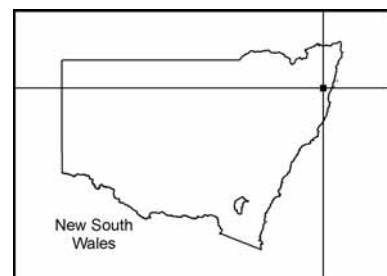




Plan of Management



Bundjalung State Conservation Area and Jackywalbin State Conservation Area



**BUNDJALUNG STATE CONSERVATION AREA AND
JACKYWALBIN STATE CONSERVATION AREA**

PLAN OF MANAGEMENT

NSW National Parks and Wildlife Service

October 2012

This plan of management was adopted by the Minister for the Environment on 2nd October 2012.

Acknowledgements

The NPWS acknowledges that Jackywalbin and Bundjalung State Conservation Areas are in the traditional country of the Bandjalang people of the Bundjalung nation.

This plan of management is based on a draft plan prepared by staff of the Northern Rivers Region of the NSW National Parks and Wildlife Service (NPWS), part of the Office of Environment and Heritage, and Southern Cross University student intern Dylan Brooks.

Cover photos: Spotted Gums in Bundjalung SCA by Liz Dargin (NPWS).

For additional information or any inquiries about these State Conservation Areas or this plan of management, contact the NPWS Richmond River Area Office, at Colonial Arcade, 75 Main St, Alstonville, NSW, 2477 or by telephone on (02) 6627 0200.

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FOREWORD

Bundjalung and Jackywalbin State Conservation Areas are situated west of the Pacific Highway between Yamba and Evans Head in northern New South Wales. They were established in 2003 and cover a combined area of 5,531 hectares.

Bundjalung and Jackywalbin State Conservation Areas conserve swamp and grassy sclerophyll forest and freshwater wetlands. They are an important part of the catchment of the Bungawalbin wetland. Two endangered ecological communities and 12 threatened flora species are contained within the reserves. Fauna surveys have recorded 122 fauna species, of which 54 are listed as threatened species.

The state conservation areas are of spiritual significance and contemporary importance to the Bundjalung Aboriginal people.

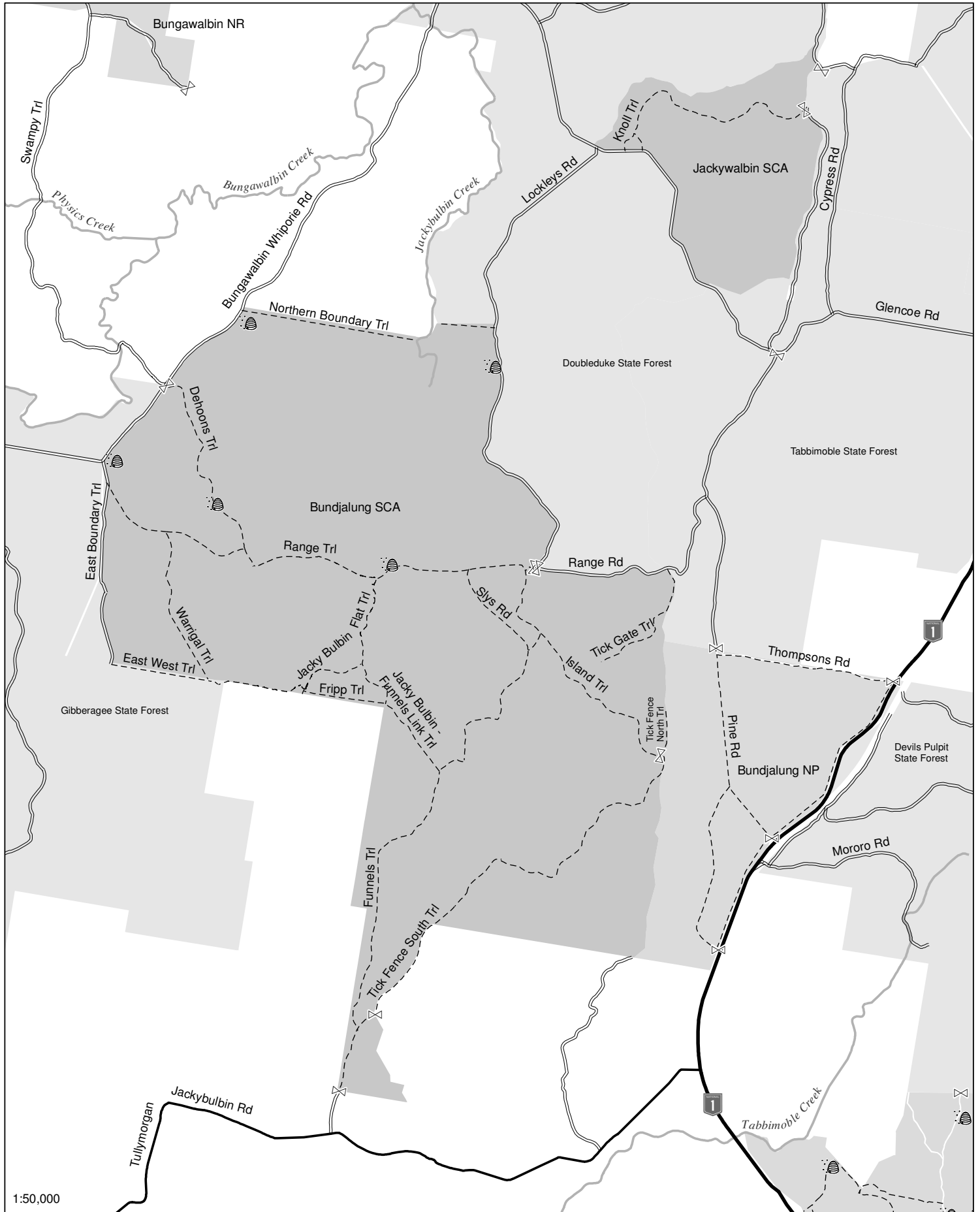
The New South Wales *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each state conservation area. A draft plan of management for Bundjalung and Jackywalbin State Conservation Areas was placed on public exhibition from 4 February to 9 May 2011. The submissions received were carefully considered before adopting this plan.

The plan contains a number of actions to achieve the NSW 2021 goal to protect our natural environment, including habitat protection for threatened species, management of pest species and fire management.

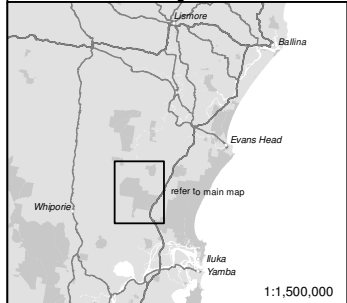
This plan of management establishes the scheme of operations for Bundjalung and Jackywalbin State Conservation Areas. In accordance with section 73B of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.



Robyn Parker MP
Minister for the Environment

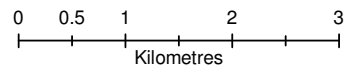


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- ⊗ Locked gate
- ⊗ Bee Sites
- Highway / Major Road
- Sealed Road - Off Park
- Unsealed Road - Off Park
- - - Management Trail
- Other NPWS reserves
- Bundjalung SCA
- Jackywalbin SCA
- Forests NSW



1. LOCATION, GAZETTAL AND REGIONAL CONTEXT

Jackywalbin State Conservation Area and Bundjalung State Conservation Area (referred to together as 'the SCAs') were gazetted in January 2003 as a result of the NSW Comprehensive Regional Assessment process. Jackywalbin SCA is 661 hectares in area and is located approximately 21 kilometres west of Evans Head. Bundjalung SCA is 4,870 hectares and is located approximately 20 kilometres north-west of Iluka and 3.2 kilometres south-west of Jackywalbin SCA. Together the SCAs total 5531 hectares (see Map 1).

Jackywalbin SCA comprises grassy and shrubby dry sclerophyll forest with smaller areas of wet sclerophyll forest. Prior to gazettal as SCA it was part of Doubleduke State Forest. The Bundjalung people know Jackywalbin SCA as 'Goongawiyán' (storm bird) and it is proposed to seek formal renaming of the reserve to Goongawiyán (refer 6.2.2).

Bundjalung SCA is mainly comprised of swamp and grassy sclerophyll forest with wet sclerophyll forest and freshwater wetlands. Prior to gazettal as an SCA it was part of the Bundjalung Crown Reserve and Doubleduke State Forest.

Together the SCAs form an important link with other significant areas of native vegetation, in particular the adjoining Bundjalung National Park and Tabbimoble, Gibberagee and Doubleduke State Forests (see Map 1). Other surrounding land uses include tea tree cropping and beef cattle grazing.

The SCAs are included under the one plan due to their close proximity and similarities in landscape and vegetation communities. Both SCAs are within the Clarence lowlands biogeographical association.

Jackywalbin SCA is within the Richmond Valley Council area while Bundjalung SCA is divided between the Clarence Valley Council and Richmond Valley Council Areas. The draft Richmond Valley Local Environmental Plan (LEP) 2010 covers Jackywalbin SCA and part of Bundjalung SCA, while the rest of Bundjalung SCA is covered by the Clarence Valley LEP 2011. Both LEPs classify the SCAs as Zone E1 – National Parks and Nature Reserves.

Both SCAs are within the areas of the Northern Rivers Catchment Management Authority and the Bogal Local Aboriginal Land Council. The SCAs are part of the Bundjalung Native Title Claim (NC98/19) No. 2.

2. MANAGEMENT CONTEXT

2.1 LEGISLATIVE AND POLICY FRAMEWORK

The management of state conservation areas in NSW is in the context of the legislative and policy framework, primarily the *National Parks and Wildlife Act 1974* (NPW Act), the NPW Regulation, *Threatened Species Conservation Act 1995* (TSC Act), and the policies of the National Parks and Wildlife Service (NPWS).

Other legislation, international agreements and charters may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979* (EPA Act) may require the assessment and mitigation of the environmental impacts of works proposed in this plan. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) also applies in relation to actions that may impact on threatened species and migratory species listed under that Act. The *Heritage Act 1977* requires that approval is needed for work that may have an impact upon the items listed under the state heritage inventory that are present in the SCAs, those items being high conservation value old growth forest.

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted a plan, no operations may be undertaken within the SCAs except in accordance with this plan. This plan will also apply to any future additions to Jackywalbin and Bundjalung SCAs. Should management strategies or works be proposed for these SCAs or any additions that are not consistent with this plan, an amendment to this plan or a new plan will be prepared and exhibited for public comment.

2.2 MANAGEMENT PURPOSES AND PRINCIPLES

State conservation areas are reserved under the NPW Act to protect and conserve areas that contain significant or representative ecosystems, landforms or natural phenomena or places of cultural significance; that are capable of providing opportunities for sustainable visitor use and enjoyment, the sustainable use of buildings and structures, or research; and that are capable of providing opportunities for uses permitted under other provisions of the Act.

Under the Act (section 30G), state conservation areas are managed to:

- conserve biodiversity, maintain ecosystem functions, protect natural phenomena and maintain natural landscapes;
- conserve places, objects and features of cultural value;
- provide for the undertaking of uses permitted under other provisions of the NPW Act (including uses permitted under section 47J such as mineral exploration and mining), having regard to the conservation of the natural and cultural values of the state conservation area;
- provide for sustainable visitor use and enjoyment that is compatible with conservation of the area's natural and cultural values and with uses permitted in the area;

- provide for sustainable use (including adaptive reuse) of any buildings or structures or modified natural areas having regard to conservation of the area's natural and cultural values and with other uses permitted in the area; and
- provide for appropriate research and monitoring.

The NPW Act requires a review of the classification of state conservation areas every 5 years in consultation with the Minister administering the *Mining Act 1992*. A review was undertaken in November 2008 in which the status of Bundjalung and Jackywalbin SCAs remained unchanged. In the long term it is intended for the SCAs to become nature reserves, and so management will also be guided by the management principles for nature reserves where possible.

2.3 STATEMENT OF SIGNIFICANCE

The SCAs are considered to be of significance due to the following:

Landscape/Catchment Values:

- The SCAs are part of the catchment draining into the Bungawalbin wetland cluster. The Bungawalbin wetland cluster has been identified as the 'largest tidal water pool in Australia' (DECC 2008a). The SCAs are part of the catchment for the Lower Bungawalbin Creek, which listed as a wetland of national importance (Environment Australia 2001).

Biological Values:

- The SCAs contain wetland, lowland and heath vegetation which provides highly significant habitat and a food source for many threatened fauna species (DECC 2008a).
- Old growth forests within the Upper North East Region Comprehensive Regional Assessment (which includes the SCAs) are listed under the state heritage inventory because of their historic significance in demonstrating the history of their use and exploitation as well as evidence of Aboriginal occupation over a long period of time. Other reasons for their listing is their aesthetic value, their potential to teach us more about eucalypt forests and their value in providing habitat to threatened species (New South Wales Heritage Branch 2000).
- The SCAs contain core habitat areas which form part of a regionally significant forest habitat corridor for priority fauna species (Scotts 2003).
- The SCAs are an important part of the Bungawalbin catchment, one of the most significant areas of fauna biodiversity in north-east NSW, with a high marsupial population, high arboreal mammal distribution and large numbers of threatened species (NPWS 1995).
- The SCAs provide habitat for 54 threatened fauna species listed under the TSC Act, 11 species under the EPBC Act and nine migratory species under the EPBC Act.
- There are two endangered ecological communities and 12 threatened flora species within the SCAs which are listed under the TSC Act. Five species in the SCAs are listed ROTAP species (Briggs and Leigh 1996).

Aboriginal Heritage:

- The SCAs are of spiritual significance and contemporary importance to the Bandjalang Aboriginal people.

Research/Education Values:

- The significant biological values and diversity of plant communities in the SCAs provide opportunities for scientific research for educational programs and tertiary research projects on plant community relationships, and the flora and fauna of differing plant communities.

2.4 SPECIFIC MANAGEMENT DIRECTIONS

Management of the SCAs will focus on the protection of the significant vegetation communities, endangered ecological communities, threatened species, Aboriginal heritage, and encouragement of the use of the reserve for research.

Major strategies to achieve these objectives are:

- Implementation of relevant actions in the Priorities Action Statement and recovery plans for threatened species, endangered populations and endangered ecological communities;
- Fire and pest management to increase the ability of these SCAs to cope with future disturbances including climate change;
- Encouragement of research into the natural values of the SCAs that will contribute to management and understanding of the areas values; and
- Consultation with Bandjalang Native Title Claimants and Bogal Aboriginal Land Council about protection of cultural heritage values.

3. VALUES

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

3.1 GEOLOGY, SOILS, LANDSCAPE AND HYDROLOGY

The SCAs lie within the Mesozoic Clarence-Moreton Basin. The bedrock underlying the SCAs consists of Kangaroo Creek Sandstone and the Grafton Formation. Kangaroo Creek Sandstone is comprised of quartz sandstone while the Grafton Formation is a combination of lithic sandstone, siltstone, claystone and conglomerate (Morand 2001).

Forming part of the Bungawalbin catchment wetland complex, the SCAs include areas of alluvial plain. Poorly drained soils with low water holding capacities and wet bearing strength form a complex landscape of swamps, streams, back plains and terrace surfaces (Morand 2001). These alluvial plain areas are typically 10-20 metres Australian Height Datum (AHD). Undulating hills rise from the alluvial plains and merge into steep escarpments reaching 200 metres AHD which in Bundjalung SCA provide panoramic and ocean views.

Morand describes the soils in the SCAs as being of poor fertility and highly acidic. Alluvial plain soils are deep being typically hydrosols and kurosols with high erodibility potential and poor drainage. Soils of the hills are also deep and are mainly kurosols, kandosols, tenosols and podosols with high erosion potential and moderate to high permeability. Soils on the steep hills and escarpments are shallow, highly erodible and are typically kurosols and tenosols. Rock falls are a hazard in these locations.

The SCAs receive an annual rainfall of 1150 millimetres (Bureau of Meteorology 2009) which, when combined with the high erodibility of the soils and steep land gradients within the SCAs, creates a high risk of severe erosion if soils are disturbed (refer section 4.5 Soil Erosion).

3.2 NATIVE PLANTS

Vegetation communities found in the SCAs include wet sclerophyll forest, swamp sclerophyll forest, shrubby dry sclerophyll forest, grassy dry sclerophyll forest and freshwater wetland. The swamp sclerophyll forest and freshwater wetland ecological communities found in the SCAs are listed under the TSC Act (see Table 1).

Over 200 species of flora have been recorded within the SCAs (DECC 2009a). Key species found in wet sclerophyll forests are the tallowwood (*Eucalyptus microcorys*)

and blackbutt (*E. pilularis*). In the swamp sclerophyll forests paperbarks (*Melaleuca quinquenervia*), swamp box (*Lophostemon suaveolens*), narrow-leaved paperbark (*Melaleuca alternifolia*) and red mahogany (*E. resinifera*) are the dominant species (DECC 2005a). Shrubby dry sclerophyll forests and grassy dry sclerophyll forests are characterised by eucalypt species including small-fruited grey gum (*E. propinqua*), grey ironbark (*E. siderophloia*), large-fruited spotted gum (*Corymbia henryi*), forest red gum (*E. tereticornis*), broad-leaved rough bark apple (*Angophora subvelutina*) and red bloodwood (*Corymbia gummifera*). The main species associated with the freshwater wetlands are frogmouth (*Phylidrum lanuginosum*), fen sedge (*Carex gaudichaudiana*), jointed twig-rush (*Baumea articulate*), soft twig-rush (*Baumea rubiginosa*), slender twig-rush (*Baumea teretifolia*) and *Eleocharis dietrichiana* with paperbarks (*M. quinquenervia*) and bottlebrushes (*Callistemon salignus* and *C. pachyphyllus*) also present (Morand 2001, Sheringham *et al.* 2008).

Although much of the area has been logged in the past, there still remains old growth forest in the SCAs which has been listed under the state heritage inventory as High Conservation Value Old Growth Forest (NSW Heritage branch 2000).

The SCAs also provide an important connection between large areas of native vegetation to the north, south and east. The SCAs form a connection between Doubleduke and Tabbimoble State Forests to the north and to large tracks of state forest and park area to the south of Bundjalung SCAs through Gibberagee State Forest. To the east Bundjalung SCA connects to Bundjalung National Park and the Devils Pulpit State Forest.

The SCAs also contain 12 threatened flora species listed under the TSC Act and five species listed as Rare or Threatened Australian Plants (Briggs and Leigh 1996) (see Table 1).

Table 1. Threatened and significant plant species and ecological communities recorded or likely to occur in Jackywalbin and Bundjalung SCAs.

Common name	Scientific name	Legal Status*
bordered guinea flower	<i>Hibbertia marginata</i>	Vulnerable #
helidon hills panic	<i>Paspalidium grandispiculatum</i>	Vulnerable ^ #
red-leaved daisy bush	<i>Olearia stilwelliae</i>	^
slaty red gum	<i>Eucalyptus glaucina</i>	Vulnerable ^ #
small-leaved paperbark	<i>Melaleuca irbyana</i>	Endangered
Orchid	<i>Oberonia titania</i>	Endangered
spiny desmodium	<i>Desmodium acanthocladum</i>	Vulnerable ^ #
Maundia	<i>Maundia triglochinosoides</i>	Vulnerable
water nutgrass	<i>Cyperus aquatilis</i>	Endangered
slender screw fern	<i>Lindsaea incisa</i>	Endangered
noah's false chickweed	<i>Lindernia alsinoides</i>	Endangered
heath wrinklewort	<i>Rutidosis heterogama</i>	Vulnerable ^ #
	<i>Tylophora woollsii</i>	Endangered#
swamp sclerophyll forest on coastal floodplain		Endangered
freshwater wetland on coastal floodplain		Endangered

* Status under TSC Act

Denotes species nationally threatened under the Environmental Protection and Biodiversity Conservation Act.

^ Denotes species listed as a Rare or Threatened Australian Plant (ROTAP) by Briggs and Leigh (1996)

Under the TSC Act recovery plans may be prepared to identify actions and priorities for threatened species, populations or ecological communities. Additionally, a threatened species Priorities Action Statement (PAS) has been prepared which outlines broad strategies and detailed priority actions in NSW to promote the recovery of threatened species, populations and endangered ecological communities and to manage key threatening processes. The PAS will be used to guide the management of threatened species in the SCAs.

3.3 NATIVE ANIMALS

Fauna surveys of the SCAs have recorded 122 fauna species (DECC 2009a). Fifty-four species are protected under the TSC Act, 11 are protected under the EPBC Act and seven migratory species are protected under the EPBC Act (see Table 2).

The SCAs also provide key habitat and corridor values for fauna species. With over a third of Australia's land bird species being woodland dependant, the ironbark-gum woodlands of the SCAs are vital for their protection (Olsen *et al.* 2005). The connection formed by the SCAs to surrounding naturally vegetated areas is also important for larger species such as the endangered coastal emu population (*Dromaius novaehollandiae*). Also of major importance are the nesting and habitat sites in hollows found in its aged woodland trees. These are used by both native bird and arboreal mammal species.

The most significant threat faced by native fauna in the SCAs include competition and predation by introduced species (refer to Section 4.1 Weeds and Pest Animals). Opportunities to manage this threat and other threats include the implementation of relevant actions in the threatened species Priorities Action Statement (PAS) and recovery plans, which outlines the broad strategies and detailed priority actions to promote the recovery of threatened species and populations and to manage key threatening processes. The PAS and recovery plans will be used to guide the management of threatened species in the SCAs.

Table 2. Threatened and significant animal species recorded or likely to occur in Jackywalbin and Bundjalung SCAs.

Common name	Scientific name	Legal Status *
Birds		
Bush stone-curlew	<i>Burhinus grallarius</i>	Endangered
Red goshawk	<i>Erythrotriorchis radiatus</i>	Endangered #
Black-breasted buzzard	<i>Hamirostra melanosternon</i>	Vulnerable
Swift parrot	<i>Lathamus discolor</i>	Endangered #
Glossy black-cockatoo	<i>Calyptorhynchus lathami</i>	Vulnerable
Red-tailed black-cockatoo	<i>Calyptorhynchus banksii</i>	Vulnerable
Black-necked stork	<i>Ephippiorhynchus asiaticus</i>	Endangered
Brown treecreeper	<i>Climacteris picumnus</i>	Vulnerable
Black-chinned honeyeater (eastern subspecies)	<i>Melithrptus gularis gularis</i>	Vulnerable
Regent honeyeater	<i>Anthochaera phrygia</i>	Critically Endangered # ^

Hooded robin	<i>Melanodryas cucullata</i>	Vulnerable
Grey-crowned babbler (eastern subspecies)	<i>Pomatostomas temporalis temporalis</i>	Vulnerable
Little lorikeet	<i>Glossopsitta pusilla</i>	Vulnerable
Barking owl	<i>Ninox connivens</i>	Vulnerable
Masked owl	<i>Tyto novaehollandiae</i>	Vulnerable
Powerful owl	<i>Ninox strenua</i>	Vulnerable
Brolga	<i>Grus rubicunda</i>	Vulnerable ^
Australasian bittern	<i>Botaurus poiciloptilus</i>	Vulnerable
Square-tailed kite	<i>Lophoictinia isura</i>	Vulnerable
Rufous fantail	<i>Rhipidura rufifrons</i>	^
Emerald dove	<i>Chalcophaps indica</i>	^
Satin fly catcher	<i>Myiagra cyanoleuca</i>	^
Latham's snipe	<i>Gallinago hardwickii</i>	^
White-throated needletail	<i>Hirundapus caudacutus</i>	^
Emu population in the NSW North Coast Bioregion	<i>Dromaius novaehollandiae</i>	Endangered
Mammals		
Spotted-tailed quoll (south east mainland population)	<i>Dasyurus maculatus</i>	Vulnerable #
Yellow-bellied glider	<i>Petaurus australis</i>	Vulnerable
Koala	<i>Phascolarctos cinereus</i>	Vulnerable
Squirrel glider	<i>Petaurus norfolcensis</i>	Vulnerable
Greater broad-nosed bat	<i>Scoteanax rueppellii</i>	Vulnerable
Little bent-wing bat	<i>Miniopterus australis</i>	Vulnerable
East coast freetail bat	<i>Mormopterus norfolkensis</i>	Vulnerable
Eastern bent-wing bat	<i>Miniopterus schreibersii oceanensis</i>	Vulnerable
Eastern cave bat	<i>Vespadelus troughtoni</i>	Vulnerable
Large-eared pied bat	<i>Chalinolobus dwyeri</i>	Vulnerable #
Golden-tipped bat	<i>Kerivoula papuensis</i>	Vulnerable
Yellow-bellied sheath-tail-bat	<i>Saccolaimus flaviventris</i>	Vulnerable
Greater broad-nosed bat	<i>Scoteanax rueppellii</i>	Vulnerable
Common blossom-bat	<i>Syconycteris australis</i>	Vulnerable
Rufous bettong	<i>Aepyprymnus rufescens</i>	Vulnerable
Grey-headed flying-fox	<i>Pteropus poliocephalus</i>	Vulnerable #
Brush-tailed phascogale	<i>Phascogale tapoatafa</i>	Vulnerable
Large-footed myotis	<i>Myotis adversus</i>	Vulnerable
Common planigale	<i>Planigale maculata</i>	Vulnerable
Eastern long-eared bat	<i>Nyctophilus bifax</i>	Vulnerable
Hoary wattled bat	<i>Chalinolobus nigrogriseus</i>	Vulnerable
Eastern chestnut mouse	<i>Pseudomys gracilicaudatus</i>	Vulnerable
Long-nosed potoroo (south east mainland population)	<i>Potorous tridactylus</i>	Vulnerable #

Eastern pygmy possum	<i>Cercartetus nanus</i>	Vulnerable
Amphibians		
Giant barred frog	<i>Mixophyes iteratus</i>	Endangered #
Wallum froglet	<i>Crinia tinnula</i>	Vulnerable
Wallum sedge frog	<i>Litoria olongburensis</i>	Vulnerable #
Stuttering frog	<i>Mixophyes balbus</i>	Endangered #
Fleay's barred frog	<i>Mixophyes fleayi</i>	Endangered #
Green-thighed frog	<i>Litoria brevipalmata</i>	Vulnerable
Reptiles		
Stephens banded snake	<i>Hoplocephalus stephensii</i>	Vulnerable
White-crowned snake	<i>Cacophis harriettae</i>	Vulnerable
Pale headed snake	<i>Hoplocephalus bitorquatus</i>	Vulnerable
Fish		
Oxleyan pygmy perch	<i>Nannoperca oxleyana</i>	Endangered ~

* Status under TSC Act

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

^ Denotes migratory species listed under EPBC Act.

~ Denotes species listed under the *NSW Fisheries Management Act 1994*.

Oxleyan pygmy perch has been identified as potentially occurring in the planning area. Oxleyan pygmy perch are listed as Endangered on Schedule 4 of the *NSW Fisheries Management Act 1994* and under the Commonwealth EPBC Act 1999. If Oxleyan pygmy perch are identified as occurring in the planning area in the future, management will be in accordance with the Recovery Plan.

3.4 CULTURAL HERITAGE

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

The SCAs are part of a landscape of cultural importance to the Bandjalang people of the Bundjalung Aboriginal nation. The SCAs lie within Bandjalang Country, the Bogal Local Aboriginal Land Council area and are part of the Bandjalang Native Title Claim (NC98/19) No. 2. The Bandjalang people know Jackywalbin SCA as 'Goongawiyani' (storm bird).

There are numerous stone scatter sites within the SCAs, indicating the presence of past Aboriginal inhabitancy, though the value of the land to the Aboriginal people also comes from its importance for resource gathering, travelling, ceremonies and beliefs. Bandjalang elders have previously indicated strong concerns for maintaining catchment health, and for maintaining the link between water quality and ongoing spiritual connections to Country (Kempff 2000). The SCAs and surrounding areas are valued by the Bandjalang and Bundjalung people as a source of foods, medicines, shelter and utensils relevant to sustaining their cultural practices and way of life.

Cultural use of wild resources, such as medicinal plants and bush tucker, are subject to NPWS policies and licensing.

European settlers arrived in the area during the 1840s seeking cedar and better pastures for grazing. Wild tea tree harvesting and dairy farming also occurred in the area around the SCAs from the early 20th century. Due to the swampy nature of the low-lying terrain, most of the low elevation area was left uncleared until more recent times. European settlers logged the SCAs at differing times and have left a scattering of large stumps throughout the SCAs. A tick fence was erected by the Commonwealth government in the mid 20th century to restrict the spread of cattle tick. Remains of the fence and gates remain along the eastern boundary of Bundjalung SCA.

3.5 VISITOR USE, EDUCATION AND RESEARCH

Visitor use of the SCAs is low due to difficulties with access. Because of the boggy, wet conditions of soils and their highly erodible nature all internal trails in the SCAs have been maintained to a 4WD standard suitable for management vehicles only. Public vehicle access is restricted to unsealed off parks roads along parts of the SCAs boundaries including the Bungawalbin Road, Glencoe Road, Lockleys Road, Range Road and Thompsons Road (see Map 1).

Because of the difficulties with access and low levels of visitor use in the SCAs, it is not proposed to develop any visitor facilities within the SCAs. Visitor facilities are provided in other nearby parks including Bundjalung National Park (Black Rocks and Woody Head camp grounds) and Broadwater National Park (day use areas).

Although there are no designated walking tracks within the SCAs, the network of management trails provides some opportunities for walking. The diversity of native plant and animal species also provide opportunities for nature-based activities including photography and bird watching. Cycling on management trails in the SCAs is also considered an appropriate recreation activity. It is not proposed to allow horse riding in the SCAs as in the longer term it is intended that both SCAs be gazetted as nature reserves and NPWS policy on horse riding does not allow horse riding in nature reserves. Horse riding is, however, permitted on designated roads and trails in the nearby Bungawalbin National Park and Bungawalbin SCA.

Hunting is allowed in the nearby Doubleduke, Tabbimoble and Gibberagee State Forests, subject to relevant licensing and permission from the NSW Game Council. It is therefore important that the boundaries of the SCAs are clearly defined to minimise the risk of hunters unknowingly entering the SCAs. Unauthorised activities occur on occasion in the SCAs, including pig hunting as well as motorbike riding and four wheel driving along management trails which promotes soil erosion (refer Section 4.5 Soil Erosion).

Illegal dance parties have occurred within Bundjalung SCA and Jackywalbin SCA. Dance parties generally involve a gathering of groups of more than 20 people are typically held at night and may involve loud music and consumption of alcohol.

4. ISSUES

4.1 WEEDS AND PEST ANIMALS

Introduced plant species occur in disturbed areas of the SCAs particularly along the boundary and adjacent to public roads and management trails. Twelve introduced plant species and six introduced animal species have been recorded in the SCAs (see Table 3). The introduced species of particular concern is lantana (*Lantana camara*) which is declared a weed of national significance and is a key threatening process under the TSC Act. The *Noxious Weeds Act 1993* places an obligation upon public authorities to control noxious weeds on land that they occupy to the extent necessary to prevent such weeds spreading to adjoining lands.

The NPWS *Northern Rivers Region Pest Management Strategy* (OEH 2012) provides management direction at a regional level for weed control, bush regeneration programs and the control of introduced animals. Under the strategy control programs have been implemented for lantana, groundsel bush and giant Parramatta grass. Restoration and rehabilitation plans for specific parks and reserves provide more detailed strategies and work programs. A draft pest management strategy has been prepared for the reserves (NPWS 2012).

Table 3. Weeds and Pest Animals recorded in Jackywalbin and Bundjalung SCAs.

Weeds		Pest Animals	
Scientific Name	Common Name	Bundjalung SCA	
		Scientific Name	Common Name
<i>Lantana camara</i> # * ~	lantana		
<i>Aster subulatus</i>	wild aster	<i>Canis lupus</i> +	dog
<i>Conyza sumatrensis</i>	tall fleabane	<i>Vulpes vulpes</i> ~ ^ >	fox
<i>Erechtites valerianifolia</i>	Brazilian fireweed	<i>Sus scrofa</i> ~ ^ >	pig
<i>Hypochaeris radicata</i>	cat ear	<i>Felis catus</i> ~ ^ >	cat
<i>Sonchus</i> spp. #	sow thistle	<i>Bos taurus</i>	cattle
<i>Myriophyllum aquaticum</i>	parrots feather	Jackywalbin SCA	
<i>Passiflora edulis</i>	common passionfruit	<i>Bufo marinus</i> ~ >	cane toad
<i>Persicaria strigosa</i>	spotted knotweed	<i>Canis lupus</i> +	dog
<i>Baccharis halimifolia</i> #	groundsel bush	<i>Felis catus</i> ~ ^ >	cat
<i>Sporobolus fertilis</i> # ~	giant Paramatta grass		
<i>Pinus elliotii</i>	slash pine		
<i>Eucalyptus dipimessmate</i>			
<i>Cylindropuntia</i> spp. # And <i>Opuntia</i> spp. #	prickly pear		

Declared noxious under *Noxious Weed Act 1993*

+ Declared pest under *Rural Lands Protection Act 1989*

* Declared weed of national significance

~ Key threatening process under TSC Act

> Key threatening process under Commonwealth EPBC Act

^ Threat Abatement Plan endorsed for this species

Prior to its gazettal into the NPWS estate, Jackywalbin SCA was managed as state forest and there are 2.19 hectares of remnant plantations of *Pinus elliotii* and

Eucalyptus dipimesmate. The NPWS is preparing a strategy for the management of remnant plantations within the NPWS estate. Removal of logs, clearing or poisoning of plantations followed by regeneration are identified as a high priority for plantations in Jackywalbin SCA.

The SCAs have been identified as containing high quality dingo habitat. Wild dogs, including dingoes, have been declared as pest animals under the *Rural Lands Protection Act 1998* (RLP Act) throughout NSW. Hence, the NPWS has a statutory obligation to control wild dogs on its estate. Under the RLP Act, however, public lands that are considered to contain high quality dingo habitat in Schedule 2 of the Wild Dog Control Order will be managed with the dual objectives of managing wild dogs while at the same time conserving dingoes. Strategic and reactive wild dog control programs will be undertaken in accordance with the Regional Wild Dog Management Plan for the North Coast Livestock Health and Pest Authority Area for the Management of Schedule 2 Lands as Prescribed by Pest Control Order Number 17. 2011-2015 (2011) and the Northern Rivers Pest Management Strategy.

Straying stock from neighbouring properties occur on occasion and may pose a threat to values of the SCAs through weed invasion, damage to endangered ecological communities, soil compaction and erosion. Where possible, fencing is maintained on a cooperative basis with neighbours, however where fencing is not possible or impractical, other cooperative arrangement with neighbours will be implemented to limit the effects of grazing in the SCAs.

Threat Abatement Plans for foxes and cats identify key processes where pest control is required to protect threatened species populations. Priority threatened species occurring in the SCAs at risk from fox and cat predation include the bush stone-curlew and the endangered north coast emu population.

Populations of feral pigs occur in low numbers in Bundjalung SCA with their distribution being seasonal and dependent upon climatic conditions and food supply. "Predation, habitat degradation, competition and disease transmission by feral pigs" is listed under the TSC Act as a Key Threatening Process. Control of feral pigs will occur in accordance with the Bungawalbin Swamp Feral Pig Management Strategy as part of an integrated and coordinated program with landholders.

Cane toads have been recorded within Jackywalbin SCA but in low numbers. A Management Plan for Cane Toads on National Parks and Nature Reserves (OEH, 2011) has been prepared to identify presence/absence and priority areas for control based on achievability and distribution of cane toads.

4.2 FIRE

The primary fire management objectives of the NPWS are to protect life and property and community assets from the adverse impacts of fire, whilst managing fire regimes to maintain and protect biodiversity and cultural heritage.

Fire is a natural feature of many environments and is essential for the survival of some plant communities. However, inappropriate fire regimes can lead to loss of particular plant and animal species and communities, and high frequency fires have

been listed as a key threatening process under the TSC Act.

Ecological communities sensitive to fire in the SCAs include old growth forest habitats for arboreal mammals, swamp sclerophyll forests and freshwater wetland ecosystems (Sheringham *et al.* 2008). The SCAs also contain dry sclerophyll forests in which bushfires play a vital role in regeneration. Ecological burns within appropriate fire regimes for different vegetation types are important to maintain biodiversity. The SCAs were extensively burnt by a combination of three separate wild fires between 2000 and 2003.

A Fire Management Strategy (FMS) has been prepared for the SCAs (DECC 2009). The FMS outlines the recent fire history of the SCAs, identifies key assets within and adjoining the SCAs including sites of natural and cultural heritage value, fire management zones which may include asset protection zones, and fire control advantages such as management trails and water supply points. Hazard reduction programs, ecological burning proposals and fire trail works are submitted annually to the Clarence Valley and Richmond Valley Bush Fire Management Committee.

4.3 CLIMATE CHANGE

Climate change has been listed as a key threatening process under the TSC Act. Projections of future changes in climate for NSW include higher temperatures, increasing sea levels and water temperatures, elevated CO₂, more intense but possibly reduced annual average rainfall, increased temperature extremes and higher evaporative demand. These changes are likely to lead to greater intensity and frequency of fires, more severe droughts, reduced river runoff and water availability, regional flooding, increased erosion and ocean acidification.

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

Programs to reduce the pressures arising from other threats, such as habitat fragmentation, invasive species and bushfires will help reduce the severity of the effects of climate change.

4.4 SOIL EROSION

Soils in the SCAs are highly erodible if disturbed. Due to the largely unmodified nature of the SCAs it is a relatively minor problem limited to roads and trails and other modified areas such as log dumps. Management trails are maintained with damage mitigation measures put in place in the form of primarily drains and culverts to minimise runoff and erosion. However, illegal access by motorbikes and four wheel drives along these trails has created channels promoting erosion. If necessary, realignment of trails and other works may be undertaken to minimise erosion.

5. MANAGEMENT OPERATIONS AND OTHER USES

In order to achieve protection of the values of the park and to facilitate management operations it is important to build and maintain appropriate infrastructure. Infrastructure and other uses may also be provided on the park by other authorities or for other purposes authorised under the NPW Act.

5.1 MANAGEMENT TRAILS

Within the SCAs a network of management trails is maintained for operations such as pest and fire control, and other management purposes (refer to Map 1). These trails are for use by NPWS and other authorised vehicles only, including the NSW Rural Fire Service, other emergency services as required, contractors and licensed beekeepers (refer section 5.2 Bee Keeping).

There are a number of trails associated with past land use, which are not required for management purposes.

5.2 BEE KEEPING

There are five licensed bee keeping sites located within Bundjalung SCA that predate its gazettal into the NPWS estate and so are considered existing interests under the NPW Act (see Map 1). The European honeybee *Apis mellifera* can have adverse impacts on some native plants and animals (Paton 1996). The NPWS policy on bee keeping allows existing sites to continue but does not allow any new or additional sites. Licensed beekeepers are permitted to use relevant management trails to access their hives. It may be necessary to relocate existing bee sites where apiary activities result in unacceptable environmental impacts, user conflicts or are inconsistent with park management.

5.3 MINING AND MINERAL EXPLORATION

There are two Petroleum Exploration Licences, PEL 445 and PEL 457, which cover the SCAs. Jackywalbin SCA is covered by PEL 445 while Bundjalung SCA is covered by both PEL 445 and PEL 457. The Department of Industry and Investment (formerly the Department of Primary Industries (Mineral Resources)) is the lead authority for mining, mineral exploration and mine site rehabilitation. The Department of Industry and Investment is required under the EPA Act to undertake environmental assessments for mining and exploration activities in all SCAs. The existing Memorandum of Understanding (MOU) between NPWS and the former DPI (Mineral Resources) describes the management and consultative arrangements associated with exploration and mining in SCAs.

Approval of the Minister administering the NPW Act must be obtained before any rights under an assessment lease or exploration licence can be exercised. Likewise, the concurrence of the Minister administering the NPW Act must be obtained before any mining lease is issued. In the case of exploration licences and other prospecting titles, an access agreement under the *Mining Act 1992* between the titleholder and the NPWS in order for the titleholder to conduct prospecting operations within the SCAs.

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6. IMPLEMENTATION

Current Situation	Desired Outcomes	Management Response	Priority*
<p>6.1 Ecological Conservation The old growth forest, wetlands, creeks and ephemeral lagoons provide important habitat for a variety of native animal species.</p> <p>There are 66 threatened species and two Endangered Ecological Communities recorded in the SCAs (Tables 1 and 2). Strategies for the recovery of threatened species, populations and ecological communities are set out in the threatened species Priorities Action Statement (PAS) and recovery plans.</p> <p>Climate change is recognised as a Key Threatening Process under the TSC Act. Appropriate fire and pest management may improve the ecological resilience of species to climate change and other threats (refer Sections 6.5 and 6.6).</p> <p>Neighbours, catchment management authorities and other agencies should be encouraged to retain, and where possible expand, areas of native vegetation close to the SCAs.</p> <p>Further research would improve understanding of the SCAs natural values, the processes that affect them (including climate change) and the requirements for management of particular species, in particular threatened species consistent with strategies identified in PAS and recovery plan.</p>	<p>Native plant and animal species and communities are conserved.</p> <p>Negative impacts on threatened taxa are diminishing or non-existent.</p> <p>Structural diversity and habitat values are restored in areas subject to past disturbance.</p> <p>Landscape and catchment values are protected.</p> <p>The effects of climate change on natural systems are reduced.</p>	<p>6.1.1 Implement relevant strategies in the PAS and recovery plans for threatened species present in the SCAs. This will include habitat protection, management of pest species and appropriate fire regimes (refer Sections 6.5 Weeds and Pest Animals and 6.6 Fire Management). These actions will also assist the resilience of native species to climate change and other threats.</p> <p>6.1.2 Encourage research into the natural values of the SCAs that will contribute to management and understanding of their values.</p>	<p>High</p> <p>High</p>

Current Situation	Desired Outcomes	Management Response	Priority*
<p>6.2 Cultural heritage</p> <p>The SCAs are located within the traditional country of the Bandjalang people and within the Bogal Local Aboriginal Land Council area. The SCAs are subject to a registered native title claim.</p> <p>Aboriginal scatter sites have been found in the SCAs. The SCAs are valued by the Bandjalang people for their traditional resources and ceremonial areas and the peoples beliefs are tied to the land. Requests for cultural use of wild resources are subject to NPWS policies and any licensing/consent requirements.</p> <p>Jackywalbin SCA is known as 'Goongawiyari' (storm bird) by the Bandjalang people and as such they have requested the SCA be renamed.</p> <p>The remains of a tick fence constructed in the early 20th century occur along the eastern boundary of Bundjalung SCA. The location has been recorded and mapped but no maintenance program is proposed.</p>	<p>Aboriginal places and values are identified and protected.</p> <p>Aboriginal people are involved in management of the Aboriginal cultural values of the park.</p> <p>Negative impacts on Aboriginal and historic heritage values are stable or diminishing.</p>	<p>6.2.1 Consult with the Bandjalang Native Claimants and Bogal Aboriginal Land Council in the management of Aboriginal sites, places and values, including any interpretation of places or values and research.</p> <p>6.2.2 Seek formal renaming of Jackywalbin SCA to 'Goongawiyari' SCA in accordance with the procedural guidelines in the NPWS Place Names Policy.</p>	<p>High</p> <p>High</p>

Current Situation	Desired Outcomes	Management Response	Priority*
<p>6.3 Visitor Use and Services</p> <p>There are no visitor facilities provided within the SCAs and visitor use is low. Camping facilities are provided at nearby Bundjalung National Park and day use facilities are provided at Broadwater National Park. This plan does not propose the provision of any new visitor facilities.</p> <p>Recreational use of the SCAs is restricted by its swampy nature, limited access, topography and highly erodible soils. Management trails provide opportunities for bush walking and cycling. Group visits will be permitted subject to limits on numbers and other conditions necessary to minimise impacts. Usage and impacts of cycling will be monitored, and if necessary access restrictions may be applied to reduce impacts on the management trails particularly during wet conditions.</p> <p>Horse riding will not be permitted in the SCAs due to the swampy landscape and highly erodible soils, as well as the longer term aim that the SCAs be gazetted as nature reserves. Opportunities for horse riding are available nearby in Bungawalbin National Park and Bungawalbin SCA.</p> <p>Recreational hunting is allowed in the nearby Doubleduke, Tabbimoble and Gibberagee State forests. It is important that the boundaries of the SCAs are clearly defined to minimise the risk of hunters unknowingly entering the reserve.</p>	<p>Visitor use is appropriate ecologically and sustainable.</p> <p>Negative impacts of visitors on park values are stable or diminishing.</p>	<p>6.3.1 Erect appropriate regulatory signage on the boundaries of the SCAs and on management trails as necessary to discourage unauthorised access and inappropriate activities.</p> <p>6.3.2 Organised group visits involving more than 20 persons will require consent from NPWS and be assessed on a case by case basis and in accordance with NPWS policy.</p>	<p>High</p> <p>High</p>

Current Situation	Desired Outcomes	Management Response	Priority*
<p>Inappropriate activities occurring in the SCAs include occasional illegal hunting as well as motorbike riding and four wheel driving along management trails.</p> <p>Unauthorised dance parties have occurred in the SCAs. Rave parties are not compatible with conservation of the natural and cultural values of the SCAs.</p>			

Current Situation	Desired Outcomes	Management Response	Priority*
<p>6.4 Weeds and Pest Animals Pest animals recorded in the SCAs include cane toads, pigs, wild dogs, foxes and cats.</p> <p>Lantana, cane toads, feral pigs, cats and the red fox are species which are identified as Key Threatening Processes under the TSC Act and impact on threatened flora, fauna, endangered populations and endangered ecological communities in the SCAs. Threat Abatement Plans have been prepared for cats and foxes. A national Threat Abatement Plan has also been prepared for feral pigs.</p> <p>The Northern Rivers Region Pest Management Strategy identifies priorities for pest control programs across the region. Ongoing control programs are in place for groundsel bush, giant Parramatta grass and lantana and all introduced fauna species in the SCAs.</p> <p>Other plans such as the Management Plan for Cane Toads on National Parks and Nature Reserves, Threat Abatement Plans and the North Coast Wild Dog Management Plans provide a more detailed approach for specific weeds and pest animals. A draft pest management strategy has also been prepared for the reserves (NPWS 2012).</p> <p>A national feral pig Threat Abatement Plan and state-wide fox and cat Threat Abatement Plan are relevant to management of these species. More recently a cross-tenure Feral Pig</p>	<p>Introduced plants and animals are controlled and where possible eliminated.</p> <p>Negative impacts of weeds on park values are stable or diminishing.</p> <p>Negative impacts of pest animals on park values are stable or diminishing.</p> <p>Pest control programs are undertaken where appropriate in consultation with neighbours.</p>	<p>6.4.1 Manage introduced species in accordance with the Northern Rivers Region Pest Management Strategy and other relevant strategies such as Threat Abatement Plans, the Bungawalbin Swamp Feral Pig Management Strategy, and the Pest Management Strategy for the reserves.</p> <p>6.4.2 Prepare a pest and weed strategy for the SCAs.</p> <p>6.4.3 Strategic and reactive wild dog control programs will be undertaken in accordance with the North Coast Livestock Health and Pest Authority's Wild Dog Management Plan and in accordance with the Northern Rivers Pest Management Strategy.</p> <p>6.4.4 Manage remnant plantations in accordance with the strategy 'Assessment of Plantations on Reserves Managed by Northern Branch Parks and Wildlife Group'. This may include logging of the plantations.</p> <p>6.4.5 Control of cane toads will be in accordance with the Management Plan for Cane Toads on National Parks and Nature Reserves.</p>	<p>High</p> <p>High</p> <p>High</p> <p>High</p> <p>High</p>

Current Situation	Desired Outcomes	Management Response	Priority*
<p>Management Strategy has been prepared for Bungawalbin Swamp which includes the reserves. Actions identified in this strategy are more specific to the reserves needs.</p> <p>Remnant pine and eucalypt plantations will be managed in accordance with the strategy 'Assessment of Plantations on Reserves Managed by Northern Branch Parks and Wildlife Group'. This strategy requires that the remnant plantations be cleared and the area allowed to regenerate.</p>			
<p>6.5 Fire Management Vegetation communities sensitive to fire in the SCAs include swamp sclerophyll forest and freshwater wetland ecosystems. Structural elements such as tree hollows used by birds and arboreal mammals can also be destroyed by fire. Ecological burns within appropriate fire regimes for different vegetation types are important to maintain biodiversity, however too frequent fire may have a detrimental affect on biodiversity. The SCAs were extensively burnt in a combination of three fires between 2000 and 2003.</p> <p>A Fire Management Strategy was approved for the SCAs in 2009. The Fire Management Strategy identifies most of the SCAs as Land Management Zones, where conservation of biodiversity is the primary objective for management. There is a Strategic Fire Advantage Zone in Bundjalung SCA to limit fire spread. A dam in Bundjalung SCA is identified as a water point for fire fighting.</p>	<p>Life, property and natural and cultural values are protected from fire.</p> <p>Fire regimes are appropriate for conservation of native plant and animal communities.</p> <p>Negative impacts of fire on natural and cultural heritage values are stable or diminishing.</p>	6.5.1 Implement the Fire Management Strategy for the SCAs and update as necessary.	High

Current Situation	Desired Outcomes	Management Response	Priority*
<p>6.7 Infrastructure and Maintenance A network of management trails is maintained for fire and other management purposes (see Map 1). Unauthorised use of trails causes erosion and other impacts.</p> <p>Five licensed apiary sites are located in Bundjalung SCA. Existing apiary sites will be permitted to continue in accordance with the NPWS policy on bee keeping. If in the future these activities result in unacceptable environmental impacts, user conflicts or are inconsistent with other park management objectives then NPWS will negotiate with apiarists to relocate hive sites within the SCAs.</p> <p>There are two Petroleum Exploration Licenses covering the SCAs. Applications for mining or exploration in the SCAs are subject to environmental assessment in accordance with the Memorandum of Understanding between NPWS and Department of Industry and Investment.</p> <p>There are occasional incidences of cattle entering the SCAs area where boundary fencing is inadequate.</p>	<p>Management facilities and operations adequately serve management needs and have minimal impact.</p> <p>Infrastructure and assets are routinely maintained.</p> <p>Existing non-park infrastructure is managed to minimise impacts on natural and cultural values.</p>	<p>6.7.1 Maintain all management trails as shown on Map 1. If necessary, realign trails and undertake other works to minimise erosion.</p> <p>6.7.2 Gate/signpost management trails as necessary to restrict unauthorised access.</p> <p>6.7.3 Encourage construction and maintenance of boundary fences to exclude stock from the reserve. Fencing assistance may be provided in accordance with NPWS policy.</p> <p>6.7.4 Monitor use of apiary sites, and manage in accordance with the NPWS policy on beekeeping.</p>	<p>High</p> <p>High</p> <p>Medium</p> <p>Medium</p>

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

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

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

Ongoing is for activities that are undertaken on an annual basis or statements of management intent that will direct the management response if an issue that arises.

