



Environment,  
Climate Change & Water  
National Parks & Wildlife Service



# Woodford Island Nature Reserve

## Plan of Management





**WOODFORD ISLAND NATURE RESERVE  
PLAN OF MANAGEMENT**

**NSW National Parks and Wildlife Service**

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

**December 2010**

**This plan of management was adopted by the Minister for Climate Change and the Environment on 20<sup>th</sup> December 2010.**

### **Acknowledgments**

The NPWS acknowledges that this reserve lies in the traditional country of the Yaegl people, today represented by the Yaegl Local Aboriginal Land Council.

This plan is based on a draft plan prepared by NPWS North Coast Region staff, with assistance from Clarence North Area staff.

Cover photograph by Louise Feltus, NPWS.

### **Further information**

For additional information or inquiries on any aspect of the plan, contact the NPWS Clarence North Area Office at Level 3, 49 Victoria Street (PO Box 361), Grafton or by phone on (02) 6641 1500.

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ISBN: 978 1 74293 087 9

DECCW: 2011/0026

## FOREWORD

Woodford Island Nature Reserve is located north-east of Grafton and six kilometres south-west of Maclean. It was established in 1999 over a small part of Woodford Island, mainly the higher elevation areas, and has an area of 374 hectares.

Woodford Island Nature Reserve contains dry forest vegetation types that are under-represented in the reserve system, as well as paperbark swamp forest, which was identified as vulnerable in the Upper North East Regional Forest Assessment. It provides habitat for four threatened and two migratory fauna species and is part of the cultural landscape of the Yaegl Aboriginal people.

The New South Wales *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each nature reserve. A draft plan of management for Woodford Island Nature Reserve was placed on public exhibition from 12<sup>th</sup> September until 15<sup>th</sup> December 2008. The submissions received were carefully considered before adopting this plan.

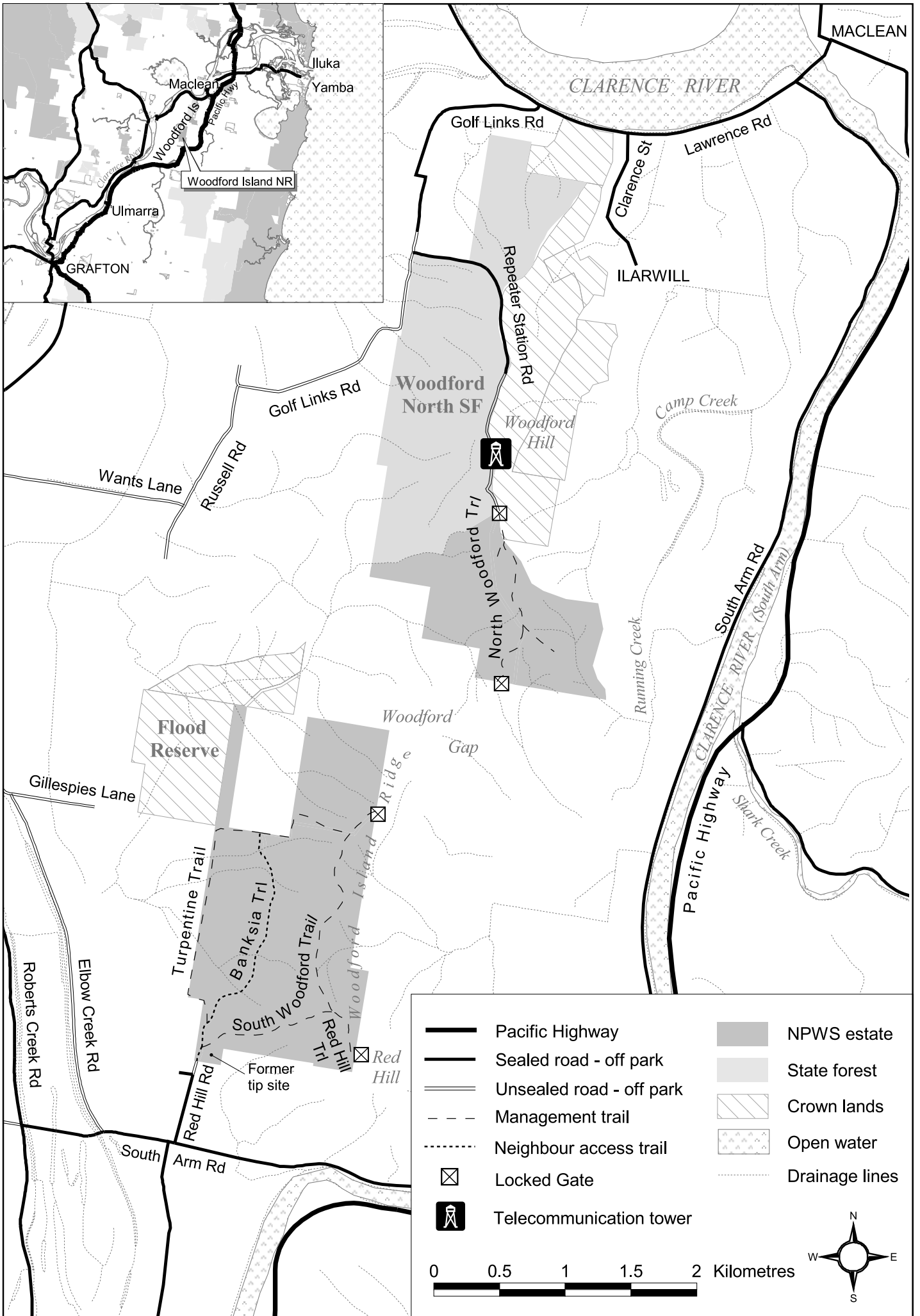
This plan contains a number of actions to achieve the State Plan priority to “Protect our native vegetation, biodiversity, land, rivers and coastal waterways”, including implementation of recovery actions for threatened species, control of weeds and pest animals, implementation of the reserve’s fire management strategy, and development and implementation of a revegetation strategy for areas requiring repair from past gravel extraction activities.

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

A handwritten signature in black ink, appearing to read 'Frank Sartor', with a long horizontal flourish extending to the right.

**Frank Sartor MP**

**Minister for Climate Change and the Environment**



## 1. WOODFORD ISLAND NATURE RESERVE

Woodford Island Nature Reserve (referred to herein as "the reserve") is located on Woodford Island in the lower reaches of the Clarence River, on the north coast of NSW (refer to Map 1). It is situated approximately six kilometres south-west of Maclean (29°27.6'S, 153°12'E), and 27 kilometres north-east of Grafton.

Woodford Island is the largest island and the island with the highest elevation in the Clarence River. Surveyor W.C.B. Wilson named Woodford Island either after his father-in-law General Woodford, under whom Wilson had fought during the Greek war of independence, or after his wife Elizabeth Woodford (McSwan 1974).

The reserve incorporates only a small part of the island, predominantly the higher elevation areas along Woodford Island Ridge. It protects dry forest vegetation types that are under-represented in the reserve system, and which also provide habitat for threatened animal species.

The reserve was created on 1 January 1999, in the lead up to the North East Regional Forest Agreement, through operation of the *Forestry and National Park Estate Act 1998* and following a comprehensive regional assessment of forest values. The reserve comprises two separate portions, totalling 374 hectares, which were formerly part of Woodford North and Woodford South state forests.

The northern section of the reserve adjoins the remaining portion of Woodford North State Forest, as well as Crown and privately owned lands. Part of the southern portion of the reserve adjoins Crown lands used for travelling stock and as a flood reserve. Privately owned lands surround the remainder of the southern portion of the reserve.

Contemporary land uses surrounding the reserve include forestry, quarrying, recreation, communications infrastructure, rural residential housing and agriculture. Agricultural activity in the area is generally restricted to beef cattle grazing and cane farming. Extensive quarrying operations have been undertaken for many years on Woodford Island on land west of the reserve and in areas further north. A radio transmission repeater station is located near the northern boundary of the reserve. The site of a small rubbish tip, which has been closed for a number of years, is located on the southern boundary of the reserve.

The reserve falls within the Clarence Valley Local Government Area and within the boundaries of the Yaegl Local Aboriginal Land Council, the Northern Rivers Catchment Management Authority and the Grafton Rural Lands Protection Board.

As well as Woodford Island Nature Reserve, the area covered by this plan includes two 'ministerial roads', which lie on land that is vested in the Minister administering the *National Parks and Wildlife Act 1974* (NPW Act) for the purposes of Part 11 of the Act. They were created to ensure the continuation of private property access arrangements that existed immediately before gazettal of the reserve. While ministerial roads do not form part of the gazetted nature reserve area, their management is subject to the provisions of this plan.

## **2. MANAGEMENT CONTEXT**

### **2.1 LEGISLATIVE AND POLICY FRAMEWORK**

The management of nature reserves in NSW and any Part 11 lands is in the context of a legislative and policy framework. This framework comprises primarily the *National Parks and Wildlife Act 1974* (NPW Act), the NPW Regulation, the *Threatened Species Conservation Act 1995* (TSC Act), and the policies of the National Parks and Wildlife Service (NPWS). These policies are compiled from the legislative background and internationally accepted principles of park management and relate to nature conservation, Aboriginal and historic heritage conservation, recreation, commercial use, research and communication.

Other legislation, international agreements and charters may also apply to management of the area. In particular, the NSW *Environmental Planning and Assessment (EP&A) Act 1979* may require the assessment and mitigation of environmental impacts of works proposed to be undertaken within the reserve.

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted a plan, it must be implemented and no operations may be undertaken within Woodford Island Nature Reserve except in accordance with the plan. The plan will also apply to any future additions to Woodford Island Nature Reserve. Where management strategies or works are proposed for the reserve (or any additions) that are not consistent with the plan, an amendment to the plan will be required.

### **2.2 MANAGEMENT PURPOSES AND PRINCIPLES**

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

Under the Act, nature reserves are managed to:

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

Nature reserves are valuable refuge areas, where natural processes, phenomena and wildlife can be studied. They differ from national parks in that they do not have the provision of visitor use as a management principle.

### **2.3 MANAGEMENT DIRECTIONS**

The primary emphasis of this plan is the conservation of the natural and cultural values of Woodford Island Nature Reserve. The following specific objectives apply to the management of Woodford Island Nature Reserve:

- Conserve the full range and condition of native flora and fauna, with an emphasis on the regeneration of native vegetation communities and conservation of significant species;
- Implement more natural fire regimes to protect and enhance biodiversity within the reserve;



- Encourage and assist regeneration of native vegetation in areas affected by gravel extraction within the reserve;
- Identify, protect and conserve Aboriginal sites and places of cultural significance in partnership with the Aboriginal community;
- Protect reserve values from inappropriate recreational uses and arson;
- Reduce the impact on reserve flora and fauna communities from weed and pest animal species located within the reserve; and
- Manage the reserve for low impact, self-reliant recreation and scientific investigation, consistent with its values and classification as a nature reserve.

### **3. DESCRIPTION OF THE RESERVE**

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

#### **3.1 NATURAL HERITAGE VALUES**

##### **3.1.1 Landform, hydrology, geology and soils**

The reserve is of low to medium elevation, lying mostly on the western slopes of Woodford Island Ridge. Altitude ranges from approximately 15 metres above sea level in the southern portion, to approximately 120 metres in the northern portion. Side slopes of greater than 20 degrees are common along ridgelines, however the majority of the reserve features slopes of between 5 and 10 degrees.

The reserve is situated on an island located in the estuary of the Clarence River, where average annual rainfall is 1100 to 1400 millimetres. Several unnamed and ephemeral drainage lines flow in a westerly direction through the reserve onto neighbouring lands.

Woodford Island lies near the eastern edge of the Clarence-Moreton sedimentary basin. The Mesozoic Kangaroo Creek Sandstone geological formation underlies most of the reserve, where the landscape is characterised by medium- to coarse-grained sandstone with infertile shallow loams. Sedimentary rocks of the Late Jurassic Grafton Formation underlie the western section of the southern portion of the reserve (Riddler & Hawkins 1981).

The reserve contains two soil landscapes characterised by sandy dark grey podzols and tenosols, which are generally of low fertility (Morand 2001). Soils at the surface are generally fine loamy sand, highly permeable and well drained, with sandy clay at depth. The Kooyong colluvial soil landscape is the major soil landscape within both

portions of the reserve and supports drier shrubby vegetation types often associated with sandstone soils. The Clay Hill erosional soil landscape occurs along the western boundary of the southern portion of the reserve. This area supports wetter vegetation types at lower elevations, such as paperbark forest.

Rock outcrops, typically comprising boulders and small overhangs, are common at higher elevations in the reserve. The sandy nature of the soil, combined with steep slopes, means soils are generally prone to erosion. The majority of the reserve has a moderate to high potential hazard for soil erosion, with high to extreme erodibility predicted for steeper parts of the reserve (Morand 2001). Soil erosion is an ongoing problem along the unsealed roads and trails in the reserve.

The reserve contains extensive areas where past gravel extraction was carried out by surface scalping, resulting in the exposure of the more erodible subsurface soil layers. Fortunately, quarrying activities were only undertaken on the gentler slopes in the area, limiting the potential for mass movement and sheet erosion. The nature of the scalping technique used to extract gravel from the area however poses problems for rehabilitation of the site. Large volumes of surface soil and gravel from around and in between mature trees were removed, permanently modifying the landform and its drainage patterns. Isolated large trees remain, growing on raised 'islands' of the original ground surface, with limited natural regeneration of vegetation occurring on the lower ground between them. It is highly likely that these remaining mature trees are unstable and will be blown over during periods of high wind. As this process occurs, action could be taken to restore a more natural ground surface and actively promote regeneration however, given the extensive nature of the quarrying activity, it is unlikely that resources will be available to undertake this process on a large scale.

### **3.1.2 Native plants**

The majority of the reserve is covered by a shrubby dry sclerophyll forest dominated by coastal blackbutt (*Eucalyptus pilularis*) and red bloodwood (*Corymbia gummifera*), some of which is in an old growth condition. Other forest communities present in the reserve feature grey gum (*E. propinqua*), grey ironbark (*E. siderophloia*), large-fruited spotted gum (*C. henryi*), Bailey's stringybark (*E. baileyana*), needlebark stringybark (*E. planchoniana*), turpentine (*Syncarpia glomulifera*) and red mahogany (*E. resinifera* subsp. *hemilampra*). Small patches of swamp sclerophyll forest, dominated by paperbarks (*Melaleuca* spp.) occur in the southern part of the reserve. The RFA identifies paperbark communities as being vulnerable in the Upper North East Region.

Past logging activities resulted in the removal of many of the larger trees from the reserve, as evidenced by the many tree stumps remaining in the reserve. Logging practices created numerous gaps in the forest canopy that have not completely recovered in some areas and extensive areas of regrowth.

In other parts of the reserve, the rugged nature of the topography restricted access for logging operations. These areas of old growth forest are considered to be of high conservation value because they contain many structural and compositional attributes that provide important fauna habitat.

The reserve is known to contain two significant plant species, and an additional six significant species are considered likely to occur (Table 1).

**Table 1 Significant plants known or predicted to occur in Woodford Island Nature Reserve**

Common name	Scientific Name	Significance*
<b>Known to occur within the reserve</b>		
bastard white mahogany	<i>Eucalyptus psammitica</i>	ROTAP
large-flowered milk vine	<i>Marsdenia liisae</i>	ROTAP
<b>Predicted to occur within the reserve</b>		
square-fruited ironbark	<i>Eucalyptus tetrapleura</i>	Vulnerable #
sandstone rough-barked apple	<i>Angophora robur</i>	Vulnerable #
a grass	<i>Paspalidium grandispiculatum</i>	ROTAP #
tapering-leaved bottlebrush	<i>Callistemon acuminatus</i>	ROTAP
hairy melichrus	<i>Melichrus hirsutus</i>	Endangered #
a shrub	<i>Leucopogon recurvicepalus</i>	ROTAP

Sources: Atlas of NSW Wildlife and NPWS (1999).

\* Significance given is either:

- Legal status under the NSW TSC Act (Endangered or Vulnerable); or
- Identified as a Rare or Threatened Australian Plant (ROTAP) by Briggs and Leigh (1996).

# Listed as threatened under the EPBC Act.

### 3.1.3 Native animals

The range in vegetation communities occurring within the reserve provides a diversity of habitats for native fauna. Four threatened and two migratory fauna species have been recorded within the reserve (Table 2). Although three systematic fauna surveys were undertaken in the southern portion of the reserve before 1999, no comprehensive targeted surveys have been undertaken and so it is likely that further surveys may confirm the presence of other threatened species within the reserve as a number is predicted to occur based on distribution and habitat requirements.

As well as providing foraging habitat for the threatened little bent-wing bat and grey-headed flying-fox, the reserve contains suitable roost sites for both species. Potential winter foraging habitat for nomadic nectivorous birds, such as the endangered regent honeyeater and swift parrot, is also present.

Vegetated public and private lands adjoining the reserve contribute to the connectivity of fauna habitats across Woodford Island. The western part of the southern portion of the reserve has been identified as regional key habitat for forest fauna and so is predicted to be an area of high conservation value (Scotts 2003).

The Priorities Action Statement prepared under the TSC Act identifies recovery actions and priorities for threatened species within NSW. The Priorities Action Statement and recovery plans will be used to guide management of threatened species in the planning area.

**Table 2 Significant fauna known or predicted to occur in Woodford Island Nature Reserve**

Common name	Scientific Name	Status*
<b>Known to occur within the reserve</b>		
eastern osprey	<i>Pandion cristatus</i>	Vulnerable
little bent-wing bat	<i>Miniopterus australis</i>	Vulnerable
large-footed myotis	<i>Myotis macropus</i>	Vulnerable
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>	^
white-throated needletail	<i>Hirundapus caudacutus</i>	^
brush-tailed phascogale	<i>Phascogale tapoatafa</i>	Vulnerable
<b>Predicted to occur within the reserve</b>		
white-crowned snake	<i>Cacophis harriettae</i>	Vulnerable
pale-headed snake	<i>Hoplocephalus bitorquatus</i>	Vulnerable
bush stone-curlew	<i>Burhinus grallarius</i>	Endangered #
glossy black-cockatoo	<i>Calyptorhynchus lathami</i>	Vulnerable
swift parrot	<i>Lathamus discolor</i>	Endangered #
square-tailed kite	<i>Lophoictinia isura</i>	Vulnerable
powerful owl	<i>Ninox strenua</i>	Vulnerable
grey-crowned babbler	<i>Pomatostomus temporalis</i>	Vulnerable
regent honeyeater	<i>Xanthomyza phrygia</i>	Endangered #
hoary wattled bat	<i>Chalinolobus nigrogriseus</i>	Vulnerable
eastern bent-wing bat	<i>Miniopterus schreibersii</i>	Vulnerable
squirrel glider	<i>Petaurus norfolcensis</i>	Vulnerable
eastern chestnut mouse	<i>Pseudomys gracilicaudatus</i>	Vulnerable
grey-headed flying-fox	<i>Pteropus poliocephalus</i>	Vulnerable #

Sources: Atlas of NSW Wildlife and NPWS (1999)

\* Status under the NSW TSC Act.

# Listed as threatened under the Commonwealth EPBC Act.

^ Listed as migratory under the EPBC Act.

## 3.2 CULTURAL HERITAGE VALUES

### 3.2.1 Aboriginal heritage

The reserve falls within the boundary of the Yaegl Local Aboriginal Land Council (LALC) and the traditional lands of the Yaegl people. Aboriginal communities have an association with and connection to the land. The land, water and biodiversity values within a landscape are central to Aboriginal spirituality and contribute to Aboriginal identity. Aboriginal heritage and nature are inseparable from each other. Aboriginal communities associate natural areas such as the reserve with the use and enjoyment of foods and medicines, caring for the land, passing on cultural knowledge and strengthening social bonds.

The most elevated areas of the reserve provide extensive views of the surrounding landscape. Aboriginal men used these areas as lookouts. Lookouts were important for a variety of reasons, such as observing the movement of people, animals and fire across the plains. It is likely these elevated areas were also used for other cultural practices but information available about these other uses is limited (Deidre King, Yaegl LALC, pers. comm. 2003).

No Aboriginal cultural heritage survey work has been undertaken in the reserve. Although Aboriginal sites have not been recorded within the reserve to date, several sites have been recorded in close proximity to the reserve on surrounding lands.

### 3.2.2 Historic heritage

Both the physical and cultural landscape began to change significantly from the time of European colonisation of the region. The first cedar-getting camp on the Clarence River was established on Woodford Island in 1837 and the Small family built and occupied a dwelling on the island that same year (Kass 1989; McSwan 1974). Settlement of the area began in earnest in 1841, when parts of the Clarence Valley along the river were surveyed for sale (Kass 1989).

Agriculture followed timber extraction as the major land use when cedar supplies began to dwindle. Large areas of the island were cleared of native vegetation in the 1850s to grow maize and, later, sugarcane. The port at Lawrence became important for shipping agricultural produce from the New England tablelands and the local area to markets in Sydney (Kass 1989). Ships for this purpose were built on Woodford Island (McSwan 1974). Stone for the Clarence River breakwall and training walls was quarried at the northern end of Woodford Island outside the reserve.

Gravel was also extracted from extensive areas in and adjacent to the reserve over a period of many years (see section 3.1.1), presumably to supply gravel for road making in other parts of the lower Clarence Valley. As described in 3.1.2, the reserve also has an extensive history of timber harvesting.

Grazing occurred in both portions of the reserve from 1850 (Blackmore & Edmonds 1993); these became occupational permits administered under the *Forestry Act 1916* when the areas were dedicated as state forest in 1917. The last of these permits expired in June 2000 following gazettal of the nature reserve. Graziers also used the area that is now the reserve, as well as adjoining Crown land, as a refuge area for livestock during flood events. Adjoining Crown land is a reserve dedicated for the purpose of providing refuge during floods and continues to provide for this purpose.

No sites of historical significance are known to exist within the reserve.

## 3.3 THREATS TO RESERVE VALUES

### 3.3.1 Introduced plants and animals

A number of weed species have been recorded in the reserve, including groundsel bush (*Baccharis halimifolia*), lantana (*Lantana camara*), coastal morning glory (*Ipomoea indica*), white passionflower (*Passiflora subpeltata*), corky passionflower (*Passiflora suberosa*), cassia (*Senna septemtrionalis* (syn. *Senna X. floribunda*)) and Parramatta grass (*Sporobolus fertilis*). Weed species have been assessed as posing a minor management problem within the reserve (DECC 2008). Wetter gullies closer to farmlands and roadsides within the reserve are most likely to be affected by weeds.

The common Indian myna (*Acridotheres tristis*) has recently been recorded from the reserve, although no breeding colonies are currently known to occur in the reserve. Regarded by the World Conservation Union as one of the world's 100 most invasive species, common mynas are aggressive birds and can out-compete both native birds and mammal species for food and nesting sites (DECC 2008).

The European red fox (*Vulpes vulpes*) has also been recorded in the reserve. While mainly preying on native ground fauna up to five kilograms, foxes may also impact upon neighbouring stock and are known to spread weed seeds (DECC 2008).

Livestock and domestic animals from adjacent lands may occasionally stray into parts of the reserve where fencing is inadequate or absent. Although not bound by legislation to provide for fencing of reserves, the NPWS recognises that cooperative boundary fencing may enhance conservation values and resolve management problems within reserves. A number of adjoining landholders have been given fencing assistance over recent years.

Visitors occasionally bring domestic animals into the reserve, particularly dogs, and ride horses in the reserve (see section 3.3.3).

### **3.3.2 Inappropriate fire regimes**

Fire is a natural feature of the environment of the reserve and is essential to the survival of some plant communities. Inappropriate fire regimes, however, can cause loss of some plant and animal species and communities. Fire can also damage cultural features and assets, such as fences, and can threaten assets on neighbouring land. High frequency fire has been identified as a key threatening process affecting the biological diversity of NSW and is considered to be a threat to biodiversity in the reserve.

Fire records are only available since the area became a reserve. Since 2000, there have been a number of fires in the northern section of the reserve, with potential impacts on biodiversity values in this part of the reserve due to the frequency of these fires.

A variety of fire regimes is needed to maintain natural diversity and for the successful regeneration of threatened plants predicted to occur within the reserve (NPWS 2002). Fire must be managed to promote regeneration of these and other significant flora species within the reserve.

Fauna species are also threatened by fire, particularly from too frequent, intense or extensive fires. Loss of habitat resources, such as stags, fallen logs and trees with hollows, will affect the ability of fauna populations to recolonise a burnt area and the continuing viability of populations (RACAC 1996).

Ecological research in fire-prone ecosystems has established some general principles relating to fire regimes and the conservation of biodiversity. That is, groups of plants and animals respond similarly to fire according to characteristics of their life history. Therefore it is not necessary to individually specify fire regimes for the conservation of every species. Requirements for most plant species can be summarised on the basis of vegetation communities and there is a threshold in fire regime variability that marks a critical change from high species diversity to low species diversity (Kenny *et al.* 2004).

### **3.3.3 Inappropriate recreational activities**

Given the presence of highly erodible soil types and steep slopes within the reserve, recreational vehicle use and horse riding pose a significant threat to reserve values. Trail bike riding in particular has the potential to damage trail surfaces and erosion mitigation structures such as cross drains. The sandy nature of the soils means that trail drainage works are easily damaged, leaving the network of trails in the reserve subject to erosion.

Significant erosion can occur in a short period. Potential climate change factors, such as increased storm and severe rainfall events (see section 3.3.4), will exacerbate these impacts, and affect soil stability and water quality within the reserve.

### **3.3.4 Climate change**

Anthropogenic 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, more intense but possibly reduced annual average rainfall, increased temperature extremes and higher evaporation. These changes are likely to lead to greater intensity, duration and frequency of fires, more severe droughts and increased occurrences of flood and severe storm events.

Climate change may significantly affect native biodiversity by changing the distribution of species, modifying species composition, and altering the geographical extent of habitats and ecosystems. Species most at risk are those unable to migrate or adapt, particularly those with small population sizes or with slow growth rates. The potential impact of climate change on the reserve's values is difficult to assess since it depends on the compounding effects of other pressures, particularly barriers to migration and pressure from weeds and feral animals. Programs to reduce pressures arising from the threats discussed above will help reduce the severity of the effects of climate change on the reserve.

## **3.4 USE OF THE RESERVE**

### **3.4.1 Access and visitor use**

Access to the reserve is by Repeater Station Road from the north or via Red Hill Road from the south (Map 1). There is an internal network of trails in the reserve but, given the fragile nature of the erodible soils and the steep topography of much of the reserve, these are intended primarily for use by management vehicles only. Several former snigging tracks, initially created to haul logs from areas, have been closed and allowed to regenerate naturally because they are not required for reserve management or access.

Privately owned land separates the two portions of the reserve. Two roads within the reserve (Banksia Trail and North Woodford Trail) were excluded from the reserve's gazettal to provide continuing access to private property. North Woodford Trail is no longer required as an access road, however Banksia Trail remains the only practical means of access to two neighbouring properties.

No formal recreation facilities exist within the reserve. The reserve currently receives low levels of use for low-impact, nature-based recreation, such as bird watching and bushwalking, and such uses are considered consistent with the purposes of a nature reserve. Higher impact recreational activities, such as horse riding, recreational trail-bike riding and four-wheel driving also currently occur within the reserve, and are considered an ongoing threat to reserve values (see section 3.3.3).

Other national parks and nature reserves in the region provide a range of visitor facilities and opportunities, which complement those provided within the reserve. For example, Yuraygir and Bundjalung national parks along the coast provide for activities such as camping, caravanning, picnicking, canoeing, fishing, bird watching, bushwalking and four-wheel driving. Other nature reserves in the area provide for passive recreational pursuits such as bushwalking, bird watching and the appreciation

of scenic views. Recreation opportunities and facilities also exist in nearby state forests, for pursuits such as car touring, bushwalking, cycling and the enjoyment of scenic sites (NPWS & SFNSW 2001).

Reserve signage located at both the northern and southern entrances to the reserve, identifies activities that may or may not occur within the reserve. Internal trail signage is positioned at the commencement and intersection of all management trails within the reserve.

### **3.4.2 Other uses**

Two licensed apiary sites are located within the reserve. These sites are recognised as existing interests under the NPW Act and are managed in accordance with NPWS policy. The NPWS policy on beekeeping permits existing apiary sites to continue, but does not allow the development of new or additional sites. The existing apiary sites are limited in size and are maintained by mowing or slashing. Access to the sites is via management trails and short access trails within the reserve.



## 4. MANAGEMENT ISSUES AND STRATEGIES

Current situation	Desired outcomes	Management response	Priority
<p><b>4.1 SOILS AND HYDROLOGY</b></p> <p>Steep slopes and highly erodible soils occur within both sections of the reserve.</p> <p>The reserve has been subject to various disturbances from past landuses, including gravel and timber extraction. Surface scalping for gravel has resulted in modified landforms and drainage patterns.</p> <p>The old tip site on the southern boundary may be a future pollution source. There is also dumped rubbish elsewhere in the reserve.</p> <p>Some sections of management trails within the reserve are prone to erosion and require works to reduce soil loss and ensure safe access for management purposes. Unauthorised use of these trails by vehicles, particularly trail bikes, is the principal cause of ongoing damage to trail surfaces and erosion mitigation works.</p>	<p>Soil erosion from reserve management activities and visitor use is minimised.</p> <p>Areas subjected to past soil disturbance are restored.</p> <p>Water quality and health of watercourses in the reserves are maintained or improved.</p> <p>Natural flow regimes are restored in disturbed areas.</p>	<p>4.1.1 Undertake all works, such as trail maintenance and fire management, in accordance with best practice principles for soil erosion mitigation and water quality conservation.</p> <p>4.1.2 As resources and opportunities permit, undertake drainage and soil profile rehabilitation works in disturbed areas to restore a more natural ground surface and drainage flows.</p> <p>4.1.3 Monitor disturbed areas and take action to arrest erosion and remove rubbish where needed.</p> <p>4.1.4 Investigate whether the old tip site has the potential to become a future pollution source and undertake any necessary remediation works.</p> <p>4.1.5 Restrict vehicle access within the reserve to management and other authorised purposes only (refer strategies 4.4.3 and 4.7.1).</p>	<p>High</p> <p>Medium</p> <p>High</p> <p>Medium</p> <p>High</p>

Current situation	Desired outcomes	Management response	Priority
<p><b>4.2 NATIVE PLANTS AND ANIMALS</b></p> <p>Remnant areas of old growth forest in the reserve are of high conservation value; much of the vegetation however is disturbed by past logging.</p> <p>Several significant plant and animal species are known to occur within the reserve and more significant species are predicted to occur.</p> <p>Recovery actions for threatened species are contained in the Priorities Action Statement prepared under the TSC Act. Targeted surveys are a priority action for many of the species predicted to occur in the reserve. Limited biodiversity surveys have been carried out in the reserve to date.</p> <p>Areas of previous disturbance occur in the reserve. There is little natural revegetation occurring on the sites subjected to gravel extraction or the former tip. The tip site should be kept with a cover of grass to minimise the possibility of it becoming a future pollution source (refer 4.1.4).</p> <p>Vegetated areas on adjacent private and Crown land are important in providing connectivity between vegetation communities and habitats.</p>	<ul style="list-style-type: none"> <li>The diversity of the reserve's native plant and animal communities is maintained, along with habitat diversity.</li> <li>Understanding of the reserve's flora and fauna and their ecological needs is improved.</li> <li>Conservation and corridor values of the reserve are enhanced by sympathetic management of adjacent land.</li> <li>Cleared and disturbed areas are rehabilitated to restore structural diversity and habitat values.</li> </ul>	<p>4.2.1 Encourage birdwatchers, neighbours and other reserve visitors to report sightings of native plants and animals occurring in the reserve.</p> <p>4.2.2 Encourage or undertake appropriate research within the reserve that increases knowledge of vegetation communities, native flora and fauna species, their distribution and conservation needs, including targeted surveys for threatened species.</p> <p>4.2.3 Implement other relevant recovery actions for threatened species in the reserve as identified in the Priorities Action Statement.</p> <p>4.2.4 Develop and implement a revegetation strategy for areas requiring repair from past gravel extraction activities. Appropriate local genetic stock will be used in all regeneration actions.</p> <p>4.2.5 Work with neighbours, local Landcare groups, Clarence Valley Council and the Northern Rivers Catchment Management Authority to encourage conservation of vegetation in the vicinity of the reserve, particularly in areas with significant value as vegetated corridors.</p>	<p>Medium</p> <p>Medium</p> <p>Medium</p> <p>Medium</p> <p>Medium</p>

Current situation	Desired outcomes	Management response	Priority
<p><b>4.3 CULTURAL HERITAGE</b></p> <p>Although sites of cultural significance have not been recorded within the reserve to date, the reserve and surrounding landscape have a long history of use by people.</p> <p>The reserve forms part of traditional Yaegl lands, with several Aboriginal sites recorded on nearby lands.</p> <p>No formal cultural heritage surveys have been conducted in the reserve. It is important that the local community is involved in the recording and protection of the reserve's cultural values.</p>	<ul style="list-style-type: none"> <li>Any Aboriginal or historic heritage features or values are identified, conserved and managed in accordance with their significance.</li> <li>Aboriginal heritage values are protected in partnership with the local Aboriginal community.</li> </ul>	<p>4.3.1 Record and protect Aboriginal sites, places of significance and other values associated with the planning area in consultation with the Aboriginal community.</p> <p>4.3.2 Undertake or encourage an Aboriginal heritage survey within the reserve, as funds permit, in partnership with the Yaegl Local Aboriginal Land Council.</p> <p>4.3.3 Encourage further research into the cultural heritage values in the reserve.</p>	<p>High</p> <p>Medium</p> <p>Medium</p>

Current situation	Desired outcomes	Management response	Priority
<p><b>4.4 VISITOR USE</b></p> <p>The reserve experiences low levels of recreational use. There are no recreational facilities or interpretive signs within the reserve and no information brochure has been produced for the reserve.</p> <p>Management trails within the reserve are not intended for vehicular access by the general public, due to the high potential for soil erosion and potential to damage significant plants. Horse riding, trail bike riding, four-wheel driving and camping are also considered inappropriate because they have the potential to impact upon reserve values.</p> <p>Arson, and illegal firewood and bush-rock collection are other threats to the reserve associated with unauthorised vehicle use of the reserve.</p>	<ul style="list-style-type: none"> <li>• Visitor use is low key, self-reliant and does not impact on reserve values.</li> <li>• The local community and visitors understand the values of the reserve and support management programs.</li> <li>• Educational opportunities are provided, consistent with reserve values and dependant on reserve access opportunities.</li> <li>• Threats to the natural values of the reserve, such as arson and illegal firewood and bush-rock collection, are removed.</li> </ul>	<p>4.4.1 In addition to regulatory signage at the reserve boundaries, provide interpretive and minimal impact use information explaining the role of nature reserves and threatened species occurring within the reserve, their management requirements and potential threats.</p> <p>4.4.2 Low key self-reliant activities such as bushwalking, photography and bird watching are allowed in the reserve.</p> <p>4.4.3 Public vehicle access, horse riding, camping and campfires within the reserve are prohibited, to protect reserve values.</p> <p>4.4.4 Group educational activities that are consistent with the values of the reserve are allowed, subject to conditions on group size, activities and location to protect reserve values and minimise conflict with other users and neighbours.</p> <p>4.4.5 Monitor impacts of visitor use through regular patrols in the reserve and undertake measures to reduce impacts where they are found to be unacceptable.</p> <p>4.4.6 Encourage members of the public to report incidents of suspected arson, and illegal firewood or bush-rock collection.</p>	<p>Low</p> <p>Ongoing/ Medium</p> <p>High</p> <p>Low</p> <p>Medium</p> <p>High</p>

Current situation	Desired outcomes	Management response	Priority
<p><b>4.5 INTRODUCED SPECIES</b></p> <p>A number of weed species have been recorded in the reserve. Although a comprehensive survey has not been undertaken, it is considered that weeds currently pose a minor problem within the reserve. The main species of concern are several noxious weeds (namely, groundsel bush, lantana and giant Parramatta grass) as well as coastal morning glory.</p> <p>Pest animals such as Indian mynas and foxes are also present, although currently in low numbers. Domestic stock occasionally stray into the reserve where fencing is in poor condition or absent. They have the potential to introduce weed seeds and increase soil erosion.</p> <p>Pest species management in the reserve is carried out in accordance with the priorities of the NPWS regional pest management strategy (DECC 2008).</p>	<ul style="list-style-type: none"> <li>The impact of introduced species on native species, reserve values and neighbouring lands is minimised.</li> <li>Population size and distribution of introduced species are reduced.</li> <li>Control of introduced species has minimal impact on native species.</li> <li>Boundary fences are maintained to prevent straying livestock entering the reserve.</li> </ul>	<p>4.5.1 Undertake priority pest species control in the reserve, in accordance with the NPWS North Coast regional pest management strategy.</p> <p>4.5.2 Encourage research into the distribution and impact of pest species within the reserve and appropriate control measures.</p> <p>4.5.3 Seek the cooperation of neighbours in implementing pest control programs.</p> <p>4.5.4 Assess the condition of boundary fencing and fence-line clearings, and prioritise the need for additional fencing to prevent livestock entering the reserve. Where appropriate, negotiate fencing agreements with neighbours to exclude livestock, in accordance with the NPWS Boundary Fencing Policy, the priorities identified for the reserve and available funding.</p> <p>4.5.5 Ensure any domestic stock found within the reserve are promptly removed. The use of horses by neighbours to remove stray stock will require consent from NPWS.</p>	<p>High</p> <p>Low</p> <p>High</p> <p>Medium</p> <p>High</p>
<p><b>4.6 FIRE MANAGEMENT</b></p> <p>The reserve has experienced a number of fires in recent years as a result of arson or escaped prescribed burns from neighbouring properties.</p> <p>The Clarence Valley Bush Fire Risk</p>	<ul style="list-style-type: none"> <li>Life, property and natural and cultural values in and adjacent to the reserve are identified and</li> </ul>	<p>4.6.1 Continue to participate in the Clarence Valley Bush Fire Management Committee. Maintain coordinated and cooperative arrangements with the Rural Fire Service Brigades and Fire Control Officers, Forests NSW and other neighbours with regard to fuel management and fire suppression.</p>	<p>High</p>

Current situation	Desired outcomes	Management response	Priority
<p>Management Plan identifies the reserve has a moderate bushfire risk. Fires in the reserve are considered unlikely to threaten neighbouring land or assets due to the reserve's position in the landscape and the presence of fuel-reduced zones along property boundaries in order to minimise the potential spread of bushfires across tenures.</p> <p>A separate fire management strategy for the reserve has been prepared. This zones the reserve as a Land Management Zone to protect its natural and cultural heritage values. Prescribed fire may be used to achieve a variety of fire regimes in appropriate vegetation types.</p> <p>Management trails within and adjacent to the reserve act as potential control lines from which fires within the reserve as well as on other tenures can be controlled.</p>	<p>protected from unplanned fire.</p> <ul style="list-style-type: none"> <li>• Fire regimes are appropriate for the conservation and enhancement of native flora and fauna communities.</li> <li>• The potential for spread of bushfires on, from, or into the reserve is reduced.</li> <li>• Neighbours and nearby communities appreciate the requirements for, and cooperate in applying, fire management objectives and prescriptions for the reserve.</li> </ul>	<p>4.6.2 Implement the reserve's fire management strategy, and update as required.</p> <p>4.6.3 Where possible, exclude fire from fire-sensitive plant communities, cultural features (should they be found) and recently burnt areas.</p> <p>4.6.4 Monitor the impacts of fire on ecosystems within the reserve.</p> <p>4.6.5 Maintain management trails shown on Map 1 to provide adequate access for management purposes (refer to section 4.7).</p> <p>4.6.6 Encourage reserve neighbours to maintain existing fire control lines on their properties to prevent fire entering the reserve.</p>	<p>High</p> <p>High</p> <p>Medium</p> <p>High</p> <p>High</p>
<p><b>4.7 MANAGEMENT OPERATIONS AND OTHER USES</b></p> <p>The reserve contains a network of trails which are required for the ongoing management of the reserve, including fire control. A trail across the private lands separating the two portions of the reserve is used by NPWS for access between the two portions.</p>	<ul style="list-style-type: none"> <li>• Management trails adequately serve access requirements for management, the relevant private landholder and other relevant authorities, and have an</li> </ul>	<p>4.7.1 Install locked gates on management trails to prevent unauthorised vehicular access.</p> <p>4.7.2 Undertake maintenance works on management trails as necessary to allow adequate access for management purposes and to mitigate soil erosion. All trails will be maintained to a dry-weather four-wheel drive standard.</p> <p>4.7.3 Subject to the negotiation of a licence with the relevant</p>	<p>High</p> <p>High</p> <p>High</p>

Current situation	Desired outcomes	Management response	Priority
<p>Signposting indicates that public vehicles are not permitted within the reserve, however unauthorised use still occurs, causing damage to trails both on the reserve and on neighbouring private property.</p> <p>Banksia Trail and North Woodford Trail are ministerial roads (i.e. their corridors were excluded from the reserve's gazetta) to ensure continued access to neighbouring private land. North Woodford Trail is not needed for private property access except during flood times.</p> <p>Two apiary sites are licensed within the reserve.</p>	<p>acceptable impact on the natural and cultural values of the reserve.</p> <ul style="list-style-type: none"> <li>Existing non-NPWS uses are managed to minimise impacts on natural and cultural values, scenic values and reserve infrastructure.</li> <li>Any proposed non-NPWS use or infrastructure within the reserve is for purposes consistent with the NPW Act.</li> </ul>	<p>landholders, continue to permit North Woodford Trail to be used as private access during flood times.</p> <p>4.7.4 Allow the relevant landholders to transport animals through the reserve, in the most convenient way that also has the least impact on the reserve's values, and subject to a formal consent.</p> <p>4.7.5 Negotiate formal access agreements with the relevant landholders to ensure ongoing NPWS access on the private trail linking the two portions of the reserve.</p> <p>4.7.6 Seek to have North Woodford Trail added to the reserve.</p> <p>4.7.7 Continue to allow Banksia Trail to be used for private property access at existing use levels. Should levels of use increase, seek to make private property access arrangements for Banksia Trail subject to a formal licence. Conditions on the licence will include contributions towards trail maintenance.</p> <p>4.7.8 If at some future time Banksia Trail is no longer required for private property access, the trail will be closed to public use and maintained as a management trail.</p> <p>4.7.9 Continue to license and manage the two apiary sites within the reserve in accordance with NPWS policy. Apiary sites that significantly compromise the environmental values of the area will be relocated in consultation with licensees.</p>	<p>High</p> <p>Medium</p> <p>Low</p> <p>Medium</p> <p>High</p> <p>Medium</p>

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

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

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

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