Aerial shooting has also been conducted in the area.

There have been occasional instances of illegal shooting / hunting of various pest species taking place within the planning area.

Weed species can be easily introduced to the planning area via vehicular, pedestrian traffic and stray cattle. Adjoining landholders on all boundaries have grazing stock and/or crops which are considered a potential source of weed spread. The recent termination of long-standing permissive occupancies has resulted in the removal of all stock from the planning area and may have implications for weed infestation. Weeds of significance within the planning area are detailed in Table 4 below.

Table 4. Weed species recorded in Camerons Gorge NR and SCA.

| Common name | Scientific name | Legal Status |
|---------------------------------|----------------------------------|--------------|
| Blackberry | <i>Rubus fruticosus</i> | C4 |
| Burrs (Noogoora and Bathurst) | <i>Xanthium</i> species | C4 |
| Pears (Prickly, Rope and Tiger) | <i>Opuntia</i> species | C4 |
| Sweet Briar | <i>Rosa rubiginosa</i> | C4 |
| Willow | <i>Salix</i> sp. | C5 |
| Blue Heliotrope | <i>Heliotropium amplexicaule</i> | C4 |
| St. John's Wort | <i>Hypericum perforatum</i> | C3 |
| Ragwort | <i>Senecio jacobaea</i> | C4 |
| Arundo Grass | <i>Arundo donax</i> | C3 |
| Century Plant | <i>Agave americana</i> | - |
| Argentinean Tobacco Bush | <i>Elephantopus</i> sp. | - |

Key to legal* status:

| Category | |
|-----------|--|
| C1 | Class 1 - State Prohibited Weed. Class 1 weeds are also notifiable weeds. |
| C2 | Class 2 - Regionally Prohibited Weed. Class 2 weeds are also notifiable weeds. |
| C3 | Class 3 - Regionally Controlled Weed. |
| C4 | Class 4 - Locally Controlled Weed. |
| C5 | Class 5 - Restricted Weed. Class 5 weeds are also notifiable weeds. |

* *Noxious Weeds Act 1993*

4.2. Fire Management

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

The primary fire management objectives of the NPWS are to protect life and property and community assets from the adverse impacts of fire, whilst managing fire regimes to maintain and protect biodiversity and cultural heritage (NPWS 2005). The NPWS uses a zoning system for bushfire management which is compatible with the zoning used by the Liverpool Range Bush Fire Management Committee in its bushfire risk management plan. Annual hazard reduction programs, which may include mechanical fuel reduction techniques, prescribed burning and fire trail works, are submitted to the Bush Fire Management Committee.

A Reserve Fire Management Strategy has been prepared for Camerons Gorge Nature Reserve and State Conservation Area. The Reserve Fire Management Strategy identifies available vehicle watering points and major roads and tracks.

Whilst no fires have been recorded recently within the planning area, a reasonably large fire burnt as a result of an accidental ignition in comparatively open country to the east of Waverley Road in January 2002. The sporadic structure of vegetation, steepness and dry nature of the area makes burning within contained lines in the planning area difficult. Table 5 outlines the general fire interval guidelines for protection of vegetation communities.

Table 5. Fire Interval Guidelines for Protection of Vegetation Communities.

| Vegetation Community | Minimum Interval (yrs.) | Maximum Interval (yrs.) | Notes |
|--------------------------------|-------------------------|-------------------------|--|
| Rainforest | n/a | n/a | Fire should be avoided |
| Wet sclerophyll forest | 25 | 60 | Crown fires should be avoided at the lower end of the interval range |
| Sclerophyll grassy woodland | 5 | 40 | - |
| Grassy dry sclerophyll forest | 5 | 50 | - |
| Scrubby dry sclerophyll forest | 7 | 30 | - |

Source: Bradstock *et al.* (2003). * Intervals given are tentative due to insufficient data.

4.3. Isolation and Fragmentation

The area surrounding the planning area has been extensively cleared, resulting in a high loss of biodiversity and fragmentation of habitat in the region (Peake 2003). Long term conservation of biodiversity depends upon the protection, enhancement and connection of remaining habitat across the landscape, incorporating vegetation remnants on both public and private lands. Nearby vegetated areas contribute to the

habitat values of the planning area and provide ecological corridors to other forested areas. Maintaining the integrity of the remaining habitat within the reserves and, where possible, linking this to adjacent areas of bushland to facilitate wildlife corridors is important in ensuring the long term viability of the biological values of the planning area.

4.4 Climate Change

Climate change has been listed as a key threatening process under the TSC Act. Projections of future changes in climate for NSW include higher temperatures, increasing sea levels and water temperatures, elevated carbon dioxide, more intense but possibly reduced annual average rainfall, increased temperature extremes and higher evaporation. These changes are likely to lead to greater intensity, duration and frequency of fires, more severe droughts and increased regional flooding.

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. Species most at risk are those unable to migrate or adapt, particularly those with small population sizes or with slow growth rates. The potential impact of climate change is difficult to assess since it depends on the compounding effects of other pressures, particularly barriers to migration and pressure from weeds and feral animals. Programs to reduce pressures arising from such threats will help reduce the severity of the effects of climate change.

5. MANAGEMENT OPERATIONS AND OTHER USES

Access to the planning area is through private property via a complex network of private roads and 4WD trails.

Management trails are located on or in close proximity to the northwest, northeast and southwest boundaries of the planning area. Some management trails are also linked by sections of private road and trail.

Access agreements with neighbours are required to ensure access to the planning area for management operations and fire management and control.

The tenure of state conservation area allows for mining activity. The area is not currently covered by any mineral exploration licence. Industry and Investment NSW (II NSW) is the lead authority for mining, mineral exploration and mine site rehabilitation. II NSW (Minerals) is required under the EPA Act to undertake environmental assessments for mining and exploration activities in all state conservation areas. A Memorandum of Understanding (MOU) between NPWS and the then Department of Mineral Resources describes the management and consultative arrangements associated with exploration and mining in state conservation areas.

6. MANAGEMENT STRATEGIES AND ACTIONS

| Current Situation | Desired Outcomes | Management Strategies / Actions | Priority |
|--|--|---|----------|
| <p>6.1 Soil and Water Conservation</p> <p>The planning area borders approximately 5 kilometres of the Pages River. Preservation of water quality within this area is therefore important.</p> <p>Most of the soils are of low fertility, have high run off rates and can be erosive.</p> | <p>Soil erosion is minimised.</p> <p>Water quality and health of the river is monitored and maintained within the planning area.</p> | <p>6.1.1 Undertake all works in a manner that minimises erosion and water pollution.</p> | Medium |
| | | <p>6.1.2 Liaise with other government departments and relevant bodies to encourage the implementation of water quality monitoring programs in the area.</p> | Medium |
| <p>6.2 Native Plant and Animal Conservation</p> <p>Plant and animal investigations indicate that the area is likely to contain a high number of threatened and regionally significant species.</p> <p>The planning area contains an endangered ecological community and a number of threatened and significant native plant and animal species. The planning area also has predicted high quality habitat for other threatened and significant native animal species.</p> | <p>An improved knowledge of threatened and significant plants and animals, ecology and habitat requirements.</p> <p>Identify and conserve native plant and animal species and communities.</p> | <p>6.2.1 Monitor changes in stand structure over time, particularly through mapping of disturbance.</p> | Medium |
| | | <p>6.2.2 Encourage vegetation surveys for predicted threatened plant species.</p> | Medium |
| | | <p>6.2.3 Implement relevant strategies in the Priorities Action Statement and recovery plans for threatened species and ecological communities.</p> | Medium |
| | | <p>6.2.4 Encourage or undertake research into fauna (with a focus on targeted fauna surveys).</p> | Medium |

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| <p>6.3 Cultural Heritage (Aboriginal and Historic Heritage)</p> <p>There is limited understanding of pre-European Aboriginal use and of the planning area, as well as of more recent uses.</p> <p>A hut exists in the western portion of the planning area.</p> | <p>Aboriginal and historic features and values are identified and protected.</p> <p>Aboriginal people are involved in management of the Aboriginal cultural values in the park.</p> <p>Ensure that the oral history of the area is documented.</p> | <p>6.3.1 Consult and involve the Local Aboriginal Land Council and Aboriginal traditional owners and elders in the management of Aboriginal sites, places and values, including interpretation of places or values.</p> <p>6.3.2 Record the hut in the western portion of the planning area and determine its historic importance and appropriate management.</p> <p>6.3.3 Encourage further research into the Aboriginal cultural heritage values of the planning area in consultation with Aboriginal owners and elders.</p> <p>6.3.4 Encourage research into the Aboriginal and pre-European history of the planning area, including oral histories.</p> | <p>High</p> <p>High</p> <p>High</p> <p>High</p> |
| <p>6.4 Recreation</p> <p>Due to its isolation and the fact that it is surrounded by private property, no visitor facilities are provided in the planning area.</p> <p>Access to the planning area is via private roads through neighbouring private property.</p> <p>There is a range of recreational opportunities available for the public at Lake Glenbawn State Park, Towarri National Park, Barrington Tops National Park and State Conservation Area, and State forests throughout the broader region.</p> | <p>No recreational pursuits to be promoted in the area.</p> | <p>6.4.1 Visitor facilities, including roads, will not be provided in the planning area.</p> | <p>High</p> |

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| <p>6.5 Introduced Plants and Animals</p> <p>Annual fox/dog baiting programs carried out in conjunction with Livestock Health and Pest Authority indicate there are significant numbers of these pest animals in and around the planning area.</p> <p>Annual pig trapping programs carried out with neighbour cooperation indicate significant numbers of pigs traverse the planning area at certain times of the year.</p> <p>Evidence of feral goats and rabbits has been found in the planning area. In the past aerial and opportunistic shooting has been used as a method of control.</p> <p>Weed invasion is evident on the boundary of the planning area and is expected to be a continuing issue due to its location in predominantly agricultural landscapes.</p> <p>Noxious weeds and significant weed species have potential to impact on the environment, particularly the riverine environments.</p> <p>Straying stock is an issue in an agricultural area and needs to be monitored.</p> <p>There are occasional instances of illegal shooting/hunting within the planning area.</p> | <p>Introduced plants and animals are controlled and where possible eliminated.</p> <p>Pest control programs are undertaken in consultation with neighbours.</p> <p>Instances where straying stock enter the planning area are dealt with as quickly as possible.</p> <p>Current weed and pest control programs are maintained and new methods considered when appropriate.</p> <p>Monitor illegal hunting activities and enforce appropriate law enforcement actions.</p> | <p>6.5.1 Manage introduced species in accordance with the Hunter Regional Pest Management Strategy. Consider new methods of control where appropriate.</p> <p>6.5.2 Undertake integrated pest control programs with the Livestock Health and Pest Authority and neighbours.</p> <p>6.5.3 Undertake on-going control programs for dogs, foxes and pigs. On-ground and aerial programs may be included.</p> <p>6.5.4 Implement opportunistic or reactive programs for the control of rabbits and goats.</p> <p>6.5.5 Monitor noxious and significant environmental weeds as per Table 4. Treat any new outbreaks where possible.</p> <p>6.5.6 In conjunction with neighbours, maintain boundary fences and determine strategies to exclude stock.</p> <p>6.5.7 Liaise with law enforcement authorities and neighbours as required to address illegal behaviour.</p> | <p>High</p> <p>High</p> <p>High</p> <p>Medium</p> <p>High</p> <p>Medium</p> <p>Medium</p> |
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| <p>6.6 Fire Management</p> <p>Anecdotal history indicates that fire has not been a frequent incident in the area. The last recorded fire in the area was in 2001-2002 to the east of the planning area.</p> | <p>Life, property and natural and cultural values are protected from fire.</p> <p>Exclude fire from rainforest areas.</p> | <p>6.6.1 Implement the Reserve Fire Management Strategy for Camerons Gorge Nature Reserve and State Conservation Area (refer to section 4.2).</p> <p>6.6.2 Participate in the Liverpool Range BFMC. Maintain cooperative arrangements with RFS brigades and fire control officers, and surrounding landowners in regard to fuel management and fire suppression.</p> <p>6.6.3 Manage the planning area to protect biodiversity in accordance with the identified fire interval guidelines for vegetation communities.</p> | <p>High</p> <p>High</p> <p>Medium</p> |
| <p>6.7 Isolation and Fragmentation</p> <p>The planning area lies within an extensively cleared landscape, with poor connectivity to adjoining habitat.</p> | <p>Encourage retention and appropriate management of key habitats and corridors adjacent to the planning area.</p> | <p>6.7.1 Liaise with neighbours, catchment management authorities and other agencies to encourage retention, and where possible expansion, of areas of native vegetation close to the planning area.</p> | <p>Low</p> |
| <p>6.8 Climate Change</p> <p>Climate Change has been listed as a key threatening process under the TSC Act.</p> | <p>The impacts of climate change on natural systems are minimised.</p> | <p>6.8.1 Continue existing fire, pest and weed management programs to increase the ability of native flora and fauna to cope with future disturbances, including climate change.</p> | <p>Medium</p> |

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| <p>6.9 Management Operations and Other Uses</p> <p>Management access to the planning area is through private property via a complex network of private roads and trails. There is a need to provide directional signage to facilitate management access to the planning area.</p> <p>The management trail network provides access to the north-west and north-east of the planning area but there is no access to the south.</p> <p>There are no mineral exploration licences over the state conservation area.</p> | <p>Management trails maintained to allow management operations to continue.</p> <p>Private road and trail network used for access maintained and signposted in conjunction with neighbours.</p> <p>Inappropriate access minimised through neighbour liaison.</p> | <p>6.9.1 Maintain the management trails shown on reserve map for management purposes. Medium</p> <p>6.9.2 Liaise with neighbours about the possibility of establishing management access from the south. Medium</p> <p>6.9.3 Additional management trails may only be constructed in the following situations:</p> <ul style="list-style-type: none"> ● Realignment of an existing trail to a more environmentally acceptable location subject to an appropriate environmental assessment. ● Protection of specific natural and cultural resources, property or life. ● During an emergency situation, such as wildfires, where there is no practical alternative. In such situations these trails will be assessed for usefulness and if appropriate rehabilitated as soon as practicable after the incident. <p>6.9.4 Negotiate access agreements with landholders where necessary to ensure access to the planning area for management operations and emergency situations. High</p> <p>6.9.5 Signpost management trails, and the private road and trail network for access in cooperation with relevant landholders. Medium</p> <p>6.9.6 Liaise with neighbours on relevant management issues. Medium</p> |
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| | <p>6.9.7 Any applications for approval to undertake exploration for mining within the state conservation area will be subject to environmental assessment in accordance with the MOU between the NPWS and Mineral Resources.</p> | Ongoing |
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High priority activities are those imperative to achievement of the objectives and desired outcomes. They must be undertaken in the near future to avoid significant deterioration in natural cultural or management resources.

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

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

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