

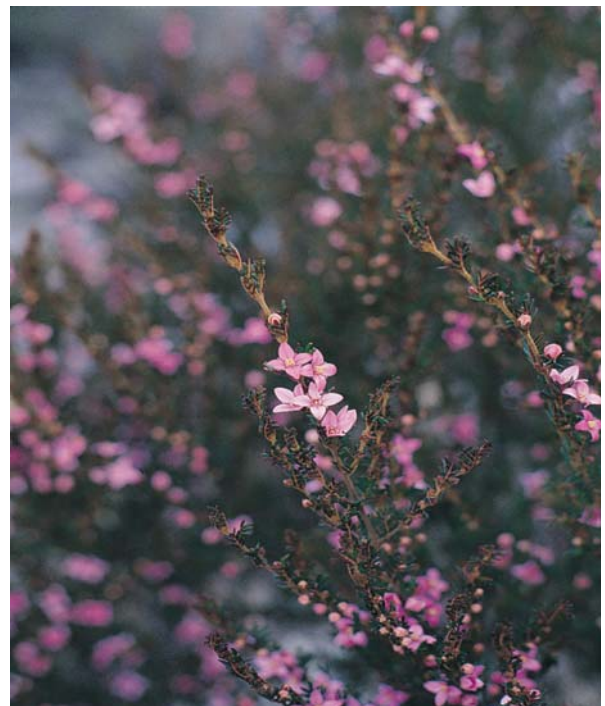


Office of  
Environment & Heritage  
NSW National Parks & Wildlife Service



# Plan of Management

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## Bluff River Nature Reserve and Bolivia Hill Nature Reserve



**BLUFF RIVER NATURE RESERVE AND  
BOLIVIA HILL NATURE RESERVE  
PLAN OF MANAGEMENT**

**NSW National Parks and Wildlife Service**

**December, 2011**

**This plan of management was adopted by the Minister for the Environment on 8<sup>th</sup> December 2011.**

### **Acknowledgements**

This plan of management is based on a draft plan prepared by staff of the Tenterfield Area of the Northern Tablelands Region of the NSW National Parks and Wildlife Service (NPWS), part of the Office of Environment and Heritage, Department of Premier and Cabinet.

The NPWS acknowledges that Bluff River and Bolivia Hill Nature Reserves are in the traditional country of the Ngarabul Nation.

FRONT COVER: The endangered Bolivia Hill Boronia (*Boronia boliviensis*).  
Photos: Copyright Peter Clarke.

For additional information or any inquiries about these reserves or this plan of management, contact the NPWS Tenterfield Area Office, 10 Miles Street, Tenterfield NSW 2372 or by telephone on 02 6736 4298.

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## FOREWORD

Bluff River Nature Reserve and Bolivia Hill Nature Reserve are located near Tenterfield on the Northern Tablelands of New South Wales. Bluff River Nature Reserve has an area of 1,793 hectares while Bolivia Hill Nature Reserve has an area of 1,782 hectares.

Bluff River and Bolivia Hill Nature Reserves conserve an area of particularly high floral diversity, including three endangered ecological communities and seven threatened flora species. Eight threatened fauna species have been recorded within the reserves.

The reserves also contain a number of sites from early European settlement in the area, including two shearing sheds, and are an area that is of interest to the Ngarabul and Bundjalung Aboriginal people.

The New South Wales *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each nature reserve. A draft plan of management for Bluff River and Bolivia Hill Nature Reserves was placed on public exhibition from 3<sup>rd</sup> December 2010 until 14<sup>th</sup> March 2011. The submissions received were carefully considered before adopting this plan.

The plan contains a number of actions to protect the natural values of the reserve, including a baseline fauna survey, the implementation of actions to assist the recovery of threatened species and endangered ecological communities, and strategies to control of introduced plants and animals. The plan also provides for low impact self-reliant recreation activities such as bushwalking, cycling, bird watching and nature observation.

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

**Robyn Parker**  
**Minister for the Environment**

## MAP 1. MAP OF PLANNING

AREA

## **1. LOCATION, GAZETTAL AND REGIONAL CONTEXT**

This plan of management applies to lands reserved as Bluff River Nature Reserve and Bolivia Hill Nature Reserve. These lands and any future additions will be managed in accordance with the management principles outlined in this plan and will be referred to in this document as the 'planning area'. The planning area is located near Tenterfield on the Northern Tablelands of New South Wales. The total size of the planning area is 3,575 hectares.

Both reserves lie within the New England Tableland bioregion and the Tenterfield Plateau subregion, and between the woodland systems of the west and the taller forest communities in the east. Consequently there is a rich diversity of flora and fauna with many species at the limit of their distributions. The planning area also forms a disjunct corridor of reserved land from the World Heritage reserves of Washpool and Gibraltar Range National Parks in the east to Torrington State Conservation Area in the west.

Bluff River Nature Reserve covers an area of 1,793 hectares on the western side of the New England Highway, 12 kilometres south of Tenterfield (refer to Map 1). It was gazetted over former vacant Crown Land grazing leases in 1999 under the provisions of the North East NSW Regional Forest Agreement to conserve values including outstanding landforms, remnant vegetation, endangered ecological communities and threatened species.

Bolivia Hill Nature Reserve covers an area of approximately 1,782 hectares, 48 kilometres south of Tenterfield on the eastern side of the New England Highway, (refer to Map 1). It was gazetted in 2000 as part of the National Reserve System program to contribute to representation at bioregional and subregional levels, and to conserve important remnant vegetation having a particularly high floristic diversity including species that are endemic or highly restricted to the area and threatened species.

Lands adjacent to both reserves are managed as small-scale sheep and cattle grazing enterprises.

The planning area is within the geographical area of Tenterfield Shire Council, Border Rivers-Gwydir Catchment Management Authority, Moombahlene Local Aboriginal Land Council and the New England Livestock Health and Pest Authority (LHPA).

## 2. MANAGEMENT CONTEXT

### 2.1. LEGISLATIVE AND POLICY FRAMEWORK

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

Other legislation, international agreements and charters may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979* (EPA Act) may require the assessment and mitigation of the environmental impacts of works proposed in this plan. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) also applies in relation to actions that may impact on matters of national environmental significance such as migratory species and threatened species listed under that Act.

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted a plan, no operations may be undertaken within the planning area except in accordance with this plan. This plan will also apply to any future additions to the planning area. Should operations be proposed for the planning area or any additions that are not in accordance with this plan and legislation, an amendment to this plan will be required.

### 2.2. MANAGEMENT PURPOSES AND PRINCIPLES

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

Under the Act (section 30J), 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 the provision of recreation as a management principle.

### 2.3. STATEMENT OF SIGNIFICANCE

The planning area is considered to be of significance for its:

- **Biological Values:** The planning area protects important remnant vegetation in a highly cleared bioregion. The planning area protects an area of particularly high floral diversity, contains three endangered ecological communities, seven



threatened flora species and eight threatened fauna species listed under the TSC Act.

- Historic Heritage Values: Bolivia Hill Nature Reserve contains a number of sites showing evidence of early European settlement in the area. Two shearing sheds remain, along with the ruins of a homestead adjacent to the southern shearing shed.
- Landscape Values: The planning area forms an integral component of reserved land in the Northern Tablelands region. Together with adjacent forested properties they form important corridors linking with larger reserves to the north, south, east and west.

## **2.4. SPECIFIC MANAGEMENT DIRECTIONS**

Management of the planning area will focus on the protection of the significant endangered ecological communities, threatened flora and fauna species and the protection of cultural heritage. Major strategies to achieve these objectives are:

- the protection and monitoring of threatened and biogeographically significant species and communities;
- the protection of Aboriginal and historic heritage values and the involvement of local Aboriginal people in the management of these values;
- the control, and where possible eradication of introduced plant and animal species;
- the protection of water catchment values;
- the management of fire to protect life and assets, and conserve biodiversity;
- the provision of opportunities for self-reliant recreation in a remote natural setting consistent with the protection of the areas natural and cultural values;
- the maintenance of relationships with neighbours and other organisations so as to enhance the protection and viability of the park.

### 3. VALUES

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

#### 3.1. GEOLOGY, LANDSCAPE AND HYDROLOGY

The planning area lies within the New England Batholith, the Inverell plateau granites landscape (Mitchell, 2003) and is part of the Great Dividing Range.

The terrain of Bluff River Nature Reserve is rugged with steep slopes and spectacular cliff faces varying in elevation from 500 metres above sea level to 1180 metres above sea level. Three major drainage lines dissect the reserve; with Bluff River itself forming part of the southern boundary (refer to Map 1).

Bolivia Hill Nature Reserve is much less rugged, incorporating part of the Bolivia Range running east-west through the reserve, with elevations varying from 950 metres above sea level to 1,225 metres above sea level.

The planning area lies within the large New England Fold Belt, which has a complex geology. A late Permian volcanic unit dominates Bluff River Nature Reserve, consisting of porphyritic and undifferentiated volcanic rocks, which have given rise to mainly dark brown clay loams and occasionally loams or sandy loams. Bolivia Hill Nature Reserve is dominated by an early Triassic granitoid called the Bolivia Range Leucomonzogranite, which has produced well drained to moist and sometimes waterlogged loamy or sandy loam soils, with colour variation of dark brown to yellow brown (Hunter, 2002).

Granitic outcrops usually occur as clusters with exposures separated by a few kilometres, and are associated with thin soils that rapidly dry out after rain and have little or no moisture available for extended periods (Murphy, 1968; Platt, 1951). They also provide resources and gradients in climatic conditions that are unavailable and/or depleted in the surrounding landscape. These include stable microclimates, food sources and shelter-based resources (Hopper, 1981; Mares, 1997; Withers, 2000). In this region of the New England Batholith the relatively drier and colder environment of the granitic outcrops are associated with higher levels of flora 'insularity', that is, they are more likely to contain plant species that are restricted to the granitic outcrops (McGann, 2002). Research by McGann (2002) indicates that Bolivia Hill Nature Reserve was rated the most 'insular' of the granitic outcrops surveyed in the New England Batholith.

### 3.2. NATIVE PLANTS

The granitic forest communities of the planning area support a diverse flora with 367 species recorded in Bluff River Nature Reserve and 505 species in Bolivia Hill Nature Reserve during survey work conducted in 2002.

Eleven distinct vegetation communities have been recorded in the planning area including three communities listed as endangered ecological communities under the TSC ACT (refer to Table 1).

**Table 1. Vegetation communities present in the planning area.**

Community Type	Bluff River NR	Bolivia Hill NR
Blackbutt–stringybark shrubby open forests	✓	✓
Heathy Shrubland on granitic outcrops of the central and western New England Tablelands		✓
Bolivia wattle–tea tree outcrop shrublands	✓	
Box–red gum grassy woodlands <sup>^</sup>	✓	✓
Heath swamps on leucogranite and granite of the New England Tablelands		✓
New England Peppermint ( <i>Eucalyptus nova-anglica</i> ) Woodland on Basalts and Sediments in the New England Tableland Bioregion*		✓
Caley's Ironbark - Orange Gum - Black Cypress Pine shrubby open forest of the northern New England Tablelands	✓	✓
Stringybark–blackbutt grassy open forests		✓
Stringybark–orange gum woodlands		✓
Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregions*#	✓	
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*	✓	✓

\* Endangered Ecological Community under the TSC Act.

<sup>^</sup> Inadequately reserved (Hunter, 2002).

<sup>#</sup> Considered to be endangered (Hunter, 2002).

Bluff River Nature Reserve contains 39 regionally significant species with one of these listed as threatened (refer to Table 2) and two previously undescribed species.

Bolivia Hill Nature Reserve is known to contain 52 regionally significant species and seven threatened species (refer to Table 2) including one previously undescribed species, *Eucalyptus boliviana* (Williams & Hill, 2001).

**Table 2. Threatened plant species recorded in the planning area**

Common name	Scientific name	Status	Reserve
<b>Trees</b>			
Bolivia stringybark	<i>Eucalyptus boliviana</i>	Vulnerable *	Bolivia Hill NR
<b>Shrubs</b>			
Bolivia wattle	<i>Acacia pycnostachya</i>	Vulnerable *#	Bluff River NR Bolivia Hill NR
Bolivia Hill boronia	<i>Boronia boliviensis</i>	Endangered *	Bolivia Hill NR
Bolivia homoranthus	<i>Homoranthus croftianus</i>	Endangered *	Bolivia Hill NR
Bolivia Hill pimelea	<i>Pimelea venosa</i>	Endangered *#	Bolivia Hill NR
<b>Herbaceous</b>			
Creeping tick-treefoil	<i>Desmodium campylocaulon</i>	Endangered *	Bolivia Hill NR
Austral toadflax	<i>Thesium australe</i>	Vulnerable *#	Bolivia Hill NR

\* Status under TSC Act.

# Denotes species nationally threatened under the EPBC Act.

Recent surveys (Hunter & Earl, 1999 and Hunter, 2002) have failed to find *Pimelea venosa*, a shrub previously located in and endemic to Bolivia Hill Nature Reserve.

*Homoranthus croftianus* is a shrub endemic to Bolivia Hill Nature Reserve. The shrub was discovered in 1997 and is named after Peter Croft, an NPWS Ranger who was one of the botanists to discover the species.

The most significant threats to vegetation structure and health in the planning area are weeds, appropriate fire regimes, grazing by feral animals, and management of easements (refer to Section 4.1).

To respond to threats to native flora and fauna, the Department of Environment, Climate Change and Water (DECCW) has prepared the NSW Threatened Species Priorities Action Statement (PAS). The PAS outlines broad strategies and detailed priority actions which will promote the recovery of threatened species, populations and endangered ecological communities and to manage key threatening processes. Priority actions and recovery plans will be used to guide management of threatened species in the planning area. The PAS includes detailed actions for all species listed in Table 2 and will be used to guide management of threatened species in the planning area.

### 3.3. NATIVE ANIMALS

The planning area provides habitat for a variety of temperate fauna groups. Significant habitat resources for fauna are present in the stands of dry sclerophyll forests and open woodland with older specimens of hollow-bearing eucalypts.

Six frogs, 16 reptiles, 43 birds and six mammal species have been recorded in Bolivia Hill Nature Reserve, including the vulnerable border thick-tailed gecko

(*Underwoodisaurus sphyrurus*) and glossy black cockatoo (*Calyptorhynchus lathami*) (refer to Table 3).

Thirty-seven birds, eight mammal and two reptile species have been recorded in Bluff River Nature Reserve. The glossy-black cockatoo and powerful owl (*Ninox strenua*), also listed as vulnerable under the TSC Act have been observed in the reserve (refer to Table 3).

**Table 3. Threatened animal species recorded in the planning area**

Common name	Scientific name	Legal Status	Reserve
<b>Birds</b>			
Glossy black-cockatoo	<i>Calyptorhynchus lathami</i>	Vulnerable*	Bluff River NR
Powerful owl	<i>Ninox strenua</i>	Vulnerable*	Bluff River NR
<b>Mammals</b>			
Spotted-tailed quoll	<i>Dasyurus maculatus</i>	Vulnerable*	Bluff River NR Bolivia Hill NR
Eastern false pipistrelle	<i>Falsistrellus tasmaniensis</i>	Vulnerable*	Bluff River NR
Eastern bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	Vulnerable*	Bluff River NR
Brush-tailed phascogale	<i>Phascogale tapoatafa</i>	Vulnerable*	Bluff River NR
Yellow-bellied sheath-tail-bat	<i>Saccolaimus flaviventris</i>	Vulnerable*	Bluff River NR
<b>Reptiles</b>			
Border thick tailed gecko		Vulnerable*	Bolivia Hill NR

\* Status under TSC Act

The PAS and recovery plans will be used to guide management of threatened species in the planning area.

Key Threatening Processes listed under the NSW TSC Act that are relevant to the planning area are:

- competition and habitat degradation by feral goats (*Capra hircus*);
- competition and grazing by the feral European rabbit;
- predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*);
- predation by the feral cat (*Felis catus*), European red fox (*Vulpes vulpes*) and predation by feral dogs (*Canis lupus familiaris*);
- invasion of native plant communities by exotic perennial grasses (such as African lovegrass, whisky grass and coolatai grass);
- high frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition;
- loss of hollow-bearing trees; and
- bushrock removal and removal of dead wood and dead trees.

### **3.4. ABORIGINAL HERITAGE**

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

The planning area lies within the area of the Moombahlene Local Aboriginal Land Council, and the Ngarabul Nation and adjoins the Bundjalung Nation. Both of these nations would have utilised the area and still maintain an interest in the reserves today.

Bluff River Nature Reserve is adjacent to Bluff Rock, the site of an Aboriginal massacre. Reports of the event are conflicting; however it is believed that in October 1844, men from the Bolivia Station sought out the local Aborigines, Ngarrabul people, after attacks on shepherds and sheep. The Aborigines were tracked to Bluff Rock, where a fight erupted and the Aborigines were forced off the cliff (Keating, 1925).

No detailed cultural heritage surveys have been conducted in the planning area, however, nearby Torrington State Conservation Area contains a number of scattered deposits, art sites and scarred trees (English, 1998). Together, the Torrington sites and the known pre-1850s traditional occupation of the area by Aboriginal people, indicate that the planning area potentially contains Aboriginal cultural heritage sites and values.

### **3.5. HISTORIC HERITAGE**

The Bolivia locality was named after the South American country. The first recorded use of the name in the locality was in 1840, when a South American squatted on the land between the two existing pastoral runs of Deepwater and Tenterfield. A number of properties in the area still bear testament to the original South American influences in their naming, for example Bolivia Hill, Peru, Ecuador and Esperanza.

Bolivia Hill Nature Reserve was once part of Bolivia Station and non-Aboriginal people have occupied the land now gazetted as the reserve since the 1830s. In the 1900s much of Bolivia Station was subdivided into smaller farm blocks including Clifferna, The Shinnies and Gallipoli Stations. Primary uses of the Bolivia area were sheep grazing with some crop farming on the flatter country. Crop farming met with little success, as the land was not fertile enough to sustain agricultural crops.

The remnants of this long agricultural history of the area within the planning area are the ruins of homestead sites and shearing sheds at both Bolivia Hill and Clifferna Stations, as well as internal fencing and a sheep dip site near the shearing shed at Bolivia Hill Station.

The Bolivia Hill shearing shed, in the southern portion of the reserve, was built in the 1940s, with the homestead built shortly after. The only remains of the homestead itself are some stairs and the brick outline of the home. The shearing shed has been restored to enable visitor access.

The Clifferna shearing shed, in the northern section of the reserve, was built at about the same time as the Bolivia Hill shearing shed. However, there is now little left of the Clifferna homestead and shearing shed except for a couple of fruit trees. It is now being managed as a ruin (refer to Section 4.1).

Both homestead sites and shearing sheds are subject to a Conservation Management Plan (Conservation Management Planners and Associates, 2001) and Schedule of Works (Arnold Wolthers Architects, 2002) to protect the historic heritage of the site. The Conservation Management Plan recognises that these sites are of local significance, providing an insight into early pastoral enterprises in the Tenterfield area (CMPA, 2001).

Since endorsement of the Conservation Management Plan, limited works have been undertaken to maintain and preserve the shearing sheds. The condition of some areas now precludes implementing the works recommended in the Conservation Management Plan. In addition, a number of moveable heritage items associated with the shearing shed have been stolen since the Conservation Management Plan was written. Arnold Wolthers Architects (2001) believed that there was significant value in preserving and conserving the fabric of the Bolivia Hill woolshed in order to retain the cultural significance of the place.

In contrast to Bolivia Hill Nature Reserve, Bluff River Nature Reserve was too steep and rugged for intensive agriculture practices. However, limited grazing did occur in the area. There are no identified historic sites within Bluff River Nature Reserve.

In 1883, the Northern Tablelands Railway was constructed through the Bolivia Range (Holmes, 1999a, and Holmes, 1999b). The imposing barrier that the range presented resulted in the contractors, Cobb & Co., choosing the site for their main camp near the north-east corner of Bolivia Hill Nature Reserve (Holmes, 1999a). However, no evidence of the camp remains. The railway terminated at Tenterfield and was finished in 1886.

Two old wells exist in Bolivia Hill Nature Reserve. There is no known significance associated with these wells. They have been fenced to reduce risks to the general public.

### **3.6. VISITOR USE**

Both of the reserves in the planning area are surrounded by private property, except for the western boundary of Bolivia Hill Nature Reserve which is bounded by a Travelling Stock Route (TSR) and railway line corridor. There is no public vehicle access to either reserve.

Access to Bluff River Nature Reserve is available only via private lands. Permission from landholders must be granted in order to visit this reserve and access is on foot only. As a consequence, there is little public use of the reserve. Bluff Rock itself is on Aboriginal owned land and is surrounded by private property. Visitors to Bluff Rock climb up from a parking area on the New England Highway. It is not contiguous with Bluff River Nature Reserve.

Public pedestrian access to Bolivia Hill Nature Reserve is available through the TSR. As a result of the pedestrian only access, visitation levels are low.

There are no picnic areas, camping areas, interpretive signs or other visitor facilities located within the planning area. However, visitors may access the recently restored Bolivia Hill shearing shed in the south western corner of the reserve.

The planning area's diversity of native plant and animal species provide opportunities for nature-based activities including bushwalking, photography and bird watching.



## 4. ISSUES

### 4.1. WEEDS AND PEST ANIMALS

The control of all pest species within the planning area is undertaken in accordance with the Northern Tablelands Regional Pest Management Strategy (NPWS, 2007). This strategy identifies appropriate control mechanisms and management strategies for all pest species throughout the Region.

Significant parts of the planning area were previously grazed, some of it cleared, leading to the alteration of the forest structure by reducing canopy cover and encouraging the establishment of weeds in the understorey. These changes have suppressed the processes of natural regeneration and succession. Introduced plants can impact on forest and woodland structure, species diversity, habitat values, prevent natural regeneration and have the potential to spread to and from neighbouring land.

Pest animals within the planning area and on adjoining land negatively impact on native animal communities through competition for resources, predation, disturbance and transmission of diseases. Pest animals also impact on native vegetation and have the potential to have an adverse economic impact on neighbouring properties. Table 4 lists the weeds and pest animals known to occur in the planning area.

**Table 4. Weeds and pest animals recorded in the planning area**

Weeds		Pest Animals	
Common Name	Scientific Name	Common Name	Scientific Name
African lovegrass	<i>Eragrostis curvula</i> ~	Feral goat	<i>Capra hircus</i> ~>
Coolatai grass	<i>Hyparrhenia hirta</i> ~	Red fox	<i>Vulpes vulpes</i> ~>
Whisky grass	<i>Andropogon virginicus</i> ~	European rabbit	<i>Oryctolagus cuniculus</i> ~>
Blackberry	<i>Rubus fruticosus</i> *	Feral pig	<i>Sus scrofa</i> ~>
Bathurst burr	<i>Xanthium spinosum</i>	Wild dog	<i>Canis familiaris</i>
Johnson grass	<i>Sorghum halepense</i> #	Feral cat	<i>Felis catus</i> >
English broom	<i>Cytisus scoparius</i> subsp. <i>scoparius</i> #~	House mouse	<i>Mus musculus</i>
		Black rat	<i>Rattus rattus</i>
		Brown hare	<i>Lepus capensis</i>
		Rabbit	<i>Oryctolagus cuniculus</i>
		Unidentified deer	<i>Cervus sp.</i> ~
		Fallow deer	<i>Dama dama</i> ~

# Declared noxious under *Noxious Weed Act 1993*

\* Declared weed of national significance

~ Key threatening process under TSC Act

> Key threatening process under Commonwealth EPBC Act

The *Noxious Weeds Act 1993* places an obligation upon public authorities to control noxious weeds on land that they occupy to the extent necessary to prevent such weeds spreading to adjoining lands.

Wild dogs have been recorded in the planning area and have been declared as pest animals under the *Rural Lands Protection Act 1998* (RLP Act) throughout NSW. Wild dogs are known to inflict losses and cause disruption to livestock on rural lands. The NPWS has a statutory obligation to control wild dogs on its estate. The reserves are included in part of an annual cooperative wild dog and fox mound-baiting program, undertaken by NPWS, New England Livestock Health and Pest Authority (LHPA) and neighbours. The cooperative control approach has been successful in reducing stock losses in the area.

Populations of feral pigs occur in the planning area, although their distribution is seasonal and is dependent upon climatic conditions and food supply. The abundance of feral pigs is unknown, however during drought times numbers generally decrease due to the lack of water and food availability in the reserves.

The NPWS undertakes aerial shooting, trapping and poisoning for feral goats and pigs in the planning area in accordance with the Northern Tablelands Regional Pest Management Strategy (NPWS, 2007). As a result goat and pig numbers have been significantly reduced within the planning area.

Weed control focuses on exotic perennial grasses within Bolivia Hill Nature Reserve. Whisky grass, African lovegrass and coolatai grass are targeted during summer. A control program has been designed and tested for coolatai grass within Bolivia Hill Nature Reserve (NPWS, 2004). Control utilises burning followed by herbicide application to control this invasive weed. Blackberry control is also a major focus within Bolivia Hill Nature Reserve. Little weed control has been necessary in Bluff River Nature Reserve due to its rugged topography and lack of disturbance.

A small number of fruit trees (walnuts mostly) occur around the Clifferna homestead site in the northern section of Bolivia Hill Nature Reserve. It is recommended in the Schedule of Works (Arnold Wolthers Architects, 2002) that the mature fruit trees be retained as part of the cultural heritage of the site. No walnut seedlings have resulted from the walnut trees being retained.

Livestock from adjacent lands have been observed to occasionally stray into parts of the planning area where fencing is inadequate or absent. Straying stock have the potential to introduce weed species to the reserves from neighbouring properties and change vegetation communities through trampling and grazing. The maintenance of boundary fences is essential to exclude stock and to protect the values of the planning area and is negotiated with neighbours in accordance with the NPWS fencing policy.

#### **4.2. FIRE**

Fire is a natural feature of many environments and is essential for the survival of some plant communities. However, inappropriate fire regimes can lead to loss of particular plant and animal species and communities, and high frequency fires have been listed as a Key Threatening Process under the TSC Act. The primary fire management objectives of the NPWS are to protect life and property and community assets from the adverse impacts of fire, whilst managing fire regimes to maintain and protect biodiversity and cultural heritage.

Ecological communities sensitive to fire in the planning area include old growth forest habitats for arboreal mammals and vine thicket ecosystems. Threatened species, particularly those that occur in small populations within the planning area, are also vulnerable to intense or inappropriate fire regimes. The planning area also contains dry sclerophyll forests in which bushfires play a vital role in regeneration. Ecological burns within appropriate fire regimes for different vegetation types are important to maintain biodiversity.

A small area on the eastern boundary of Bluff River Nature Reserve was subject to wildfire in 2004/05 and neighbours have reported fires in the area 10 years ago.

In 2002/03, 90% of Bolivia Hill Nature Reserve was subject to wildfire. The area had not been burnt by a wildfire since 1965. Selected areas were burnt every 3-4 years prior to reserve gazettal to manage pasture in the northern cleared end of the reserve.

Separate fire management strategies have been prepared for both of these reserves (NPWS, 2005; NPWS, 2006). These fire management strategies outline the recent fire history of the reserves, key assets within and adjoining the reserves including sites of natural and cultural heritage value, fire management zones which may include asset protection zones, and fire control advantages such as management trails and water supply points. The strategies provide a low frequency strategic pattern of burning, incorporating ecological burning principles. Hazard reduction programs, ecological burning proposals and fire trail works are submitted annually to the Tenterfield Bush Fire Management Committee.

#### **4.3. ISOLATION AND FRAGMENTATION**

The main form of disturbance in the reserves has been clearing through tree poisoning operations and grazing. In Bluff River Nature Reserve, 9 hectares of forest was poisoned in the southern end of the reserve, when the land was privately leased from the Crown.

In Bolivia Hill Nature Reserve there are two distinct disturbed areas. Thirty-six hectares were cleared in the southern area for agriculture and introduced whisky grass now dominates this disturbed portion of the reserve (refer to Section 4.1). Natural regeneration is very slow due to the high density of whisky grass. In the north of the reserve, approximately 500 hectares or almost one third of the reserve has been disturbed through tree poisoning which occurred under private ownership. Within this area, natural regeneration has occurred in some places as tea tree (*Leptospermum brevipes*) monocultures. In recent years, exotic perennial grasses such as coolatai grass and whisky grass have been spreading into the area.

The area surrounding the planning area has also been extensively cleared, which has resulted in a high loss of biodiversity and fragmentation of habitat in the region. Long term conservation of biodiversity depends upon the protection, enhancement and connection of remaining habitat across the landscape, incorporating vegetation remnants on both public and private lands. Nearby vegetated areas contribute to the

habitat values of the reserves and provide ecological corridors to other vegetated areas. Maintaining the integrity of the remaining habitat within the reserves and, where possible, linking this to adjacent areas of vegetation to facilitate wildlife corridors is important in ensuring the long term viability of the reserves' biological values.

Bolivia Hill and Bluff River Nature Reserves form an integral component of east-west and north-south corridors, respectively, on the Northern Tablelands. Forested properties adjacent to the reserves are of high conservation value for their connectivity to other reserved land, enabling them to function as wildlife corridors.

#### **4.4. CLIMATE CHANGE**

The 2007 CSIRO report on climate change in the Border Rivers-Gwydir Catchment notes that since 1950 the region has experienced warming of around 0.8–1.3°C, partially attributable to human activities. In this period there has been little change in rainfall, with data indicating trends in the order of  $\pm 5$  mm per decade, however the contribution of human activities to rainfall changes is hard to distinguish from natural variability. The report notes that the future climate of the Border Rivers-Gwydir catchment is likely to be warmer and drier leading to increases in evaporation, heat waves, extreme winds and fire risk. Nevertheless, despite this trend toward drier conditions, there is also potential for increases in extreme rainfall events.

Climate change may significantly affect biodiversity by changing population size and distribution of species, modifying species composition, and altering the geographical extent of habitats and ecosystems. The potential impact of climate change is difficult to assess since it depends on the compounding effects of other pressures, particularly barriers to migration and pressure from feral animals. Species most at risk are those unable to migrate or adapt, particularly those with small population sizes or with slow growth rates. Within the planning area, climate change is likely to be a concern to peppermint woodlands whilst little is known about its impact on species such as the border thick tailed gecko (CSIRO, 2007).

Programs to reduce the pressures arising from other threats, such as habitat fragmentation, invasive species, bushfires, pollution and urban expansion, will help reduce the severity of the effects of climate change. Increasing habitat connectivity and appropriate fire management may also improve the ecological resilience of species.

## **5. MANAGEMENT OPERATIONS AND OTHER USES**

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

### **5.1. MANAGEMENT TRAILS AND FENCING**

Access to the eastern boundary of Bluff River Nature Reserve is gained through private property. The NPWS assists the neighbour in maintaining this trail. The terrain of this reserve hampers construction of additional trails.

Historically, 27 hectares of Bluff River Nature Reserve was incorrectly fenced into private property. Correct fencing of this area back into the reserve in cooperation with the adjoining neighbour is a priority.

Several internal management trails occur in Bolivia Hill Nature Reserve (refer to Map 1). These trails are maintained for fire and pest management to a four-wheel drive, dry weather standard. The trails have been named after South American countries to reflect the name of the reserve. These trails are for use by NPWS and other authorised vehicles only, including the NSW Rural Fire Service, other emergency services as required, and contractors. Management trails are closed to public vehicle use. Management access to the reserve is achieved through traversing private property in the south and north and through TSR in the west. NPWS contributes to the maintenance of these access trails.

### **5.2. TRANSGRID POWERLINES**

A 132kV powerline dissects Bolivia Hill Nature Reserve (refer to Map 1). A number of threatened plants grow under the powerline. Transgrid regularly maintains the powerline easement and proceeds through the reserve on internal management trails with NPWS permission. Maintenance involves the lopping of trees and herbicide application to plants that may impact on the powerlines or impede access for maintenance.

The procedure for access to and maintenance of these power lines is detailed within a Memorandum of Understanding (MoU) between the NPWS and Transgrid (2002).

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## 7. IMPLEMENTATION

Current Situation	Desired Outcomes	Management Response	Priority*
<p><b>7.1. On-Park Ecological Conservation</b></p> <p>There are currently no major erosion or surface water issues in the planning area. The reserves contain the upper catchments of several ephemeral creeks.</p> <p>The reserves contain a number of inadequately reserved vegetation communities, including three Endangered Ecological Communities. The planning area supports a number of threatened and regionally uncommon species and endemic plants. There are eight threatened fauna species recorded in the planning area and little recorded of the fauna present.</p> <p>The semi-evergreen vine thicket community of Bluff River Nature Reserve and several of the other threatened plant species are sensitive to fire.</p> <p>Large areas of Bolivia Hill Nature Reserve are in a degraded state from previous agricultural enterprises.</p>	<p>Native plant and animal species and communities are conserved.</p> <p>Negative impacts on threatened taxa are stable or diminishing.</p> <p>Structural diversity and habitat values are restored in areas subject to past disturbance.</p> <p>Landscape and catchment values are protected.</p> <p>The effects of climate change on natural systems are reduced.</p>	<p>7.1.1. Continue existing fire, pest and weed management programs to increase the reserves' ability to cope with future disturbances, including climate change, and encourage research into appropriate indicators to monitor the effects of climate change.</p> <p>7.1.2. Implement relevant strategies in the Priority Action Statement and recovery plans for threatened species and endangered ecological communities present in the planning area.</p> <p>7.1.3. Carry out a baseline presence / absence fauna survey targeting likely threatened species.</p> <p>7.1.4. Work with neighbours, local Landcare groups and the local Catchment Management Authority to encourage conservation of remnant native vegetation in the vicinity of the reserves.</p>	<p>High Ongoing</p> <p>High Ongoing</p> <p>Medium</p> <p>Medium Ongoing</p>
<p><b>7.2. Cultural Heritage</b></p> <p>Two shearing sheds and homestead sites are present in Bolivia Hill Nature Reserve. A Conservation Management Plan and Schedule of Works have been prepared for the site. The sites are of local conservation significance. A number of moveable heritage items have been stolen from</p>	<p>Aboriginal places and values are identified and protected.</p> <p>Aboriginal people are involved in management of the</p>	<p>7.2.1. Implement the Conservation Management Plan and Schedule of Works for the shearing sheds and homestead sites in Bolivia Hill Nature Reserve.</p> <p>7.2.2. Consult and involve the Moombahlene Local Aboriginal Land Council and other relevant Aboriginal</p>	<p>Medium Ongoing</p> <p>High Ongoing</p>



<p>the site.</p> <p>A number of internal fences occur in Bolivia Hill Nature Reserve as result of previous farming practices.</p> <p>Bluff River Nature Reserve is adjacent to Bluff Rock, which is the infamous site of an Aboriginal massacre in 1844.</p> <p>An Aboriginal sites survey has not been conducted in the planning area; and the reserves may contain sites and values as yet unrecorded.</p>	<p>Aboriginal cultural values of the park.</p> <p>Historic features are appropriately conserved and managed.</p> <p>Understanding of the cultural values of the park is improved.</p>	<p>community organisations in the management of Aboriginal sites, places and values including interpretation of places or values.</p> <p>7.2.3. Retain the homestead fireplace at Cliffferna Shearing Shed and the existing mature fruit trees but prevent any further spread of the trees.</p>	<p>Low Ongoing</p>
<p><b>7.3. Visitor Use and Services</b></p> <p>The reserves are surrounded by private property, except for the western boundary of Bolivia Hill Nature Reserve which is a Travelling Stock Route (TSR). There is no public vehicle access to the planning area, therefore visitation is low.</p> <p>There are no visitor facilities or interpretive signs located in the planning area.</p> <p>There are two wells in Bolivia Hill Nature Reserve.</p>	<p>Visitor use is appropriate and ecologically sustainable.</p> <p>Visitor use and services encourage appreciation of the park's values.</p>	<p>7.3.1. Allow low impact self-reliant recreation throughout the planning area, such as bushwalking, cycling (on management trails only), bird watching and nature observation.</p> <p>7.3.2. Install signs and gates to assist neighbours in addressing potential trespassing issues, and to identify that cycling is allowed on management trails only.</p> <p>7.3.3. Permit public entry to the Bolivia Shearing Shed.</p> <p>7.3.4. Install warning signpost and maintain the fences around the wells.</p>	<p>Medium Ongoing</p> <p>Medium</p> <p>Medium Ongoing</p> <p>High Ongoing</p>
<p><b>7.4. Weeds and Pest Animals</b></p> <p>The NPWS Northern Tablelands Regional Pest Management Strategy 2008-2011 (NPWS, 2007) has been developed for the region. This strategy</p>	<p>Introduced plants and animals are controlled and where possible eliminated.</p>	<p>7.4.1. Manage introduced species in accordance with the Regional Pest Management Strategy in association with neighbours and other control authorities. Priority will be</p>	<p>High Ongoing</p>

<p>identifies pest populations, priorities for control and suggested control methods.</p> <p>A number of pest plants occur, predominantly around disturbed areas. Species of particular concern include African lovegrass, coolatai grass, blackberry and Bathurst burr.</p> <p>Pest animals include feral goats, red foxes, rabbits, feral pigs, feral cats and wild dogs. These species have the potential to impact on threatened plants and prey on native wildlife.</p> <p>Stray stock from neighbouring pastoral properties occasionally enter the reserves and may also impact on the natural values of the reserves.</p>	<p>Negative impacts of weeds and pest animals on park values are stable or diminishing.</p> <p>Pest control programs are undertaken where appropriate in consultation with neighbours.</p>	<p>given to control of exotic grasses, wild dogs and pigs.</p> <p>7.4.2. Develop and implement boundary fencing agreements with neighbours where appropriate to restrict the movement of stock into and out of the reserves, in accordance with NPWS Boundary Fencing Policy.</p>	<p>Medium Ongoing</p>
<p><b>7.5. Fire Management</b></p> <p>Fire is a natural feature of many environments but inappropriate fire regimes can lead to loss of particular plant and animal communities. High frequency fires have been listed as a Key Threatening Process under the TSC Act.</p> <p>The reserves have been zoned as Land Management Zones (LMZ) because they are not adjacent to built assets which would be exposed to a high level of bushfire risk and do not have a history of bushfire ignitions.</p> <p>Separate Reserve Fire Management Strategies have been approved for both reserves in the planning area.</p>	<p>Life, property and natural and cultural values are protected from fire.</p> <p>Fire regimes are appropriate for conservation of native plant and animal communities.</p> <p>Negative impacts of fire on natural and cultural heritage values are stable or diminishing.</p>	<p>7.5.1. Implement the Reserve Fire Management Strategy for each reserve (refer to Section 4.2).</p> <p>7.5.2. Participate in the Northern Tablelands BFMC. Maintain cooperative arrangements with local Rural Fire Service brigades and fire control officers, other fire authorities and surrounding landowners in regard to fuel management and fire suppression.</p>	<p>High Ongoing</p> <p>High Ongoing</p>

<p><b>7.6. Infrastructure and Maintenance</b></p> <p>Bolivia Hill Nature Reserve has several management trails on the western side of the reserve (refer to Map 1). There is no public vehicle access in this reserve.</p> <p>Bluff River Nature Reserve is accessed through private property on the eastern reserve boundary. Twenty-seven hectares of the reserve is currently incorrectly fenced into private property.</p> <p>Transgrid powerlines dissect Bolivia Hill Nature Reserve. Transgrid vehicles use internal management trails to access the powerlines for maintenance under a state-wide MoU with NPWS.</p> <p>Maintenance of the powerlines involves lopping and herbicide application to trees and shrubs. A number of threatened species occur under the powerline.</p> <p>Near the shearing sheds within Bolivia Hill Nature Reserve there are old sheep dip sites. It is unknown if this prior use has impacted on soil and groundwater quality.</p>	<p>Management facilities and operations adequately serve management needs and have minimal impact.</p> <p>Infrastructure and assets are routinely maintained.</p> <p>Existing non-park infrastructure is managed to minimise impacts on natural and cultural values.</p>	<p>7.6.1. Maintain the network of management trails identified on Map 1.</p> <p>7.6.2. Gate and/or signpost management trails as necessary to restrict unauthorised access.</p> <p>7.6.3. Negotiate a formal access agreement with relevant neighbours regarding maintenance of any private trails used for access and fire management purposes.</p> <p>7.6.4. Fence the 27 hectares of Bluff River Nature Reserve that is fenced into private property, back into the reserve.</p> <p>7.6.5. Authorised access for use and maintenance of the powerlines will be permitted under the provision of existing or future formal agreements between NPWS and Transgrid.</p> <p>7.6.6. Identify and map threatened flora under the powerline to prevent damage during powerline maintenance.</p> <p>7.6.7. Conduct a risk assessment of the sheep dip sites in Bolivia Hill Nature Reserve and undertake remedial action as required.</p>	<p>Medium Ongoing</p> <p>Medium</p> <p>Medium Ongoing</p> <p>Medium</p> <p>Medium Ongoing</p> <p>Medium Ongoing</p> <p>High</p>
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\* **High** priority activities are those imperative to achievement of the objectives and desired outcomes. They must be undertaken in the near future to avoid significant deterioration in natural, cultural or management resources.

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

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

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