

**DORRIGO PLATEAU GROUP OF
NATURE RESERVES
PLAN OF MANAGEMENT**

**INCORPORATING BAGUL WAAJAARR,
DEER VALE AND MULDIVA NATURE RESERVES**

**NSW National Parks and Wildlife Service
Part of the Department of Environment and Climate Change**

November 2008

This plan of management was adopted by the Minister for Climate Change and the Environment on 28th November 2008.

Acknowledgments

This plan of management is based on a draft plan prepared by staff of the North Coast Region of the NSW National Parks and Wildlife Service (NPWS – part of the Department of Environment and Climate Change).

Valuable information and comments were provided by NPWS specialists, the Regional Advisory Committee and members of the public.

Cover photograph of the Nymboida River in Bagul Waajaarr Nature Reserve, by Tony priori, NPWS.

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FOREWORD

Bagul Waajaarr, Deer Vale and Muldiva Nature Reserves occur in close proximity to each other, north-west of the town of Dorrigo on the Dorrigo Plateau. Muldiva Nature Reserve was reserved in 1981 and covers an area of 10 hectares. Deer Vale Nature Reserve was reserved in 1985 and covers an area of 181 hectares. Bagul Waajaarr Nature Reserve was reserved in 1999 and is in two areas totalling 520 hectares.

Deer Vale and Muldiva Nature Reserves contain rainforest communities, while Bagul Waajaarr Nature Reserve contains moist eucalypt forest ecosystems. The endangered Dorrigo daisy has been recorded in Deer Vale Nature Reserve as well as the rare Dorrigo waratah and pink cherry. The diversity of habitats in the reserves are likely to provide for a range of threatened animal species including the Hastings River mouse, stuttering frog, spotted-tailed quoll, brush-tailed rock wallaby and the powerful, masked and sooty owls.

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

A draft plan of management for Bagul Waajaarr, Deer Vale and Muldiva Nature Reserves was placed on public exhibition from 1st December 2006 until 12th March 2007. The submissions received were carefully considered before adopting this plan.

This plan contains a number of actions to achieve “Better environmental outcomes for native vegetation, biodiversity, land, rivers, and coastal waterways” (Priority E4 in the State Plan) including encouraging revegetation of previously disturbed areas, controlling and where possible eradicating introduced species, and using weed control techniques that minimise soil exposure.

This plan of management establishes the scheme of operations for Bagul Waajaarr, Deer Vale and Muldiva Nature Reserves. In accordance with section 73B of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.

Carmel Tebbutt MP

1. THE DORRIGO PLATEAU GROUP OF NATURE RESERVES

Bagul Waajaarr, Deer Vale and Muldiva Nature Reserves (referred herein as the reserves) occur in close proximity to each other, north-west of the town of Dorrigo (30°20.4'S, 152°42.6'E) on the Dorrigo Plateau (see map).

Muldiva Nature Reserve, which forms part of the lower southern slopes of Christophersons Mountain on the Dorrigo Plateau, was reserved in 1981 and covers an area of 10 hectares. This reserve is the closest of the reserves to Dorrigo, located approximately 10 kilometres north-west of the town. The reserve is named after the locality of Muldiva Creek.

Deer Vale Nature Reserve is located approximately 12 kilometres north-west of Dorrigo and was also named after a nearby locality. It was reserved in 1985 and covers an area of 181 hectares.

Both these reserves were formerly freehold land and were dedicated as nature reserves because they are rare remnants of rainforest vegetation on the Dorrigo Plateau, and contain rare plants and a relatively large number of forest associations.

Bagul Waajaarr Nature Reserve is relatively new compared to the other two reserves, being reserved in January 1999 as part of the negotiations leading to the North East Regional Forest Agreement. Formerly part of Muldiva State Forest, its name is derived from the local Aboriginal dialect (refer to section 3.4). The remaining part of Muldiva State Forest bisects the reserve, dividing it into two discrete areas totalling 520 hectares. The reserve is located approximately 15 kilometres north-west of Dorrigo.

The geology, landform, climate and plant and animal communities of the area, plus the location, have determined how the reserves have been used. Since European settlement of the Dorrigo Plateau, uses have included logging, grazing, clearing and limited recreation use. Clearing, logging and the creation of a transmission line easement have had a marked impact on the vegetation and habitat values of some areas in the reserves, as well as their scenic values.

The reserves are within the boundaries of the Grafton Rural Lands Protection Board, the Northern Rivers Catchment Management Authority and the Dorrigo Plateau Local Aboriginal Land Council. The current gazetted areas of the reserves lie within the local government area (LGA) of Bellingen Shire; a new, yet-to-be-gazetted addition to Bagul Waajaarr Nature Reserve, comprising a recent land purchase of leasehold land on the western side of the Nymboida River, lies in Clarence Valley LGA.

Legend

Tenure

- NPWS Estate
- National Park Estate not Gazetted
- State Forest

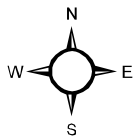
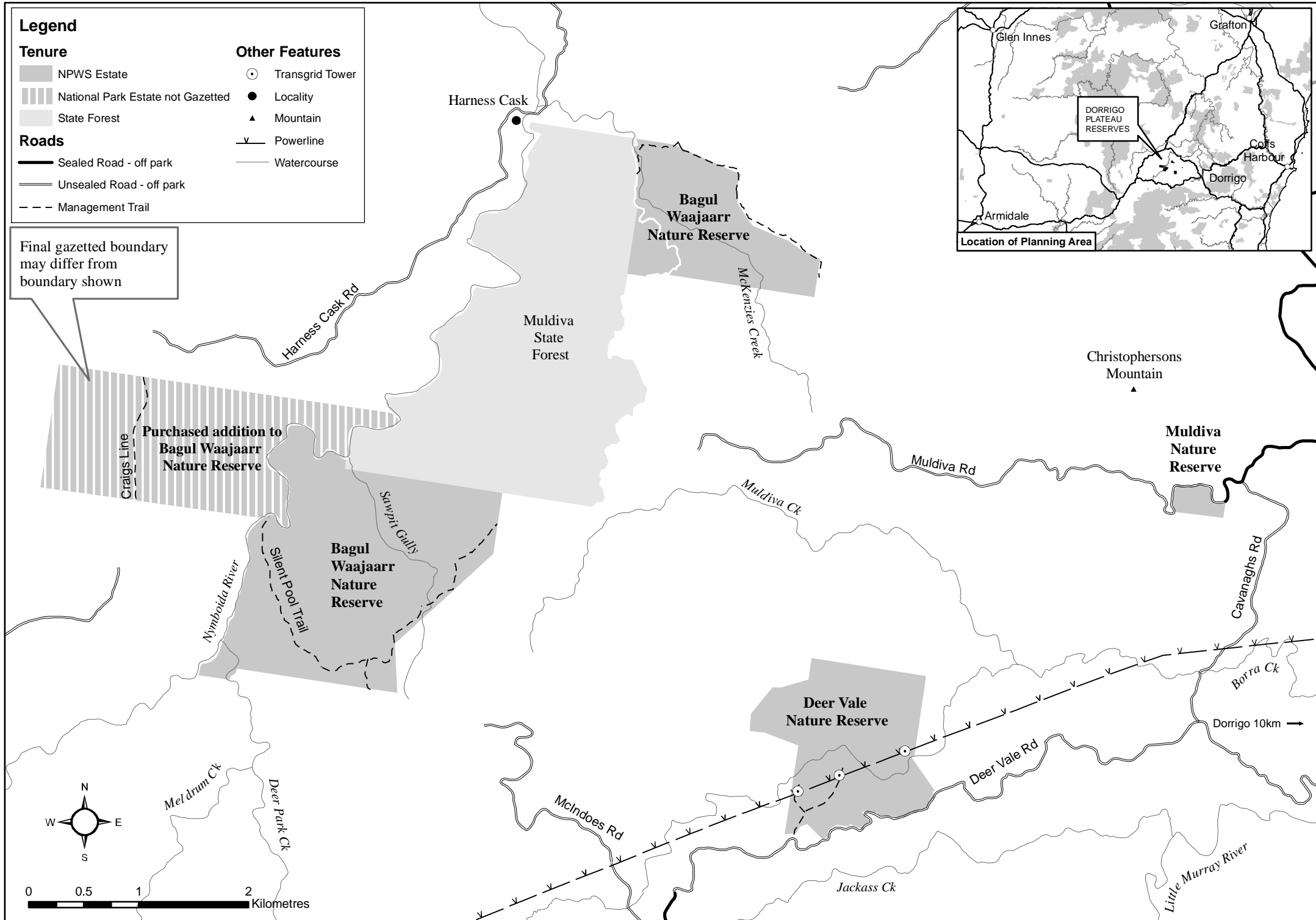
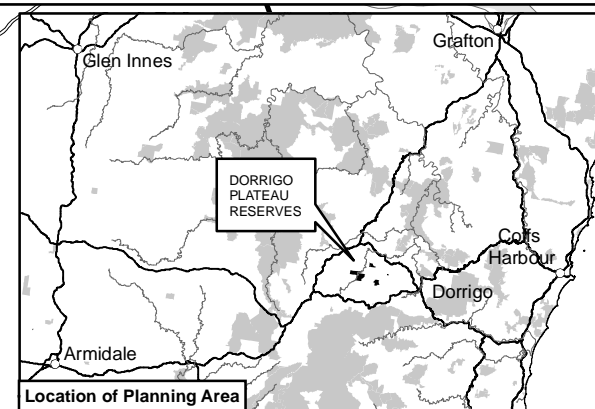
Roads

- Sealed Road - off park
- Unsealed Road - off park
- Management Trail

Other Features

- Transgrid Tower
- Locality
- Mountain
- Powerline
- Watercourse

Final gazetted boundary may differ from boundary shown



2. MANAGEMENT CONTEXT

2.1 LEGISLATIVE AND POLICY FRAMEWORK

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

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

The plan of management is a statutory document under the NPW Act. Section 72AA of the NPW Act lists the matters to be considered in its preparation. Once the Minister has adopted a plan, no operations may be undertaken within the planning area except in accordance with the plan. The plan will also apply to any future additions to the planning area. Where management strategies or works are proposed for the planning area or any additions that are not consistent with the plan, an amendment to the plan will be required.

2.2 MANAGEMENT PURPOSES AND PRINCIPLES

Nature reserves are reserved under the NPW Act to protect and conserve areas containing outstanding, unique or representative ecosystems, 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 the provision for visitor use is not a management principle under the Act.

2.3 SPECIFIC MANAGEMENT DIRECTIONS

The following specific objectives apply to the management of the reserves:

- management of the reserves as part of a regionally important system of protected areas;
- enhancement of the conservation values of the reserves through control and where possible eradication of introduced plant and animals species, and the exclusion of fire;

- protection of habitat for significant plants and animals, including species and populations that are:
 - listed under the TSC Act or the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act);
 - endemic or regionally significant;
 - otherwise rare or threatened; or
 - at the limits of their known distribution.
- provision of opportunities for self-reliant, nature-based visitor use in the context of regional opportunities;
- management of visitor use to minimise impacts and encourage appropriate visitor behaviour; and
- encouragement of continued research into the values of the reserves.

3. DESCRIPTION OF THE RESERVES

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

3.1 GEOLOGY, LANDFORM, SOILS AND HYDROLOGY

The reserves are geologically similar and occur within two major physiographic regions, the Nymboida gorges and Cascade Hills (Milford 1996). The Cascade Hills cover an extensive part of the Dorrigo region and are characterised by landscape features that occur on a partially dissected plateau of Carboniferous metasediments, with alluvial and colluvial veneers of varying thickness on valley floors and footslopes respectively. The Nymboida gorges have progressively dissected the Cascade Hills, and both these features occur on Carboniferous metasediments of the Coffs Harbour Association (Milford 1996).

Structured red and yellow earths, structured brown earths and lithosols, as well as red and yellow podsollic soils are derived from the fine-grained sedimentary rocks of Carboniferous metasediments. This contrasts to the largely cleared undulating agricultural lands of the Dorrigo Plateau to the south of the reserves, which lie on the residual soil landscapes derived from basalt flows of the Ebor Volcano. Only a tiny part of this residual landscape is present in the reserves, in the south eastern corner of Bagul Waajaarr Nature Reserve. The podsollic soils are generally of low to moderate fertility, with relatively poor shallow stony podsollic soils occurring on crests and upper slopes. Richer and deeper soils can be found on the lower slopes, as soil particles move down steep side slopes (Milford 1996).

The type of soil influences erodibility and the occurrence of vegetation communities. Subtropical rainforest is generally found on lower valley and gully slopes, while the shallow rocky soils support different vegetation communities. This is evident when looking at the gully lines from the steep upper slopes of Christophersons Mountain near Muldiva Nature Reserve.

The reserves are all located within the sub-catchment of the Upper Nymboida River, part of the Clarence River catchment. The Nymboida River itself traverses the southern section of Bagul Waajaarr Nature Reserve. Elevation in Bagul Waajaarr Nature Reserve ranges from 740 to 1120 metres above sea level, while the other reserves are flatter in topography, ranging from 750 metres to 990 metres in Deer Vale Nature Reserve and from 800 metres to 870 metres in Muldiva Nature Reserve.

3.2 NATIVE PLANTS

Two vegetation communities occur within Muldiva Nature Reserve: warm temperate rainforest of the coachwood (*Ceratopetalum apetalum*), sassafras (*Doryphora*

sassafras) association; and subtropical rainforest dominated by black booyong (*Argyrodendron actinophyllum* ssp. *actinophyllum*), yellow carabeen (*Sloanea woollsi*) and stinging tree (*Dendrocnide excelsa*).

The vegetation of Deer Vale Nature Reserve is largely similar. Three major rainforest types are present, made up of five floristic associations. This includes two warm temperate rainforest associations: coachwood – crabapple (*Schizomeria ovata*) – sassafras; and coachwood – crabapple – lilli pilli (*Acmena smithii*). The subtropical rainforest within this reserve is of the black booyong – red cedar (*Toona ciliata*) – brown beech (*Pennantia cunninghamii*) association. Cool temperate rainforest dominated by Antarctic beech (*Nothofagus moorei*) plus a small area of wet sclerophyll forest also occurs within Deer Vale Nature Reserve.

Bagul Waajaarr Nature Reserve is divided into two areas, however the vegetation communities represented are very similar and Muldiva State Forest provides a continuous vegetation corridor between the two sections. The reserve conserves five moist forest ecosystems, with the dominant communities present in both areas being grassy tall open forest dominated by New England blackbutt (*Eucalyptus campanulata*), tallowwood (*E. microcorys*) and blue gum (*E. saligna*), and tall open forest at mid-elevation dominated by blue gum (*E. saligna*). Small sections of these two forest associations in the reserve have been classified as high quality old growth forest which, in conjunction with surrounding areas, provide important habitat for species such as the threatened powerful owl (refer to section 3.3).

During the process of assessing the suitability of the land that was to become Deer Vale Nature Reserve for dedication, Floyd (1976) undertook a flora survey, which identified three significant species: the Dorrigo daisy (*Olearia flocktoniae*), Dorrigo waratah (*Alloxylon pinnatum*) and pink cherry (*Austrobuxus swainii*). The Dorrigo daisy is listed as endangered under both the TSC Act and the Commonwealth's *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). This species appears to favour disturbed areas and a draft recovery plan has been prepared (DEC 2004). Dorrigo waratah and pink cherry are considered rare (Briggs & Leigh 1996). Floyd also found southern marara (*Vesselowskyia rubifolia*) during his survey, a small tree associated with the Antarctic beech. Floyd regarded the population of this tree as possibly being at its extreme northern limit, as the most northerly occurrence previously recorded was at Meldrum, south of the reserves (Floyd 1976).

Floyd regarded the area of the future Deer Vale Nature Reserve as being of conservation significance, due to the relatively large number of forest associations in a small area. He felt that this area would also provide a great variety of habitat and food supply for, and therefore diversity of, fauna species (Floyd 1976).

Modelling during the comprehensive regional assessment (CRA) process found that the reserves potentially contain other significant plant species, including milky silkpod (*Parsonsia dorrigoensis*), listed as vulnerable under the TSC Act, and the regionally significant nodding green-hood orchid (*Pterostylis torquata*).

3.3 NATIVE ANIMALS

No systematic survey of fauna has been undertaken within any of the reserves, however a number of threatened species have been recorded on the adjoining lands and it is expected that many of these would also occur within the reserves. In

addition, a number of species are predicted to occur based on the habitats present (NPWS 1999). Threatened species likely to occur within the reserves are listed in Table 1.

Table 1 Threatened animal species predicted to occur within the reserves

Common Name	Scientific Name	Reserve	Status*
<u>Frogs</u>			
New England tree frog	<i>Litoria subglandulosa</i>	Bagul Waajaarr	V
stuttering frog	<i>Mixophyes balbus</i>	All	E#
<u>Reptiles</u>			
Stephens banded snake	<i>Hoplocephalus stephensii</i>	All	V
<u>Birds</u>			
glossy black-cockatoo	<i>Calyptorhynchus lathami</i>	Bagul Waajaarr	V
barred cuckoo-shrike	<i>Coracina lineata</i>	All	V
square-tailed kite	<i>Lophoictinia isura</i>	Bagul Waajaarr	V
powerful owl	<i>Ninox strenua</i>	Bagul Waajaarr	V
wompoo fruit-dove	<i>Ptilinopus magnificus</i>	Bagul Waajaarr	V
rose-crowned fruit-dove	<i>Ptilinopus regina</i>	All	V
masked owl	<i>Tyto novaehollandiae</i>	Bagul Waajaarr	V
sooty owl	<i>Tyto tenebricosa</i>	All	V
<u>Mammals</u>			
eastern pygmy possum	<i>Cercartetus nanus</i>	All	V
large-eared pied bat	<i>Chalinolobus dwyeri</i>	All	V
spotted-tail quoll	<i>Dasyurus maculatus</i>	All	V#
little bent-wing bat	<i>Miniopterus australis</i>	Deer Vale, Muldiva	V
eastern bent-wing bat	<i>Miniopterus schreibersii</i>	Bagul Waajaarr	V
eastern freetail-bat	<i>Mormopterus norfolkensis</i>	Bagul Waajaarr	V
large-footed mouse-eared fishing bat	<i>Myotis adversus</i>	Bagul Waajaarr	V
great pipistrelle	<i>Falsistrellus tasmaniensis</i>	Bagul Waajaarr	V
greater broad-nosed bat	<i>Scoteanax rueppellii</i>	Bagul Waajaarr	V
yellow-bellied glider	<i>Petaurus australis</i>	Bagul Waajaarr	V
brush-tailed rock wallaby	<i>Petrogale penicillata</i>	Bagul Waajaarr	E
koala	<i>Phascolarctos cinereus</i>	Bagul Waajaarr	V
long-nosed potoroo	<i>Potorous tridactylus</i>	All	V
Hastings River mouse	<i>Pseudomys oralis</i>	All	E#
grey-headed flying fox	<i>Pteropus poliocephalus</i>	Bagul Waajaarr	V#
red-legged pademelon	<i>Thylogale stigmatica</i>	All	V

* Status is given by the schedules of the TSC Act (E= endangered or V= vulnerable)

Also listed as nationally threatened under the EPBC Act.

The Hastings River mouse (*Pseudomys oralis*), masked owl (*Tyto novaehollandiae*), koala (*Phascolarctos cinereus*), glossy black-cockatoo (*Calyptorhynchus lathami*)

and spotted-tailed quoll (*Dasyurus maculatus*) have all been recorded in Muldiva State Forest, which adjoins and links the two sections of Bagul Waajaarr Nature Reserve. The brush-tailed rock wallaby (*Petrogale penicillata*) has also been recorded on private property immediately to the south of Bagul Waajaarr. The sooty owl (*Tyto tenebricosa*) has been recorded south of Deer Vale Nature Reserve in an area of vegetation continuous with the reserve.

Deer Vale and Bagul Waajaarr Nature Reserves form part of an important regional vegetation corridor across the Dorrigo Plateau linking Nymboi-Binderay National Park to New England National Park (Scotts 2003). This corridor is believed to be important for the movement of a number of threatened species including the yellow-bellied glider (*Petaurus australis*), rufous bettong (*Aepyprymnus rufescens*), long-nosed potoroo (*Potorous tridactylus*), parma wallaby (*Macropus parma*), Stephens banded snake (*Hoplocephalus stephensii*) and rufous scrub-bird (*Atrichornis rufescens*).

The extensive rainforest and wet sclerophyll forest habitats within the reserves are also expected to provide important resources for a number of threatened frugivorous birds such as the rose-crowned fruit-dove (*Ptilinopus regina*) and barred cuckoo-shrike (*Coracina lineata*).

The small remnant old growth areas within Bagul Waajaarr Nature Reserve provide suitable habitat, in conjunction with off-reserve forest, for a number of threatened species, such as the powerful, masked and sooty owls, the yellow-bellied glider, glossy black-cockatoo and microbats, all of which rely on tree hollows for nesting or roosting. The retention and enhancement of old growth forest in this reserve is likely to be important for the survival of these species on the Dorrigo Plateau.

Under the *Threatened Species Conservation Act 1995* a Priorities Action Statement has been prepared and recovery plans may be prepared. A recovery plan has been approved for the yellow-bellied glider (NPWS 2003a), and draft recovery plans have been exhibited for the koala (NPWS 2003b), Hastings River mouse (NPWS 2003c) and large forest owls (DEC 2005). Recovery plans have not been prepared for the other threatened animal species expected to occur in the planning area, although some recovery actions are included in the Priorities Action Statement.

3.4 CULTURAL HERITAGE

3.4.1 Aboriginal Heritage

The reserves are all located within the boundaries of the Gumbaynggirr Aboriginal people and the Dorrigo Plateau Local Aboriginal Land Council area. The name of one of the reserves, Bagul Waajaarr, is derived from the local Gumbaynggirr dialect and means 'flat top'. The reserves were at one stage subject to a registered Native Title Claim by the Gumbaynggirr people but this has since lapsed.

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

There have not been any studies into the Aboriginal cultural heritage values of the reserves and, as such, there are no recorded sites on the reserves. However, Aboriginal sites including sites of spiritual and ceremonial significance are known to occur in the wider area west of Dorrigo and it is believed that Aboriginal sites, areas or places are likely to occur in the reserves.

3.4.2 Historic Heritage

Deer Vale Nature Reserve was previously part of a larger rural freeholding, used predominantly for cattle grazing and selective logging. Initially, a small 4 hectare area was proposed by Jack Hodgson to be donated as a memorial to the life of Annie Sawtell, a prominent Dorrigo district pioneer and Mrs Hodgson's mother. In 1985, the 181ha area now gazetted as Deer Vale Nature Reserve was purchased by NPWS. A series of small waterfalls, known as "Annie Sawtell Cascades", are found on Borra Creek as it enters the western edge of the reserve. The Geographical Names Board assigned this name in 1986.

Substantial areas of Deer Vale Nature Reserve were formerly cleared pastureland, including the southern section, which was an operating dairy farm until the mid-1960s. Selective logging also occurred in the reserve, and this continued under the terms of the contract of sale after the purchase and dedication of the nature reserve until the 1990s. The remnants of an old cedar cutters' track used by bullock teams still remains in Deer Vale Nature Reserve. This track was used to haul out logs, particularly red cedar, probably during the period of the First World War.

Prior to gazettal, Muldiva Nature Reserve was freehold land. In 1971, the owner, Mr L. Shaw, offered the rights to log the land to the Briggs mill. Ted Durie (then the Manager of J. Briggs & Co) approached the NPWS and offered an invitation to inspect the area. The outcome of the on-site meeting was that Mr Durie paid Mr Shaw \$300 as royalty for the millable timber, on the condition that the timber was not harvested and the land was reserved for all time. Mr Shaw in turn then donated the land to the NPWS.

Bagul Waajaarr Nature Reserve is comprised of land that previously formed part of Muldiva State Forest. An occupation permit for cattle grazing existed over the northern portion of the reserve. Authorised grazing of the reserve ceased on gazettal, although cattle still enter the reserve from adjoining properties (refer to sections 3.8.1 and 4.5).

3.5 VISITOR USE

Public access to Muldiva and Deer Vale Nature Reserves is directly off Muldiva and Deer Vale Roads respectively (see map). Visitors may access Deer Vale Nature Reserve on foot from Deer Vale Road, at the southern boundary of the reserve. Similarly, visitors may access Muldiva Nature Reserve directly off Muldiva Road and walk through the reserve, although there are no trails on this reserve. The gazetted parts of Bagul Waajaarr Nature Reserve are surrounded by private property and access is not generally available to the public although some visitors walk up the Nymboida River from the 'Harness Cask', north of the reserve. Access to the newly acquired lands to be added to Bagul Waajaarr Nature Reserve is also limited due to gated roads.

The relatively small size of the reserves and lack of public access has implications for their suitability for public use. The reserves currently experience a low level of recreational use, with the main activities being self-reliant bushwalking and nature appreciation. There are no visitor facilities in the reserves.

Other parks in the region, such as Dorrigo, Guy Fawkes River, New England, Chaelundi and Nymboi-Binderay National Parks, provide for a range of recreational activities such as camping, picnicking, canoeing, fishing, bird watching, bushwalking and four-wheel driving. Visitor facilities and opportunities for car touring, four-wheel driving, picnicking, cycling and the enjoyment of scenic sites also exist in nearby State Forest areas (NPWS & SFNSW 2001).

3.6 MANAGEMENT OPERATIONS

NPWS accesses Bagul Waajaarr Nature Reserve via Crown and private roads across surrounding private property. Access to management trails within Deer Vale Nature Reserve is off Deer Vale Road through private property and also relies on permission from neighbours. No formal or long-term access arrangements are in place at present. Trails within Deer Vale and Bagul Waajaarr Nature Reserves are all natural-surface, dry weather four-wheel drive standard. Some gates exist on the private property access trails to the reserves and at the reserve boundaries (see the map). There are no management trails within Muldiva Nature Reserve.

Boundary fencing is inadequate or absent in parts of the reserves and in some areas reserve boundaries are unmarked or unclear. This uncertainty may result in the use of reserved lands for inappropriate activities. Inadequate fencing results in livestock from adjacent lands straying into the nature reserves (refer to section 3.8.1).

3.7 OTHER USES

A single overhead 330kV transmission line traverses Deer Vale Nature Reserve, with three associated support towers located in the reserve (see the map). The transmission line runs on an easement that existed prior to gazettal of the reserve.

The maintenance of the transmission line easement generates impacts such as clearing or trimming of vegetation, use of herbicides and the maintenance of access trails, as well as the visual impact of the lines and towers. TransGrid manages the line under an agreement developed in 2002 with NPWS. There are three unnamed management trails (refer to section 3.6) through the reserve, that provide TransGrid with access for maintenance of the line.

3.8 THREATS TO RESERVE VALUES

3.8.1 Introduced Plants and Animals

The North Coast Region Pest Management Strategy (NPWS 2003d) broadly identifies the weed and feral animal priorities for the reserves. A separate weed strategy has also been prepared for both Muldiva and Deer Vale Nature Reserves. The weed strategies identify the major weed species of concern and the specific

control options available. There is currently no separate weed strategy for Bagul Waajaarr Nature Reserve.

Small-leaved privet (*Ligustrum sinense*) and large-leaved privet (*L. lucidum*) are the two major weed species of conservation concern for Deer Vale and Muldiva Nature Reserves (NPWS 2003d). Significant infestations of both these species in Deer Vale Nature Reserve have established along some creek lines. Muldiva Nature Reserve has mainly edge and drainage line infestations of small-leaved privet, large-leaved privet and wandering creeper (*Tradescantia fluminensis*)

The Regional Pest Management Strategy identifies privet as also being a major problem in Bagul Waajaarr Nature Reserve, with blackberry, exotic vines, herbaceous weeds and exotic grasses as being minor problems (NPWS 2003d).

The Regional Pest Management Strategy does not identify introduced animals as a problem within the reserves, however there have been some instances of cattle entering Bagul Waajaarr and Deer Vale Nature Reserves from neighbouring properties. Cattle create tracks, damage the vegetation and deposit weed seeds that establish easily in disturbed areas. Fencing on some boundaries and co-operation from neighbours should address this problem. Anecdotal evidence suggests that wild dogs, foxes, goats and feral cats also transit the reserves.

3.8.2 Fire

The NPWS regards fire as a natural phenomenon and one of the continuing physical factors influencing the Australian environment. Inappropriate fire regimes have been identified as a key threatening process affecting the biological diversity of NSW. Although the recorded wildfire history of the reserves is incomplete, it is significant that there have been three wildfires in Bagul Waajaarr in recent years. These occurred in 2001 in the northern section, in 2002 in the southern section and in October of 2003 in both the northern and southern sections of the reserve. Due to the small size of the reserve, most of the reserve was burnt each time with only the wet forest in the southern section, south of Silent Pool Trail, remaining unburnt. A small wildfire on the fringe of Deer Vale Nature Reserve was recorded in 1986. There has been no recorded wildfire in Muldiva Nature Reserve since recording commenced in 1946.

The rainforest vegetation that is typical of both Muldiva and Deer Vale Nature Reserves is sensitive to fire. Fires are likely to cause the rainforest to retract, altering the species composition and vegetation structure. As such, fire needs to be excluded from these reserves.

There are a number of assets that border the reserves, mainly rural homes and sheds, as well as a plantation located in Muldiva State Forest. Assets surrounding Deer Vale and Muldiva Nature Reserves are not considered to be at threat from wildfire in the reserves because of the moist vegetation types found in the reserves and the protection afforded by a pasture buffer.

The NPWS approach to fire management planning (NPWS 2005) uses a system of zones that are compatible with district bushfire risk management plans. These zones are management areas where a specified fire management operational objective,

strategy and performance indicator have been developed to mitigate against the threat of a wildfire.

NPWS regards cooperative fire management as essential for the protection of life and surrounding property, as well as for protection of the natural and cultural heritage of the reserve. NPWS maintains cooperative arrangements with surrounding landowners and RFS brigades and is actively involved in the Bellingen Bush Fire Management Committee. Cooperative arrangements include approaches to fuel management, support for neighbours' fire management efforts, information sharing and preparation of district bushfire management plans for the area covered by this committee.

The NPWS is a fire authority under the *Rural Fires Act 1997* and is required to implement the provisions of district fire management plans. The NPWS approach is based on the level of complexity involved. In regard to Deer Vale and Muldiva Nature Reserves, the NPWS considers that it is appropriate to include the specific fire management strategies for these reserves in this plan of management.

NPWS has assessed Deer Vale and Muldiva Nature Reserves for fire management planning purposes and has zoned the reserves as Land Management Zones (LMZ). The primary fire management objectives within this zone are, in addition to protecting life and property, to maintain native biodiversity and to protect culturally significant sites. The reserves have been designated as LMZ due to the sensitivity of rainforest vegetation to fire, the lack of any nearby built assets, and because they do not have a history of bushfire ignitions and are not known to be areas of high bushfire behaviour potential. The LMZ does not require intensive management of fire risk and focuses on those actions appropriate to conserve biodiversity and cultural heritage.

Ecological research in fire-prone ecosystems has established some general principles about fire regimes and the conservation of biodiversity. That is, groups of plants and animals respond similarly to fire according to characteristics of their life history. Therefore, even though a LMZ may have the objective of preventing the extinction of all species that are known to occur naturally within the zone, it is not necessary to individually specify fire regimes for the conservation of every species. Requirements for most plant species can be summarised on the basis of vegetation communities and there is a threshold in fire regime variability that marks a critical change from high species diversity to low species diversity (see Table 2).

Table 2 Fire Regime Guidelines for Muldiva and Deer Vale Nature Reserves

Vegetation type	Minimum interval	Maximum interval	Notes
Rainforest	n/a	n/a	Fire should be avoided
Wet sclerophyll forest	25	60	Crown fires should be avoided in the lower end of the interval range

Source: Bradstock *et al.* (2003)

A separate fire management strategy will be prepared for Bagul Waajaarr Nature Reserve due to the complex issues such as the different vegetation communities, adjacent assets, and the higher risk of fire within this reserve. The areas of state forest around the reserve have leases over them that are presently burnt on a regular

basis for grazing. These fires often escape into the reserve and vegetation communities in the reserve are showing the effects of over-burning. This, plus the history of 'green-pick' burning of the area that is now in the reserve itself, has resulted in fire tolerant species dominating in some areas, considerable fire damage or death of young regenerating trees and shrubs, and the loss of many hollow-bearing mature trees and stags. Fire management for the reserve should aim at restoring fire regimes that will maintain the biodiversity of the reserve. Fire regime thresholds and associated detailed information will be identified in the separate fire management strategy.

3.8.3 Isolation and Fragmentation

Clearing of vegetation within the bioregion has resulted in a high loss of biodiversity and fragmentation of habitat. Long term conservation of biodiversity depends upon the protection, enhancement and connection of remaining habitat across the landscape, involving vegetation remnants on both public and private lands. Nearby vegetated areas consolidate the habitat values of the reserves and provide ecological corridors to other surrounding forested areas.

4. MANAGEMENT ISSUES AND STRATEGIES

Current Situation	Desired Outcomes	Strategies	Priority
<p>4.1 GEOLOGY, LANDFORM, SOILS AND HYDROLOGY</p> <p>There are currently minimal soil erosion or water quality issues in the reserves, although soils may be easily eroded down slopes where disturbance has occurred.</p> <p>Small areas of soil erosion occur in Bagul Waajaarr Nature Reserve, commonly around disturbed areas such as old snig trails and log dumps.</p>	<ul style="list-style-type: none"> • There is no evidence of increased soil erosion from reserve management activities and visitor use. • There is no reduction in the water quality and health of watercourses in the reserves. 	<p>4.1.1 Undertake all works, such as trail maintenance, in a manner that minimises erosion and water pollution.</p> <p>4.1.2 Work in conjunction with Bellingen Shire and Clarence Valley Councils, the Northern Rivers Catchment Management Authority and other relevant authorities to maintain and improve water quality in the reserve's catchments.</p> <p>4.1.3 Promote the regeneration of native vegetation in disturbed areas to reduce erosion potential and sedimentation of streams (refer to section 4.2).</p> <p>4.1.4 Undertake soil conservation works on management trails, and close and rehabilitate trails in the reserves not shown on the map.</p>	<p>Ongoing</p> <p>Ongoing</p> <p>Medium</p> <p>Medium</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>4.2 NATIVE PLANT AND ANIMAL CONSERVATION</p> <p>Deer Vale and Bagul Waajaarr Nature Reserves form part of a regional vegetation corridor important for the movement of a number of species. The diversity of habitats in the reserves is likely to provide for a range of animal species.</p> <p>A variety of vegetation types occur, including fire-sensitive rainforest and eucalypt forest. A number of old snig trails and other disturbed areas such as log dumps occur in Bagul Waajaarr Nature Reserve.</p> <p>Some native plant surveys have been undertaken in the reserves but no systematic fauna surveys. Some significant plant and animal species have been recorded in the reserves and a number of additional threatened animal species are predicted to occur.</p> <p>Frequent, unplanned fires have occurred in Bagul Waajaarr Nature Reserve and have impacted on biodiversity and habitat value (refer to sections 3.8.2 and 4.6).</p>	<ul style="list-style-type: none"> • There is no reduction in native plant and animal species found in the reserves, particularly significant species, or reduction in habitat diversity. • Structural diversity and habitat values are restored in areas subject to past disturbance. • There is increased knowledge of the reserve's fauna and their ecological requirements. 	<p>4.2.1 Close old snig trails and other disturbed areas not required for management purposes, and allow to regenerate naturally. Active revegetation and weed control may be implemented to achieve this.</p> <p>4.2.2 Manage threatened species in accordance with the Priorities Action Statement.</p> <p>4.2.3 Undertake or encourage plant and animal surveys, particularly for rare and threatened species and other appropriate ecological research.</p> <p>4.2.4 As far as possible, exclude fire from fire sensitive communities, such as rainforest and areas that have been over-burned.</p> <p>4.2.5 Work with neighbours, the local Landcare group, Bellingen Shire Council and the Northern Rivers Catchment Management Authority to promote, support and encourage the protection of high conservation value vegetation adjacent to the reserves through appropriate conservation mechanisms, particularly in those areas identified as forming corridors or containing key habitat for fauna.</p>	<p>Medium</p> <p>High</p> <p>High</p> <p>High/ongoing</p> <p>High</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>4.3 CULTURAL HERITAGE</p> <p>The reserves are all located within the boundaries of the Gumbaynggirr Aboriginal Nation and the Dorrigo Plateau Local Aboriginal Land Council area.</p> <p>No surveys have been undertaken within the reserves for Aboriginal sites. Evidence of Aboriginal use of surrounding areas suggests that future study of the reserves could identify sites, objects, places or values and it is important that the local Aboriginal community is involved in the protection of any cultural values in the reserves.</p> <p>Parts of the reserves were logged and grazed in the past. Remnants of an old cedar cutters track remain in Deer Vale Nature Reserve and the Annie Sawtell Cascades, near Deer Vale Nature Reserve is named after a local identity (refer to section 3.4.2).</p>	<ul style="list-style-type: none"> • Any cultural features are identified, recorded, conserved and managed in accordance with their significance. • The history of the reserves are documented and recorded. • Aboriginal heritage values are protected in partnership with the local Aboriginal community. 	<p>4.3.1 Encourage appropriate studies into Aboriginal and non-Aboriginal cultural heritage in the reserves, including formal documentation of cultural resources and locations (refer to Research).</p> <p>4.3.2 Work with the local Aboriginal community, Dorrigo Plateau Local Aboriginal Land Council and relevant knowledge holders to identify and manage Aboriginal cultural heritage sites, places and values.</p> <p>4.3.3 Precede all new ground disturbance work by a check for cultural features as part of the Review of Environmental Factors process. Maintenance of existing works is exempted to the extent of land previously disturbed.</p>	<p>Medium</p> <p>High</p> <p>Medium</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>4.4 VISITOR USE AND EDUCATION</p> <p>Use of the reserves must be carefully managed since they are relatively small and have significant areas of remnant vegetation.</p> <p>Public access to Deer Vale and Muldiva Nature Reserves is via foot and the reserves experience a low level of use for activities such as bushwalking and nature appreciation. Bagul Waajaarr Nature Reserve is largely surrounded by private property and public access is not available.</p> <p>There are no visitor facilities within the reserves.</p> <p>Promotion of community understanding and appreciation of the conservation values of the reserves will be important for minimising damaging activities.</p>	<ul style="list-style-type: none"> • The local community is aware of the significance of the area and of management programs. • Visitor use remains low and is ecologically sustainable, consistent with management principles (refer to section 2.1). 	<p>4.4.1 While self-reliant use of the reserves for bush walking, bird watching and nature study will be allowed, such use and access to the reserves will not be promoted.</p> <p>4.4.2 Prohibit camping, public vehicle use, commercial activities, horse riding, cycling and camp fires in the reserves.</p> <p>4.4.3 Promote community understanding and appreciation of the conservation values of the reserves through contact with neighbours, community organisations and media releases as needed.</p> <p>4.4.4 Install tenure and regulatory signage at the boundaries of all reserves.</p> <p>4.4.5 Group educational activities that are consistent with the values of the reserves may be permitted, subject to conditions on group size, activities and location as determined by the Area Manager to protect the reserves' values and minimise conflict with other users.</p> <p>4.4.6 Monitor impacts of visitor use and undertake measures to reduce impacts where they are found to be unacceptable.</p>	<p>Medium</p> <p>High</p> <p>High</p> <p>Medium</p> <p>Medium</p> <p>Low</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>4.5 INTRODUCED SPECIES</p> <p>The North Coast Region Pest Management Strategy (NPWS 2003d) broadly identifies the pest plant and animals priorities and strategies for the reserves. It identifies woody weeds, such as privet as a major problem within Bagul Waajaarr Nature Reserve, while blackberry, exotic vines, herbaceous weeds and exotic grasses are a minor problem.</p> <p>A weed strategy has been prepared for Muldiva and Deer Vale Nature Reserves. Small-leaved and large-leaved privet are identified as the two major weed species of conservation concern for these reserves.</p> <p>Introduced animals have not been identified as a major problem within the reserves, however there have been some instances of cattle entering Bagul Waajaarr and Deer Vale Nature Reserves from neighbouring properties. Wild dogs, foxes and feral cats are also likely to transit the reserves.</p>	<ul style="list-style-type: none"> • Introduced species are controlled and, where possible, eradicated from the reserves. • The impact of introduced species on native species and neighbouring lands is minimised. • Distribution of weed species does not expand beyond their current extent. • Control of introduced species has minimal impact on native species. 	<p>4.5.1 Monitor, control and, where possible, eradicate introduced species in accordance the Regional Pest Management Strategy, reserve-specific weed strategies, and best management practice, to deliver optimal biodiversity outcomes.</p> <p>4.5.2 Give priority for the control of introduced species to those species that:</p> <ul style="list-style-type: none"> – are declared noxious; or – have a significant environmental impact, including damage to threatened species, catchment values and recreation values; or – may affect neighbouring lands or are considered of high priority by the community. <p>4.5.3 Seek the cooperation of other authorities and neighbours in implementing weed and pest animal control programs.</p> <p>4.5.4 Encourage research into the distribution and impact of pest species within the reserve and appropriate control methods (refer to section 4.7).</p> <p>4.5.5 Use weed control techniques that minimise soil exposure and, if required, undertake works to encourage native revegetation following weed control (refer to sections 4.1 and 4.2).</p> <p>4.5.6 Ensure the removal of cattle found in the reserves.</p> <p>4.5.7 Encourage maintenance of effective boundary fencing to prevent domestic stock from entering into the reserves. In accordance with NPWS Policy, provide fencing assistance where appropriate.</p>	<p>Ongoing</p> <p>High</p> <p>Medium</p> <p>Low</p> <p>Ongoing</p> <p>High</p> <p>High</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>4.6 FIRE MANAGEMENT</p> <p>There have been three recorded wildfires in Bagul Waajaarr Nature Reserve in recent years (refer to section 3.8.2) and a small wildfire on the fringe of Deer Vale Nature Reserve in 1986. No recorded wildfire has occurred within Muldiva Nature Reserve for over 50 years.</p> <p>Deer Vale and Muldiva Nature Reserves have been designated as Land Management Zones (LMZ) because of the sensitivity of the rainforest vegetation to fire and the low risk of bushfire within the reserves. Natural and man-made barriers inhibit the likelihood and spread of fire from and into these reserves.</p> <p>A separate fire management strategy will be prepared for Bagul Waajaarr Nature Reserve.</p> <p>Management access through private property is required to Bagul Waajaarr Nature Reserve and may be required for fire management activities in Deer Vale and Muldiva Nature Reserves. Additional firebreaks or trails may be required on neighbouring land to protect the reserves or adjoining land from fire. No additional trails are proposed within the reserves.</p>	<ul style="list-style-type: none"> • Fire regimes are appropriate for conservation of native flora and fauna communities, particularly threatened species. • Life, property and natural and cultural values within and adjacent to the reserves are protected from fire. • The potential for spread of bushfires on, from, or into the reserve is minimised. • Neighbours and nearby communities appreciate the requirements for, and cooperate in applying, fire management objectives and prescriptions for the reserve. 	<p>4.6.1 Manage Deer Vale and Muldiva Nature Reserves as LMZ, in accordance with the local district bushfire risk plan.</p> <p>4.6.2 Suppress all unplanned fires and, where possible, exclude fire from Deer Vale and Muldiva Nature Reserves until the desired fire regimes are met.</p> <p>4.6.3 Monitor the impacts of fire on ecosystems within the reserves and encourage appropriate research (refer to section 4.2 and 4.7).</p> <p>4.6.4 Prepare and implement separate fire management strategies for Bagul Waajaarr Nature Reserve.</p> <p>4.6.5 Prohibit the lighting of all fires by visitors within the reserves (refer to section 4.4).</p> <p>4.6.6 Continue to participate actively in the Bellingen Bush Fire Management Committee. Maintain coordinated and cooperative arrangements with the Rural Fire Service, Bellingen Shire Council, Forests NSW and other neighbours with regard to fuel management and fire suppression.</p> <p>4.6.7 Consider potential impacts on the reserves' values when locating firebreaks and negotiate with neighbours to enable the clearance of firebreaks/trails on adjacent land where necessary for the mutual protection of the nature reserves and property values from wildfire.</p>	<p>High</p> <p>High</p> <p>Medium</p> <p>High</p> <p>High</p> <p>Ongoing</p> <p>High</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>FIRE MANAGEMENT (cont'd)</p>		<p>4.6.8 Support neighbours' efforts to contain fire on their own properties, protect their own assets and report unplanned ignitions.</p> <p>4.6.9 Liaise with adjoining private landholders to ensure continued access to the reserves for fire management purposes.</p> <p>4.6.10 Provide information and advice to neighbours regarding the ecological impact of fire and fire management issues.</p>	<p>Ongoing</p> <p>High</p> <p>Ongoing</p>
<p>4.7 RESEARCH</p> <p>Research to date has focused on the vegetation in Deer Vale Nature Reserve and includes data on a range of biological observations.</p> <p>Further study is needed to improve understanding of the reserve's natural and cultural heritage, the processes that affect them and the requirements for management of particular species.</p>	<ul style="list-style-type: none"> • Research is undertaken that enhances scientific knowledge, assists management of the reserves and has minimal impact on the reserves' values. 	<p>4.7.1 Undertake or encourage research to improve knowledge and management of natural and cultural heritage.</p> <p>4.7.2 Encourage and guide research in the reserves by educational organisations and others into the following priority areas:</p> <ul style="list-style-type: none"> - fauna surveys and ecological studies; - Aboriginal and non-Aboriginal cultural heritage; - the effect of fire on ecosystems in Bagul Waajaarr Nature Reserve; and - appropriate management of pest species. 	<p>Medium</p> <p>Medium</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>4.8 MANAGEMENT OPERATIONS</p> <p>A number of management trails exist in Bagul Waajaarr Nature Reserve with three trails to powerlines within Deer Vale Nature Reserve. No management trails exist within Muldiva Nature Reserve.</p> <p>Bagul Waajaarr Nature Reserve is surrounded by private property and state forest. Access to the reserve by the NPWS requires permission from adjacent property owners. Access to management trails in Deer Vale Nature Reserve also requires permission from private property owners. No formal or long-term access arrangements are in place.</p> <p>A road reserve exists in the south-west corner of the northern section of Bagul Waajaarr Nature Reserve. This 'paper' road is not in use and has never been constructed.</p> <p>In some areas, reserve boundaries are unmarked or unclear. This uncertainty may result in the use of reserved lands for inappropriate activities.</p>	<ul style="list-style-type: none"> • Management facilities adequately serve management needs and have acceptable impact. • Management trails are maintained to an appropriate standard for use by NPWS and other fire authorities. • The unconstructed road easement is incorporated into Bagul Waajaarr Nature Reserve. • Boundaries are clearly defined to minimise inappropriate activities. 	<p>4.8.1 Management trails within Deer Vale and Bagul Waajaarr Nature Reserves will be maintained to a four-wheel-drive dry weather standard and gated to exclude public vehicle use (see the map).</p> <p>4.8.2 No management trails will be constructed in Muldiva Nature Reserve and no new trails will be constructed in Deer Vale Nature Reserve. Additional trails in Bagul Waajaarr Nature Reserve should be located on boundaries, preferably on private property (refer to section 4.6).</p> <p>4.8.3 Negotiate with neighbours and Forests NSW regarding ongoing access for management purposes and contribution by NPWS to maintenance of private trails where appropriate.</p> <p>4.8.4 Vehicle access to the reserves will be limited to that required for management purposes and ongoing maintenance of the existing transmission line and towers by TransGrid (refer to section 4.9).</p> <p>4.8.5 Investigate the possibility of gazetting the unconstructed road easement into Bagul Waajaarr Nature Reserve.</p> <p>4.8.6 Survey and mark the boundaries of the reserves where required to correctly identify their location.</p>	<p>Medium/ ongoing</p> <p>High</p> <p>Ongoing</p> <p>High</p> <p>Medium</p> <p>Medium</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>4.9 OTHER USES</p> <p>A single overhead 330kV transmission line traverses Deer Vale Nature Reserve on a pre-existing easement through the reserve. Access and maintenance of the transmission line within the reserve occurs under the terms of a state-wide agreement between TransGrid and NPWS.</p>	<ul style="list-style-type: none"> • All existing non-NPWS infrastructure is licensed or easements granted, consistent with the NPW Act. • No further non-NPWS infrastructure is developed within the reserves. • Existing non-NPWS infrastructure is managed to minimise impacts on natural and cultural values, scenic values and NPWS infrastructure. 	<p>4.9.1 Ensure the existing powerline is managed in accordance with the current agreement and any revised agreement with TransGrid, the NPW Act and NPWS policy.</p> <p>4.9.2 Develop a reserve-specific maintenance and access agreement with Transgrid if required. This may include conditions regarding vegetation and fauna management, including consideration of any recommendations from threatened species recovery plans.</p> <p>4.9.3 Discourage activities relating to non-NPWS uses that are considered incompatible with the values of the reserves.</p> <p>4.9.4 Ensure all non-NPWS uses are licensed or easements granted as appropriate under the NPW Act.</p>	<p>High</p> <p>High</p> <p>High</p> <p>Medium</p>

High priority activities are those that are imperative to achieving 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 of the plan but are not urgent.

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

REFERENCES

- Bradstock, R., Kenny, B. & Tasker, E. 2003. *Guidelines for Ecological Sustainable Management. Final Report for the NSW Biodiversity Strategy*. Department of Environment and Conservation, Hurstville.
- Briggs, J.D. & Leigh, J.H., 1996. *Rare or Threatened Australian Plants* (Revised Edition). CSIRO Publishing, Collingwood, Victoria.
- DEC 2004. *Draft Recovery Plan for Olearia flocktoniae (Dorrigo Daisy Bush)*, Department of Environment and Conservation (NSW), Sydney.
- DEC 2005. *Draft 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.
- Floyd, A.G. 1976. Vegetation Report – J. Hodgson's property, Deevale. Internal report to the NPWS Regional Superintendent, Grafton, dated October 1976.
- Milford, H.B. 1996, *Soil Landscapes of the Dorrigo 1:100 000 Sheet*, Department of Land & Water Conservation, Sydney.
- NPWS & SFNSW 2001. *Best Bush: Recreation map of the forests & parks of NSW*. A joint project by the NSW National Parks and Wildlife Service and State Forests of NSW.
- NPWS 1999. *Modelling Areas of Habitat Significance for Vertebrate Fauna and Vascular Flora in North-East NSW*. A project undertaken for the Joint Commonwealth NSW Regional Forest Agreement Steering Committee as part of the Comprehensive Regional Assessments. NSW National Parks and Wildlife Service, Coffs Harbour.
- NPWS 2003a. *Recovery Plan for the Yellow-bellied Glider (Petaurus australis)*. NSW National Parks and Wildlife Service, Hurstville.
- NPWS 2003b. *Draft Recovery Plan for the Koala*. NSW National Parks and Wildlife Service, Hurstville.
- NPWS 2003c. *Draft Recovery Plan for the Hastings River Mouse (Pseudomys oralis)*, NSW National Parks & Wildlife Service, Hurstville.
- NPWS 2003d. *North Coast Region Pest Management Strategy*. NSW National Parks and Wildlife Service, Hurstville, NSW.
- NPWS 2005. *Fire Management Manual*. NSW National Parks and Wildlife Service, Hurstville.
- Scotts, D. 2003. *Key Habitats and Corridors for Forest Fauna: A landscape framework for conservation in north-east New South Wales*. Occasional Paper 32. NSW National Parks & Wildlife Service, Hurstville.