

**RAWDON CREEK NATURE RESERVE**  
**PLAN OF MANAGEMENT**

**NSW National Parks and Wildlife Service**

**February 2004**

**This plan of management was adopted by the Minister for the Environment on 5 February 2004.**

**Acknowledgments**

This plan of management was prepared by NPWS Macleay Area staff, NPWS Mid-North Coast Regional staff and the NPWS Northern Directorate Planning Group.

**Further information**

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**NSW National Parks and Wildlife Service**

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## FOREWORD

Rawdon Creek Nature Reserve is located on the Mid North Coast of NSW, in the lower Hastings River catchment. The reserve is 20 km north of Port Macquarie and 30 km south of Kempsey.

The reserve is mainly covered by dry forest, with moist heath and fen in the drainage lines. There is also a bog and fen (saltmarsh) community covering an area of approximately 7 ha, occurring with acid sulphate soils and estuarine mangroves. The reserve is particularly important as it contains the largest protected stand of low relief coastal blackbutt, a forest ecosystem that is restricted to this region.

Three sites showing the earthworks for an old convict road are located within the reserve.

The reserve currently receives a low level of visitor use, however, it is used as an access route to Thurlings Road which leads to a fishing site on Rawdon Creek within Cairncross State Forest. Forest Hut Road will continue to provide public access through to Thurlings Road.

The New South Wales *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each nature reserve. A plan of management is a legal document that outlines how a reserve will be managed in the years ahead.

A draft plan of management for Rawdon Creek Nature Reserve was placed on public exhibition for three months from 18<sup>th</sup> October 2002 until 3<sup>rd</sup> February 2003. The exhibition of the plan of management attracted 9 submissions which raised 9 issues. All submissions received were carefully considered before adopting this plan of management.

This plan of management establishes the scheme of operations for Rawdon Creek Nature Reserve. In accordance with section 76 of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.

**BOB DEBUS**  
**Minister for the Environment**

## 1. NATURE RESERVES IN NEW SOUTH WALES

### 1.1 LEGISLATIVE AND POLICY FRAMEWORK

The management of nature reserves in NSW is in the context of a legislative and policy framework, primarily the *National Parks and Wildlife Act 1974* (NPW Act), the NPW Land Management Regulation, the *Threatened Species Conservation Act 1995* (TSC Act) and the policies of the National Parks and Wildlife Service (NPWS). Section 72AA of the NPW Act lists the matters to be considered in the preparation of a plan of management. The policies arise from the legislative background and internationally accepted principles of park management. They relate to nature conservation, Aboriginal and historic heritage conservation, recreation, commercial use, research and communication.

Other legislation, international agreements and charters may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979* (EPA Act) requires the assessment and mitigation of environmental impacts of any works proposed in this plan.

The planning area includes one 'Ministerial road', Forest Hut Road, which is vested in the Minister for the Environment on behalf of the Crown for the purposes of Part 11 of the NPW Act. Ministerial roads were created under section 13 of the *Forestry and National Parks Estate Act 1998* to ensure the continuation of access arrangements which existed immediately before the park's creation. This primarily relates to use of these roads for timber hauling and private property access. Whilst Ministerial roads do not form part of the gazetted park area, the management of these roads is subject to the provisions of this plan, the NPW Act's *Land Management Regulations 1995* and the requirements of the EP&A Act.

### 1.2 MANAGEMENT OBJECTIVES

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

Under the Act, nature reserves are managed to:

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

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

## **2. RAWDON CREEK NATURE RESERVE—BASIS FOR MANAGEMENT**

This plan applies both to the land currently reserved as Rawdon Creek Nature Reserve and to any future additions to the reserve. Where management strategies or works proposed for the reserve or any additions are not consistent with the plan, an amendment to the plan will be required.

### **2.1 LOCATION, GAZETTAL AND REGIONAL SETTING**

Rawdon Creek Nature Reserve (hereafter called “the reserve”) is located on the Mid North Coast of NSW, in the lower Hastings River catchment. The reserve is 20 km north of Port Macquarie and 30 km south of Kempsey, immediately on the western side of the Pacific Highway, 5 km north of Dennis Bridge. The reserve was formerly part of Cairncross State Forest and was gazetted on 1 January 1999 as part of the Regional Forest Agreement (RFA) process, to cover an area of 560 ha.

Lands to the north, west and to the east on the opposite side of the Pacific Highway are mainly Cairncross State Forest, with some Council property to the north-west. Lands to the south are primarily cleared for grazing, with some rural residential development.

The reserve is within the Hastings Local Government area, the Kempsey Rural Lands Protection Board area, the Birpai Local Aboriginal Land Council area and the Mid North Coast Catchment Management Board area.

#### **Regional Forest Agreements**

RFA are one of the principal means of implementing the National Forest Policy Statement of 1992. Under this Statement, Commonwealth, State and Territory governments agreed to work towards a shared vision for Australia’s forests. This aimed to maintain native forest estate, manage it in an ecologically sustainable manner and develop sustainable forest-based industries. The Statement provided for joint comprehensive assessments of the natural, cultural, economic and social values of forests. These assessments formed the basis for negotiation of Regional Forest Agreements that provide, amongst other things, for Ecologically Sustainable Forest Management.

The North East RFA covers the planning area. The process leading up to the RFA provided for major additions to the reserve system, including establishment of Cooperabung Creek Nature Reserve.

### **2.2 LANDSCAPE CONTEXT**

Natural and cultural heritage and on-going use are strongly inter-related and together form the landscape of an area. Much of the Australian environment has been influenced by past Aboriginal and non-Aboriginal land use practices and the activities of modern day Australians continue to influence bushland through recreational use, cultural practices, the presence of introduced plants and animals and in some cases air and water pollution.

The geology, landform, climate and plant and animal communities of the area, plus its location, have determined how it has been used by humans. The estuarine environment of the Rawdon Creek Nature Reserve was a food source for Aboriginal people, while the vegetation communities of have been managed for timber production, resulting in a network of logging and snig trails. The location and accessibility of the reserve has lead to contemporary access or use that is incompatible with the current tenure as a nature reserve.

Both Aboriginal and non-Aboriginal people place cultural values on natural areas, including aesthetic, social, spiritual, recreational and other values. Cultural 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 and cultural heritage, non-human threats and on-going use are dealt with individually, but their inter-relationships are recognised.

## **2.3 NATURAL AND CULTURAL HERITAGE VALUES**

### **Landform, Geology and Soils**

The reserve consists of gently sloping terrain, with an elevation rising from near sea level to just 30 m. The majority of the reserve is on Permian mudstones. There are areas of very low elevation with saline and acid sulphate soils.

The soils in the reserve are chiefly derived from the weathering of parent rock *in situ*. They are low in fertility and subject to gully erosion (Atkinson 1999). Gully erosion is limited by the low relief of the topography, but evidenced by the entrenched creeks.

### **Catchment values**

The area receives a moderate annual rainfall, averaging between 1300 mm to 1400 mm. This rainfall drains largely into Tommy Owens Creek and Rawdon Creek. These creeks both flow southwards into Munns Channel, in the lower tidal reaches of the Hastings River.

### **Native Plants**

A survey for forest types (SFNSW 1965) reveals that dry forest types occupy approximately 90% of the reserve, with moist heath and fen in the drainage lines (Table 1). There is also a bog and fen (saltmarsh) type covering an area of approximately 7 ha, occurring with acid sulphate soils and estuarine mangroves in the area of Tommy Owens Creek.

A survey of flora (Kendall & Kendall 2001) found nine vegetation associations, which are listed in Table 2. The reserve is particularly important as it contains the largest protected stand of low relief coastal blackbutt (*E. pilularis*), a forest ecosystem that is restricted to this region.

**Table 1** Forest types of the reserve

Overstorey species	Approx. % of area
dry blackbutt ( <i>Eucalyptus pilularis</i> )	74.8
scrub	8.1
bog and fen	0.8
blackbutt plantation (1976 planting)	12.6
grey gum, grey ironbark, white mahogany ( <i>E.punctata</i> , <i>E.siderophloia</i> , <i>E. acmenoides</i> )	3.8

**Table 2** Vegetation associations occurring in the reserve.

Name	Upper strata
Dry grassy blackbutt-tallowwood	<i>Eucalyptus pilularis</i> , <i>E. microcorys</i>
Low relief coastal blackbutt	<i>Corymbia intermedia</i> , <i>E. resinifera</i> , <i>E. pilularis</i> .
Mangrove	<i>Avicennia marina var australasica</i>
Paperbark	<i>Melaleuca quinquenervia</i> , <i>M. linariifolia</i> , <i>M. styphelioides</i> , <i>Callistemon salignus</i>
Red mahogany*	<i>E. resinifera</i> , <i>E propinqua</i> , <i>E siderophloia</i>
Saltmarsh	No upper strata
Swamp mahogany	<i>E. robusta</i> , <i>E. propinqua</i> , <i>M. quinquenervia</i>
Swamp oak	<i>Casuarina glauca</i> , <i>E. crebra</i> , <i>M. quinquenervia</i>
Forestry plantations	<i>E. pilularis</i>

\* This community may be rare community or it may be a variant of another community modified by logging or timber stand improvement.

The same survey found 193 plant species on the reserve of which 11 are introduced species (refer table 6). Six significant species were also found to occur on the reserve (refer table 3).

**Table 3** Significant plants known to occur in the reserve

Common name	Scientific name	Significance
geebung	<i>Persoonia stradbokensis</i>	southern limit of distribution
southern red mahogany	<i>Eucalyptus resinifera ssp resinifera</i>	northern limit of distribution
pomaderris	<i>Pomaderris ferruginea</i>	northern limit of distribution
trefoil	<i>Desmodium nemorosum</i>	southern limit of distribution
solanum	<i>Solanum densevestitum</i>	southern limit of distribution
dwarf blue trumpet	<i>Brunoniella pumilio</i>	northern limit of distribution

The reserve was modelled during the comprehensive regional assessment (CRA) process as potentially containing threatened plant species listed under the TSC Act.

These species are the rare vine *Cynanchum elegans* and the endangered *Grevillia guthrieana*. *G. guthrieana* is also listed as endangered under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

### Native Animals

Past land use activities in the reserve have brought about some alteration to the natural ecosystem, however, a small number of old, senescent or dead trees remain to provide nesting hollows.

A formal fauna survey was undertaken by NPWS in 1999. Six species listed as vulnerable under the TSC Act are known to occur within the reserve (Table 4).

**Table 4** Threatened species known to occur in the reserve

Common name	Scientific name	Status under TSC Act
<b>Mammals</b>		
little bent-wing bat	<i>Miniopterus australis</i>	Vulnerable <sup>r</sup>
koala	<i>Phascolarctos cinereus</i>	Vulnerable <sup>r</sup>
<b>Birds</b>		
osprey	<i>Pandion haliaetus</i>	Vulnerable <sup>r</sup>
masked owl	<i>Tyto novaehollandiae</i>	Vulnerable <sup>r</sup>
square-tailed kite	<i>Lophoictinia isura</i>	Vulnerable <sup>r</sup>
glossy black-cockatoo	<i>Calyptorhynchus lathami</i>	Vulnerable <sup>r</sup>
powerful owl	<i>Ninox strenua</i>	Vulnerable <sup>r</sup>
<b>Amphibians</b>		
green-thighed frog	<i>Litoria brevipalmata</i>	Vulnerable

<sup>r</sup> recovery plan in preparation.

The vulnerable grass owl (*Tyto capensis*) is known to occur near the reserve.

The reserve was modelled during the CRA process as providing suitable habitat for other threatened species. The species that are predicted to occur within the reserve are shown in Table 5.

**Table 5** Significant animals predicted by modelling to occur within the reserve

Common name	Scientific name	Status under TSC Act
<b>Mammals</b>		
greater broad-nosed bat	<i>Scoteanax rueppellii</i>	Vulnerable
grey-headed flying-fox	<i>Pteropus poliocephalus</i>	Vulnerable
yellow-bellied glider	<i>Petaurus australis</i>	Vulnerable <sup>r</sup>
eastern free-tail bat	<i>Mormopterus norfolkensis</i>	Vulnerable
large-footed myotis	<i>Myotis adversus</i>	Vulnerable
squirrel glider	<i>Petaurus norfolcensis</i>	Vulnerable
<b>Birds</b>		
swift parrot	<i>Lathamus discolor</i>	Endangered <sup>^</sup>

<sup>r</sup> recovery plan in preparation

<sup>^</sup> also listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999*



A survey of animal species conducted for the waste management facility to the north-west of the reserve (Hastings Council 1999) included part of the land now gazetted as Rawdon Creek Nature Reserve. This survey found those species listed in Table 5 and predicted that the brush-tailed phascogale (*Phascogale tapoatafa*), listed as vulnerable under the TSC Act, was likely to occur in the area.

Micro-bats are relatively abundant and the reserve may be an important foraging habitat for larger and faster flying species of bats, as there is a more diverse forest structure in the reserve than in the surrounding lands. In addition the reserve contains regionally important key fauna habitats and links the Ballengarra-Cairncross regional fauna corridor to the estuarine environment.

NPWS is required by the TSC Act to prepare and implement recovery plans for all listed threatened species. These are progressively being prepared and will be used to guide management of threatened species in the area.

### **Aboriginal Heritage**

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

The reserve is in the Birpai tribal area and Birpai Local Aboriginal Land Council area. There have been no Aboriginal sites recorded on the reserve.

The reserve borders an estuarine environment that was a food source for Aboriginal people, thus the creek banks are likely to contain middens of shellfish material. There are three known open camp sites as well as isolated stone artefact scatters in Cairncross State Forest, immediately to the north.

### **Non Aboriginal Heritage**

Three sites showing the earthworks for an old convict road are located within the reserve (Hastings Council 1999), near Blackbutt, Forest Hut and Berts roads. The sites have not been recorded in the historic sites register. The reserve was formerly part of the Cairncross State Forest and has been intensively logged and managed for timber production.

## 2.4 THREATS TO THE RESERVE'S VALUES

### Introduced plants

There has been no comprehensive study of weeds undertaken in the reserve. Casual observation indicates that pink lantana (*Lantana camara*) is common throughout the reserve, although not in dense thickets. Lantana is considered unlikely to threaten the vegetation of the reserve. Salvinia (*Salvinia molesta*) occurs in a dam on Extension Road, and Canna on 4.3 Trail, both introduced by the dumping of garden refuse within the reserve. Introduced plants can adversely affect the integrity of native vegetation in the park. Those species known to occur in the reserve are listed in Table 6.

**Table 6** Introduced plants found in the reserve

Common name	Scientific name	Status (Hastings Council)
lantana	<i>Lantana camara</i>	Environmental weed
whisky grass	<i>Andropogon virginicus</i>	
cats ear	<i>Hypochaeris radicata</i>	
camphor laurel	<i>Cinnamom camphora</i>	Environmental weed
bitou bush	<i>Chrysanthemoides monilifera</i>	Environmental weed
tall fleabane	<i>Conyza albida</i>	
common passionfruit	<i>Passiflora edulis</i>	
fireweed	<i>Senecio madagascariensis</i>	
salvinia	<i>Salvinia molesta</i>	Noxious
canna	<i>Canna Indica</i>	
prickly pear	<i>Opuntia stricta</i>	

### Introduced animals

There has been no direct observation or formal survey of introduced animals within the reserve, however a recent fauna survey found dog (*Canis familiaris*) and fox (*Vulpes vulpes*) tracks in low densities (NPWS 1999). Wild dogs as well as foxes and feral cats (*Felis catus*) were reported in a 1998 Kempsey RLPB/NPWS survey of landholders in the vicinity of the reserve.

Other pest animals likely to occur in the reserve are the rabbit (*Oryctolagus cuniculus*), house mouse (*Mus musculus*), black rat (*Rattus rattus*) and the brown hare (*Lepus capensis*).

Domestic cattle occasionally enter the reserve along the southern boundary. The memorandum of understanding between the NPWS Mid-North Coast Region and the NSW Farmers Association for stock removal defines the procedures for removal of stock from the reserve. NPWS Policy on boundary fencing also covers fencing adjacent to private property, leasehold and Crown lands.

## **Fire**

It is known that the reserve was regularly subjected to low intensity hazard reduction fires to protect the blackbutt plantation to the west. Frequent fire, while reducing the risk of uncontrolled, high intensity burns and favouring some species, can impact on species diversity. In the 2001/2002 fire season the south-eastern section of the reserve was intensively burned by wildfire.

A draft fire management strategy will be prepared for the reserve. It will identify the bushfire threat and requirements for community protection measures in areas where it is identified that fire is a threat to property, including the adjacent blackbutt plantation, as well as the conservation of native plants, animals, or any cultural features that may be found within the reserve.

## **Modification of surrounding lands**

The state forest to the west has been extensively modified by clearing and planting to blackbutt, whilst north-west of the reserve the land has been intensively logged and largely cleared for the Hastings Waste Management Depot. Lands to the south are chiefly cleared for grazing, although state forest adjoins to the south-east. The Pacific Highway to the east separates the reserve from state forest, while state forest adjoins to the north of the reserve. Rural residential developments are occurring to the south and on the eastern side of the Pacific Highway to the south-east.

The Waste Management Depot, managed by Hastings Shire Council is adjacent to the north of the reserve, with a vegetated buffer zone around the facility. The site is used as a landfill for segregated non-recyclable material and as a composting site for segregated organic matter. The site was selected for its impervious geology. The facility is modern in design and operation, with landfill regularly covered and drainage contained.

## **Non-NPWS uses**

There are three bee sites located within the reserve that pre-date its gazettal. The European honey bee can have adverse impacts on some native plants and animals (Paton, 1996). NPWS policy on bee keeping allows existing sites to continue but does not allow any new or additional sites. It may be necessary to relocate existing bee sites within the reserve where apiary activities result in unacceptable environmental impacts, user conflicts or are inconsistent with park management.

Access to apiary sites require the use of roads or management trails, some of which may be proposed for closure and rehabilitation because they may present hazards to users or threats to the environment.

## **2.5 VISITOR USE**

Public access to the reserve is via the Pacific Highway, Forest Hut Road, Wharf Road or Thurlings Road. Within the reserve, public vehicles will only be permitted on Forest Hut Road and will not be permitted on management trails (see the map).

Under former Cairncross State Forest tenure, part of the reserve was leased for “paint ball” games. This activity is considered inappropriate in NPWS estate and is no longer carried out on the reserve. The reserve currently receives a low level of visitor use, however it is used as an access route to Thurlings Road, which leads to a fishing site on Rawdon Creek, within Cairncross State Forest.

Reserve identification signs are located on the Pacific Highway. There are no visitor facilities in the reserve, however, camping and day use facilities are available at Limeburners Creek Nature Reserve on the coast.

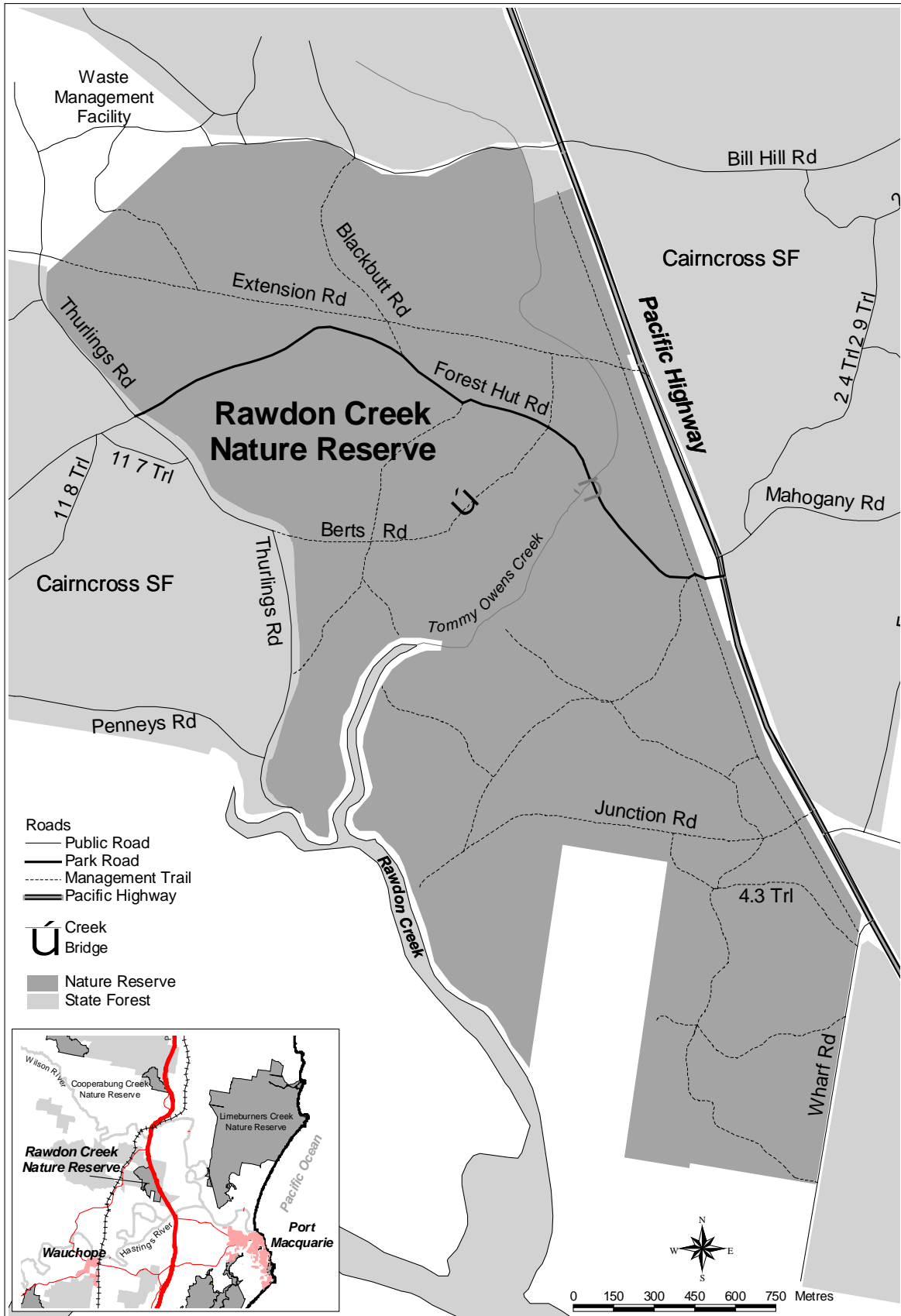
Due to its dispersible soils, the relatively small area, and the tenure as a nature reserve, horse riding, trail bike riding and recreational four-wheel driving are considered inappropriate in the reserve and are inconsistent with the purposes of a nature reserve under the NPW Act. Horse riding is not permitted in nature reserves under NPWS policy.

## **2.6 MANAGEMENT ACCESS**

NPWS can access the reserve by the public access routes (refer to section 2.5 - Visitor Use) as well as a number of management trails leading off these roads into the reserve (see the map).

As a result of a long history of former logging, the reserve contains many logging and snigging trails. In order to protect reserve values, only those trails shown on the map that are required for the protection and management of the reserve will be retained. Following the preparation of the fire management plan these trails may be further rationalised and some may be closed if they are no longer required for management purposes.

### 3. RAWDON CREEK NATURE RESERVE AND LOCALITY MAP



#### 4. RAWDON CREEK NATURE RESERVE—MANAGEMENT ISSUES AND STRATEGIES

Current Situation	Desired Outcomes	Strategies	Priority
<p><b>Soil and water conservation</b></p> <p>A culvert under Forest Hut Road has changed the hydrology in that section of the reserve. The concentration of overland flow through the culvert has the potential to cause gully erosion.</p> <p>The change in hydrology also has the potential to impact on vegetation communities on both sides of the road.</p> <p>Surface water from the waste management hard stand and western access road is directed into a sedimentation dam. Water leaving the dam flows over a riprap to a broad, flat vegetated area before entering the reserve. A groundwater monitoring site managed by Hastings Shire Council is adjacent to the sedimentation dam.</p> <p>There is potential for water in the reserve to be polluted by the waste management depot.</p>	<ul style="list-style-type: none"> <li>• There is minimal evidence of accelerated soil erosion.</li> <li>• There is little or no reduction in water quality in the reserve.</li> <li>• The effect of change to the hydrological regime on surrounding vegetation is minimised.</li> </ul>	<ul style="list-style-type: none"> <li>• Undertake all works, such as trail maintenance, in a manner that minimises erosion and water pollution.</li> <li>• Continue to liaise with Mid North Coast Catchment Management Board to maintain water quality in the reserve's catchment.</li> <li>• Liaise with Hastings Council to ensure that the water quality entering the reserve from the catchment dam is maintained at a high quality.</li> <li>• Monitor the effects of the culvert on Forest Hut Road for accelerated soil erosion and for any adverse effects on vegetation. If adverse effects are observed, investigate options for reinstating an acceptable hydrological regime.</li> </ul>	<p>High</p> <p>High</p> <p>High</p> <p>Medium</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p><b>Native plant and animal conservation</b></p> <p>The reserve has been intensively managed for timber production, resulting in lowered plant species diversity and an almost complete absence of nesting hollows for larger arboreal species. An area of approximately 12 ha of blackbutt plantation occurs in the reserve.</p> <p>A formal vegetation survey was conducted in the reserve in 2001, while NPWS conducted a fauna survey in the reserve (NPWS 1999). The reserve provides habitat for a number of threatened or significant plant and animal species.</p> <p>Ecological viability of the reserve would be improved by the maintenance of vegetation corridors on neighbouring lands. This would assist in the movement of wildlife between the reserve and other forested areas.</p>	<ul style="list-style-type: none"> <li>• There is no loss of native plant and animal species found in the reserve, or reduction in habitat diversity.</li> <li>• Reserve neighbours support conservation of remaining areas of privately owned native vegetation near the reserve.</li> <li>• Increased knowledge the ecological requirements of plants and animals within the reserve.</li> </ul>	<ul style="list-style-type: none"> <li>• Allow natural regeneration of previously cleared and logged areas, logging trails not shown on the map and the blackbutt plantation. If required, undertake works to encourage successful revegetation.</li> <li>• Volunteers may be permitted to install nesting boxes within the reserve to provide additional habitat for arboreal species and birds, including threatened species.</li> <li>• Liaise with neighbours, Landcare groups, vegetation management committees and other land use authorities to encourage retention, and if possible expansion, of areas of native vegetation close to the reserve.</li> <li>• Use prescribed fire in accordance with the fire management plan to maintain biodiversity (refer to Fire Management).</li> <li>• Encourage appropriate research into the ecological requirements of significant species in the reserve (refer to Research).</li> <li>• Work with relevant neighbours including leaseholders, Landcare groups and others to encourage retention of vegetation in the vicinity of the reserve.</li> </ul>	<p>High</p> <p>Medium</p> <p>High</p> <p>Medium</p> <p>Medium</p> <p>Medium</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p><b>Introduced species</b></p> <p>Pest animals known to occur in the reserves are foxes, wild dogs and feral cats.</p> <p>Weed species, apart from lantana, are present but uncommon. There is a patch of the noxious weed salvinia in a low-lying section of Extension Road, which may wash into the Hastings River and disperse during floods.</p> <p>A Pest Management Strategy (NPWS 2001) has been developed for the region as a whole. This strategy identifies pest populations, priorities for control and suggested control methods.</p> <p>Only part of the southern boundary of the reserve is fenced. Domestic cattle occasionally gain access to the reserve.</p>	<ul style="list-style-type: none"> <li>• The impact of introduced species on native biodiversity and neighbouring lands is minimised.</li> <li>• That the spread of salvinia is minimised or prevented.</li> <li>• Foxes, wild dogs, cats and rabbits are controlled.</li> </ul>	<ul style="list-style-type: none"> <li>• Control, and where possible eradicate, introduced pest plant and animal species, in accordance with the Regional Pest Management Strategy. Control of foxes, wild dogs and salvinia will be a priority in the reserve.</li> <li>• Seek the cooperation of neighbours in implementing weed and pest animal control programs. Undertake control in cooperation with neighbours, the Kempsey Rural Lands Protection Board, Hastings Shire Council, the Mid North Coast Weeds Advisory Council, and other stakeholders.</li> <li>• Monitor the reserve near the waste management facility to detect the introduction or spread of any introduced plant species and control if necessary.</li> <li>• Encourage maintenance of effective fencing of boundaries with grazing properties to prevent domestic stock from entering into the reserve, in accordance with NPWS boundary fencing policy.</li> <li>• Remove domestic stock as soon as possible.</li> </ul>	<p>Medium</p> <p>Medium</p> <p>High</p> <p>High</p> <p>High</p>



Current Situation	Desired Outcomes	Strategies	Priority
<p><b>Fire management</b></p> <p>Fire is a natural feature of the environment and is essential to the survival of some plant communities. Frequent or regular fire, however, can cause loss of particular plant and animal species and communities.</p> <p>Fire could also damage fences, or some cultural features that may be found on the reserve, as well as threaten neighbouring land.</p> <p>The reserve is currently burnt at a frequency too high to maintain biodiversity</p> <p>Management and control of fire in the reserve is facilitated by the extensive network of internal trails, boundary fire trails and adjacent roads (refer to map and Management operations).</p> <p>The bridge on Berts Road provides access to a good source of water for fire fighting tankers (refer to map and Management operations).</p>	<ul style="list-style-type: none"> <li>• The potential for spread of wildfire on, from, or into the reserve is minimised.</li> <li>• Life and property, including the adjoining blackbutt plantation, are protected from unplanned fire.</li> <li>• Fire regimes are appropriate for long-term maintenance of the reserve's plant and animal communities.</li> <li>• Fires do not escape into the reserve from recreational fires lit on Thurlings Road.</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare and implement a fire management strategy, which takes account of the need to protect the adjoining blackbutt plantation.</li> <li>• The use of heavy machinery and vehicles for fire management purposes must be confined to trails shown on the reserve map. In emergency situations, former trails (e.g. logging trails) may be reopened if essential to protect natural or cultural values in or off the reserve. No new trails are to be constructed anywhere in the reserve.</li> <li>• Encourage research into the ecological effects of fire in the reserve, particularly the fire response of significant plant species and the fire requirements of the various plant communities (refer to Research).</li> <li>• Use prescribed fire to achieve a variety of fire regimes in appropriate vegetation types and maintain habitat suitable for species with specific requirements.</li> <li>• Continue to actively participate in the Hastings Bush Fire Management Committee. Maintain close contact and cooperation with neighbours, Council fire officers and volunteer bush fire brigades concerning fire management on the reserve.</li> </ul>	<p>High</p> <p>High</p> <p>Low</p> <p>Medium</p> <p>High</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>There is potential for recreational fires at the southern end of Thurlings Road on state forest estate to escape into the reserve.</p> <p>Multiple access points from the Pacific Highway contribute to the high incidence of arson in the reserve (refer to Management operations).</p>		<ul style="list-style-type: none"> <li>The reserve may be closed to public use during periods of extreme fire danger.</li> <li>Monitor the use of the southern end of Thurlings Road and liaise with SFNSW regarding recreational fires at the southern end of Thurlings Road.</li> </ul>	<p>High</p> <p>Medium</p>
<p><b>Cultural heritage</b></p> <p>There are no known Aboriginal cultural sites within the reserve.</p> <p>There are three sites with earthwork relics of a convict road.</p> <p>No formal cultural heritage surveys have been undertaken in the reserve.</p>	<ul style="list-style-type: none"> <li>Cultural heritage studies are undertaken and any objects or sites are appropriately recorded and protected.</li> <li>The convict road earthworks and relics are preserved.</li> </ul>	<ul style="list-style-type: none"> <li>Photograph and map the convict road earthworks and relics, record on the historic site register, and protect from damage by bulldozers and tree roots.</li> <li>Undertake an archaeological survey and cultural assessment prior to all new works with the potential to impact on Aboriginal and non-Aboriginal sites and values. Maintenance of existing reserve infrastructure will not require this assessment.</li> <li>Consult with Birpai Local Aboriginal Land Council in all aspects of management of Aboriginal sites, places and values. Provide copies of any research findings on Aboriginal cultural heritage to the Land Council (refer to Research).</li> <li>Encourage appropriate cultural heritage surveys in the reserve (refer to Research).</li> </ul>	<p>High</p> <p>High</p> <p>Medium</p> <p>Low</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p><b>Visitor use</b></p> <p>Use of the reserve must be carefully managed since it is a relatively small and significant area of remnant vegetation.</p> <p>Promotion of community understanding and appreciation of the conservation values of the reserve can minimise inappropriate visitor activities.</p> <p>The reserve is currently used as a through route to Rawdon Creek for fishing.</p>	<ul style="list-style-type: none"> <li>• There is widespread community understanding and appreciation of the reserve's natural and cultural values as well as management programs.</li> <li>• Visitor use is ecologically sustainable and consistent with its management as a nature reserve.</li> <li>• Signage identifies the reserve boundary and prohibited activities.</li> <li>• Vehicular access into the reserve directly from the Pacific Highway is restricted.</li> </ul>	<ul style="list-style-type: none"> <li>• Liaise with neighbours and community organisations to promote community understanding of the reserves values and management strategies.</li> <li>• Maintain, and where necessary erect, reserve identification signs at boundaries and update signs where necessary to indicate prohibited activities.</li> <li>• No visitor facilities will be provided.</li> <li>• Permit nature based visitor use such as bushwalking, bird watching, nature observation.</li> <li>• Permit cycling on management trails.</li> <li>• Wood fires, camping and horse riding will not be permitted in the reserve.</li> <li>• Maintain Forest Hut Road to a 2WD all weather standard to provide public access through to Thurlings Road. Public vehicles will not be permitted on any other trails in the reserve.</li> </ul>	<p>Medium</p> <p>Medium</p> <p>Medium</p> <p>Medium</p> <p>Medium</p> <p>High</p> <p>High</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p><b>Research</b></p> <p>Further scientific study will improve understanding of the reserve's natural and cultural values, the processes that affect them and the requirements for management of particular species.</p>	<ul style="list-style-type: none"> <li>• Research that enhances the information base and assists management of the reserve is encouraged or undertaken</li> </ul>	<ul style="list-style-type: none"> <li>• Undertake or encourage research to improve knowledge and management of the reserve's natural and cultural heritage, as well as visitor use (refer to Native plant and animal conservation, Fire management, Cultural heritage).</li> </ul>	Low
<p><b>Management operations</b></p> <p>An extensive network of internal trails occur within the reserve. Some of these trails which are to be maintained for management purposes are currently shown as 'roads' on maps and by existing signs.</p> <p>To avoid confusion as to which roads and trails are available for public vehicle use following closure of some roads, the term 'road' should be used where public recreational vehicle access is allowed and 'trail' used when only used for management purposes.</p>	<ul style="list-style-type: none"> <li>• Management facilities adequately serve management needs and have acceptable impact.</li> <li>• Bridges are maintained in a safe condition.</li> <li>• Refuse is removed from the reserve and dumping is reduced or eliminated.</li> </ul>	<ul style="list-style-type: none"> <li>• Close, and rehabilitate where necessary, all roads or trails not required for management purposes or essential access to private lands, and not shown on the map.</li> <li>• Maintain management trails to a minimum of 4WD dry weather standard (see map).</li> <li>• Change the title from 'Road' to 'Trail' where trails are used for management purposes and not available for recreational vehicle use. Where necessary, advise relevant agencies, visitors, etc. so that maps and signage can be progressively updated.</li> <li>• Maintain bridges to ensure safety of fire fighters and safety during other management uses.</li> </ul>	<p>Medium</p> <p>Medium</p> <p>Low</p> <p>High</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>There are two bridges on the reserve. The bridge on Berts Road is old and has weak decking, however, it provides access to a good source of water for fire fighting tankers.</p> <p>Illegal dumping of domestic and light industrial refuse is common due to easy access from the Pacific Highway.</p>		<ul style="list-style-type: none"> <li>• Gate Junction Road, Extension Road and 4.3 Trail on the eastern boundary to minimise access from the Pacific Highway.</li> <li>• Gate other management trails as required.</li> <li>• Remove rubbish dumped on the reserve (refer Introduced Species).</li> </ul>	<p>High</p> <p>Low</p> <p>Medium</p>
<p><b>Non-NPWS uses</b></p> <p>There are three apiary sites on the reserve. The existing apiary sites are limited in size and are maintained by mowing or slashing.</p> <p>Access to the sites is via management trails that will be maintained according to NPWS requirements.</p>	<ul style="list-style-type: none"> <li>• Non-NPWS uses have minimal environmental impact, user conflicts or inconsistencies with the park management program</li> </ul>	<ul style="list-style-type: none"> <li>• Permit apiarists to clear a minimal area of their existing sites for hives by mowing/slashing only.</li> <li>• Monitor use of apiary sites.</li> <li>• Monitor for the presence and impact of any feral bee hives that may have established in the reserve and implement appropriate control methods.</li> </ul>	<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.

Once a plan has been adopted by the Minister it must be implemented, and no operations may be undertaken except in accordance with the plan. If after adequate investigation, operations not included in the plan are found to be justified, the plan may be amended in accordance with section 73B of the Act.

## 5. REFERENCES

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## GLOSSARY

### ACRONYMS USED

NPW Act	NSW <i>National Parks and Wildlife Act (1974)</i>
NPWS	NSW National Parks and Wildlife Service
RLPB	Rural Lands Protection Board
SFNSW	State Forests of New South Wales
TSC Act	NSW <i>Threatened Species Conservation Act (1995)</i>
TSI	Timber Stand Improvement (for forestry purposes)

### SELECTED DEFINITIONS

Biodiversity	Biological diversity, namely the variety of life forms: the different plants, animals and microorganisms, the genes they contain, and the ecosystems they form. It is usually considered at three levels: genetic diversity, species diversity and ecosystem
Cultural heritage	Encompasses past and present cultural associations of all people in Australia, including tradition, knowledge and customs. It can be tangible (i.e. have physical manifestations in the form of art, buildings etc.) or intangible (i.e. spiritual or social associations, songs, stories and cultural practices). Cultural significance includes values that are social, spiritual, aesthetic, historic and scientific. When natural resources acquire meaning for a particular group, they become cultural resources as well.
Ecologically sustainable use	Using society's natural resources within the capacity of the species and ecosystems, so that the health, diversity and productivity of the environment and the ecological processes on which life depends are conserved and enhanced, and the quality of life, now and in the future, can be increased.
Fauna	Any mammal, bird, reptile or amphibian. NPWS has responsibility for the conservation of fauna. Note this definition excludes fish or invertebrates.
Feral species	A domesticated species that has become wild
Fire authorities	Organisations (including land management authorities such as NPWS) vested by the <i>RF Act</i> with the responsibility to suppress fires. Under the <i>RF Act</i> , Fire management activities on NPWS reserves are the responsibility of NPWS

Fire management	Includes all activity associated with the use and control of fire in bushland designed to achieve stated objectives for the protection of life and property, and the maintenance of wildlife communities.
Fire management plan	A plan of operations to prevent, detect and suppress unplanned fires and to reduce bushfire hazard, prepared by a Bushfire Management Committee, constituted under the RF Act for coordinated fire management and operations within a rural fire district.
Historic places	Landscapes, sites buildings or other works together with pertinent contents and surroundings and include structures, ruins, archaeological sites and areas
Introduced species	A species occurring in an area outside its historically known natural range as a result of intentional or accidental dispersal by human activities. Also known as exotic or alien species.
Ministerial roads	Road corridors through the park/ reserve which, although managed by NPWS, do not form part of the gazetted area of the park/ reserve. Typically the access to adjacent State forest or private land, these roads are vested in the name of the Minister for the Environment.
Park roads	Access roads, which form part of the gazetted area of a park/ reserve, maintained by the NPWS for public use primarily to access visitor facilities and points of interest.
Policy	A statement of attitude and courses of action, directed toward the attainment of NPWS corporate goals and/or objectives.
Recovery plan	A document, prepared under the <i>TSC Act</i> , that identifies the actions to be taken to promote the recovery of a threatened species, or endangered population or ecological community.
Regeneration	The recovery of natural integrity following disturbance or degradation. This can be achieved through totally natural processes or an assisted process, where human intervention (through removing weeds or planting seedlings) accelerates recovery.
Senesce	The loss of limbs from the canopy as a tree ages, creating hollows in the limbs or trunk. Most relevant for eucalypt trees, this indicates the tree has reached late maturity.