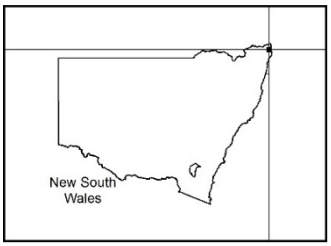
NSW NATIONAL PARKS & WILDLIFE SERVICE

Inner Pocket Nature Reserve

Plan of Management



environment.nsw.gov.au

Cover photo: Lowland rainforest in Inner Pocket Nature Reserve. J Aschmann

This plan of management was adopted by the Minister for Energy and Environment on 3 April 2020.

Acknowledgments:

Inner Pocket Nature Reserve is in the traditional Country of the Minjungbal People of the Bundjalung Nation.

This plan of management was prepared by staff of the NSW National Parks and Wildlife Service (NPWS). Southern Cross University intern, Joshua Aschmann, assisted in producing the first draft. Valuable information and comments were provided by local residents Kath and Greg Vail, Simon Dodds and Jacque Marks.

Published by:

Environment, Energy and Science
Department of Planning, Industry and Environment
4 Parramatta Square, 12 Darcy Street, Parramatta NSW 2150
Phone: +61 2 9995 5000 (switchboard)
Phone: 1300 361 967 (Environment, Energy and Science enquiries)
TTY users: phone 133 677, then ask for 1300 361 967
Speak and listen users: phone 1300 555 727, then ask for 1300 361 967
Email: info@environment.nsw.gov.au
Website: www.environment.nsw.gov.au

Report pollution and environmental incidents
Environment Line: 131 555 (NSW only) or info@environment.nsw.gov.au
See also www.environment.nsw.gov.au

ISBN 978-1-922318-77-0
EES 2020/ 0156
April 2020

Find out more about your environment at:

www.environment.nsw.gov.au

Contents

List of tables

List of figures

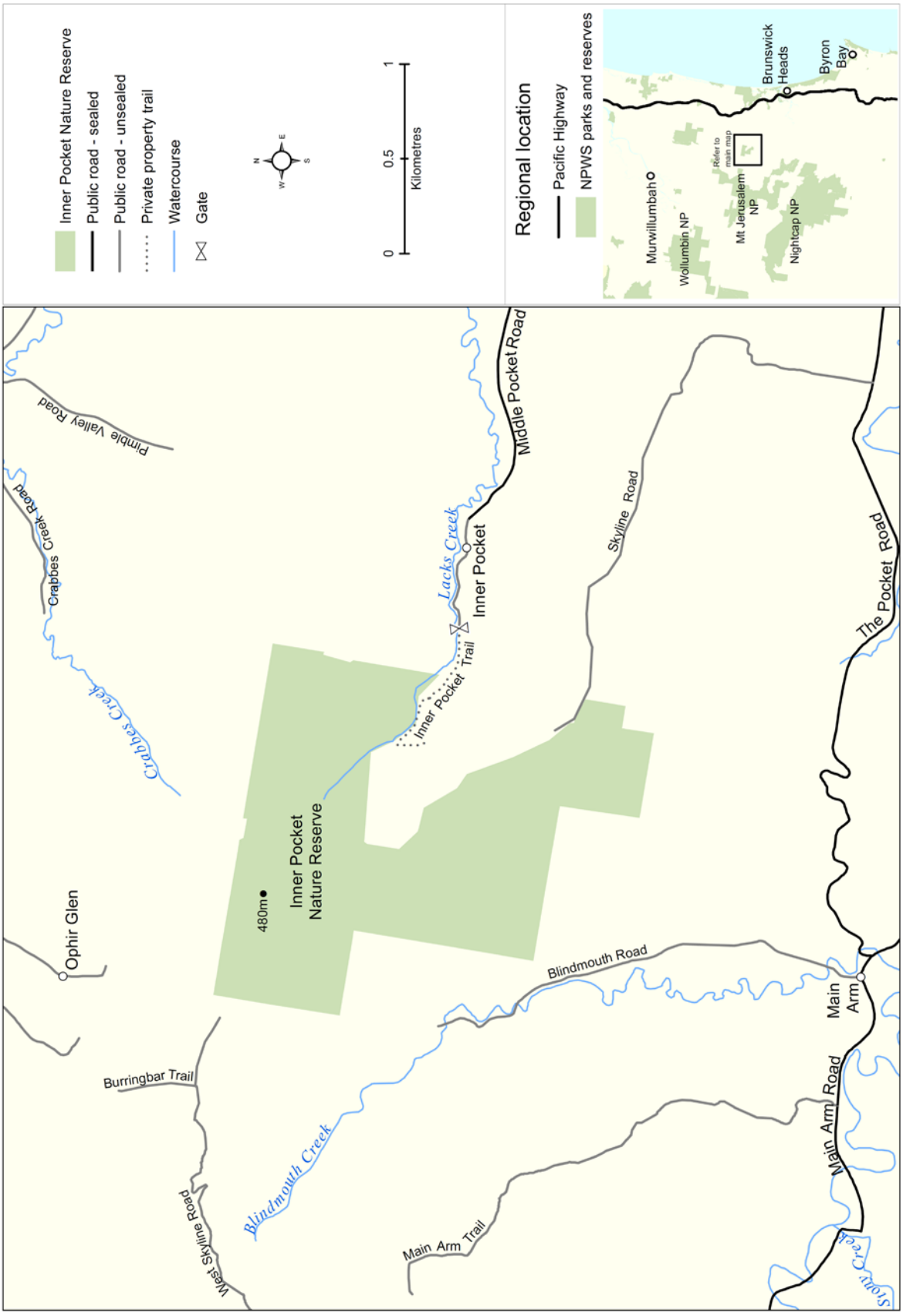


Figure 1 Inner Pocket Nature Reserve

1. Introduction

1.1 Location, reservation and regional setting

Features	Description
Location	Inner Pocket Nature Reserve (referred to as 'the reserve' in this plan) is in the Brunswick River catchment, on the eastern rim of the erosion caldera of the long-extinct Tweed Shield Volcano. The reserve is in the locality of Inner Pocket, approximately 10 kilometres west of Brunswick Heads and 40 kilometres south-west of Tweed Heads on the NSW Far North Coast.
Area	Approximately 220 hectares
Reservation date	29 March 1989
Previous tenure	Private freehold property
Regional context	
Biogeographic region	The reserve is part of a system of protected areas in north-east NSW and protects some of the most easterly rainforests of the Tweed erosion caldera. It falls within the Burringbar–Conondale Ranges Subregion of the South Eastern Queensland Bioregion (ERIN 2012). However, for the purposes of the NSW *Biodiversity Conservation Act 2016*, the reserve is considered to lie within the NSW North Coast Bioregion, as defined by Thackway and Cresswell (1995).
Surrounding land use	The reserve is surrounded by rural freehold land which is mostly forested and contains various private residences, cabins, shacks and old banana sheds. A banana farm adjoins the reserve to the north-west and beef cattle are grazed on a few other neighbouring properties to the south and east. Mount Jerusalem National Park lies two kilometres west of the reserve.
Other authorities	The reserve is located within the areas of the Tweed Byron Local Aboriginal Land Council, North Coast Local Land Services and Byron Shire Council.

1.2 Statement of significance

Inner Pocket Nature Reserve is significant because of the following key values:

- approximately 100 hectares of Lowland Rainforest, which is listed nationally as critically endangered
- records of 14 threatened and seven rare plant species, some of which are at their geographical limit and/or have a very small distribution
- its location as part of a major regional wildlife corridor linking the hinterland with coastal habitat.

The events that led to the reserve's establishment, including the NSW Heritage Council's decision to place an Interim Conservation Order over the land when it was still freehold to halt a proposed logging operation, are considered of historic significance because these actions are very rare in New South Wales. This also reflects the significance of the reserve's conservation values.

2. Management context

2.1 Legislative and policy framework

The management of nature reserves in New South Wales is in the context of the legislative and policy framework of NSW National Parks and Wildlife Service (NPWS); primarily the *National Parks and Wildlife Act 1974* and Regulation, the Biodiversity Conservation Act (BC Act) and NPWS policies.

Other legislation, strategies and international agreements may also apply to management of the reserve. In particular, the NSW *Environmental Planning and Assessment Act 1979* may require assessment of the environmental impact of works proposed in this plan. The NSW *Heritage Act 1977* may apply to the excavation of known archaeological sites or sites with potential to contain historic archaeological relics. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) may apply in relation to actions that impact matters of national environmental significance, such as migratory and threatened species listed under that Act.

A plan of management is a statutory document under the National Parks and Wildlife Act. Once the Minister has adopted a plan, the plan must be carried out and no operations may be undertaken in relation to the lands to which the plan relates unless the operations are in accordance with the plan. This plan will also apply to any future additions to the reserve. Should management strategies or works be proposed in future that are not consistent with this plan, an amendment to the plan will be required.

2.2 Management purposes and principles

Nature reserves are reserved under the *National Parks and Wildlife Act 1974* (NPW Act) to protect and conserve areas containing outstanding, unique or representative ecosystems, species, communities or natural phenomena.

Under section 30J of the National Parks and Wildlife 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
- provide for appropriate research and monitoring.

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

Inner Pocket Nature Reserve has been identified as a possible addition to the Gondwana Rainforests of Australia World Heritage property (Kitching & Braithwaite 2005). The Gondwana Rainforests include representative areas of the major stands of rainforest located between Newcastle and Brisbane, including Barrington Tops, Werrikimbe, Dorrigo, Washpool, Border Ranges and Lamington national parks. The strategic overview for management of the Gondwana Rainforests (CERRA 2000) has been considered in the preparation of this plan.

2.3 Specific management directions

In addition to the general principles for the management of nature reserves (see Section 2.2), the specific management direction for this reserve is the protection of its threatened plant species and communities, primarily through weed control and fire management.

Opportunities for visitors and the wider community to appreciate rainforest and other natural and cultural values represented in the reserve are provided in other nearby NPWS parks and reserves, such as Mount Jerusalem, Nightcap, Wollumbin and Mebbin national parks and Brunswick Heads Nature Reserve.

3. Values

This plan aims to conserve both natural and cultural values of the reserve. The location, landforms and plant and animal communities of an area have determined how it has been used and valued by both Aboriginal and non-Aboriginal people. These values may be attached to the landscape as a whole or to individual components, for example to plant and animal species used by Aboriginal people. To make this plan clear and easy to use, various aspects of natural heritage, cultural heritage, threats and ongoing use are dealt with individually, although they are interrelated.

3.1 Geology, landscape and hydrology

The reserve provides an example of the eroded metamorphic landscape of the erosion caldera associated with the Tweed Shield Volcano, which has Wollumbin/Mount Warning at its centre. The altitude within the reserve ranges from 75 metres above sea level at Lacks Creek to just over 480 metres at the crest of the unnamed forested peak shown on Figure 1. The peak and adjoining range in the reserve are part of the eastern rim of the erosion caldera and form an imposing feature in the local scenery, particularly when viewed from the east. Nearly all of the land is over 18° in slope, and much of it exceeds 30°.

The north-western half of the reserve, in particular, is rocky. Small cliff lines are common and scree slopes are very common and often occur on 30–40° slopes. The gullies in this area have cut down to the bedrock in many places. Landslides are evident to the north of Lacks Creek and on the steep slopes above Blindmouth Creek. Some of these were triggered by natural disturbance; others may owe their existence to past clearing for banana cultivation and logging.

The reserve is composed of Palaeozoic metasediments of the Neranleigh–Fernvale Beds, which constitute part of the geological structure known as the Beenleigh Block (Brown et al. 2007). At about 350 million years old, these are the oldest exposed rocks in the Richmond–Tweed area. Typical rocks within this formation are metamorphosed sedimentary rocks (metasediments) and include quartzite (metamorphosed sandstones), phyllite and argillite (metamorphosed shales and mudstones). The Neranleigh–Fernvale Beds in this area form the southern extremity of a band that runs north through Brisbane. They are exposed in New South Wales mainly in the eastern parts of the Tweed–Brunswick area, forming (among other features) the Burringbar Range. The reserve lies close to the southern extremity of the mapped metasediments in the Brunswick area but more southerly outcrops occur at Cape Byron and in the hinterland west of Ballina. Metamorphosed chert is one of the metasediments present in the reserve.

The Brunswick River roughly marks the boundary between the Neranleigh–Fernvale Beds to its north and the Lamington Volcanics (basalt and rhyolite associated with the Tweed Shield Volcano) to its south. The general area includes metasediments, volcanic (predominantly basalt and rhyolite) and alluvial material (D Morand, 2015, pers. comm., 6 July 2015).

Common soils that have developed on the Neranleigh–Fernvale Beds include red kurosols, yellow kurosols, red dermosols and yellow dermosols. Dark, shallow, stony kandosols or tenosols may occur on ridge crests and upper slopes. Some deep red ferrosols may have formed on the lower slopes. In general, the soils formed on the metamorphic rocks are acidic and have low inherent fertility. Soil depth is variable but soil structure is often moderate to strong.

Basalt occurs a short distance to the west of the reserve along West Skyline Road. Although not definitively identified in the reserve, soils formed on basalt in similar environments are generally shallow brown dermosols. Hunter (1986) noted that the presence of such soils can

facilitate the development of dry rainforest, although similar communities are known to grow where aspect is favourable on the better quality soils derived from the metamorphic rocks.

Rhodonite (manganese silicate), a mineral ore of manganese, was formerly mined in the south-west of what is now the reserve, adjacent to the cliff north of Blindmouth Creek (see Section 3.5). This mineral forms as a hydrothermal deposit (i.e. it is created by reaction with extremely hot water commonly associated with undersea volcanic activity).

Climate for the reserve is best described as humid subtropical, with strong maritime and orographic influences (mountains forcing warm air to rise), high summer rainfall and a distinct winter dry season. Climatic data from the nearest Bureau of Meteorology station at Bray Park (28°20.37'S, 153°22.85'E), located 16.5 kilometres north-west of the reserve, shows average temperatures in the region range from 8.6–21°C in June to 19.8–29.5°C in January. Frosts are rare but occasional.

At the nearest official rain gauge at Fairview Farm near Mullumbimby (7.5 kilometres south-east of the reserve), the annual average rainfall is 1773 millimetres (BOM 2016). The wettest months are January to March, which contribute 39% of annual rainfall. The driest months from July to September contribute only 13% of the total. Rainfall in the reserve is likely to be similar but may be greater due to orographic uplift, particularly in the headwaters of Lacks Creek, due to the effect of the high range.

Issues

- Due to its steep terrain, the reserve is prone to naturally occurring landslips and erosion, particularly on the steep scree slopes above Lacks Creek and Blindmouth Creek.
- Being at the head of the catchment, some weeds present in the reserve may spread downstream onto other properties (see Section 4.1).
- Regeneration of landslip areas by native trees and plants is required to help bind soil and minimise accelerated erosion (see Section 3.2).

Desired outcomes

- Natural land-forming and erosive processes, including landslips, are allowed to continue unimpeded.
- Weed coverage is reduced, minimising the risk of weeds spreading downstream from the reserve, and facilitating natural regeneration of native trees and plants to help bind the soil and minimise accelerated erosion.

Management response

3.1.1. Leave undisturbed any areas within the reserve which are subject to naturally occurring landslips or erosion, unless there is a threat to public safety or assets, or to improve environmental outcomes.

3.2 Native plants

The reserve supports a diverse range of plant species and communities that reflect variations in hydrology, landform, soil type, drainage, fire history and community succession in response to past disturbance. Sclerophyll forest covers about 60% of the reserve and usually occurs in the more elevated and exposed areas, while rainforest is generally confined to more sheltered sites. The sclerophyll and rainforest communities both show considerable variation in their species composition and dominant species associations.

Rainforest covers about 100 hectares of the reserve, ranging from Lacks Creek to the crest of the highest peak at an altitudinal range of more than 400 metres. Most of it occurs on the south-facing aspects to the north of Lacks Creek and above Blindmouth Creek. This rainforest meets the specifications for Lowland Rainforest in the NSW North Coast *and Sydney Basin Bioregions,* an endangered ecological community under the Biodiversity Conservation Act. On a national level, this rainforest is classified as Lowland Rainforest of Subtropical Australia, which is listed under the Environment Protection and Biodiversity Conservation Act as a critically endangered ecological community.

Three main types of rainforest occur in the reserve: subtropical rainforest on higher fertility soils, warm temperate rainforest on lower fertility soils and dry rainforest on fertile soils with lower moisture availability. According to Hunter (1986), most of the rainforest can be broadly described as gully rainforest, which has both subtropical and warm temperate rainforest species (Baur, cited in Hunter 1986). Gully rainforest is typically found in sheltered, moist situations on poorer substrates, such as metasediments and acid volcanics, and often has a well-developed layer of bangalow palm (*Archontophoenix cunninghamiana*) (Harden et al. 2006). The gully rainforest in the reserve contains a number of narrowly endemic species, and may have acted as a refugia for a suite of rainforest species during past climatic perturbations (Hunter 1986).

Apart from the broader classification of gully rainforest, Hunter (1986) describes seven plant communities in the reserve, as follows.

Warm Temperate Rainforest is best developed in the east of the reserve north of Lacks Creek, but occurs throughout the rainforest below the ridgetops, particularly where landslips have removed the topsoil. Species include corkwood (*Duboisia myoporoides*), red carabeen (*Geissois benthamiana*), grey possumwood (*Quintinia verdonii*), mango bark (*Canarium australasicum*), prickly treefern (*Cyathea leichhardtiana*), yellow carabeen (*Sloanea woollsii*) and silver leaf (*Argophyllum nullumense*).

Black Bean – Blue Fig Subtropical Rainforest occurs along the creeks and lower slopes. The dominant species are black bean (*Castanospermum australe*) and blue quandong (*Elaeocarpus grandis*), along with maiden's blush (*Sloanea australis*), cudgerie (*Flindersia schottiana*) and red apple (*Acmena ingens*). This community also contains many threatened species, such as hairy quandong (*Elaeocarpus williamsianus*), yellow satinheart (*Bosistoa transversa*) and red lilly pilly (*Syzygium hodgkinsoniae*).

Bangalow Palm Dominated Forest is best developed on sheltered sites in gullies, where in some cases it forms almost pure stands with other tree species only occasionally emerging above the canopy. Individual palms may be of considerable height with some reaching nearly 30 metres. Some of the emergent trees are also very tall, varying in height from 25 to 50 metres and include species such as blunt-leaved coondoo (*Planchonella myrsinifolia*), crow's ash (*Flindersia australis*), bumpy ash (*F. schottiana*), red cedar (*Toona ciliata*), black bean and mango bark.

Dry Rainforest is well developed on the upper slopes at the western end of the Lacks Creek basin and extends over the northern ridge. Generally, these forests occur on the drier and more exposed sites, and this rainforest is typical of fertile soils with lower moisture availability. Species composition indicates a moister form than is typical of most dry rainforests. It has more of an affinity with the dry rainforests of the Big Scrub (such as that found in Wilson Nature Reserve on the southern outskirts of Lismore) and those west of the Tweed Range, than it does with the gully rainforest in the reserve. Common species are deep yellowwood (*Rhodosphaera rhodanthema*), native olive (*Olea paniculata*), koda (*Ehretia acuminata*), yellow laurel (*Cryptocarya bidwillii*), twin-leaved coogera (*Arytera distylis*), broad-leaved whitewood (*Atalaya multiflora*) and blush coondoo (*Pouteria queenslandica*).

Brush Box Forest ranges from areas with scattered large brush box (*Lophostemon confertus*) to areas where brush box is almost solely dominant. Associated rainforest species form an understorey that varies from open to closed. Occasional large specimens of bumpy ash, mango bark, churnwood (*Citronella moorei*), yellow carabeen, black bean and red cedar occur within this forest type, which can be found on ridge tops and mid slopes.

Wet Sclerophyll Forest occurs on crests of the main ridge lines and section of the tops and sides of the spurs running south from the main ridge lines. It often forms a transitional forest between the rainforest and the drier sclerophyll forest. Dominant species include brush box, tallowwood (*Eucalyptus microcorys*), flooded gum (*E. grandis*), pink bloodwood (*Corymbia intermedia*) and black walnut (*Endiandra globosa*).

Dry Sclerophyll Forest is common on the main southern ridge, most likely due to the presence of free-draining soils derived from quartzite. Blackbutt (*E. pilularis*) is the dominant species and reaches a maximum height of 35 metres. Other canopy species include pink bloodwood, tallowwood, grey ironbark (*E. siderophloia*) and white mahogany (*E. acmenoides*), with smaller areas dominated by white mahogany. The understorey varies from sclerophyll species, such as grass trees (*Xanthorrhoea* sp.) in some areas to a moist shrubby understorey in others.

The reserve protects at least 366 plant species (Hunter 1986), of which 14 are listed as threatened (see Table 1). Stinking cryptocarya (*Cryptocarya foetida*) is of particular significance because it is usually found in areas closer to the coast in littoral rainforest on sands or on areas of metamorphic geology adjacent to sands (Hunter 1986).

Table 1 Threatened plant species recorded in Inner Pocket Nature Reserve

Common name	Scientific name	BC Act status	EPBC Act status
Acalypha [1]	*Acalypha eremorum*	Endangered	
Arrow-head vine [2]*	*Tinospora tinosporoides*	Vulnerable	
Durobby [2]	*Syzygium moorei*	Vulnerable	Vulnerable
Hairy quandong [2, 3]	*Elaeocarpus williamsianus*	Endangered	Endangered
Isoglossa [2]	*Isoglossa eranthemoides*	Endangered	Endangered
Ravine orchid [1]*	*Sarcochilus fitzgeraldii*	Vulnerable	Vulnerable
Red boppel nut [1]	*Hicksbeachia pinnatifolia*	Vulnerable	Vulnerable
Red lilly pilly [2]	*Syzygium hodgkinsoniae*	Vulnerable	Vulnerable
Rough-shelled bush nut [2]	*Macadamia tetraphylla*	Vulnerable	Vulnerable
Rusty rose walnut [2, 4]	*Endiandra hayesii*	Vulnerable	Vulnerable
Small-leaved tamarind [2, 4]	*Diploglottis campbellii*	Endangered	Endangered
Smooth Davidson's plum [2, 3]	*Davidsonia johnsonii*	Endangered	Endangered
Stinking cryptocarya [1]	*Cryptocarya foetida*	Vulnerable	Vulnerable
Yellow satinheart [2]	*Bosistoa transversa*	Vulnerable	Vulnerable

Source: OEH (2015) except for those marked with '*' which come from Hunter (1986).

BC Act = NSW Biodiversity Conservation Act; EPBC Act = Commonwealth Environment Protection and Biodiversity Conservation Act.

[1] Species included in the Northern Rivers Regional Biodiversity Management Plan (DECCW 2010b).

[2] Species included in the *Border Ranges Rainforest Biodiversity Management Plan* (DECCW 2010a).

[3] Draft individual recovery plan prepared for species.

[4] Individual recovery plan approved for species.

A further seven plant species are considered to be of conservation significance due to their rarity or limited geographical distribution (Briggs & Leigh 1995). These are long-leaved tuckeroo (*Cupaniopsis newmanii*), smooth-leaved scrub turpentine (*Rhodamnia maideniana*), silver leaf, black walnut, Byron Bay acronychia (*Acronychia baeuerlenii*), veiny lace flower (*Archidendron muellerianum*) and the shrub, *Tapeinosperma pseudojambosa* (Hunter 1986). Finger lime (*Citrus australasica*) and other plants significant to the Aboriginal community also occur in the reserve.

Strategies for the recovery of threatened species, populations and ecological communities have been set out in a statewide *Biodiversity Conservation Program* (OEH 2017). These actions are currently prioritised and implemented through the *Saving our Species* program, which aims to maximise the number of threatened species that can be secured in the wild in New South Wales for 100 years (OEH 2013c). Individual recovery plans may also be prepared for threatened species to consider management needs in more detail. Recovery plans have been prepared for those species indicated in Table 1 (DEC 2004a–d). In addition, two regional biodiversity management plans (DECCW 2010a, 2010b) are considered multi-species recovery plans under the Environment Protection and Biodiversity Conservation Act for the threatened species occurring in the reserve identified in Table 1.

Issues

While most of the vegetation in the reserve is in excellent condition, past disturbance has affected small sections of every plant community. Past disturbance includes selective logging of the accessible parts of the eucalypt forest and rainforest margins. There were also small areas cleared for banana cultivation north of Lacks Creek and on the northern boundary upslope from Ophir Glen. Despite this, a variety of age classes is still present, including very large old-growth eucalypts, which may have been left due to some perceived defect or to serve as seed trees. The steep terrain also precluded logging in most of the reserve. The hollows that form in old-growth eucalypts are crucial for providing habitat for many animal species, some of which are threatened, such as owls, parrots, insectivorous bats and arboreal mammals including possums and gliders (see Section 3.3).

The most significant threat to native plants and communities is from introduced species, such as lantana (*Lantana camara*) and camphor laurel (*Cinnamomum camphora*), which inhibit the regeneration of native species. Lantana is common in all open areas and camphor laurel is present in rainforest gaps (see Section 4.1). However, the gaps are also being colonised by rainforest pioneers, such as macaranga (*Macaranga tanarius*), red kamala (*Mallotus philippensis*), blackwood (*Acacia melanoxylon*), pencil cedar (*Polyscias murrayi*) and guioa (*Guioa semiglauca*).

Other threats to the native plant communities in the reserve are:

- inappropriate fire regimes, particularly to rainforest species and communities (see Section 4.2)
- trampling of rainforest seedlings from inappropriate visitor use, such as off-track bush walking, an impact exacerbated by the steep slopes in the reserve (see Section 3.6)
- illegal plant collection
- edge effects, as the reserve's relatively small size compared with its long, circuitous perimeter increases vulnerability to outside influences, such as weed invasion, fire and human disturbance.

Under the current priorities of *Saving our Species*, active site management (mainly weed control and monitoring) is occurring for the hairy quandong, isoglossa and red lilly pilly (see Section 4.1). Natural regeneration of ecological communities in the reserve is being assisted by these programs and by weed control undertaken by several reserve neighbours on their

own properties. Opportunities exist to implement strategies to recover the other threatened plant species present in the reserve.

Desired outcomes

- Populations of significant plant and ecological communities are conserved.
- Negative impacts on threatened species are minimised.
- Structural diversity and habitat values are restored in degraded areas.

Management response

3.2.1. Implement relevant strategies and actions in the *Biodiversity Conservation Program* to conserve and restore threatened species, populations and ecological communities in the reserve.

3.2.2. Improve the condition of the reserve's vegetation by implementing bush regeneration programs.

3.3 Native animals

The reserve supports a rich and diverse assemblage of animals, including migrating and nomadic species. This is due to the combination of a number of factors, including the variety of forest types occurring in the reserve and the presence of old-growth eucalypts (see Section 3.2), a large altitudinal range and the reserve's location in a corridor of vegetation that links the heavily forested range to the west with coastal habitats to the east. According to Scotts (2003), this is a major regional wildlife corridor, the focal species of which are the long-nosed potoroo (*Potorous tridactylus*) and Stephens' banded snake (*Hoplocephalus stephensii*). For birds that are carnivorous and require large feeding territories, such as the sooty owl (*Tyto tenebricosa*), these links with other forest areas are vital (Stanton 1990).

The local importance of the reserve is reflected in the number of species recorded. The NSW Wildlife Atlas (OEH 2015) lists 252 native animal species recorded in or immediately adjacent to the reserve, including 19 threatened or migratory species recorded within the reserve (see Table 2).

Table 2 Significant animals recorded in Inner Pocket Nature Reserve

Common name	Scientific name	BC Act status	EPBC Act status
Invertebrate			
Southern pink underwing moth	*Phyllodes imperialis*	Endangered	Endangered
Birds			
Albert's lyrebird	*Menura alberti*	Vulnerable	
Cattle egret	*Ardea ibis*		Migratory
Fork-tailed swift	*Apus pacificus*		Migratory
Marbled frogmouth	*Podargus ocellatus*	Vulnerable	
Pale-vented bush-hen	*Amaurornis olivaceus*	Vulnerable	
Rainbow bee-eater	*Merops ornatus*		Migratory
Rose-crowned fruit-dove	*Ptilinopus regina*	Vulnerable	

Common name	Scientific name	BC Act status	EPBC Act status
Scarlet robin	*Petroica boodang*	Vulnerable	
Sooty owl	*Tyto tenebricosa*	Vulnerable	
Superb fruit-dove	*Ptilinopus superbus*	Vulnerable	
Varied sittella	*Daphoenositta chrysoptera*	Vulnerable	
White-bellied sea-eagle	*Haliaeetus leucogaster*	Vulnerable	Migratory
White-eared monarch	*Carterornis leucotis*	Vulnerable	
White-throated needle-tail	*Hirundapus caudacutus*		Migratory
Wompoo fruit-dove	*Ptilinopus magnificus*	Vulnerable	
Mammals			
Greater glider	*Petauroides volans*		Vulnerable
Koala	*Phascolarctos cinereus*	Vulnerable	Vulnerable
Spotted-tailed quoll	*Dasyurus maculatus*	Vulnerable	Endangered

Source: OEH (2015).
BC Act = NSW Biodiversity Conservation Act; EPBC Act = Commonwealth Environment Protection and Biodiversity Conservation Act.

Threatened species that have not been recorded in the reserve but are considered likely to occur due to the presence of suitable habitat and nearby records include birds such as the glossy black-cockatoo (*Calyptorhynchus lathami*), little lorikeet (*Glossopsitta pusilla*), powerful owl (*Ninox strenua*), black-breasted button-quail (*Turnix melanogaster*) and speckled warbler (*Chthonicola sagittata*); and mammals such as the long-nosed potoroo, brush-tailed phascogale (*Phascogale tapoatafa*), common blossom bat (*Syconycteris australis*), common planigale (*Planigale maculata*), eastern tube-nosed bat (*Nyctimene robinsoni*) and red-legged pademelon (*Thylogale stigmatica*). Significant invertebrate species expected to occur include the Richmond birdwing butterfly (*Ornithoptera richmondia*) (K Vail, pers. comm., 4 October 2016) and the endangered Mitchell's rainforest snail (*Thersites mitchellae*). Coxen's fig-parrot (*Cyclopsitta diophthalma coxeni*), which is critically endangered in New South Wales and listed as endangered nationally, may also occur.

As for threatened plant species, strategies for the recovery of threatened animal species and populations have been set out in the statewide *Biodiversity Conservation Program*. Individual recovery plans may also be prepared for threatened species to consider management needs in more detail. Recovery plans have been approved for the koala (DECC 2008), large forest owls (DEC 2006) and Mitchell's rainforest snail (NPWS 2001). Several animal species that have been recorded or are likely to occur in the reserve are included in the *Border Ranges Rainforest Biodiversity Management Plan* (DECCW 2010a) or the *Northern Rivers Regional Biodiversity Management Plan* (DECCW 2010b).

Issues

- Land clearing on surrounding private land may impact the reserve's native animals through habitat isolation and degradation.
- Introduced plant and animal species may impact native animals in the reserve (see Section 4.1). These include domestic dogs that sometimes roam or are walked in the reserve (see Section 3.6).
- A comprehensive animal survey has not been undertaken in the reserve since 1990, resulting in a lack of recent data.

Desired outcomes

- Negative impacts on threatened species are minimised.
- The habitat and populations of all threatened animal species are protected and maintained.
- Knowledge of native animals using the reserve is improved.

Management response

3.3.1. Implement relevant strategies in the *Biodiversity Conservation Program* and recovery plans for threatened species and populations in the reserve.

3.3.2. Encourage or undertake targeted native animal surveys in the reserve.

3.3.3. Work with local landholders (or neighbours) to develop voluntary, cooperative programs to conserve, protect and restore habitat corridors.

3.4 Aboriginal heritage

The reserve is in the traditional Country of the Minjungbal People of the Bundjalung Nation. The local Aboriginal community is represented by the Tweed Byron Local Aboriginal Land Council and the Bundjalung Council of Elders. The land, water, plants and animals within a landscape are central to Aboriginal spirituality and contribute to Aboriginal identity. Aboriginal communities associate natural resources with the use and enjoyment of foods and medicines, caring for the land, passing on cultural knowledge, kinship systems and strengthening social bonds. Aboriginal heritage and connection to nature are inseparable and need to be managed in an integrated manner across the landscape.

Aboriginal sites are places with evidence of Aboriginal occupation or that are related to other aspects of Aboriginal culture. They are important as evidence of Aboriginal history and as part of the culture of local Aboriginal people. The reserve has not been formally surveyed for Aboriginal heritage values and there are no records of sites in formal databases. However, the reserve as a natural landscape is known to be important to the local Aboriginal community and it is known to contain discrete sites of particular importance.

While the NSW Government has legal responsibility for the protection of Aboriginal sites and places, NPWS acknowledges the right of Aboriginal people to make decisions about their own heritage. As such, Aboriginal communities will be consulted and involved in the management of Aboriginal sites, places and related issues, and the promotion and presentation of Aboriginal culture and history.

Issues

- Due to a lack of on-ground research, an archaeological survey and cultural assessment needs to be undertaken prior to any works with the potential to impact Aboriginal sites and places.

Desired outcomes

- Significant Aboriginal places and values are identified and protected.
- Aboriginal people are involved in management of the Aboriginal cultural values of the reserve.
- Understanding of the reserve’s cultural values is improved.

Management response

3.4.1. Continue to consult and involve the Tweed Byron Local Aboriginal Land Council, the Bundjalung Council of Elders, other relevant Aboriginal community organisations and custodial families in the management of their Country, including the management of cultural and natural values of the reserve.

3.4.2. Undertake an archaeological survey and cultural assessment prior to all works with the potential to impact Aboriginal sites or values.

3.4.3. Encourage further research into the Aboriginal cultural heritage values of the reserve with the relevant Aboriginal community organisations and members.

3.5 Historic heritage

Heritage places and landscapes are made up of living stories as well as connections to the past, which can include natural resources, objects, customs and traditions that individuals and communities have inherited and wish to conserve for current and future generations. Cultural heritage comprises places and items that may have historical, scientific, cultural, archaeological, architectural, natural, aesthetic or social significance. NPWS conserves the significant heritage features of the parks and reserves that it manages.

There are few sites of historic cultural heritage in the reserve. During the 1950s, Metro Minerals Syndicate prospected for rhodonite, an ornamental mineral, in what is now the reserve (see Section 3.1). The mine consisted of two shallow pits (up to 3 metres in depth) and a trench above Blindmouth Creek (Relph 1961). Some of the rhodonite taken from these pits is now in the collection of the Richmond River Historical Society's museum (R Holland, pers. comm., 21 March 2016). The location of the abandoned mineshafts needs to be confirmed and any safety hazards removed or controlled.

Another former land use was banana cultivation, most of which took place on the north-facing slopes south of Lacks Creek. Smaller areas were also cleared and cultivated on the northern side of the creek and on the slopes above Ophir Glen, partially in what is now the reserve. Apart from the clearings, there is little evidence remaining of this land use.

The history of the reserve's establishment is considered a significant part of the reserve's historic heritage. In the mid-1960s, members of the Bryant family from Bray Park near Murwillumbah bought portion 263 and part portion 264, Parish Billinudgel, as a timber source for their small sawmill and commenced selectively logging the eucalypt forest and rainforest margins. The land had been selectively logged for some time before this, as shown by the huge old tree stumps with springboard marks on the ridges north of Lacks Creek. In 1984, the Bryants submitted an application to the (then) Soil Conservation Service to expand logging operations into the steeper parts of the property, which caused concern among local residents who petitioned the NSW Government to reject the application in recognition of the area's high conservation and catchment values.

The NSW Heritage Council responded by placing an Interim Conservation Order on the land in 1985 to preclude logging until the land could be scientifically evaluated. In 1986, NPWS was directed to conduct a plant survey on the property and prepare a report. This survey discovered many threatened rainforest species, as well as several subtypes of rainforest, and concluded that the area had outstanding conservation values (Hunter 1986). After years of negotiation, the land was eventually purchased by the NSW Government and reserved in 1989 as a nature reserve.

Issues

- Land that was previously disturbed by logging or banana cultivation now has varying levels of weed infestation (see Section 4.1).
- The abandoned rhodonite mine could have historic heritage values and could pose a safety risk.

Desired outcomes

- Understanding of the historic values of the reserve is improved.
- Negative impacts on historic heritage values are minimised.
- Risks to public safety are minimised.

Management response

3.5.1. In liaison with the relevant regulatory authorities, assess safety requirements and the heritage significance of the abandoned rhodonite mines. Where appropriate, undertake measures to make the sites safe and protect the historical values of the mines. This may include fencing or signage.

3.5.2. Undertake an archaeological survey and cultural assessment prior to all works with the potential to impact historic sites and places.

3.6 Visitor use

NPWS parks and reserves provide a range of visitor opportunities. NPWS aims to ensure that visitors enjoy, experience and appreciate the parks, while park values are conserved and protected. The provision for visitor use is constrained by park values. It also varies according to the category of reserve. As a nature reserve, there is no requirement for the provision of visitor use in Inner Pocket Nature Reserve (see Section 2.2).

Visitor opportunities in this reserve are highly constrained by steep slopes, threatened plants and vegetation communities vulnerable to even low levels of disturbance, and lack of suitable legal public access. Visitation to the reserve is low and there are no visitor facilities. Any visitation that currently occurs is principally centred on low-impact, self-reliant, nature-based recreation, such as bushwalking, birdwatching and observing plant life.

Public vehicle access to the reserve's boundary is only possible from Skyline Road, off The Pocket Road. The remainder of the reserve is bounded by private property. Skyline Road skirts part of the reserve in the south-east (see Figure 1) and is steep, narrow and suitable only for four-wheel-drive vehicles in dry weather. This access is considered unsafe. It accesses the reserve high on a ridge line where there are limited opportunities for safe parking and turn-around. Anyone entering the reserve at this point needs to walk cross-country down steep, unstable slopes to access key features such as rainforest.

There is no public access from Middle Pocket Road because the Crown road terminates approximately 200 metres east of the reserve. Public access to this area of the reserve cannot be promoted by NPWS as visitors cannot access this area without permission from neighbouring landholders.

Public vehicle access within the reserve is not possible as there are no constructed roads or trails within the reserve. There are also no formal walking tracks. Trail or track construction cannot be undertaken for environmental reasons because much of the reserve is dominated by steep slopes of at least 15°, and usually 30°. The lack of any trails precludes activities, such as cycling and horse riding, consistent with relevant NPWS policies and strategies (OEH 2011b; OEH 2012b).

Pedestrian access in the reserve is highly restricted. The reserve's outstanding natural heritage values could be negatively impacted by inappropriate visitor use. For example, trampling is one of the key threats to many threatened rainforest plants. Such damage is unavoidable when people bushwalk 'off track' through rainforest. This impact is exacerbated by the steep slopes that dominate the reserve. Stanton (1990) noted that the steep terrain was vulnerable to erosion from pedestrian traffic, with soil and leaf litter moving downslope after only one or two passes on foot.

All potential visitors are advised to contact the local NPWS office for current information before attempting to access the reserve.

Other areas managed by NPWS, other agencies and private operators in the region provide opportunities for a range of recreational activities. A similar environment to this reserve can be experienced in nearby Mount Jerusalem National Park, which has good public roads and walking tracks that provide easy access to rainforest-lined creeks, some of which are suitable for swimming. Slightly further afield are Nightcap and Mebbin national parks, which also feature rainforests and natural waterways, as well as walking tracks, camping areas and other visitor facilities.

Issues

- Visitor use opportunities in the reserve are highly constrained. Access is problematic due to the steep terrain, the potential impacts to significant species and the fact that the reserve is surrounded by freehold lands. The only formed and legal access (Skyline Road) can be hazardous and has limited space for parking.
- There are ongoing reports from neighbours of people trespassing on foot across private land to access Lacks Creek, and undertaking illegal activities such as dog walking or removing native plants. Even activities that are appropriate in other reserves, such as bushwalking off track, could have serious impacts on threatened species and ecological communities in this reserve due to increased erosion and trampling of threatened species.

Desired outcomes

- Negative impacts of visitors on the reserve's values are minimised.
- Visitor opportunities are appropriate, and encourage appreciation and awareness of the reserve's values and their conservation.

Management response

3.6.1. Provide and promote opportunities for guided community activities, such as volunteer bush regeneration, birdwatching and plant surveys in the reserve.

3.6.2. Provide regulatory, safety and minimal impact use information at the reserve boundary near Lacks Creek and adjacent to Skyline Road.

3.6.3. Do not provide visitor facilities in the reserve.

3.6.4. Monitor recreational activities and manage them as appropriate to protect the conservation values of the reserve and minimise impacts on neighbours.

4. Threats

4.1 Pests

Pest species are plants, animals and pathogens that have negative environmental, economic and social impacts; and they are commonly introduced species. Pests can have impacts across the range of park values, including impacts on biodiversity, cultural heritage, catchment and scenic values.

The reserve is considered susceptible to invasion by pest species due to its relatively small size compared with its perimeter, and the presence of pest species on surrounding land. Where the perimeter is cleared there are edge effects of increased wind and light penetration which eliminate many native rainforest species and enable weeds to establish (Joseph 1995). Much of the reserve's boundary is unfenced, in part due to the topographic constraints posed by the steep unstable slopes. Fencing is also absent along sections of Lacks Creek and, in the past, cattle and other stock have strayed into the reserve across the creek impacting on the threatened plants found in this rainforest. The NPWS *Boundary Fencing Policy* provides for NPWS to assist neighbours with the cost of establishing boundary fencing where it is a priority for conserving the values of a park or reserve (NPWS 2014).

NPWS prepares regional pest management strategies, which identify pest species across that region's parks and priorities for control, including actions listed in the *Biodiversity Conservation Program* (see Sections 3.2 and 3.3), threat abatement plans, and other strategies such as the NSW *Biodiversity Priorities for Widespread Weeds* (NSW DPI & OEH 2011) and the *NSW Biosecurity Strategy 2013–2021* (DPI 2013). The NPWS *Regional Pest Management Strategy 2012–17, Northern Rivers Region* (OEH 2012a), applies to this reserve.

The overriding objective of the NPWS Regional Pest Management Strategy is to minimise adverse impacts of pest species on biodiversity and other park and community values, while complying with legislative responsibilities. The strategy also identifies where other site- or pest-specific plans or strategies need to be developed to provide a more detailed approach. A pest management plan for the reserve was prepared (Joseph 1995) but needs to be updated. There are also site management plans for the current weed control works that are part of the recovery actions for hairy quandong, isoglossa and red lilly pilly (see Section 3.2).

The *Biosecurity Act 2015* and its regulations provide specific legal requirements for the response, management and control of biosecurity risks, including weeds and pest animals. These requirements apply equally to public and privately owned land. Under this framework Local Land Services (LLS) has prepared regional strategic management plans for each of its 11 regions, including North Coast LLS regional weed plans (North Coast LLS 2017) and regional pest animal plans (North Coast LLS 2018). These priorities will be implemented via the relevant NPWS pest management strategy.

Observations by NPWS staff and contractors identify more than 20 pests in the reserve, the most significant of which are listed in Table 3. The regional pest management strategy also states the reserve could be susceptible to trumpet tree (*Cecropia* spp.), a new and emerging regional priority weed (North Coast LLS 2017).

Those species associated with key threatening processes are listed in Table 3. Key threatening processes most relevant to the reserve are:

- invasion, establishment and spread of lantana *(NSW SC 2006b) which is hindering natural regeneration processes in open areas of previous disturbance (see Section 3.2)*

- invasion of native plant communities by exotic perennial grasses (NSW SC 2003), specifically broadleaf paspalum, which displaces the seedlings of native plants even in shaded undisturbed areas in the vicinity of Lacks Creek
- invasion and establishment of the cane toad (NSW SC 2006a; TSSC 2005) which may compete with native frogs and is toxic to native predators, such as the spotted-tailed quoll
- predation by the European red fox (DoE 2009; NSW SC 1998) and predation by the feral cat (DoE 2009; NSW SC 2000c) which predate on the pale-vented bush-hen and other birds and a range of medium-sized mammals, but their numbers and direct impact on the native animals in the reserve are poorly understood
- predation and hybridisation of feral dogs (NSW SC 2009) which pose a threat to the reserve's koala populations through predation.

Table 3 Significant pest plants and animals recorded in Inner Pocket Nature Reserve

Common name	Scientific name	Comment
Weeds		
Crofton weed [1]	*Ageratina adenophora*	Occurs along the ridges in previously logged areas and on slopes near Lacks Creek
Mistflower	*Ageratina riparia*	Found in damp areas, such as stream banks and clearings in the rainforest
Camphor laurel [1]	*Cinnamomum camphora*	Found in previously disturbed areas and canopy gaps; mostly younger plants as older trees have been controlled
Lantana [2, 3, 4]	*Lantana camara*	Most abundant weed species in the reserve; occurs mostly in previously disturbed areas and canopy gaps; thrives in rainforest areas
Broadleaf paspalum [4]	*Paspalum mandiocanum*	Common on slope down to Lacks Creek; shade tolerant; one of several exotic grasses in the reserve
Pest animals		
Wild dog [4, 5]	*Canis lupus familiaris*	Seen and heard in the reserve
Feral cat [4, 5 ,6]	*Felis catus*	Seen on reserve boundary near Lacks Creek
Cane toad [4, 5, 6]	*Rhinella marina*	Seen and heard near Lacks Creek where at least four common species of native frog occur
European red fox [4, 5, 6]	*Vulpes vulpes*	Seen near the reserve and extremely likely to be in the reserve

[1] Other regional weed (North Coast LLS 2017).

[2] State-level priority weed (North Coast LLS 2017).

[3] Declared Weed of National Significance.

[4] Listed as a key threatening process under the Biodiversity Conservation Act.

[5] Priority pest animal (North Coast LLS 2018).

[6] Listed as a key threatening process under the Environment Protection and Biodiversity Conservation Act.

A *Plan to Protect Environmental Assets from Lantana* (Biosecurity Queensland 2010) establishes national conservation priorities for the control of lantana. It identifies the research, management and other actions needed to ensure the long-term survival of native species and ecological communities affected by the invasion of lantana. Due to the presence of many threatened plant species and the Lowland Rainforest Endangered Ecological Community, the reserve is one of the highest priority sites on the east coast of Australia for this project. Since 2009, NPWS and its contractors have been controlling lantana and other

weeds in the reserve in accordance with an approved site management plan. Monitoring has revealed the success of the control program: areas that were 100% lantana now have 90% coverage of regenerating rainforest trees. Planning for lantana control in the reserve was done in consultation with reserve neighbours, three of whom later received a grant from the (then) Northern Rivers Catchment Management Authority (now North Coast Local Land Services) to control lantana and other weeds on their own properties. A collaborative and multi-tenure approach to pest management is highly effective, especially when undertaken at the head of catchments such as Lacks Creek.

The NSW fox threat abatement plan (OEH 2011a) determines priority areas for long-term fox control across New South Wales to protect biodiversity. The reserve is not currently a priority for fox control under that plan.

A *Management Plan for Cane Toads in National Parks and Reserves* (OEH 2013b) guides the management and control of cane toads in NSW parks. This plan identifies other parks of the Tweed Caldera, namely the eastern part of the Border Ranges National Park, Nightcap National Park and Whian Whian State Conservation Area as priorities for cane toad control. The status of cane toads in the reserve is unknown but predicted to be uncommon and, as such, the reserve is not currently listed as a priority for cane toad control.

Desired outcomes

- Pest plants and animals are controlled and where possible eliminated.
- Negative impacts of introduced species on park values are minimised.
- Negative impacts of pest animals on park values are minimised.

Management response

4.4.1. Manage pest species in accordance with pest management strategies relevant to the reserve.

4.1.2. Survey the reserve to determine the presence and extent of pest animal species and identify biodiversity most at risk.

4.1.3. Prepare and implement an updated reserve-level pest management strategy.

4.1.4. Continue to seek the cooperation of neighbours in implementing weed and pest control programs. Undertake control in cooperation with North Coast Local Land Services, Brunswick Valley Landcare and Byron Shire Council.

4.1.5. Provide fencing assistance to neighbours in accordance with the NPWS *Boundary Fencing Policy*.

4.1.6. Where boundary fencing is not practicable, work with neighbours to identify effective strategies to exclude stock from the reserve.

4.2 Fire

The primary objectives of NPWS fire management are to protect life, property, community assets and cultural heritage from the adverse impacts of fire, while also managing fire regimes in parks to maintain and enhance biodiversity. NPWS also assists in developing fire management practices that contribute to conserving biodiversity and cultural heritage across the landscape, and implements cooperative and coordinated fire management arrangements with other fire authorities, neighbours and the community (OEH 2013a).

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

animal species and communities, and high frequency fires have been listed as a key threatening process under the BC Act (NSW SC 2000b).

According to Stanton (1990), southern parts of what is now the reserve were burned in 1983. The fire history in what is now the reserve is well-documented since 1989. In 1993, an area of about 34 hectares burned the ridgetop in the reserve's north-west. The most recent fire was in 1995, when about 20 hectares burned in the north-west corner of the reserve.

Apart from that, no part of the reserve has been subjected to fire for at least 30 years. Rainforest is vulnerable to fire but does not burn well except under extreme drought conditions. The eucalypt forest is more fire-prone and, combined with the steep terrain, a fire in the reserve could have a devastating impact on its threatened plants, animals and rainforest communities. Several neighbouring residences lie close to the south and west of the reserve.

A fire management strategy, which defines the fire management approach for the reserve, was initially prepared in 2005 (DEC 2005) and is periodically updated (NPWS 2016). The fire management strategy outlines key assets within and adjoining the reserve including sites of natural and cultural heritage value, fire management zones and fire control advantages, such as access trails on neighbouring lands and nearby water supply points. It also contains fire regime guidelines for conservation of the reserve's plant communities.

NPWS maintains cooperative arrangements with surrounding landowners and the Rural Fire Service and is actively involved with the Far North Coast Bush Fire Management Committee. Cooperative arrangements include fire planning, fuel management and information sharing. Hazard reduction programs, ecological burning proposals and fire trail works are submitted annually to the committee.

Desired outcomes

- Negative impacts of fire on life, property and the environment are minimised.
- The potential for spread of bushfires on, from or into the park is minimised.
- Fire regimes are appropriate for conservation of native plant and animal communities.

Management response

4.2.1. In cooperation with neighbouring landholders, implement the reserve fire management strategy, and review and update it as required.

4.2.2. Rehabilitate areas disturbed by fire suppression operations as soon as practical after the fire.

4.3 Climate change

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

The latest information on projected changes to climate are from the NSW and ACT Regional Climate Modelling (NARClim) project (OEH 2014). The climate projections for 2020–39 are described as 'near future'; and projections for 2060–79 are described as 'far future'. The snapshot shown in Table 4 is for the NSW North Coast Region, which includes Inner Pocket Nature Reserve (OEH 2014).

The projected increases in temperatures, number of hot days and severe fire weather days (OEH 2014) are likely to influence bushfire frequency and intensity across the region. Higher rainfalls in autumn and spring (OEH 2014) are likely to increase runoff at these times of year,

leading to regional flooding and increased soil erosion (DECCW 2010c). Increased bushfire risk and erosion risk are likely to be specific issues for Inner Pocket Nature Reserve.

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

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

Table 4 North Coast climate change snapshot

Projected temperature changes	
Maximum temperatures are projected to **increase** in the near future by 0.4–1.0°C	Maximum temperatures are projected to **increase** in the far future by 1.5–2.4°C
Minimum temperatures are projected to **increase** in the near future by 0.5–1.0°C	Minimum temperatures are projected to **increase** in the far future by 1.6–2.5°C
The number of hot days will **increase**	The number of cold nights will **decrease**
Projected rainfall changes	
Rainfall is projected to **decrease** in winter	Rainfall is projected to **increase** in autumn and spring
Projected Forest Fire Danger Index changes	
Average fire weather is projected to **increase** in spring and summer	Severe fire weather days are projected to **increase** in spring and summer

Source: OEH 2014.

Desired outcomes

- The effects of climate change on natural systems are reduced.

Management response

4.3.1. Continue existing fire, pest and weed management programs to increase the reserve's ability to cope with future disturbances, including climate change.

5. Management operations

5.1 Management operations and other uses

There are no management trails within the reserve and all management operations within the reserve itself are conducted on foot. To access the reserve's boundaries, NPWS either uses Skyline Road (the constructed Crown road that provides access to the reserve's south-east corner, described in Section 3.6); or uses a private property trail known as Inner Pocket Trail, located west of Middle Pocket Road (see Figure 1). There is no public road reserve associated with this trail, therefore it cannot be legally used by the general public.

Inner Pocket Trail is a rough dirt trail that runs west from the end of Middle Pocket Road to the corner of the reserve, and then along the southern bank of Lacks Creek. It was created decades ago to access the banana plantations in operation at the time. This narrow trail also provides private property access for the owners of two lots adjoining the reserve (Lot 1 and Lot 2 DP208063).

NPWS has a formal right of carriageway over Inner Pocket Trail on Lots 1 and 2 commencing at the reserve boundary. This provides valuable access to the rainforest section of the reserve for weed control, threatened species monitoring and other management activities. As this easement is overgrown, the physical trail is situated slightly to the south.

NPWS does not have a formal right of way over the section of trail that joins Middle Pocket Road to the reserve. NPWS's use of this 200-metre section of trail, or track in use, is subject to the ongoing agreement of the landholder. Securing access along this section of the trail is a priority as it provides direct access to the rainforest around Lacks Creek, which is identified for ongoing lantana control and the monitoring of threatened species such as isoglossa and hairy quandong under the NSW *Saving our Species* program.

Desired outcomes

- NPWS has continuous secure legal access over tracks used by NPWS between Middle Pocket Road and the Lacks Creek section of the reserve.

Management response

5.1.1. Maintain cooperative arrangements with nearby landholders regarding access, fire and pest species management.

5.1.2. NPWS will seek secure legal access such as by compensatory easements over the tracks used by NPWS between Middle Pocket Road and the reserve. Any easements granted over these areas should negotiate conditions that limit use of these trails to neighbouring property owners and NPWS only. Conditions should also specify maintenance arrangements of these trails. Public vehicle access is not available in this area.

6. Implementation

This plan of management establishes a scheme of operations for Inner Pocket Nature Reserve. Implementation of this plan will be undertaken within the annual program of NPWS.

Identified activities for implementation are listed in Table 5. Relative priorities are allocated against each activity as follows:

- **High priority** activities are imperative to achieve the plan's objectives and desired outcomes and must be undertaken in the near future to avoid significant deterioration in natural, cultural or management resources.
- **Medium priority** activities are necessary to achieve the objectives and desired outcomes but are not urgent.
- **Low priority** activities are desirable to achieve the objectives and desired outcomes but can wait until resources become available.
- **Ongoing** activities are undertaken on an annual basis or in response to an issue that arises.

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

Table 5 Management response priorities

Management response	Priority
3.1 Geology, landscape and hydrology	
3.1.1 Leave undisturbed any areas within the reserve which are subject to naturally occurring landslips or erosion, unless there is a threat to public safety or assets, or to improve environmental outcomes.	Ongoing
3.2 Native plants	
3.2.1 Implement relevant strategies and actions in the *Biodiversity Conservation Program* to conserve and restore threatened species, populations and ecological communities in the reserve.	High
3.2.2 Improve the condition of the reserve's vegetation by implementing bush regeneration programs.	Medium
3.3 Native animals	
3.3.1 Implement relevant strategies in the *Biodiversity Conservation Program* and recovery plans for threatened species and populations in the reserve.	High
3.3.2 Encourage or undertake targeted native animal surveys in the reserve.	Low
3.3.3 Work with local land holders (or neighbours) to develop voluntary, cooperative programs to conserve, protect and restore habitat corridors.	Medium
3.4 Aboriginal heritage	
3.4.1 Continue to consult and involve the Tweed Byron Local Aboriginal Land Council, the Bundjalung Council of Elders, other relevant Aboriginal community organisations and custodial families in the management of their Country, including the management of cultural and natural values of the reserve.	High
3.4.2 Undertake an archaeological survey and cultural assessment prior to all works with the potential to impact Aboriginal sites or values.	Ongoing
3.4.3 Encourage further research into the Aboriginal cultural heritage values of the reserve with the relevant Aboriginal community organisations and members.	Low

Management response	Priority
3.5 Historic heritage	
3.5.1 In liaison with the relevant regulatory authorities, assess safety requirements and the heritage significance of the abandoned rhodonite mines. Where appropriate, undertake measures to make the sites safe and protect the historical values of the mines. This may include fencing or signage.	Low
3.5.2 Undertake an archaeological survey and cultural assessment prior to all works with the potential to impact historic sites and places.	Ongoing
3.6 Visitor use	
3.6.1 Provide and promote opportunities for guided community activities, such as volunteer bush regeneration, birdwatching and plant surveys in the reserve.	Ongoing
3.6.2 Provide regulatory, safety and minimal impact use information at the reserve boundary near Lacks Creek and adjacent to Skyline Road.	Medium
3.6.3 Do not provide visitor facilities in the reserve.	Ongoing
3.6.4 Monitor recreational activities and manage them as appropriate to protect the conservation values of the reserve and minimise impacts on neighbours.	Ongoing
4.1 Pests	
4.1.1 Manage pest species in accordance with pest management strategies relevant to the reserve.	Medium
4.1.2 Survey the reserve to determine the presence and extent of pest animal species and identify biodiversity most at risk.	Low
4.1.3 Prepare and implement an updated reserve-level pest management strategy.	Medium
4.1.4 Continue to seek the cooperation of neighbours in implementing weed and pest control programs. Undertake control in cooperation with North Coast Local Land Services, Brunswick Valley Landcare and Byron Shire Council.	Ongoing
4.1.5 Provide fencing assistance to neighbours in accordance with the NPWS *Boundary Fencing Policy*.	Low
4.1.6 Where boundary fencing is not practicable, work with neighbours to identify effective strategies to exclude stock from the reserve.	Medium
4.2 Fire	
4.2.1 In cooperation with neighbouring landholders, implement the reserve fire management strategy, and review and update it as required.	High/ Ongoing
4.2.2 Rehabilitate areas disturbed by fire suppression operations as soon as practical after the fire.	Ongoing
4.3 Climate change	
4.3.1 Continue existing fire, pest and weed management programs to increase the reserve's ability to cope with future disturbances, including climate change.	Ongoing
5. Management operations	
5.1.1 Maintain cooperative arrangements with nearby landholders regarding access, fire and pest species management.	Ongoing
5.1.2 NPWS will seek secure legal access such as by compensatory easements over the tracks used by NPWS between Middle Pocket Road and the reserve. Any easements granted over these areas should negotiate conditions that limit use of these trails to neighbouring property owners and NPWS only. Conditions should also specify maintenance arrangements of these trails. Public vehicle access is not available in this area.	High

References

Biosecurity Queensland 2010, *Plan to Protect Environmental Assets from Lantana,* Prepared on behalf of the National Lantana Management Group, Department of Employment, Economic Development and Innovation, Yeerongpilly, Queensland.

Briggs JD & Leigh JH 1995, *Rare or Threatened Australian Plants,* Revised Edition, CSIRO Publishing, Australia.

Brown RF, Cranfield IC, Denaro TJ, Burrows PF, Henley HF, Stroud WJ & Brownlow JW 2007, *Warwick Tweed Heads 1:250 000 Metallogenic Map SH/ 2-3*, Geological Survey of New South Wales, Maitland and Geological Survey of Queensland, Brisbane.

BOM 2016, *Climate Data Online: Daily rainfall – Mullumbimby (Fairview Farm),* Bureau of Meteorology, Melbourne, Victoria, accessed 28 October 2016, www.bom.gov.au/climate/data/index.shtml.

CERRA 2000, *Strategic Overview for the Management of the World Heritage Central Eastern Rainforest Reserves (Australia)*, Department of the Environment and Heritage, Canberra, accessed 17 January 2014, www.environment.gov.au/heritage/publications/strategy/strategicoverview.html.

DEC 2004a, *Recovery Plan for* Davidsonia johnsonii *(Smooth Davidsonia),* Department of Environment and Conservation (NSW), Hurstville.

DEC 2004b, *Recovery Plan for* Diploglottis campbellii *(Small-leaved Tamarind)*, Department of Environment and Conservation (NSW), Hurstville.

DEC 2004c, *Draft Recovery Plan for* Elaeocarpus williamsianus, Department of Environment and Conservation (NSW), Hurstville.

DEC 2004d, *Recovery Plan for the Green-leaved Rose Walnut and the Rusty Rose Walnut*, Department of Environment and Conservation (NSW), Hurstville.

DEC 2005, *Mt Jerusalem National Park & Inner Pocket Nature Reserve: Fire Management Strategy (Type 2),* accessed 24 July 2015, www.environment.nsw.gov.au/firemanagement/InnerPocketNRFms.htm.

DEC 2006*, NSW Recovery Plan for the Large Forest Owls: Powerful owl* (Ninox strenua*), sooty owl* (Tyto tenebricosa*) and masked owl* (Tyto novaehollandiae*)*, Department of Environment and Conservation (NSW), Sydney, www.environment.nsw.gov.au/resources/nature/TSRecoveryPlanForestOwls.pdf.

DECC 2008, *Recovery Plan for the Koala (*Phascolarctos cinereus*)*, Department of Environment and Climate Change NSW, Sydney, www.environment.nsw.gov.au/resources/threatenedspecies/08450krp.pdf.

DECCW 2010a, *Border Ranges Rainforest Biodiversity Management Plan — NSW & Queensland*, Department of Environment, Climate Change and Water NSW, Sydney, www.environment.gov.au/resource/border-ranges-rainforest-biodiversity-management-plan.

DECCW 2010b, *Northern Rivers Regional Biodiversity Management Plan: National recovery plan for the Northern Rivers Region*, Department of Environment, Climate Change and Water NSW, Sydney, www.environment.gov.au/resource/northern-rivers-regional-biodiversity-management-plan.

DECCW 2010c, *NSW Climate Impact Profile: The impacts of climate change on the biophysical environment of New South Wales*, Department of Environment, Climate Change and Water NSW, Sydney, http://climatechange.environment.nsw.gov.au/Impacts-of-climate-change/2010-NSW-climate-impact-reporting.

DoE 2009, *Listed Key Threatening Processes*, Department of the Environment, Canberra www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl.

DPI 2013, *NSW Biosecurity Strategy 2013–2021*, Department of Primary Industries, a division of NSW Department of Trade and Investment, Regional Infrastructure and Services, Orange, www.dpi.nsw.gov.au/biosecurity/biosecurity-strategy.

ERIN 2012, *Interim Biogeographic Regionalisation for Australia, Version 7*, Map produced for the National Reserve Systems Section, Australian Government Department of Sustainability, Environment, Water, Population and Communities, Canberra, accessed 21 July 2015, www.environment.gov.au/land/nrs/science/ibra/australias-bioregions-maps.

Harden GJ, McDonald WJF & Williams JB 2006, *Rainforest Trees and Shrubs: A field guide to their identification,* Gwen Harden Publishing, Nambucca Heads.

Hunter RJ 1986, 'Report on a Flora Survey of portion 263 and part portion 264, Parish of Billinudgel', unpublished report to NSW Heritage Council, NSW National Parks and Wildlife Service, Lismore

Joseph R 1995, 'Inner Pocket Nature Reserve Pest Management Plan: Incorporating restoration and weed control strategies', unpublished plan prepared for the NSW National Parks and Wildlife Service, Murwillumbah.

Kitching RL & Braithwaite R 2005, *Proposed extension to CERRA under the current rainforest theme,* letter on behalf of the CERRA Technical and Scientific Advisory Committee and the CERRA Community Advisory Committee to the CERRA Ministerial Council members, recommending additions to the World Heritage Central Eastern Rainforest Reserves of Australia, dated 12 October 2005.

North Coast LLS 2017, *North Coast Regional Strategic Weed Management Plan 2017–2022*, North Coast Local Land Services, http://northcoast.lls.nsw.gov.au/__data/assets/pdf_file/0006/722760/north-coast-regional-weed-management-plan.pdf.

North Coast LLS 2018, *North Coast Regional Strategic Pest Animal Management Plan 2018-2023*, North Coast Local Land Services, https://northcoast.lls.nsw.gov.au/__data/assets/pdf_file/0020/820802/north-coast-regional-pest-plan.pdf

NPWS 2001, *Mitchell's Rainforest Snail* Thersites mitchellae *Recovery Plan*, NSW National Parks and Wildlife Service, Hurstville, NSW, www.environment.gov.au/resource/mitchells-rainforest-snail-thersites-mitchellae-recovery-plan

NPWS 2014, *Boundary Fencing Policy*, NSW National Parks and Wildlife Service, Office of Environment and Heritage, www.environment.nsw.gov.au/policies/BoundaryFencing.htm

NPWS 2016, Mount Jerusalem National Park and Inner Pocket Nature Reserve: Type 2 Reserve Fire Management Strategy, Revised edition, National Parks and Wildlife Service, Alstonville.

NSW DPI & OEH 2011, *Biodiversity Priorities for Widespread Weeds*, report prepared for the 13 Catchment Management Authorities (CMAs) by NSW Department of Primary Industries and Office of Environment & Heritage, Orange, www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/publications/cmas.

NSW SC 1998, Final Determination to List Predation by the European Red Fox *Vulpes vulpes* (Linnaeus1758) as a Key Threatening Process on Schedule 3 of the TSC Act, NSW Scientific Committee, www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20015.

NSW SC 2000a, *Final Determination to List Anthropogenic Climate Change as a Key Threatening Process on Schedule 3 of the TSC Act*, NSW Scientific Committee, www.environment.nsw.gov.au/threatenedspecies/HumanClimateChangeKTPListing.htm.

NSW SC 2000b, Final Determination to List High Frequency Fire Resulting in the Disruption of Life Cycle Processes in Plants and Animals and Loss of Vegetation Structure and Composition as a Key Threatening Process on Schedule 3 of the TSC Act, NSW Scientific Committee, www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20014.

NSW SC 2000c, Final Determination to List Predation by the Feral Cat Felis catus (Linnaeus, 1758) as a Key Threatening Process on Schedule 3 of the TSC Act, NSW Scientific Committee, www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20008.

NSW SC 2003, *Final Determination to List Invasion of Native Plant Communities by Exotic Perennial Grasses on Schedule 3 of the TSC Act,* NSW Scientific Committee, www.environment.nsw.gov.au/determinations/ExoticPerennialGrassesKTPListing.htm.

NSW SC 2006a, Final Determination to List Invasion and Establishment of the Cane Toad (Bufo marinus) as a Key Threatening Process on Schedule 3 of the TSC Act, NSW Scientific Committee, www.environment.nsw.gov.au/determinations/BufoMarinusKtp.htm.

NSW SC 2006b, Final Determination to List Invasion, Establishment and Spread of Lantana (Lantana camara L. sens. Lat) as a Key Threatening Process on Schedule 3 of the TSC Act, NSW Scientific Committee, www.environment.nsw.gov.au/determinations/LantanaKtp.htm.

NSW SC 2009, Final Determination to List Predation and Hybridisation by Feral Dogs, Canis lupus familiaris as a Key Threatening Process on Schedule 3 of the TSC Act, NSW Scientific Committee, www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20116.

OEH 2011a, *NSW Threat Abatement Plan for Predation by the Red Fox* (Vulpes vulpes), Office of Environment and Heritage, Sydney, www.environment.nsw.gov.au/pestsweeds/Foxes.htm.

OEH 2011b, *Sustainable Mountain Biking Strategy*, Office of Environment and Heritage, Sydney, www.environment.nsw.gov.au/parkmanagement/SustainableMtBStrategy.htm.

OEH 2012a, Regional Pest Management Strategy 2012–17, Northern Rivers Region: A new approach for reducing impacts on native species and park neighbours, Office of Environment and Heritage, Sydney, www.environment.nsw.gov.au/pestsweeds/RegionPestManagement.htm.

OEH 2012b, *Strategic Directions for Horse Riding in NSW National Parks*, Office of Environment and Heritage, Sydney, www.environment.nsw.gov.au/policies/HorseRideStrat.htm.

OEH 2013a, *Living with Fire in NSW National Parks: A strategy for managing bushfires in national parks and reserves 2012–2021*, revised edition, Office of Environment and Heritage, Sydney, www.environment.nsw.gov.au/fire/120690livfire.htm.

OEH 2013b, *Management Plan for Cane Toads in National Parks and Reserves 2012*, Office of Environment and Heritage NSW, Sydney, www.environment.nsw.gov.au/pestsweeds/13772canetoadmp.htm.

OEH 2013c, *Saving our Species*, Office of Environment and Heritage, Sydney, www.environment.nsw.gov.au/savingourspecies/about.htm

OEH 2014, *North Coast: Climate change snapshot*, Office of Environment and Heritage, Sydney, www.climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/Climate-projections-for-your-region/North-Coast-Climate-Change-Downloads

OEH 2015, *NSW BioNet, Atlas of NSW Wildlife*, Office of Environment and Heritage, Sydney, accessed 18 July 2015, www.bionet.nsw.gov.au/.

OEH 2017, *Biodiversity Conservation Program*, Office of Environment and Heritage, www.environment.nsw.gov.au/threatenedspecies/pas.htm.

Relph RE 1961, Manganese occurrence at Mullumbimby, in Department of Mines, *Technical Reports Volume 7 1959*, Government Printer, Sydney, p.157.

Scotts D 2003, Key Habitats and Corridors for Forest Fauna: A Landscape Framework for conservation in North-east New South Wales, NSW NPWS Occasional Paper 32, NSW National Parks and Wildlife Service, Sydney.

Stanton MA 1990, Inner Pocket Nature Reserve Vertebrate Fauna Survey: A qualitative assessment of the vertebrate fauna in Inner Pocket Nature Reserve conducted on behalf of the NSW National Parks and Wildlife Service, unpublished report provided to the Lismore District of the NSW National Parks and Wildlife Service, Alstonville.

Thackway R & Cresswell I 1995, An Interim Biogeographic Regionalisation for Australia: A framework for establishing the national system of reserves, Version 4.0. Australian Nature Conservation Agency, Canberra.

TSSC 2001, *Commonwealth Listing Advice on Loss of Terrestrial Climatic Habitat Caused by Anthropogenic Emissions of Greenhouse Gases*, Threatened Species Scientific Committee, www.environment.gov.au/cgi-bin/sprat/public/publicshowkeythreat.pl?id=7.

TSSC 2005, *Commonwealth Listing Advice for the Biological Effects, including Lethal Toxic Ingestion, caused by Cane Toads (*Bufo marinus*)*, Threatened Species Scientific Committee, www.environment.gov.au/biodiversity/threatened/key-threatening-processes/biological-effects-cane-toads.