

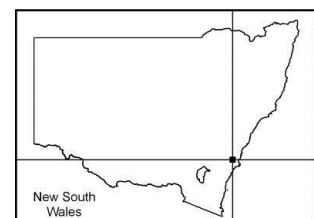


**NSW National Parks
& Wildlife Service**
Office of Environment & Heritage

Plan of Management



Bugong National Park and Tapitallee Nature Reserve



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This plan of management was adopted by the Minister for the Environment on 20 October 2016.

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This plan of management was prepared by staff of the South Coast Region of the NSW National Parks and Wildlife Service (NPWS), part of OEH.

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Front cover: Escarpment near Coolendel Lookout in Bugong National Park, overlooking the Shoalhaven River (Photo: NPWS Nowra Area)

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Foreword

Bugong National Park and Tapitallee Nature Reserve are located on the south coast of New South Wales, 14 and 7 kilometres north-west of Nowra. The national park has a total area of 1022 hectares and the nature reserve is 94 hectares.

The national park and nature reserve were gazetted in 2001 as a result of the Southern Forest Agreement. This is the first plan of management for these reserves.

Bugong National Park and Tapitallee Nature Reserve are rich in biodiversity. They protect threatened animals and plants and a wide range of vegetation communities.

The New South Wales *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each national park and nature reserve. A draft plan of management for Bugong National Park and Tapitallee Nature Reserve was placed on public exhibition from 25 October 2013 to 3 February 2014. The submissions received were carefully considered before adopting this plan.

The plan contains a number of actions to protect our natural environment, including protection of threatened species and communities, monitoring and survey of threatened native animals, control of pest plants and animals, and fire management to protect both biodiversity and the community. The plan also provides opportunities for camping, bushwalking, cycling and horse riding.

This plan of management establishes the scheme of operations for Bugong National Park and Tapitallee Nature Reserve. 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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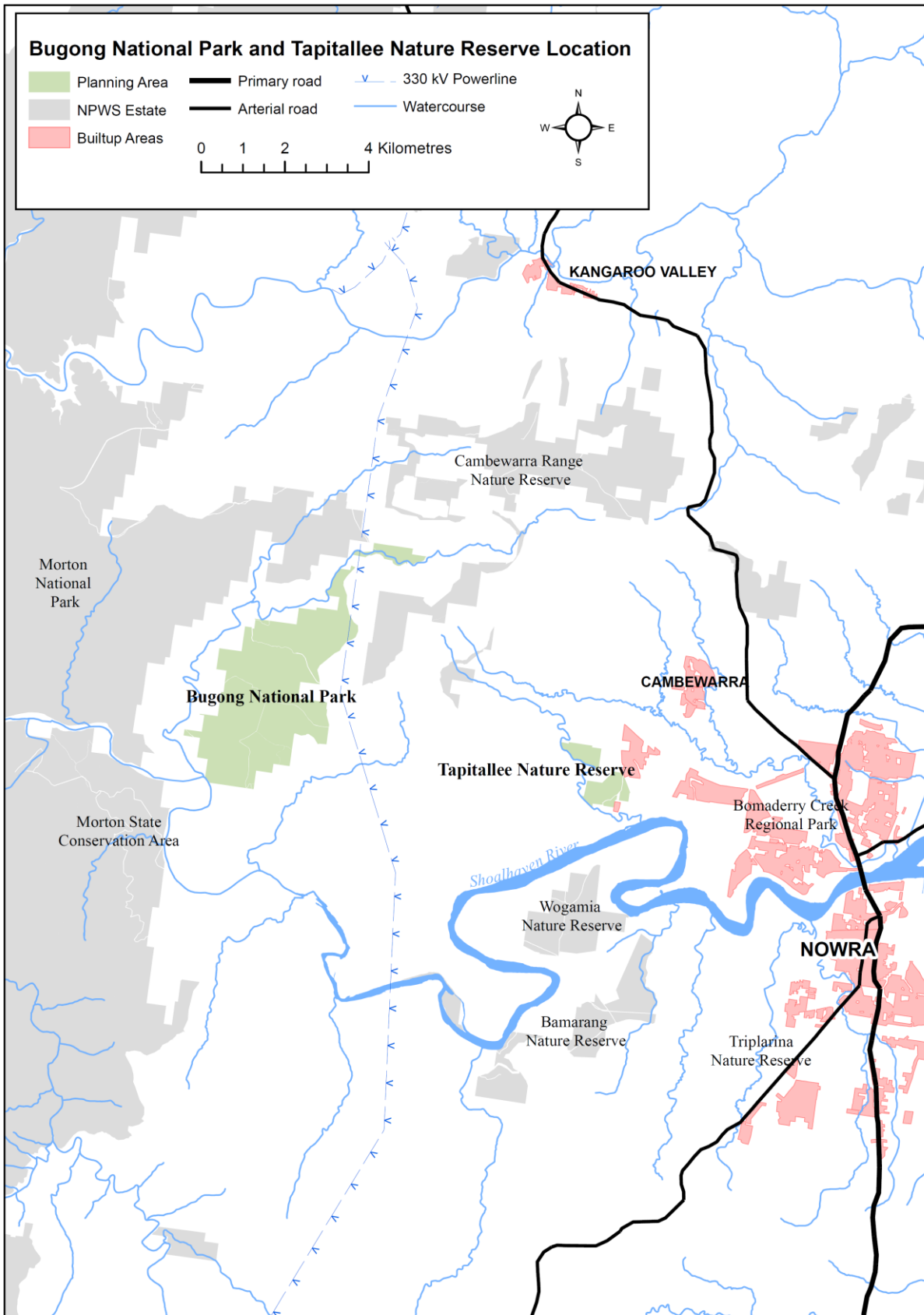
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Map 1: Location



1. Introduction

1.1 Location, reservation and regional setting

Features	Description
Bugong National Park and Tapitallee Nature Reserve	
Location	Bugong National Park (the park) and Tapitallee Nature Reserve (the nature reserve, or reserve) are located on the south coast of New South Wales, 14 and 7 kilometres north-west of Nowra (see Map 1).
Area	The park has an area of 1022 hectares and consists of a large southern section and a small northern section. The nature reserve is also in two sections, with a total area of 94 hectares.
Reservation date	The park and reserve were formerly Crown land and were reserved on 1 January 2001 as a result of the Southern Regional Forest Agreement.
Name	The park is named after Bugong Parish, in which it is located, and Bugong Creek, which runs through it. The name is pronounced 'Budjong'. The nature reserve carries the local name for the surrounding area, which is based on Tapitallee Creek to the north of the reserve.

Regional context

Biogeographic region	The park and reserve are located in the Illawarra and Ettrema subregions of the Sydney Basin Bioregion (Thackway & Cresswell 1995). They are among several conservation reserves that protect examples of the coastal hinterland environments around Nowra and the lower Shoalhaven River valley. Together these provide a system of protected lands along the valley and adjacent escarpment landscapes. Nearby reserves are Morton National Park, Morton State Conservation Area, Bomaderry Creek Regional Park and Cambewarra Range, Wogamia, Bamarang and Triplarina nature reserves.
Surrounding land use	<p>The park is surrounded primarily by freehold forested and cleared land used for grazing and rural retreats. There are also adjacent areas of Crown land, including an area that links the two sections of the park and connects them to Morton National Park, and a large area adjoining the park to the south-east. The Shoalhaven River borders the south-west tip of the park.</p> <p>The reserve is bordered by freehold rural land and urban development. An area of Crown land, Bangalee Reserve, is located a short distance to the south along the Shoalhaven River. Vegetated areas along the river, including the publicly owned Bundanon properties, form an important corridor between the park and reserve.</p>
Other authorities	The park and reserve are located within the areas of the Nowra Local Aboriginal Land Council, South East Local Land Services and Shoalhaven City Council.

Bugong National Park includes several roads (Illaroo Fire Trail and roads to private property) that are managed by NPWS under Part 11 of the *National Parks and Wildlife Act 1974* to ensure continued access to neighbouring land (see Section 5). These roads do not form part

of the reserved area of the park but their management is subject to this plan and relevant legislation (see Section 2.1).

1.2 Statement of significance

Natural values

Bugong National Park has the following important natural values:

- The park contains a variety of topography including plateau, steep slopes, cliffs and creek corridors.
- It protects part of the catchments of Bugong Creek and Kellets Creek.
- The vegetation is diverse and includes low and medium dry open forest, heathland, tall moist forest and three types of rainforest.
- It contains areas of the endangered ecological community Illawarra Subtropical Rainforest in the Sydney Basin Bioregion.
- It contains populations of the endangered broad-headed snake and at least 14 vulnerable native animal species including the yellow-bellied glider, Rosenberg's goanna and giant burrowing frog. A large colony of the vulnerable grey-headed flying-fox roosts partly in the park and partly on adjacent Crown land.

Tapitallee Nature Reserve has the following natural values:

- It protects part of the catchment of Bengalee Creek and moist forests along the creek and its tributaries.
- It supports populations of the vulnerable powerful owl, gang-gang cockatoo, glossy black-cockatoo and spotted-tailed quoll.
- It protects a small area of native vegetation and native animal habitat in an area that is increasingly subject to clearing for subdivision and development.

Cultural heritage values

The park and reserve fall within the traditional area of the south coast Aboriginal people of the Dharawal language group. Members of the local community maintain direct association to the Bugong area, in the vicinity of the park, where family members were born.

Artefact scatters have been recorded in the park and reserve and there is potential for further sites to occur, as a number of Aboriginal sites are located nearby.

The park area has been used for rural and recreational activities from the early 19th century. It contains an early road from Nowra to Goulburn constructed in 1859 and a historic cutting on Bugong Road.

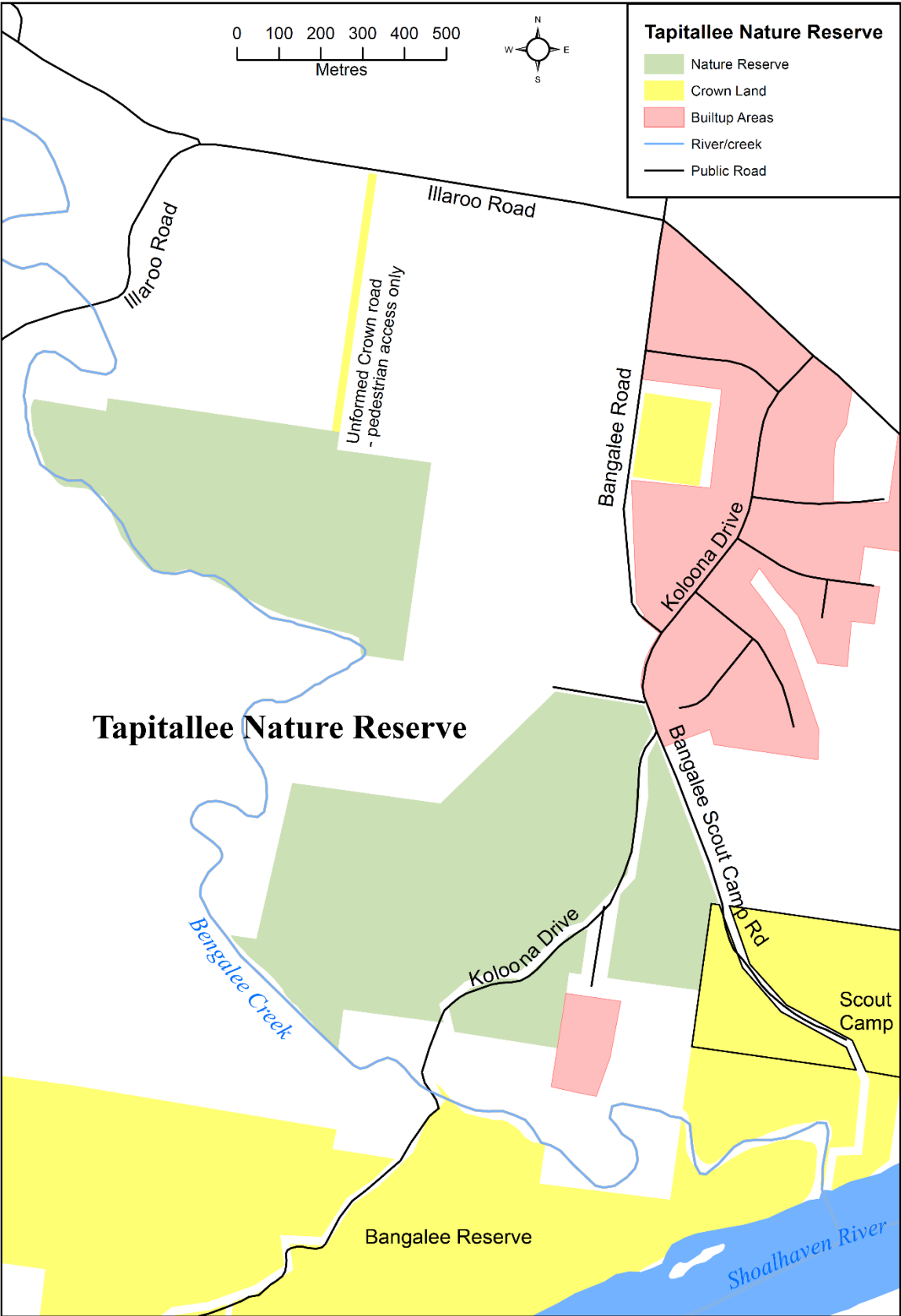
Recreation and scenic values

The park is located within easy reach of population centres around Nowra and provides opportunities for walking, cycling, horse riding, rock climbing, camping and vehicle touring in a forest environment. The park's natural character, combined with the nearby escarpment and Shoalhaven River, gives it a sense of isolation and distance from urban areas.

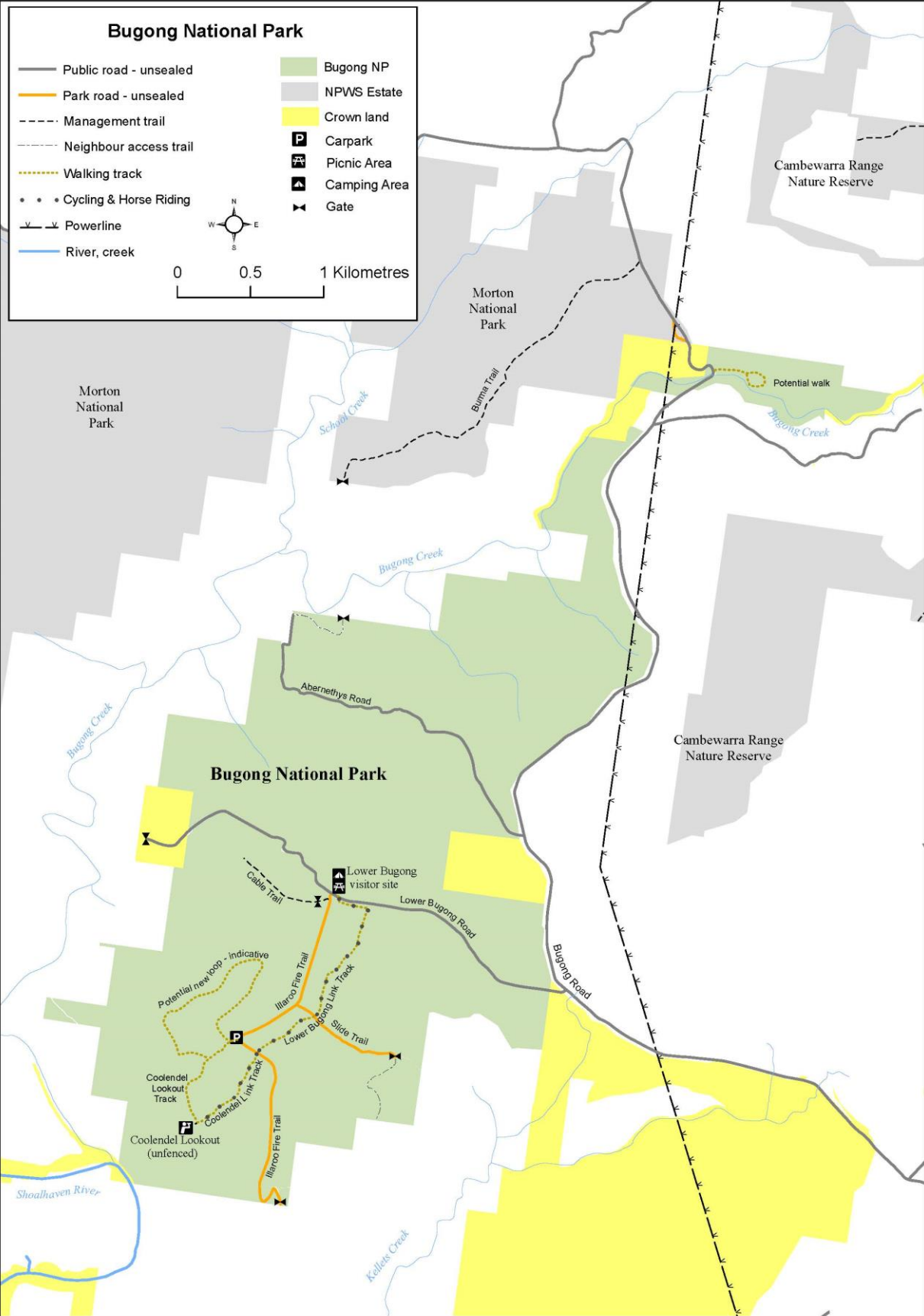
The nature reserve is adjacent to residential areas and semi-rural properties. Along with nearby vegetated areas, it assists with landscape protection and maintenance of the bushland setting.

There are panoramic views across the Shoalhaven River from the Coolendel Lookout area in the south-west of the park. The moist forests, cliffs and permanent creeks in the park and reserve (Bugong Creek and Bengalee Creek) are very scenic.

Map 2: Tapitallee Nature Reserve



Map 3: Bugong National Park



2. Management context

2.1 Legislative and policy framework

The management of national parks and nature reserves in New South Wales is in the context of a legislative and policy framework, primarily the *National Parks and Wildlife Act 1974*, the *National Parks and Wildlife Regulation*, the *Threatened Species Conservation Act 1995* and the policies of the National Parks and Wildlife Service (NPWS). The matters to be considered in the preparation of a plan of management are listed in section 72AA of the *National Parks and Wildlife Act*. NPWS policies arise from this legislative background and internationally accepted principles of park management. They relate to nature conservation, cultural heritage conservation, recreation, fire management, commercial use, research and information provision.

Other legislation may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979* may require the assessment and mitigation of the environmental impacts of any works proposed in this plan. The NSW *Heritage Act 1977* may apply to the excavation of known archaeological sites or sites with potential to contain historical archaeological relics. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* also applies in relation to actions that may impact on matters of national environmental significance including threatened species.

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

2.2 Management purposes and principles

National parks

National parks are reserved under the *National Parks and Wildlife Act* to protect and conserve areas containing outstanding or representative ecosystems, natural or cultural features or landscapes or phenomena that provide opportunities for public appreciation and inspiration and sustainable visitor or tourist use and enjoyment.

Under the *National Parks and Wildlife Act* (section 30E), national parks are managed to:

- conserve biodiversity, maintain ecosystem functions, protect geological and geomorphological features and natural phenomena and maintain natural landscapes
- conserve places, objects, features and landscapes of cultural value
- protect the ecological integrity of one or more ecosystems for present and future generations
- promote public appreciation and understanding of the park's natural and cultural values
- provide for sustainable visitor or tourist use and enjoyment that is compatible with conservation of natural and cultural values
- provide for sustainable use (including adaptive re-use) of any buildings or structures or modified natural areas having regard to conservation of natural and cultural values
- provide for appropriate research and monitoring.

Nature reserves

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

Under the National Parks and Wildlife Act (section 30J), nature reserves are managed to:

- conserve biodiversity, maintain ecosystem function, 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 nature reserve's natural and cultural values
- provide for appropriate research and monitoring.

The primary purpose of nature reserves is to conserve nature. Nature reserves differ from national parks in that they do not have the provision of visitor use as a management purpose or principle.

2.3 Specific management directions

The park and reserve are relatively small and crossed by public roads, vehicle trails and public utilities. Some parts have been disturbed by gravel extraction, recreational vehicle use, informal camping, and rubbish and car dumping. The nature reserve is small, fragmented and isolated from larger reserves, and likely to be vulnerable to increasing disturbance as residential development in the surrounding area proceeds. Maintaining habitat linkages across the landscape will therefore be vital for protection of biodiversity and ecosystems within the park and reserve, and will need to be pursued with land-use planning authorities.

The primary management emphasis for the park and reserve will be on protection of biodiversity values through programs such as:

- survey, monitoring and protective management for significant species
- rehabilitation of disturbed areas
- measures to minimise sedimentation of streams
- reduction in habitat fragmentation
- protection from illegal activities such as rock and reptile collection and dumping of garden waste and rubbish.

There are currently no visitor facilities in the park apart from roads, but there is an established pattern of recreational use for scenery viewing, bushwalking, rock climbing, horse riding and some camping, including use by educational groups. These activities will continue to be permitted but will be managed to ensure sustainability. Visitor opportunities will be enhanced by:

- provision of basic camping, picnicking and interpretive facilities in a former quarry on Lower Bugong Road
- formalisation of existing walking tracks connecting this area to Coolendel Lookout
- construction of additional tracks, subject to environmental impact assessment.

Horse riding and cycling will be permitted on roads, a management trail and two other tracks of sufficient width (see Section 3.5). Rock climbing and group adventure activities will be permitted but with controls to minimise impacts.

The nature reserve has no visitor facilities and it is not proposed to provide any during the term of this plan of management.

Fostering community appreciation of park and reserve values and management needs will be important. Neighbour liaison and cooperative management programs such as pest control will continue.

3. Values

This plan aims to conserve both natural and cultural values of the park and reserve. The location, landforms and plant and animal communities of the area have determined how it has been used and valued by both Aboriginal and non-Aboriginal people. These values may be attached to the landscape as a whole or to individual components, for example to plant and animal species used by Aboriginal people.

To make 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

Landform and geology

The park and reserve are located on the coastal hinterland just below the Cambewarra Range (part of the Great Eastern Escarpment). About half the park consists of a small plateau and the rest is steeply sloping country falling to the Kellets Creek, Bugong Creek and Shoalhaven River valleys east, west and south of the plateau. Low cliff lines border the western and southern edges of the plateau. Elevation ranges from approximately 10 metres above sea level along the Shoalhaven River to 270 metres above sea level on the southern part of the plateau. Bugong Creek runs through and alongside the northern part of the park.

The nature reserve is gently to moderately sloping, ranging from 10 metres to 90 metres above sea level. Bengalee Creek forms its western edge and the reserve is crossed by gullies flowing into the creek. There are steep slopes and low cliffs along parts of Bengalee Creek. The upper reaches of some of the tributary gullies contain shallow pools.

The park and reserve landscapes have formed on Permian age rocks of the southern Sydney Basin. The plateau area of the park and the majority of the reserve lie on sandstone, siltstone and conglomerate beds of the Nowra Sandstone formation. There are small areas of Berry Siltstone in the higher areas of both the park and reserve. Wandrawandian Siltstone occurs on the steep slopes below the sandstone cliffs in the park and along Bengalee Creek and its tributaries in the nature reserve. Sandstone and siltstone of the Conjola Formation are found in the lowest areas of the park along Bugong Creek and the Shoalhaven River (Department of Mines 1966).

In areas of Nowra sandstone, the soils are generally shallow and sandy or gravelly, with low fertility (CALM 1993). In some locations drainage is impeded as the rock strata are close to the surface. Soils on siltstone are deeper and support taller forest.

Scenery

As stated in Section 2.3, the park has high scenic values, particularly associated with the cliff lines, where the rock faces and the moist forests at their base are very picturesque. Scenic views are available from several locations along the cliff tops, particularly from the Coolendel Lookout area in the south-west of the park. This site has panoramic views across the Shoalhaven River to Morton State Conservation Area and Morton National Park. There are attractive views of the Cambewarra Range from a former gravel quarry in the central part of the plateau, at the proposed Lower Bugong visitor site (see Section 3.5).

Bengalee and Bugong creeks are scenic, permanent creeks running over rocky beds set in moist forest. Rocky slopes and cliffs flank both creeks.

The southern approach to the Bugong Creek crossing along Bugong Road runs past a scenic rock cutting that also has historic values (see Section 3.4). The rock faces are partly

within the park and partly within the defined width of Bugong Road. As far as possible any road upgrading should maintain the current character and rock surfaces.

Water quality

Most of the drainage systems within the park arise on the plateau and flow into nearby creeks. Water quality in the park is therefore of a reasonably high standard, although sediment loads from unsealed roads are potentially of concern.

Streams flowing through the nature reserve begin on private land that mainly supports native vegetation. Water quality is likely to be of quite a high standard at present. However, this may not continue in the longer term as residential and rural subdivision is occurring in the surrounding area.

Issues

- Views from Coolendel Lookout and other cliff top locations in the park could be affected by any clearing or development in the Bugong Creek and Shoalhaven River valleys.
- The rock faces along Bugong Road could be affected by road works, or by unauthorised blasting to widen the road as has occurred previously.
- Soils in the park and reserve are highly erodible when disturbed. They can produce significant amounts of sediment where roads cross steep terrain such as at the western ends of Abernethys Road and Lower Bugong Road and the southern end of the Slide Trail. Sediment emanating from unsealed roads can have significant impacts on adjacent creek habitats (see Section 3.3).
- Two former gravel quarries are located in the park. Sheet erosion is occurring on the large former quarry at the intersection of Lower Bugong Road and Illaroo Fire Trail (labelled Lower Bugong visitor site on the park map). It is subject to unauthorised vehicle use and rubbish dumping, despite work to control vehicle access. Further access control and site rehabilitation will be undertaken in conjunction with providing visitor facilities (see Section 3.5).
- The small former gravel quarry near the intersection of the Illaroo Fire Trail and Coolendel Lookout Trail (marked with a carpark symbol) needs to be reshaped to improve safety and amenity, in conjunction with provision of a track head (see Section 3.5).
- Erosion is occurring as a result of uncontrolled vehicle access off the southern end of the Illaroo Fire Trail. Visitors are driving a short distance beyond the park boundary to view the scenery from the edge of the escarpment. The main viewing site is known locally as Illaroo Lookout but is on private land. Access control and the construction of a turning area are needed, in conjunction with the neighbouring land holder.
- Part of the nature reserve south of Koloona Drive appears to have been subject to soil or gravel extraction in the past. The surface is irregular but is now revegetated.

Desired outcomes

- The geomorphological and scenic values of the park and reserve are protected.
- Human-induced soil erosion in the park and reserve is minimised and disturbed areas are rehabilitated.
- Water quality and stream habitat values are maintained or, if necessary, improved.

Management response

- 3.1.1 Locate and design management and visitor facilities to minimise their visual impact from public access roads, Coolendel Lookout and other vantage points.

- 3.1.2 Liaise as needed with Shoalhaven City Council to seek protection of the attractive and historic rock faces on the southern side of the Bugong Creek crossing during any road work along Bugong Road.
- 3.1.3 Design and undertake all works in a manner that minimises soil erosion and water pollution.
- 3.1.4 Ensure sediment contribution to waterways is minimised during any work on NPWS roads and trails, through such measures as correct road and trail surface preparation, roll-overs, sediment traps on steep slopes and retaining low vegetation on road batters. Liaise with relevant authorities to promote best practice land management, including road maintenance works, to improve sediment control.
- 3.1.5 In conjunction with the adjacent land owner, fence or gate access into the adjacent private property off the southern end of the Illaroo Fire Trail. Install signs to inform visitors of the location of the park boundary and establish a turn-around area for vehicles.

3.2 Native plants

The Comprehensive Regional Assessment conducted for the Southern Regional Forest Agreement (Thomas et al. 2000) and subsequent ground truthing (EcoGIS 2004) identified seven vegetation communities occurring within Bugong National Park and three in Tapitallee Nature Reserve. The extent of each community needs to be confirmed by further survey.

Shoalhaven Sandstone Forest (Red Bloodwood – Scribbly Gum – Heath Shrub Dry Forest) occurs on plateau areas of the park north of Abernethys Road and the upper, relatively flat parts of the nature reserve. It is a medium to low forest/woodland with a canopy of red bloodwood (*Corymbia gummifera*), yertchuk (*Eucalyptus consideniiana*) and hard-leaved scribbly gum (*E. sclerophylla*). It has a shrub layer of species such as finger hakea (*Hakea dactyloides*), mountain devil (*Lambertia formosa*), hairpin banksia (*Banksia spinulosa* var. *spinulosa*) and swamp banksia (*Banksia paludosa*) with a groundcover of grasses and sedges. There are patches of heathland where the tree layer is sparse.

Currumbene-Batemans Lowlands Forest (Red Bloodwood – Spotted Gum Dry forest) covers a large proportion of the nature reserve, on gentle slopes with deeper soils. It is a medium forest of red bloodwood and spotted gum (*Corymbia maculata*) with turpentine (*Syncarpia glomulifera*). There is an open shrub layer of species such as hairy bush-pea (*Pultenaea villosa*) and a dense ground cover of grasses and herbs such as weeping grass (*Microlaena stipoides*) and blue flax lily (*Dianella caerulea*).

Yalwal Shale – Sandstone Transition forest (Red Bloodwood – Turpentine Dry Shrub Forest) is found in the park on lower parts of the plateau and on the lower dry slopes below the plateau. It is a medium forest with a canopy of red bloodwood, turpentine and grey gum (*Eucalyptus punctata*) with a small tree layer including black she-oak (*Allocasuarina littoralis*). The community has a shrub layer of species such as silky hakea (*Hakea sericea*), holly-leaved lomatia (*Lomatia ilicifolia*), narrow-leaf platysace (*Platysace linearifolia*) and *Bossiaea heterophylla*. It has a groundcover of grasses and sedges including the grass tree *Xanthorrhoea concava*.

Southern Turpentine Forest occurs widely in the park, over much of the plateau and on some upper slopes below the cliff line. It is a medium to tall dry sclerophyll forest with a canopy of turpentine, red bloodwood, Sydney peppermint (*E. piperita*) and rough-barked apple (*Angophora floribunda*). The shrub layer includes species such as narrow-leaf geebung (*Persoonia linearis*), blunt-leaf wattle (*Acacia obtusifolia*), hairpin banksia, trailing guinea flower (*Hibbertia empetrifolia*) and burrawang (*Macrozamia communis*). It has a groundcover of ferns, sedges and grasses. Some areas of this community are located on better soils and

are potentially part of the endangered ecological community Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion.

Small areas of Morton Mallee Heath are found on poorly drained areas of the plateau south of Lower Bugong Road. This community has emergent mallees such as hard-leaved scribbly gum and red bloodwood, and an open shrub canopy that includes flaky-barked tea-tree (*Leptospermum trinervium*), dagger hakea (*Hakea teretifolia*), heath banksia (*Banksia ericifolia*), hairpin banksia and swamp banksia.

Warm Temperate Layered Forest (shrubby wet sclerophyll forest) occurs on sheltered upper slopes and gullies below the cliff line in the main section of the park and on the slopes above Bugong Creek in the northern section. It is a tall moist forest with an emergent tree layer of Sydney blue gum – bangalay hybrid (*E. saligna* x *E. botryoides*) and turpentine. Some areas along Bugong Creek merge into Coastal Warm Temperate Rainforest with lilly pilly (*Acmena smithii*), native laurel (*Cryptocarya glaucescens*), two-veined hickory (*Acacia binervata*), sassafras (*Doryphora sassafras*) and blueberry ash (*Elaeocarpus reticulatus*). Beneath the canopy are palms, large ferns, cycads, climbers and a shrub layer of species such as sweet pittosporum (*Pittosporum undulatum*) and three-veined cassinia (*Cassinia trinerva*) with a ferny and grassy groundcover.

Lowland Wet Forest (wet sclerophyll forest) is found in the nature reserve along Bengalee Creek and the lower parts of some tributaries. This is a dense forest of spotted gum, blackbutt (*Eucalyptus pilularis*) and grey ironbark (*E. paniculata*) with an understorey of small rainforest trees, shrubs and grasses.

Dry Temperate Rainforest occurs in a sheltered rocky gully on the cliff line in the north-west of the park. It has a canopy of grey myrtle (*Backhousia myrtifolia*) and water gum (*Tristanopsis laurina*) and other trees with an emergent tree layer of grey gum and turpentine. Beneath the canopy are small trees, shrubs, palms, cycads and tree ferns with a groundcover of ferns, grasses and sedges.

Coastal Warm Temperate Rainforest – Subtropical Rainforest Complex occurs in sheltered gullies in two pockets along the south-east boundary of the park. It has a canopy of whalebone tree (*Streblus brunonianus*), sassafras, lilly pilly and giant stinging tree (*Dendrocnide excelsa*) with a secondary tree layer of species such as brittlewood (*Claoxylon australe*), red-fruited olive plum (*Elaeodendron australe* var. *australe*) and wilkiea (*Wilkiea huegeliana*). Beneath the canopy are palms, shrubs, climbers and tree ferns such as cabbage tree palm (*Livistona australis*) with a grassy and ferny groundcover. This community corresponds with the endangered ecological community Illawarra Subtropical Rainforest in the Sydney Basin Bioregion. Subtropical rainforest is poorly conserved on the south coast as it occurs at lower altitudes, primarily on private land. All rainforest, however, has a restricted distribution and is therefore significant.

The threatened species *Grevillea parviflora* subsp. *parviflora* was recorded on the plateau between Abernethys and Lower Bugong roads in 1923, however it is not known whether it still occurs in the park or which subspecies it is (NGH Environmental 2001). The endangered Nowra heath myrtle (*Triplarina nowraensis*) has been recorded nearby to the east and may be present in the park.

Three records of plants listed as Rare or Threatened Australian Plants occur close to the park and may occur within it (NGH Environmental 2001). These are shredded spleenwort (*Asplenium aethiopicum*), which has been recorded 300 metres to the north of the park, *Acacia jonesii* which has been recorded 500 metres to the west and the lily *Typhonium eliosurum* recorded 100 metres to the south-west. The regionally rare elkhorn (*Platynerium bifurcatum*) is found within the Warm Temperate Layered Forest along Bugong Creek.

The laterite soils that occur on the central part of the plateau have a high potential to support rare or threatened plant species such as the vulnerable Deane's paperbark (*Melaleuca deanei*) and the endangered Bynoe's wattle (*Acacia bynoeana*) (S. Douglas, pers. comm. 2010).

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

Links to other vegetated areas

The park and reserve are relatively small but are currently connected to other vegetated areas. These critical habitat links help sustain the diversity of plants and animals in the park and reserve.

Areas of private land adjacent to the park and reserve contain significant vegetation communities, including rainforest, and provide connections to other reserves. Private land to the west and east of the park connects it to Morton National Park and Cambewarra Range Nature Reserve. Land to the south and east connects the park to areas along the Shoalhaven River corridor as far as the nature reserve.

The large block of Crown land located south-east of the park contains the endangered Nowra heath myrtle plus several threatened native animals. An adjacent block of Crown land to the north of the park supports a colony of the threatened grey-headed flying-fox (see Section 3.3) and connects the park to Morton National Park. Another block of Crown land connects the northern and southern sections of the park. Other areas of Crown land are partly surrounded by the southern section of the park. Retention of native vegetation cover on these areas would contribute to habitat protection and connectivity, landscape and catchment values. These areas of Crown land may be appropriate as additions to the park.

Vegetated private land connects the two sections of nature reserve and connects the nature reserve to Bangalee Reserve, an area of Crown land along the Shoalhaven River. Retention of native vegetation in these areas would assist wildlife movement and viability.

Issues

- Survey is needed to check the identity and locations of vegetation communities in the park and reserve.
- Maintenance of links with other naturally vegetated areas will be vital for retention of biodiversity in the park and reserve.
- Apart from loss of connectivity, the most significant overall threats to vegetation structure and health are weeds (see Section 4.1) and inappropriate fire (see Section 4.2). Species diversity will need to be maintained through a mosaic of patch burns at appropriate intervals, exclusion of fire from rainforest and maintenance of long-unburnt thresholds in wet sclerophyll forest.
- Other impacts include off-road trail bike riding, rubbish dumping and unauthorised firewood removal. The vegetation in the vicinity of Coolendel Lookout is being damaged by vehicle access and activities associated with camping (see Section 3.5).
- Vegetation monitoring plots established in the park to monitor fire response (see Section 4.2) could be used to measure changes in response to factors such as climate change, weed invasion and visitor impacts.

Desired outcomes

- The full range of native plant species and communities found in the park and reserve is conserved.
- Vegetation structural diversity and habitat values are conserved.
- The endangered subtropical rainforest community is conserved.
- Neighbours support the conservation of privately owned native vegetation close to the park and reserve.

Management response

- 3.2.1 Implement relevant recovery actions in the *Priorities Action Statement* for threatened plant species, populations and communities occurring in the park.
- 3.2.2 Undertake vegetation surveys to determine the extent of the vegetation communities and check for threatened and significant species and communities, particularly those species recorded close to the park and species that may occur in the areas of laterite soils.
- 3.2.3 Ensure that park management and visitor facilities are not located within the endangered subtropical rainforest community. Monitor the subtropical rainforest to check for threatening processes such as invasive vines and other weeds.
- 3.2.4 Use the vegetation/fire monitoring plots to measure changes in the park's vegetation such as responses to climate change, weed invasion and visitor impacts. Establish additional plots in the park or reserve if necessary.
- 3.2.5 Liaise with neighbours, Landcare, South East Local Land Services and Shoalhaven City Council to encourage retention of areas of native vegetation close to the park and reserve and to maintain and strengthen connectivity with other naturally vegetated areas. Promote conservation agreements with neighbours over suitable land.

3.3 Native animals

The park has high native animal values and provides diverse habitats including woodland, open forest, rainforest, rocky escarpment with fissures and overhangs, and riparian areas. Several small native animal surveys have been undertaken and a total of 63 bird species, 24 mammal species, 16 reptile species and 12 amphibians have so far been recorded in the park. This is a fairly high number for a relatively small area and is likely to be due to the park's habitat diversity and its proximity to other conservation areas and naturally vegetated Crown and private land (Clarke 2012).

A bird survey was undertaken in the nature reserve in 2013 and a total of 43 birds have now been recorded, but little is known about other native animals. The nature reserve is smaller and less diverse than the national park, and is adjacent to partly developed or cleared land. In addition, some parts of the nature reserve have been cleared or logged, resulting in fewer hollow-bearing trees. It is therefore likely to contain fewer native animal species than the national park.

Four species listed as vulnerable under the Threatened Species Conservation Act have been recorded in the nature reserve. These are the powerful owl (*Ninox strenua*), gang-gang cockatoo (*Callocephalon fimbriatum*), glossy black-cockatoo (*Calyptorhynchus lathamii*) and spotted-tailed quoll (*Dasyurus maculatus*).

Fifteen threatened native animal species have been recorded within the park. One of these, the broad-headed snake (*Hoplocephalus bungaroides*), is endangered. The other 14 are vulnerable; the glossy black-cockatoo, sooty owl (*Tyto tenebricosa*), gang-gang cockatoo,

little lorikeet (*Glossopsitta pusilla*), koala (*Phascolarctos cinereus*), yellow-bellied glider (*Petaurus australis*), spotted-tailed quoll, long-nosed potoroo (*Potorous tridactylus*), eastern freetail-bat (*Mormopterus norfolkensis*), greater broad-nosed bat (*Scoteanax rueppellii*), large-eared pied bat (*Chalinolobus dwyeri*), grey-headed flying-fox (*Pteropus poliocephalus*), Rosenberg's goanna (*Varanus rosenbergi*) and giant burrowing frog (*Heleioporus australiacus*).

Another species of interest found in the park is the rockwarbler (*Origma solitaria*). While not threatened, this is the only bird species restricted to New South Wales. It is found in the Sydney basin, mainly in sandstone areas.

Census of the grey-headed flying-fox colony is undertaken when it is present in the area and giant burrowing frog monitoring sites have been established in the park (see below). In addition, broad-headed snake populations are monitored as part of a regional program. These monitoring programs provide information about species occurrence and enable early detection of population changes and any need for management intervention to assist conservation.

A small colony of the endangered brush-tailed rock-wallaby (*Petrogale penicillata*) previously occurred in the southern part of the park near Coolendel Lookout. The colony was monitored between 1998 and 2001 and from 1999 onwards was found to be extinct as a result of predation by foxes. In addition, old rock-wallaby scats were found near the northern end of the park during a 1996 survey (Capararo & Beynon 1996) and there is a historical rock-wallaby record at Bengalee Creek in the nature reserve. A brush-tailed rock-wallaby colony still occurs south-east of the park and cooperative fox control is undertaken for its protection (see Section 4.1). Much of the escarpment within the park, particularly north- and west-facing areas, is potential brush-tailed rock-wallaby habitat and as such should be protected to allow re-colonisation or re-introduction of rock-wallabies, should effective broad-scale fox control become possible.

Four other threatened species have been recorded close to the park and are likely to occur within it: the powerful owl, eastern bentwing-bat (*Miniopterus schreibersii oceanensis*), southern myotis (*Myotis macropus*) and stuttering frog (*Mixophyes balbus*). Similarly, the yellow-bellied glider has been recorded very close to the nature reserve, and the greater broad-nosed bat, masked owl (*Tyto novaehollandiae*) and square-tailed kite (*Lophoictinia isura*) have been recorded in similar habitat at Bangalee Reserve, a short distance to the south.

Habitat modelling conducted for the Southern Comprehensive Regional Assessment indicates the park and reserve may provide significant suitable habitat for several additional threatened species including the smoky mouse (*Pseudomys fumeus*), regent honeyeater (*Anthochaera phrygia*) and swift parrot (*Lathamus discolor*) as well as the regionally significant little red flying-fox (*Pteropus scapulatus*).

As for plants, strategies for the recovery of threatened native animal species and populations have been set out in the *Priorities Action Statement*. These actions are currently prioritised and implemented through the Saving our Species program which aims to maximise the number of threatened species that can be secured in the wild in New South Wales for 100 years (OEH 2013a). Individual recovery plans may also be prepared for threatened species to consider management needs in more detail.

Issues

- A native animal survey is needed for the nature reserve to develop adequate baseline information on the presence and population status of key native animals such as small to medium mammals, micro-bats, large forest owls and other threatened species. It is also likely that further surveys in the national park would record

additional species. Information from surveys and opportunistic sightings is recorded in the Atlas of NSW Wildlife to build up a picture of species distribution and changes over time.

- Black she-oak stands in the park provide important food resources for the glossy black-cockatoo and require protection from broad-scale fire. Further survey is needed to establish whether glossy black-cockatoo breeding occurs so that breeding sites can be protected.
- The broad-headed snake utilises rocky areas and is vulnerable to illegal collection and disturbance by activities such as abseiling and bushwalking.
- Disturbance by people is thought to reduce breeding success of the endangered brush-tailed rock-wallaby and should be minimised in areas of potential re-colonisation.
- The vulnerable grey-headed flying-fox roosts seasonally on the northern edge of the park near Bugong Creek. Most of the colony occurs on adjacent Crown land and retention of native vegetation cover is highly desirable (see Section 3.2).
- The vulnerable giant burrowing frog is found in drainage lines near Abernethys Road. This and other frog species may be threatened by sediment input into streams from the unsealed roads, as many frog species require clear water in pools for breeding. A high standard of sediment control is needed near creek crossings, both permanently and during road works (see Section 3.1). Sediment control measures have been installed along Abernethys Road to protect giant burrowing frog populations but infrequent maintenance can result in heavy sediment loads entering adjacent bushland and streams.
- Roads and trails can cause habitat fragmentation, barriers to wildlife movement and provide routes along which pest animals can travel. Two trails in the park (Coolendel Link Track and Lower Bugong Link Track) are not needed as management trails or for public vehicle access. They will be used as walking/cycling/horse riding tracks (see Section 3.5) and allowed to narrow further through vegetation growth.
- The roads and trails through the park are generally narrow, which reduces the speed at which vehicles travel and lessens the potential for wildlife roadkills. There is also tree canopy linkage across much of the road and trail length, which reduces the effect of habitat fragmentation for tree dwelling species such as gliders and possums. It is desirable to retain the existing relatively narrow nature of road and trail formations and low travel speeds within the park, including those roads that are managed by other authorities (Abernethys and Lower Bugong roads).
- The nature reserve is small and native animal populations are likely to be affected by habitat loss, isolation and disturbance as nearby residential development expands. Retention of habitat linkages where possible will be fundamental to retention of biodiversity.

Desired outcomes

- The full range of native animal species found in the park and reserve is conserved.
- The habitat and populations of all threatened native animals and regionally significant species are protected and maintained, and the opportunity for re-introduction of brush-tailed rock-wallabies is retained.
- Habitat linkages and wildlife corridors are conserved across the landscape.

Management response

- 3.3.1 Implement relevant recovery actions in the *Priorities Action Statement* for threatened animal species and populations occurring in the park and reserve.

- 3.3.2 Undertake additional surveys to improve native animal information and target threatened species, particularly in the nature reserve.
- 3.3.3 Continue monitoring programs for threatened species including the giant burrowing frog, grey-headed flying-fox, broad-headed snake and brush-tailed rock-wallaby.
- 3.3.4 Install additional sediment control measures if necessary to protect stream habitats.
- 3.3.5 Maintain NPWS road and trail corridors through the park in a manner that protects canopy linkages and encourages low traffic speeds. Establish a maximum advisory speed limit of 50 kilometres per hour on roads and trails in the park.
- 3.3.6 Develop maintenance agreements for Lower Bugong and Abernethys roads with Shoalhaven City Council and NSW Department of Primary Industries – Lands respectively. The agreements should aim for best practice to minimise the impacts of the roads on park values, including:
 - maintaining sediment ponds and minimising sediment contribution to waterways during road upgrading or maintenance
 - maintaining canopy linkages
 - setting a maximum vehicle speed of 50 kilometres per hour
 - sealing priority sections of Abernethys Road to protect frog breeding habitat.
- 3.3.7 Install additional boundary signs as needed in the nature reserve to minimise unauthorised track creation and other activities.

3.4 Cultural heritage

Aboriginal heritage

Aboriginal communities have an association and connection to the land whereby natural values within a landscape are central to Aboriginal spirituality and contribute to Aboriginal identity. NPWS recognises the significance of Aboriginal cultural heritage and the need to ensure it is managed in an integrated manner across the landscape.

Bugong National Park and Tapitallee Nature Reserve fall within the traditional area of the South Coast Aboriginal people of the Dharawal language group. Prior to European settlement they had a diverse economy, with trade and cultural links with neighbouring groups along the coast and in the southern highlands. The park and reserve areas would have provided permanent water, rock overhangs or campsites and food and other resources.

Plants, animals and landscape features, as well as sites with physical evidence of past use or occupation, are an integral part of the cultural heritage of contemporary Aboriginal communities.

An artefact scatter has been recorded in the north-west of the national park, on level land below the escarpment. Further sites are likely, including along the cliffs and creeks. There are several known sites nearby within Morton National Park, consisting of rock shelters with art, shelters with occupation deposits and axe-grinding grooves.

An artefact scatter has been recorded in the nature reserve and there are shelters, artefact scatters and an art site nearby. It is likely that more sites occur within the reserve.

While NPWS has legal responsibility for the protection of Aboriginal sites and places, it acknowledges the right of Aboriginal people to make decisions about their own heritage. It is NPWS 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. There are a number of Aboriginal community organisations and

individuals who may have an interest in the use and management of the park and reserve, including the Aboriginal owners of a property on the southern boundary of the park.

Post-1788 history

The first Europeans in the Bugong/Tipitallee area are likely to have been cedar cutters who accessed timber resources from the Shoalhaven River corridor during the 1830s. Large stumps carrying pegging scars along Bugong Creek and the base of the escarpment indicate that logging also occurred for other species such as turpentine. Overgrown tracks below the escarpment are likely to be from former logging activities.

European settlers moved into the district in the mid to late nineteenth century, primarily undertaking cattle grazing (Bayley 1975). An area of the nature reserve at the junction of Bangalee and Bangalee Scout Camp roads has been cleared and fenced in the past, indicating it was probably grazed. It is unlikely the park area was grazed, given the poor soils.

Aboriginal people may also have worked in the timber industry or on agricultural properties in the area.

Part of a historic road between Nowra and Goulburn runs through the park to the north of Abernethys Road. The road is completely overgrown but the road formation is still visible, including cuttings and stone batters where the road crosses the escarpment. The route was explored by Henry Moss in 1848 and was surveyed and constructed during 1859 (Berry 2005). Moss's road enabled the land along Bugong Creek to be selected. It began at a wharf on the Shoalhaven River (Kennedys Wharf) and headed north-west across Bugong Creek to the western end of what is now Bugong Fire Trail to join an earlier route between Sutton Forest and the coast via Meryla Pass. This earlier route was originally an Aboriginal pathway linking the coast to the southern highlands that was shown to Charles Throsby by his Aboriginal guides. Moss's road also linked to an old route to Goulburn (now Tallowa Dam Road and Cedar Road in Morton National Park).

There are anecdotal stories that the rock face on Bugong Road to the south of Bugong Creek was blasted by early settlers to provide bullock-dray access into the valley (C. Langan, pers. comm. 2005). This has not been confirmed and further historical research is needed. As outlined in Section 3.1, the area could be affected by any road upgrading undertaken by Shoalhaven City Council and NPWS will liaise with Council about minimising the impacts.

In more recent years prior to dedication the national park was utilised for a variety of recreational activities, small-scale timber getting and gravel extraction for road formation (see Section 3.1). The nature reserve also appears to have been subject to a small amount of recreational use and some small-scale gravel extraction and timber removal.

Issues

- There is potential for additional Aboriginal sites to occur in the park and reserve.
- It has been identified that there may be a more appropriate spelling for the park name, such as Budjong, to reflect Aboriginal pronunciation.
- The historic Moss Road has not been recorded or assessed and its significance and management needs are not known.
- There has been no recording of features remaining from former logging or other historic activities.

Desired outcomes

- Aboriginal sites and places are protected from damage by human activities and Aboriginal people are involved in management of Aboriginal cultural values in the park.
- Significant historic features are appropriately conserved and managed, in consultation with relevant community members.

Management response

- 3.4.1 Manage Aboriginal heritage in consultation with relevant Aboriginal community organisations and individuals including traditional custodial families.
- 3.4.2 Encourage research into Aboriginal sites and cultural associations with the park and reserve, including oral history recording.
- 3.4.3 Review the spelling of the park name in consultation with the Aboriginal community, to determine whether there is a more appropriate spelling.
- 3.4.4 Do not publicise the location of Aboriginal sites and places except where the agreement of relevant Aboriginal community organisations has been obtained. Prior to any promotion of a site or place, prepare a conservation study and undertake any management work necessary to protect the site or place.
- 3.4.5 Ensure that visitor facilities are not located close to any significant Aboriginal sites and places found in the park or reserve, unless protective works are undertaken.
- 3.4.6 Undertake an archaeological survey and cultural assessment prior to all works with the potential to impact Aboriginal or historic sites and places.
- 3.4.7 Manage historic places and features in consultation with local families who have ties with the area. Encourage oral history recording and research into historic use and associations with the park.
- 3.4.8 Record the remnants of the historic Moss Road and assess their significance. Subject to the assessment, protect the road remains from disturbance and undertake conservation work as appropriate.
- 3.4.9 Record evidence of past logging such as stumps and tracks, as opportunities arise. Retain old logging stumps where possible, as evidence of previous use.

3.5 Recreation and education

Visitor opportunities provided in the natural and undeveloped settings afforded by national parks are generally at the low-key end of the spectrum. Uses that are considered appropriate are those that are ecologically sustainable and which directly contribute to the visitor's understanding and appreciation of the area. Nature reserves, while allowing for educational visits and appreciation of reserve values, have greater emphasis on conserving natural environments and commonly do not have visitor facilities.

Provision for visitor use of the park and reserve has been considered in a regional context. Public land managed by NPWS and other authorities in the region provides diverse opportunities for a range of recreation activities. Morton National Park to the west is a well-known bushwalking and bush camping destination and has a range of visitor facilities. Other reserves in the region, such as Bomaderry Creek Regional Park, Seven Mile Beach National Park, Morton State Conservation Area and Bangalee Reserve (managed by Shoalhaven City Council), offer picnicking and walking opportunities. Developed vehicle-based camping opportunities are provided at privately managed sites in Nowra and Kangaroo Valley and on the southern side of the Shoalhaven River near the park.

Bugong National Park currently does not have any formal visitor facilities with the exception of vehicle trails and, unlike other better known destinations in the region, does not receive high visitor levels. It is used mainly for scenery viewing, bushwalking, horse riding, cycling, trail bike riding, abseiling, rock climbing and some camping. The nature reserve receives little recreational use, mainly walking and other uses by locals.

Both the park and reserve are located close to the existing and expanding residential areas of North Nowra/Bomaderry and Cambewarra and are likely to increasingly play a role in providing outdoor opportunities for locals. The park also has potential to attract visitors from further afield because it has diverse landscapes and scenic views and can provide for a variety of activities. Provision of facilities is discussed below.

The nature reserve is small and vulnerable to damage should use significantly increase. It is not intended to provide any visitor facilities.

Access

Public vehicle access is available through the park on roads managed by Shoalhaven City Council and NSW Department of Primary Industries – Lands as well as on NPWS roads. The roads are shown on Map 3 and the tenures are explained in Section 5.

Public roads provide vehicle access to the southern section of the nature reserve (see Map 2). There are no formed roads providing access to the northern section of the reserve but pedestrian access is possible along an unformed Crown road reserve running south from Illaroo Road (see Map 2).

Camping and picnicking

Some organised group camping occurs in the large former gravel quarry on Lower Bugong Road (Lower Bugong visitor site). This area is cleared, easily accessed and has views of the Cambewarra Range. It is considered to be the best site in the park for provision of visitor facilities. There is sufficient room to provide separately for day use, vehicle-based camping and group walk-in camping. Toilets could be shared by campers and day users and the area could be linked to walking tracks at Coolendel Lookout via a former vehicle trail that runs parallel to Illaroo Fire Trail (Lower Bugong Link Track).

A small amount of informal vehicle-based camping occurs near Coolendel Lookout, in the rainforest on the northern side of Bugong Creek and adjacent to the small former quarry on Illaroo Fire Trail (the carpark site on the park map). Camping at these locations is not appropriate because of impacts such as vegetation cutting and trampling, size restraints, and safety concerns near the cliff edges and from water trapped in the quarry.

Remote camping is not appropriate in the park or reserve because of their small size and the risk of campfires escaping to nearby rural and residential areas.

Walking

The Coolendel Lookout area has excellent views of the Shoalhaven River and nearby escarpments. A little-used vehicle trail (Coolendel Link Track) and a walking track (Coolendel Lookout Track) both lead to the area and provide an opportunity to formalise a short loop walk from Illaroo Fire Trail. Terminating vehicle access at Illaroo Fire Trail would help reduce risks from the unfenced cliff line, manage visitor impacts and create a more interesting visitor destination.

A linked second loop walk, utilising an existing spur track off the walking track to Coolendel Lookout, could be created above and below the cliff line. This would add to the recreational attractions of the park and feature a greater range of vegetation communities. The new loop walk would be subject to consideration of potential environmental impacts, including the need to avoid former brush-tailed rock-wallaby colony sites. A potential route is shown on Map 3.

As mentioned above, a former vehicle trail running parallel to Illaroo Fire Trail (Lower Bugong Link Track) could be used to provide walking access from the proposed Lower Bugong visitor site to the Coolendel Link Track (see Map 3).

There is also potential to create a short walk along the northern side of Bugong Creek, east of Bugong Road (see Map 3). This area has a level bench adjacent to the creek and features moist forest with some very tall turpentine trees. A small informal carpark adjacent to Bugong Road is being used by people exploring along the creek but there is little room to expand it.

As well as the proposed formal walks, the park is an easy location for self-reliant off-track bushwalking across the plateau and utilising breaks in the cliff line to walk below the escarpment.

The nature reserve provides some attractive walking opportunities but the area is very small. Bengalee Creek is likely to be an attraction for local walkers as urban development expands and it is possible that informal tracks will develop. Track development could cause further habitat fragmentation and other impacts and should be avoided if possible since the area is so small. It may be necessary in future to provide formal walking access to the creek to minimise erosion or other impacts but this would require amendment of the plan of management.

Cycling and horse riding in the park

In accordance with NPWS policy and the *Sustainable Mountain Biking Strategy* (OEH 2011b) cycling is permitted on park roads and management trails.

Horse riding is a popular recreational activity that has cultural associations for many Australians. Abernethys Road, Lower Bugong Road and Illaroo Fire Trail are quiet, unsealed roads that provide opportunities for cycling and horse riding. In addition, two former vehicle trails to be retained for walking (Coolendel Link Track and Lower Bugong Link Track) are level, well-drained and sufficiently wide to be suitable for cycling and horse riding. The latter would enable a loop ride in conjunction with Illaroo Fire Trail.

Some of these roads and trails have occasionally been used for organised endurance horse riding and other group rides as part of a longer route. The impacts are low as long as riders stay on the roads and trails. Large groups would cause significant vegetation trampling at Coolendel Lookout, however, and a group size limit is needed at this location.

Rock climbing and abseiling

The escarpments adjacent to Lower Bugong Road and Abernethys Road provide opportunities for rock climbing and abseiling and a number of bolted climbs have been developed by climbers. Rock climbing and abseiling are appropriate activities as long as they are undertaken in an environmentally sustainable manner. Heavy use or use of fragile areas, however, could result in crumbling of rock formations, impacts on scenic values and vegetation loss from rock crevices and the base of cliffs. Significant increases in rock climbing could also affect native animals because fissures and overhangs in the cliffs provide habitat for owls, bats, peregrine falcons, brush-tailed rock-wallabies and other species.

Organised groups

Youth groups and clubs occasionally use the park for activities such as walking, abseiling, rock climbing, camping and horse riding. This is appropriate but large groups could have increased environmental impacts and disturb other visitors in this relatively small park. For this reason, limits may be set on group size and activities.

Any group use of the nature reserve should be for educational purposes and not result in track creation or other impacts.

Interpretation and community involvement

Provision of interpretive information at the proposed Lower Bugong visitor site would promote greater awareness of the park's values and help to minimise damaging activities.

There is strong local community interest in the park and surrounding environments. It will be important to inform neighbours about management activities such as fire hazard reduction for the park and reserve, and to consult with regard to issues such as pests and access. Neighbour involvement in cooperative activities may also be appropriate.

Issues

- The park is close to population centres around Nowra but currently has no formal visitor facilities.
- Current informal camping near Coolendel Lookout and off Illaroo Fire Trail is not sustainable and presents safety risks.
- The impacts of rock sports in the park are currently low but could be of concern if the amount and extent of use were to significantly increase. There is potential for rock climbing to affect certain plant species, native animal habitat and Aboriginal cultural sites. The impacts should be monitored and, if necessary, regulated.
- Rock climbing is an inherently dangerous activity and it is necessary for organisers and participants to accept responsibility for their own safety. A particular concern is the safety of bolts as they deteriorate and climbers must ensure the safety of fixed anchor points prior to use. It is not practical for NPWS to replace or carry out certification of bolts.
- Unauthorised trail bike riding is occurring on the Cable Trail, Coolendel Link Track, Lower Bugong Link Track, walking tracks and off road within bushland. Riding on the walking track to Coolendel Lookout is churning up the track surface and could pose a danger to walkers. Riders have also formed new trails near the lookout. Off-road trail bike riding causes vegetation damage, habitat fragmentation, erosion and weed introduction and is not an appropriate activity in conservation reserves.
- The nature reserve is vulnerable to damage should nearby residential development result in significant increases in visitor use.

Desired outcomes

- A range of low-key visitor opportunities are available that encourage appreciation of the natural environment, and a visitor destination is established in the park.
- Visitor use is compatible with the purposes of national parks and nature reserves and is managed to be ecologically sustainable.
- Visitors, neighbours and community members are informed about the park and reserve and involved in management activities where appropriate.

Management response

- 3.5.1 Provide basic picnicking and camping facilities in the large former quarry on Lower Bugong Road (Lower Bugong visitor site). Install picnic tables and toilets. Provide a small number of sites for vehicle-based camping and a small walk-in group camping area. Install a fireplace in the group camping area. Require wood to be brought from outside the park. Monitor impacts and remove the fireplace if damage from firewood collection occurs in the park.
- 3.5.2 Provide interpretive information at the Lower Bugong visitor site that includes:
- the park's geomorphology

- significant plant and animal species and vegetation communities
 - cultural heritage, including early road development and settlement in the area.
- 3.5.3 Prohibit camping and wood fires other than at the Lower Bugong visitor site.
- 3.5.4 Formalise a loop walk to the Coolendel Lookout area utilising the existing Coolendel Lookout Track and Coolendel Link Track. Provide a small track-head carpark adjacent to the small former gravel quarry on Illaroo Fire Trail. Reshape the quarry to provide gentle slopes and vegetated banks. Install basic signage for the walk, including warnings about unfenced cliff edges.
- 3.5.5 Investigate options for constructing a longer loop walk above and below the cliff line in the Coolendel Lookout area (see indicative track on Map 3). Construct a track, subject to resources and consideration of potential environmental impacts.
- 3.5.6 Re-align the southern end of Lower Bugong Link Track to meet the Coolendel Link Track.
- 3.5.7 Investigate the feasibility and desirability of creating a short walking track along Bugong Creek in the northern section of the park. Discuss with Shoalhaven City Council any safety or other issues associated with use of the informal car park on Bugong Road.
- 3.5.8 Permit public vehicle use, including motorbikes, only on public access roads in the park as marked on Map 3.
- 3.5.9 Allow cycling and horse riding on park roads, management trails, the Coolendel Link Track and the Lower Bugong Link Track.
- 3.5.10 Allow no more than six horses at a time in the Coolendel Lookout area. If needed, install a horse hitching rail or other measures to minimise impacts.
- 3.5.11 Allow small group horse camping (maximum six horses) by prior arrangement in the Lower Bugong visitor site, as long as impacts are acceptable and horses are kept within the designated camping area.
- 3.5.12 Allow abseiling and rock climbing in suitable locations in the park as long as it is undertaken in a safe and environmentally acceptable manner. The following restrictions will apply:
- climbing will not be permitted in the vicinity of Coolendel Lookout, areas of significant native animal habitat, rock overhangs and any walk that may be established below the cliff face in this area
 - climbing groups must be no larger than eight participants unless consent is given for a larger number
 - safety will be the responsibility of organisers and participants
 - prior consent will be required for development of new climbing locations
 - a survey for significant species and for Aboriginal sites may be required prior to establishing new abseiling and climbing sites
 - the impacts of rock sports will be monitored and may be further regulated if needed, in conjunction with user groups.
- 3.5.13 Allow commercial, educational and community group tours and activities subject to licensing requirements and the following:
- minimal impact practices will be encouraged

- any use of the nature reserve must be educational and not result in track formation or other disturbance
- limits may be placed on group sizes, locations and frequency of use to minimise impacts and conflicts with other users.

3.5.14 Consult and involve neighbours in park management and hold joint projects where appropriate. Keep neighbours informed about fuel management burns, pest control programs and other activities as needed.

4. Threats

4.1 Pests

An introduced species is defined in this plan as any plant or animal species not native to the park or reserve. Introduced species are of concern because they have the potential to have detrimental effects on ecological values. They can also spread to and from neighbouring land.

The occurrence of introduced plant species in the park is generally low but there are significant weed infestations in some locations. Several weeds are present in the large former quarry on Lower Bugong Road (Lower Bugong visitor site), partly as a result of dumping of garden waste. Rehabilitation and visitor facility work will address this problem. Dumping of garden waste also occurs at other locations in the park such as off Bugong Road.

Mistflower (*Ageratina riparia*) is displacing native plants along Bugong Creek. This species easily spreads along watercourses but a biological control agent, white smut fungus, appears to have established in the park and may bring it under control.

The nature reserve has few weeds at present. Lantana (*Lantana camara*) is present along Bengalee Creek at the northern end of the northern section and in a small former clearing in the north-west corner of the southern section. There are escaped garden weeds along the boundary close to houses on the southern side of the nature reserve. Some rubbish dumping occurs in the nature reserve and is potentially a source of further weed infestations.

Foxes (*Vulpes vulpes*), wild dogs (*Canis lupus* subsp.), rabbits (*Oryctolagus cuniculus*), brown hares (*Lepus europaeus*), feral deer (family *Cervidae*) and feral goats (*Capra hircus*) are known to occur in the national park, and it is likely there are foxes, wild dogs, rabbits and feral cats (*Felis catus*) in the nature reserve. Numbers of introduced species are generally low.

Competition and habitat degradation by feral goats and predation by the European red fox have been listed as key threatening processes under the Threatened Species Conservation Act (NSW SC 2004, 1998). Competition and land degradation by feral goats is also listed as a key threatening process under the Environment Protection and Biodiversity Conservation Act (DoE 2009).

NSW Threat Abatement Plan, Predation by the Red Fox (*Vulpes vulpes*) (OEH 2011a) guides fox control at priority sites to protect threatened native animal species and populations. Fox control is undertaken in the park and on adjacent land for the protection of the remaining brush-tailed rock-wallaby population found nearby (see Section 3.3). The program is conducted cooperatively with park neighbours.

Wild dogs, including dingos, are a declared pest throughout New South Wales under the *Local Land Services Act 2013* due to their impacts on livestock. Bugong National Park is not considered to provide high quality core habitat for dingos and NPWS has a statutory obligation to control wild dogs if necessary to minimise attacks on livestock. There have been no reports of wild dog attacks in the area since the park was created.

NPWS prepares regional pest management strategies that 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).

The NPWS regional pest management strategy for South Coast Region (OEH 2012b) identifies pest species and priority programs for this park. The overriding objective of the pest

management strategy is to minimise adverse impacts of introduced species on biodiversity and other park and community values while complying with legislative responsibilities. The strategy also identifies where other site- or pest-specific plans or strategies need to be developed to provide a more detailed approach.

The park and reserve are located adjacent to rural properties. Incursion of domestic stock is not currently a problem, however it will be important to liaise with neighbours as needed regarding boundary fencing.

Desired outcome

- The impact of introduced species on native plants and animals is minimised.

Management response

- 4.1.1 Control introduced species in accordance with the regional pest management strategy and threat abatement plans where relevant.
- 4.1.2 Monitor the presence, extent and abundance of introduced plant and animal species. If necessary, develop programs for control and possible eradication of introduced species.
- 4.1.3 Monitor the spread and success of the biological control agent white smut fungus in controlling mistflower along Bugong Creek.
- 4.1.4 Close rubbish dumping access points where possible and control associated weeds. If needed, erect signs to deter rubbish dumping.
- 4.1.5 Continue to carry out cooperative fox control programs for the benefit of brush-tailed rock-wallaby populations.
- 4.1.6 Undertake weed and pest control in association with Shoalhaven City Council, South East Local Land Services and neighbours where appropriate.
- 4.1.7 Undertake programs for the control of wild dogs if needed, in conjunction with South East Local Land Services and neighbours.
- 4.1.8 Liaise with neighbours as needed regarding boundary fencing to prevent domestic stock from entering the park.

4.2 Fire

Fire is a natural feature of the environment and is essential to the survival of some plant and animal communities. Inappropriate fire, however, can damage natural and cultural heritage and endanger park visitors and neighbours. Management of bushfire in the park is a complex issue. Management must aim to achieve both long-term conservation of native plant and animal communities and ongoing fire management obligations that contribute to the protection of life, property and community assets.

Fire history

Fire records for the park are minimal. It is known that there was a prescribed burn over a small section of the north-west edge of the national park in 1979–80 and a large wildfire burnt an area north of Abernethys Road in 1982–83, but it is possible that more fires have occurred. There are anecdotal reports that the western slopes of the national park and parts of the plateau were burnt by neighbouring landholders in the past as part of grazing practices. Prescribed burns were conducted by NPWS in 2004 over part of the area north of Abernethys Road and in 2008 over an area south of Lower Bugong Road in the centre of the national park. It appears that some areas, particularly the wet sclerophyll forests, are long-unburnt.

The apparent infrequency of wildfire in the park needs to be considered when determining prescribed burning and other hazard reduction activities. It has been suggested (Bushfire & Environmental Services 1999) that topographic and ecological features such as the Shoalhaven River, nearby ranges and moist forests may mitigate wildfire entry into the area, although fire crossed the river below the plateau in a broad-scale fire event during 2002.

There are no records of wildfires in the nature reserve but a prescribed burn was conducted in its south-east corner in 2009.

Ecological requirements

Bushfire regimes are a major determinant for the distribution and abundance of plants and animals. Fire also affects nutrient cycles, erosion patterns and hydrological regimes. Ecological research suggests the following requirements for biodiversity conservation:

- Variability of fire intervals and area burnt is important for conserving floristic diversity and providing diversity of native animal habitat. Fire at regular intervals or exceeding fire tolerance thresholds will lead to loss of species and should be avoided.
- Most plant species and communities require infrequent fires of moderate to high intensity to achieve regeneration, but patchy burns are better for native animals as they retain shelter and food sources. Adequate refuge areas should be available for native animals during any prescribed burn.
- Where known, the fire requirements of threatened species and other significant animal and plant species should be considered and specific fire management strategies applied to ensure their protection.

The dry sclerophyll forests and woodlands in the park and reserve are adapted to infrequent high-intensity fires and require fire for regeneration. A fire frequency of between 7 and 30 years is appropriate for most of the national park's forests and between 5 and 50 years for most of the nature reserve's vegetation. Species decline is predicted if successive fires occur less than 7 years apart in the national park or 5 years apart in the nature reserve as frequent fires can prevent the regeneration process. Species decline is also predicted if there are no fires for more than 30 years in the park or 50 years in the nature reserve as this can result in smaller shrubs and herbs disappearing from the understorey.

Rainforest is damaged by fire, whether it is through wildfire opening up the canopy and destroying the stand structure, or frequent cool burns drying the margins and causing loss of rainforest species around the edges. Avoiding prescribed burning in and around rainforest vegetation in the park is important for maintenance of these communities.

The wet sclerophyll forests of the park and reserve have a high proportion of rainforest species. In the absence of frequent fires over a long period, such forests may develop into rainforest. Wildfires may be necessary for canopy species regeneration in wet sclerophyll forest, however, prescribed burning is likely to be detrimental to the understorey and should be avoided. A fire frequency of between 25 and 200 years is appropriate for wet sclerophyll forest.

Several monitoring plots have been established in the park to monitor the fire response and requirements of the plant communities.

Strategies and cooperative arrangements

Under the *Rural Fires Act 1997* NPWS is a fire authority and is responsible for controlling fires on the park and reserve and ensuring they do not cause damage to other land or property. An important part of NPWS fire management is participation in local cooperative fire management arrangements, including implementation of Bush Fire Risk Management

Plans developed by District Bush Fire Management Committees. NPWS is a member of the Shoalhaven Bush Fire Management Committee.

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 2013b).

Fire management strategies have been prepared to identify bushfire threats and to provide guidelines for the conservation of significant plants and animals and cultural features, including protection of the historic Moss Road from earth-moving machinery. They also identify NPWS commitments in meeting obligations to limit the spread of fire from the park and reserve. This will contribute to mutually cooperative arrangements that enhance the protection of life, property and assets on adjoining lands and within the park and reserve.

Strategic fire advantage zones have been identified for the park to assist in the protection of private property and areas of rainforest. Fuel management programs are developed based on fire history, appropriate fire frequencies and protection of assets. Close to boundary areas, bushfire fuel management programs will be implemented in cooperation with rural neighbours and the Rural Fire Service.

Illaroo Fire Trail has been designated as a Category 1 fire tanker access. A turn-around area suitable for fire tankers will be constructed at the southern park boundary (see Section 3.1). The public roads and management trails will assist fire management access and will be maintained to appropriate standards. A fire refuge has been identified for inclusion in the Lower Bugong visitor site, in conjunction with development of visitor facilities.

In the nature reserve, strategic fire advantage zones and asset protection zones (slashed breaks) have been designated in the south-east section adjacent to residential and caravan park development. Fuel management and slashing programs are being implemented for asset protection.

Desired outcomes

- Fire regimes are appropriate for long-term maintenance of plant and animal communities.
- The occurrence and effects of unplanned bushfires caused by human activity are minimised.
- Bushfire mitigation measures that contribute to the cooperative protection of life, property and community assets are maintained.
- Any Aboriginal sites, historic places and culturally significant features found are afforded protection from damage by bushfires and fire suppression activities.

Management response

- 4.2.1 Implement the fire management strategies for the park and reserve.
- 4.2.2 Maintain Illaroo Fire Trail to a serviceable standard.
- 4.2.3 Liaise as needed with NSW Department of Primary Industries – Lands and Shoalhaven City Council regarding appropriate maintenance of Abernethys and Lower Bugong roads for fire access purposes.
- 4.2.4 Establish a fire refuge area at the Lower Bugong visitor site, in conjunction with construction of visitor facilities.

- 4.2.5 Maintain the asset protection zones in the nature reserve.
- 4.2.6 As far as possible exclude fire from areas of rainforest.
- 4.2.7 Use prescribed burns and other means to achieve fuel management as needed in strategic fire advantage zones and to achieve a variety of fire regimes that maintain fire thresholds for each vegetation community. Where appropriate, carry out fuel management in cooperation with neighbours for mutual protection.
- 4.2.8 To avoid unnecessary damage, limit the use of heavy machinery for fire suppression and avoid its use in areas of rainforest, tall moist forest and any significant plants or cultural features found. Rehabilitate areas disturbed by fire suppression operations as soon as practical after fire.
- 4.2.9 Continue to monitor the fire response of plant species and communities in the park.
- 4.2.10 Continue to actively participate in the Shoalhaven Bush Fire Management Committee. Maintain contact and cooperation with the Rural Fire Service, volunteer bushfire brigades, NSW Department of Primary Industries – Lands and neighbours.
- 4.2.11 As far as possible, manage visitor activities to limit unplanned human-caused bushfires within the park. This may require closing the park to public use during periods of extreme and catastrophic fire danger.

4.3 Climate change

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

The latest information on projected changes to climate is from the NSW and ACT Regional Climate Modelling (NARClIM) project (OEH 2014). The climate projections for 2020–39 are described as ‘near future’; and projections for 2060–79 are described as ‘far future’. The snapshot shown in Table 1 is for the Illawarra Region which includes Bugong National Park and Tapitallee Nature Reserve (OEH 2014).

Table 1: Illawarra climate change snapshot

Projected temperature changes	
Maximum temperatures are projected to increase in the near future by 0.4–0.9°C	Maximum temperatures are projected to increase in the far future by 1.6–2.3°C
Minimum temperatures are projected to increase in the near future by 0.4–0.7°C	Minimum temperatures are projected to increase in the far future by 1.5–2.4°C
The number of hot days will increase	The number of cold nights will decrease
Projected rainfall changes	
Rainfall is projected to decrease in winter	Rainfall is projected to increase in summer and autumn
Projected Forest Fire Danger Index changes	
Average fire weather is projected to increase in spring	Severe fire weather is projected to increase in summer and spring in the far future

Source: OEH 2014.

The projected increases in temperature, number of hot days and severe fire weather days (OEH 2014) are likely to influence bushfire frequency and intensity across the Illawarra Region and result in an earlier start to the bushfire season. Higher rainfalls in summer and autumn are likely to accelerate all forms of soil erosion across the region and increase runoff at these times of year (DECCW 2010). As a result flooding could occur in some sections of the park adjacent to Bugong Creek and its tributaries.

Climate change may significantly affect biodiversity by changing the size of populations and the distribution of species, and altering the geographical extent and species composition 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 specific impacts of climate change on the park are difficult to assess since they will depend on the compounding effects of other pressures, particularly barriers to migration and pressure from weeds and feral animals. However, it is likely that wet sclerophyll forest and rainforest will be under greater stress from fire and drought and that native animals vulnerable to stream sedimentation will be adversely affected.

It is likely that erosive rainfall events will be more common, negatively impacting upon water quality in the creeks and streams. More intense rainfall events also have implications for increased landform instability along the escarpments.

Programs to reduce pressures arising from habitat loss, fragmentation and introduced species will help reduce the severity of the effects of climate change on native species.

Desired outcome

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

Management response

- 4.3.1 Continue existing weed, pest, fire management and sediment control programs and continue to encourage retention of habitat connectivity, to minimise climate change-induced threats.

5. Management operations and other uses

5.1 Park management facilities and operations and other uses

Park management access is available using a combination of council, Crown and NPWS roads. Lower Bugong Road is a public road managed by Shoalhaven City Council while Abernethys Road is a Crown public road. Both these roads provide access to private property to the west of the park.

Illaroo Fire Trail and the Slide Trail are managed by NPWS to provide park visitor, management and private property access. Two other trails provide private property access only (labelled neighbour access trails on Map 3). These roads and trails are not reserved as part of the park but are vested in the Minister for the Environment under Part 11 of the National Parks and Wildlife Act. Under the provisions of the *National Park Estate (Southern Region Reservations) Act 2000* under which the park was reserved, roads that form the only practical means of access to private property may continue to be used for that purpose.

Public roads provide management access to the southern section of the nature reserve but there are no formed roads providing access to the northern section. An unformed Crown road reserve provides legal access from Illaroo Road, but, unless that road is formed in the future, access for fire management and other park management purposes will need to be across private property with the permission of landowners.

A 330-kilovolt powerline easement crosses the park in two locations (see Map 3). Powerline easements can form barriers to wildlife movement, have a very high visual impact and facilitate unauthorised vehicle access. The impacts are minimised through maintenance agreements that provide for protection of threatened plants and habitats and retention of low vegetation cover to facilitate animal movement.

A telephone line crosses the central part of the park south of Lower Bugong Road. East of Illaroo Fire Trail it follows the road, but further west it moves away, along the Cable Trail, and then drops over the cliff line. Car dumping occurs along the line and gating is needed to prevent public vehicle access.

A telephone line running parallel to the short road off Koloona Drive appears to be outside the nature reserve boundary, although this has not been confirmed.

Apiarists with pre-existing licences maintain European honey bee hives seasonally in the park and will be allowed to continue in accordance with NPWS policy and licence conditions. There are several approved set-down sites along vehicle trails and licences set limits on the number of hives. As European honey bees affect native plant pollination and compete with native animals it will be important to keep apiary operations under review and seek to minimise their impacts. There is also potential for bees to impact on park visitors if inappropriately located.

Unauthorised stone and rock removal is occurring at Bugong Creek crossing within Bugong National Park.

Desired outcomes

- Commercial and other non-park uses have minimal environmental impact.
- Appropriate access arrangements are in place for neighbouring properties.

Management response

- 5.1.1 Maintain NPWS roads and trails shown on the park and reserve maps.
- 5.1.2 Continue to allow existing private property access on Illaroo Fire Trail, the Slide Trail and the Part 11 neighbour access trails through the park. Enter into appropriate agreements for future maintenance.
- 5.1.3 Continue to allow existing commercial beekeeping operations in accordance with NPWS policy and licence conditions. Monitor operations and, where necessary, seek to relocate sites or vary their operation in conjunction with licensees, in order to minimise environmental impacts.
- 5.1.4 Monitor maintenance of the powerline and telephone line to maintain an adequate vegetation cover and minimise erosion potential.
- 5.1.5 Gate access to the telephone line through the park (Cable Trail).
- 5.1.6 Adopt compliance strategies to ensure adherence to national park regulations.

6. Implementation

This plan of management establishes a scheme of operations for the park and reserve. Implementation of this plan will be undertaken within the annual program of the NPWS South Coast Region. Identified activities for implementation are listed in the table below. 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.

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

Management response	Priority
3.1 Geology, landscape and hydrology	
3.1.1 Locate and design management and visitor facilities to minimise their visual impact from public access roads, Coolendel Lookout and other vantage points.	Ongoing
3.1.2 Liaise as needed with Shoalhaven City Council to seek protection of the attractive and historic rock faces on the southern side of the Bugong Creek crossing, during any road work along Bugong Road.	Ongoing
3.1.3 Design and undertake all works in a manner that minimises soil erosion and water pollution.	Ongoing
3.1.4 Ensure sediment contribution to waterways is minimised during any work on NPWS roads and trails, through such measures as correct road and trail surface preparation, roll-overs, sediment traps on steep slopes and retaining low vegetation on road batters. Liaise with relevant authorities to promote best practice land management, including road maintenance works, to improve sediment control.	Ongoing
3.1.5 In conjunction with the adjacent land owner, fence or gate access into the adjacent private property off the southern end of the Illaroo Fire Trail. Install signs to inform visitors of the location of the park boundary and establish a turn-around area for vehicles.	Medium
3.2 Native plants	
3.2.1 Implement relevant recovery actions in the <i>Priorities Action Statement</i> for threatened plant species, populations and communities occurring in the park.	High
3.2.2 Undertake vegetation surveys to determine the extent of the vegetation communities and check for threatened and significant species and communities, particularly those species recorded close to the park and species that may occur in the areas of laterite soils.	Medium

Management response	Priority
3.2.3 Ensure that park management and visitor facilities are not located within the endangered subtropical rainforest community. Monitor the subtropical rainforest to check for threatening processes such as invasive vines and other weeds.	Medium
3.2.4 Use the vegetation/fire monitoring plots to measure changes in the park's vegetation such as responses to climate change, weed invasion and visitor impacts. Establish additional plots in the park or reserve if necessary.	Medium
3.2.5 Liaise with neighbours, Landcare, South East Local Land Services and Shoalhaven City Council to encourage retention of areas of native vegetation close to the park and reserve and to maintain and strengthen connectivity with other naturally vegetated areas. Promote conservation agreements with neighbours over suitable land.	Medium
3.3 Native animals	
3.3.1 Implement relevant recovery actions in the <i>Priorities Action Statement</i> for threatened animal species and populations occurring in the park and reserve.	High
3.3.2 Undertake additional surveys to improve native animal information and target threatened species, particularly in the nature reserve.	Medium
3.3.3 Continue monitoring programs for threatened species including the giant burrowing frog, grey-headed flying-fox, broad-headed snake and brush-tailed rock-wallaby.	Medium
3.3.4 Install additional sediment control measures if necessary to protect stream habitats.	Medium
3.3.5 Maintain NPWS road and trail corridors through the park in a manner that protects canopy linkages and encourages low traffic speeds. Establish a maximum advisory speed limit of 50 kilometres per hour on roads and trails in the park.	High
3.3.6 Develop maintenance agreements for Lower Bugong and Abernethys roads with Shoalhaven City Council and NSW Department of Primary Industries – Lands respectively. The agreements should aim for best practice to minimise the impacts of the roads on park values, including: <ul style="list-style-type: none"> – maintaining sediment ponds and minimising sediment contribution to waterways during road upgrading or maintenance – maintaining canopy linkages – setting a maximum vehicle speed of 50 kilometres per hour – sealing priority sections of Abernethys Road to protect frog breeding habitat. 	High
3.3.7 Install additional boundary signs as needed in the nature reserve to minimise unauthorised track creation and other activities.	Low
3.4 Cultural heritage	
3.4.1 Manage Aboriginal heritage in consultation with relevant Aboriginal community organisations and individuals including traditional custodial families.	Ongoing
3.4.2 Encourage research into Aboriginal sites and cultural associations with the park and reserve, including oral history recording.	Low
3.4.3 Review the spelling of the park name in consultation with the Aboriginal community, to determine whether there is a more appropriate spelling.	Low

Management response	Priority
3.4.4 Do not publicise the location of Aboriginal sites and places except where the agreement of relevant Aboriginal community organisations has been obtained. Prior to any promotion of a site or place, prepare a conservation study and undertake any management work necessary to protect the site or place.	Ongoing
3.4.5 Ensure that visitor facilities are not located close to any significant Aboriginal sites and places found in the park or reserve, unless protective works are undertaken.	Ongoing
3.4.6 Undertake an archaeological survey and cultural assessment prior to all works with the potential to impact Aboriginal or historic sites and places.	Ongoing
3.4.7 Manage historic places and features in consultation with local families who have ties with the area. Encourage oral history recording and research into historic use and associations with the park.	Ongoing
3.4.8 Record the remnants of the historic Moss Road and assess their significance. Subject to the assessment, protect the road remains from disturbance and undertake conservation work as appropriate.	Medium
3.4.9 Record evidence of past logging such as stumps and tracks, as opportunities arise. Retain old logging stumps where possible, as evidence of previous use.	Low
3.5 Recreation and education	
3.5.1 Provide basic picnicking and camping facilities in the large former quarry on Lower Bugong Road (Lower Bugong visitor site). Install picnic tables and shared toilets. Provide a small number of sites for vehicle-based camping and a small walk-in group camping area. Install a shared fireplace in the group camping area. Require wood to be brought from outside the park. Monitor impacts and remove the fire place if damage from firewood collection occurs in the park.	Low
3.5.2 Provide interpretive information at the Lower Bugong visitor site that includes: <ul style="list-style-type: none"> – the park’s geomorphology – significant plant and animal species and vegetation communities – cultural heritage, including early road development and settlement in the area. 	Low
3.5.3 Prohibit camping and wood fires elsewhere in the park. Prohibit all camping and fires in the nature reserve.	Ongoing
3.5.4 Formalise a loop walk to the Coolendel Lookout area utilising the existing Coolendel Lookout Track and Coolendel Link Track. Provide a small track-head carpark adjacent to the small former gravel quarry on Illaroo Fire Trail. Reshape the quarry to provide gentle slopes and vegetated banks. Install basic signage for the walk, including warnings about unfenced cliff edges.	Medium
3.5.5 Investigate options for constructing a longer loop walk above and below the cliff line in the Coolendel Lookout area (see indicative track on Map 3). Construct a track, subject to resources and consideration of potential environmental impacts.	Low
3.5.6 Re-align the southern end of the Lower Bugong Link Track to meet the Coolendel Link Track.	Low

Management response	Priority
3.5.7 Investigate the feasibility and desirability of creating a short walking track along Bugong Creek in the northern section of the park. Discuss with Shoalhaven City Council any safety or other issues associated with use of the informal car park on Bugong Road.	Low
3.5.8 Permit public vehicle use, including motorbikes, only on public access roads in the park as marked on Map 3.	Ongoing
3.5.9 Allow cycling and horse riding on park roads, management trails, the Coolendel Link Track and the Lower Bugong Link Track.	Ongoing
3.5.10 Allow no more than six horses at a time in the Coolendel Lookout area. If needed, install a horse hitching rail or other measures to minimise impacts	Ongoing
3.5.11 Allow small group horse camping (maximum six horses) by prior arrangement in the Lower Bugong visitor site, as long as impacts are acceptable and horses are kept within the designated camping area.	Ongoing
3.5.12 Allow abseiling and rock climbing in suitable locations in the park as long as it is undertaken in a safe and environmentally acceptable manner. The following restrictions will apply: <ul style="list-style-type: none"> – climbing will not be permitted in the vicinity of Coolendel Lookout, areas of significant native animal habitat, rock overhangs and any walk that may be established above or below the cliff face in this area – climbing groups must be no larger than eight participants unless consent is given for a larger number – safety will be the responsibility of organisers and participants – prior consent will be required for development of new climbing locations – a survey for significant species and for Aboriginal sites may be required prior to establishing new abseiling and climbing sites – the impacts of rock sports will be monitored and may be further regulated if needed, in conjunction with user groups. 	Ongoing
3.5.13 Allow commercial, educational and community group tours and activities subject to licensing requirements and the following: <ul style="list-style-type: none"> – minimal impact practices will be encouraged – any use of the nature reserve must be educational and not result in track formation or other disturbance – limits may be placed on group sizes, locations and frequency of use to minimise impacts and conflicts with other users. 	Ongoing
3.5.14 Consult and involve neighbours in park and reserve management and hold joint projects where appropriate. Keep neighbours informed about fuel management burns, pest control programs and other activities as needed.	Low
4.1 Pests	
4.1.1 Control introduced species in accordance with the regional pest management strategy and threat abatement plans where relevant.	Ongoing
4.1.2 Monitor the presence, extent and abundance of introduced plant and animal species. If necessary, develop programs for control and possible eradication of introduced species.	High
4.1.3 Monitor the spread and success of the biological control agent white smut fungus in controlling mistflower along Bugong Creek.	Medium

Management response	Priority
4.1.4 Close rubbish dumping access points where possible and control associated weeds. If needed, erect signs providing contact information in case of rubbish dumping.	Ongoing
4.1.5 Continue to carry out cooperative fox control programs for the benefit of brush-tailed rock-wallaby populations.	High
4.1.6 Undertake weed and pest control in association with Shoalhaven City Council, South East Local Land Services and neighbours where appropriate.	Ongoing
4.1.7 Undertake programs for the control of wild dogs if needed, in conjunction with South East Local Land Services and neighbours.	Ongoing
4.1.8 Liaise with neighbours as needed regarding boundary fencing to prevent domestic stock from entering the park or reserve.	Ongoing
4.2 Fire	
4.2.1 Implement the fire management strategies for the park and reserve.	High
4.2.2 Maintain Illaroo Fire Trail to a serviceable standard.	High
4.2.3 Liaise as needed with NSW Department of Primary Industries – Lands and Shoalhaven City Council regarding appropriate maintenance of Abernethys and Lower Bugong roads for fire access purposes.	Ongoing
4.2.4 Establish a fire refuge area at the Lower Bugong visitor site, in conjunction with construction of visitor facilities.	Medium
4.2.5 Maintain the asset protection zones in the nature reserve.	High
4.2.6 As far as possible exclude fire from areas of rainforest.	Ongoing
4.2.7 Use prescribed burns and other means to achieve fuel management as needed in strategic fire advantage zones and to achieve a variety of fire regimes that maintain fire thresholds for each vegetation community. Where appropriate, carry out fuel management in cooperation with neighbours for mutual protection.	High
4.2.8 To avoid unnecessary damage, limit the use of heavy machinery for fire suppression and avoid its use in areas of rainforest, tall moist forest and any significant plants or cultural features found. Rehabilitate areas disturbed by fire suppression operations as soon as practical after fire.	Ongoing
4.2.9 Continue to monitor the fire response of plant species and communities in the park.	Medium
4.2.10 Continue to actively participate in the Shoalhaven Bush Fire Management Committee. Maintain contact and cooperation with the Rural Fire Service, volunteer bushfire brigades, NSW Department of Primary Industries – Lands and neighbours.	Ongoing
4.2.11 As far as possible, manage visitor activities to limit unplanned human-caused bushfires within the park. This may require closing the park to public use during periods of extreme and catastrophic fire danger.	Ongoing
4.3 Climate change	
4.3.1 Continue existing weed, pest, fire management and sediment control programs and continue to encourage retention of habitat connectivity, to minimise climate change-induced threats.	Ongoing

5.1 Management operations and other uses		
5.1.1	Maintain NPWS roads and management trails shown on the park and reserve maps.	Medium
5.1.2	Continue to allow existing private property access on Illaroo Fire Trail, the Slide Trail and the Part 11 neighbour access trails through the park. Enter into appropriate agreements for future maintenance.	High
5.1.3	Continue to allow existing commercial beekeeping operations in accordance with NPWS policy and licence conditions. Monitor operations and, where necessary, seek to relocate sites or vary their operation in conjunction with licensees, in order to minimise environmental impacts.	Ongoing
5.1.4	Monitor maintenance of the power line and telephone line to maintain an adequate vegetation cover and minimise erosion potential.	Low
5.1.5	Gate access to the telephone line through the park (Cable Trail).	High
5.1.6	Adopt compliance strategies to ensure adherence to national parks regulations.	Ongoing

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