MUNDOONEN NATURE RESERVE

PLAN OF MANAGEMENT

NSW National Parks and Wildlife Service

Part of the Department of Environment and Conservation (NSW)

May 2005

This plan of management was adopted by the Minister for the Environment on 10 May 2005

Acknowledgments

This plan of management is based on a draft plan written by Susan Jackson, Ranger Queanbeyan Area, with assistance from South West Slopes Regional staff.

Cover photograph of Swamp Gully in Mundoonen Nature Reserve by Michael Doherty, NPWS.

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FOREWORD

Mundoonen Nature Reserve covers an area of 1,485 hectares and is located approximately 70km north of Canberra in the Central Tablelands of NSW. The reserve straddles the Hume Highway approximately midway between Gunning and Yass.

Mundoonen Nature Reserve is one of several conservation areas that protect Southern Tableland dry sclerophyll forest, with associated animal and plant communities. It protects a sample of dry tablelands vegetation in an area which has been largely cleared, several regionally significant plant species and communities, habitat for a variety of native animals including the vulnerable koala and powerful owl, and sites of European historical importance including remnants of the Old Gap Road (the first route of the Hume Highway) and several charcoal burning sites.

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

A draft plan of management for Mundoonen Nature Reserve was placed on public exhibition for three months from 1 August until 31 October 2003. The exhibition of the plan of management attracted 4 submissions which raised 7 issues. All submissions received were carefully considered before adopting this plan of management.

This plan of management provides for the protection of the plant and animal communities within the nature reserve and the provision of opportunities for research and educational use.

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

Bob Debus
Minister for the Environment

Table of Contents

1. Management Context **1**

1.1 Legislative and Policy Framework 1

1.2 Mundoonen Nature Reserve 1
1.2.1 Location, Reservation and Regional Setting 1
1.2.2 Importance of Mundoonen Nature Reserve 1

2. Objectives of Management **4**

2.1 Management Purposes and Principles 4

2.3 Overall Strategy 4

3. Reserve Map **5**

4. Policies and Framework for Management **6**

4.1 Natural Heritage 6
4.1.1 Geomorphology, soils and hydrology 6
4.1.2 Native and Introduced Plants 7
4.1.3 Native and Introduced Animals 10
4.1.4 Fire Management 13

4.2 Cultural Heritage 16
4.2.1 Historic Places 16
4.2.2 Aboriginal Sites 17

4.3 Use of the Area 17
4.3.1 Education and Promotion 18
4.3.2 Research 19
4.3.3 Management Operations 20

5. Plan Implementation **21**

6. References **24**

1. MANAGEMENT CONTEXT

1.1 LEGISLATIVE AND POLICY FRAMEWORK

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

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

1.2 MUNDOONEN NATURE RESERVE

1.2.1 Location, Reservation and Regional Setting

Mundoonen Nature Reserve is located approximately 70 km north of Canberra in the Central Tablelands of NSW. The reserve straddles the Hume Highway approximately midway between Gunning and Yass (See Reserve Map, page 5).

The reserve was gazetted in 1970, with additions gazetted in 2000, and is currently 1,485 hectares in size.

Much of the surrounding country is cleared and used primarily for sheep and cattle production. However, parts of the reserve are flanked by open forests and woodland that are in private ownership, contributing to a total forested area of approximately 3,000 ha. The Mundoonen Range is timbered in pockets further to the southeast.

The Mundoonen Range lies on the boundary between Yass and Gunning Shires.

1.2.2 Importance of Mundoonen Nature Reserve

Mundoonen Nature Reserve is one of several conservation areas that protect Southern Tableland dry sclerophyll forest, with associated animal and plant communities. The most important conservation values of the nature reserve are outlined below. More detailed information is provided in sections 4.1 and 4.2.

- **Biological Values**

Mundoonen Nature Reserve preserves a representative sample of vegetation and habitats found on tableland sandstone, metasediment and acid volcanic lithologies from Goulburn southward. Mundoonen Nature Reserve samples the drier tableland vegetation types, midway in their range, and is important as a sample of this dry tablelands vegetation in an area where there are few other reserves.

The primary vegetation type within the reserve is dominated by scribbly gum *Eucalyptus rossii* and red stringybark *E. macrorhyncha*. The landscape surrounding the reserve is largely cleared with some remnants of yellow box – Blakely's red gum (*E. melliodora - E. blakelyi)* woodland. A small pocket of this woodland occurs in the reserve.

Five species of plant recorded in the reserve appear to be of regional significance. The presence of *Bossiaea foliosa* in the reserve represents an outlying population of a species otherwise generally characteristic of the Australian Alps. Argyle apple *Eucalyptus cinerea* and *Viola caleyana* appear to be at their distributional limits in the reserve. *Hibbertia calycina* is regarded as rare by Harden (1990), who states that the species grows "in woodland and rocky slopes in the ACT". A *Pultenaea* species is being identified by the National Herbarium, Canberra, and may be of significance.

Fauna surveys have identified over 55 bird, 11 mammal and 6 reptile species in the reserve. Threatened native animal species recorded in the reserve include koala *Phascolarctos cinereus* and powerful owl *Ninox strenua.* Both these species are listed as vulnerable species under the *Threatened Species Conservation Act, 1995*.

- **Landscape Values**

The steep timbered ridges and gullies of Mundoonen Range provide a scenic backdrop to the Yass and Gunning valleys, being clearly visible from the Barton Highway and for travellers on the Hume Highway between Yass and Gunning.

- **Cultural Values**

A section of the Old Gap Road, constructed in 1830 as the first route of the Hume Highway, passes through the reserve, and is of local historical significance. The reserve also contains charcoal-burning pits dating from the 1930's.

- **Scientific and Educational Values**

Mundoonen Nature Reserve provides broad opportunity for scientific study in natural and cultural heritage. The CSIRO has in the past undertaken vegetation monitoring within the reserve (Leigh and Holgate 1979).

In addition the reserve is used by educational institutions and organised community groups for bird studies and community education.

Summary Statement of Significance

Mundoonen Nature Reserve is of regional conservation significance as it protects:

- a sample of dry tablelands vegetation in an area which has been largely cleared;
- an area of yellow box – Blakely's red gum open forest, which is poorly represented in reserves in the Southern Tablelands;
- several regionally significant plant species and communities;
- habitat for a variety of native animals including the vulnerable koala and powerful owl;
- sites of European historical importance including remnants of the Old Gap Road (the first route of the Hume Highway) and several charcoal burning sites; and
- sites of both scientific and educational value, which are available for specific research, study groups and the general public.

2. OBJECTIVES OF MANAGEMENT

2.1 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, nature reserves are managed to:

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

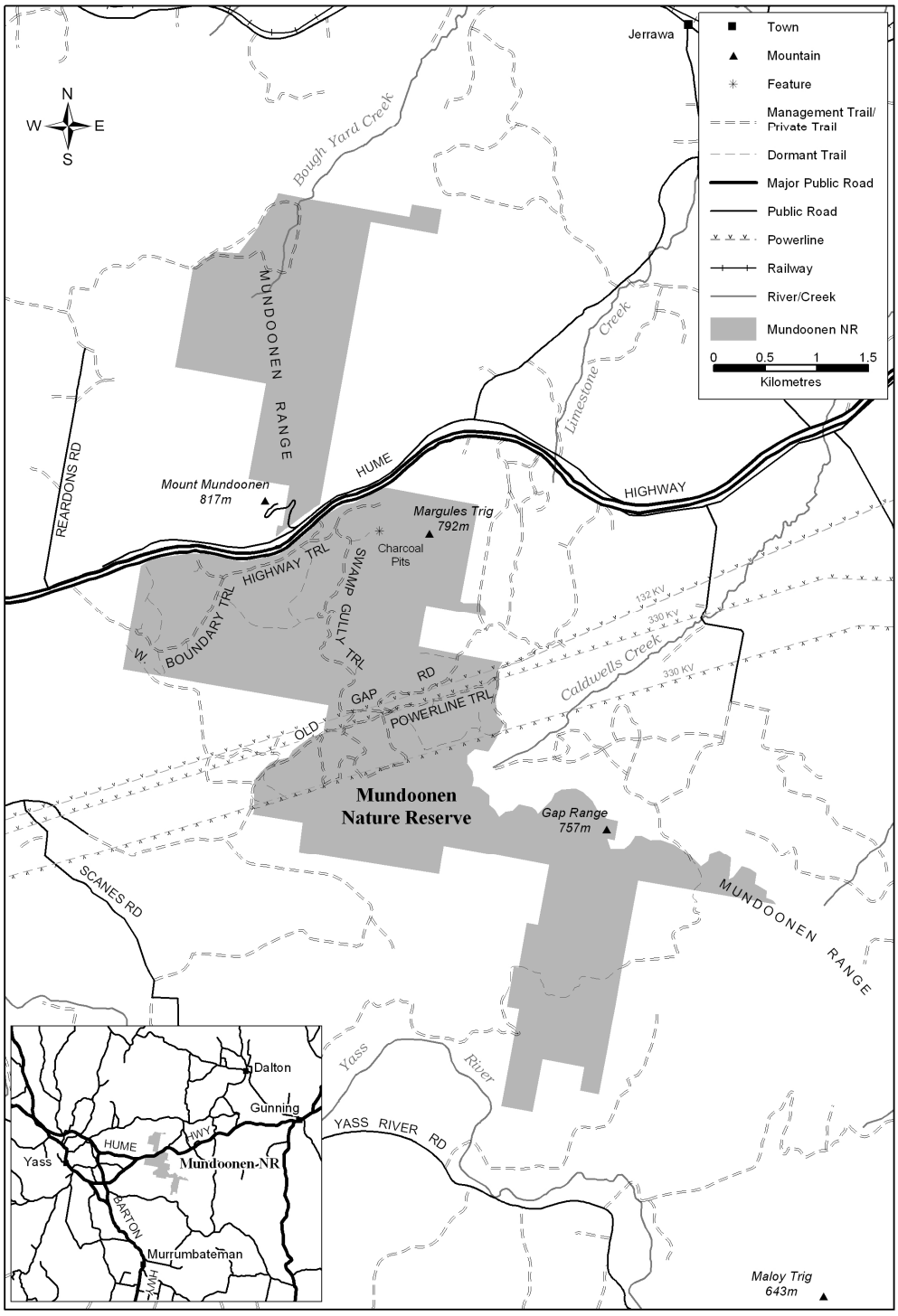
Nature reserves differ from national parks in that they do not have as a management principle to provide for visitor use.

2.2 OVERALL STRATEGY

Mundoonen Nature Reserve will be managed to protect the plant and animal communities that it samples and to provide opportunities for research and educational use. Major efforts will be directed towards:

- the development of fire planning to maintain biodiversity of the area while meeting broader obligations for protection of life and property;
- continued research to expand knowledge of ecological processes and management prescription that maintain or enhance species diversity;
- control of introduced plant and animal species;
- the reduction as far as possible of unplanned fire in the reserve;
- liaison with neighbours for cooperative implementation of pest control and broader management programmes to promote reserve values; and
- evaluation and identification of features and values of Aboriginal heritage significance.

3. RESERVE MAP



4. POLICIES AND FRAMEWORK FOR MANAGEMENT

This chapter contains the policies and framework for the management of Mundoonen Nature Reserve together with relevant background information.

Policies are under the following section headings:

4.1 Natural heritage
4.2 Cultural heritage
4.3 Use of the area

The policies established in this plan of management provide the framework for management consistent with anticipated resources available to the Service and with anticipated community trends over the next five to ten years.

4.1 NATURAL HERITAGE

Natural heritage comprises all aspects of the natural environment including physical features such as geology and soils, plants and animals and the relationship between these. For convenience, associated management of landscape values and of fire is also considered in this section.

4.1.1 Geomorphology, soils and hydrology

The reserve is generally orientated in a north-west/south-east direction along the western side of Mundoonen Range. The terrain consists of mainly steep ridges running from the main range to the west, interspersed with steep gullies. Gentler slopes and alluvial flats occur to a limited extent between the middle and southern segments of the reserve. The range generally increases in altitude from around 700m in the south to 817m at Mount Mundoonen, which adjoins the reserve next to the Hume Highway, then falls off again to the north. The broader southern part of the reserve has an altitudinal range between 600m and 800m, while the narrower northern section lies primarily between 700m and 800m.

Mundoonen Nature Reserve is primarily composed of early Silurian sandstone, quartzite and shale, known as Mundoonen Sandstone. This elongated area of sediments occurs between large areas of undifferentiated Silurian volcanics known as the Douro Group, which include fine to coarse rhyolitic to dacitic tuffs, rhyolite, dacite and andesite. The Douro Group also contains some sandstones, shales and interbedded limestones. Both the Mundoonen Sandstone and Douro Group were deposited on the Canberra rise, which was an offshore submarine topographic high during the Silurian period. On the easternmost margin of the reserve are found older deeper water sediments of Ordovician greywacke, shale and slate.

Soils are generally poor and skeletal and can be classified as lithosol/alluvial. The best soil development is in the flats in the vicinity of the high voltage powerlines, in the central section of the reserve. While most of the area shows

little erosion, there are some large gullies associated with past clearing and grazing. Erosion mitigation works have been conducted in the past on severe gully erosion in the vicinity of Old Gap Rd.

The reserve forms the watershed between the Yass and Lachlan rivers. However, all watercourses in the reserve are ephemeral, and contribute little to water collection in these rivers.

Policies

- All management activities in the reserve will be designed and undertaken in a manner that minimises erosion, siltation and water pollution.

- Management trails will be maintained in accordance with South West Slopes Region Trail Maintenance Policy (2001) and South West Slopes Region Environmental Safeguards Code of Practice (2001).

Actions

- Erosion associated with Gap Creek will be monitored and remedial works undertaken as required.

- Trails constructed during wildfire suppression will be closed and rehabilitated immediately.

4.1.2 Native and Introduced plants

The native vegetation in the reserve consists primarily of a low open forest association of red stringybark *E. macrorhyncha* and scribbly gum *E. rossii*. Other associated species include red box *E. polyanthemos*, bundy *E. goniocalyx* and broad-leaved peppermint *E. dives*.

The understorey is generally dominated by the shrub *Daviesia leptophylla* to approximately 2 metres in height or by the tussock grass *Joycea pallida* to 0.5 metres. In some areas the grass *Poa sieberiana* forms the main understorey but this occurs less frequently. In general, the understorey north of the transmission line easements is dominated by *D. leptophylla* where *Joycea pallida* dominates south of the easements. This appears to be a consequence of wildfire in 1979, which burnt the reserve north of the easement. Other understorey species include *Hibbertia obtusifolia, Dillwynia phylicoides, Acacia gunnii, Persoonia rigida, Rhytidosporum procumbens* and *Persoonia chamapeuce.*

The reserve also contains small areas of other vegetation types. The most widespread of these is creek open forest. This vegetation type is very mixed with respect to dominant canopy species but sites are similar in the dominant understorey species. The dominant canopy species are argyle apple *E. cinerea,* apple box *E. bridgesiana,* yellow box *E. melliodora,* red stringybark *E.*

macrorhyncha, bundy *E. goniocalyx and* red box *E. polyanthemos,* with the first three species being confined to this vegetation type. In general, this type occurs on flats along the larger creeks usually below 600 m elevation and near the boundaries of the reserve. These areas are the most fertile parts of the landscape and tree size and floristic composition reflect this. The middle layer may consist of a thicket of *Acacia mearnsii or A. dealbata* and the lower layer consists of a species rich mix of grasses and herbs. Typical native species include *Microlaena stipoides, Echinopogon ovatus, Schoenus apogon, Hydrocotyle laxiflora, Senecio species, Stellaria pungens, Luzula flaccida* and *Lepidosperm agunnii. A*ll these areas show signs of previous grazing and clearing and are moderately disturbed.

In one gully in the reserve, brittle gum *E. mannifera* open forest occurs. *E. mannifera* is the dominant canopy species forming open stands to 20 m in height. The understorey is dominated by *Leptospermum myrtifolium* in the wetter areas and *Lomandra longifolia* in drier areas. Three species of *Pultenaea* occur in this area - *P. cunninghamii, P. subspicata* and *P.* sp, the last two species being uncommon in the reserve.

A very small stand of yellow box *E. melliodora* - Blakely's red gum *E. blakelyi* woodland occurs near the southern entrance to the reserve at Old Gap Rd. Only a few small trees of *E. blakelyi* occur with some larger *E. melliodora*. The understorey is highly disturbed consisting of exotic grasses and herbs and the canopy spp are mature regrowth from past clearing.

The reserve has been subject to significant clearing in the past, and the broader vegetation types can be split further into areas undisturbed since at least 1944, post 1944 regrowth, post 1962 regrowth based on air photos from those years. It seems likely that all the reserve has been subject to clearing or logging in the past. This is indicated by the small diameter of many of the trees, and their high density. Few old growth trees remain. While it is thought that dense thickets of trees may thin naturally over time, there are some indications that in some instances these may become locked by limited nutrients and trees may not grow. Field observations during the koala survey indicate that these dense thickets provide sub-optimal koala habitat. Koala scats were found under trees with a broader cleared area around, potentially for added protection from predators. The management of these regrowth areas may become more active in the future.

A number of species of regional significance occur in the reserve. *Bossiaea foliosa* has been recorded in the reserve, representing an outlying population of a species characteristic of the Australian Alps. Argyle apple *Eucalyptus cinerea* has been recorded in the more fertile, flatter creeks within the reserve. While this species occurs from Goulburn to Tumut, it is not adequately represented in reserves over its range and Mundoonen Nature Reserve samples the species in the middle of its range. Doherty (1996) also recorded *Hibbertia calycina* in exposed areas north of the Hume Highway. This species is regarded as rare by Harden (1990) and its occurrence in the reserve is regionally significant. An unidentified P*ulteneae* sp. is currently

being identified by the National Herbarium in Canberra and is likely to be of regional significance. *Viola caleyana* was found in swampy areas in previously cleared land. The species does not appear to be common, and while occurring in the Southern Tablelands may be approaching a western limit in the reserve. Management of these species is based on the management of the broader vegetation community, until knowledge of any specific requirements is gained.

The reserve is adjoined in numerous places by open forests and woodland that are in private ownership. Retention and sympathetic management of these areas would contribute to the long-term viability of the plant and animal communities within the reserve (see section 4.1.3).

Weeds

The area contains limited discrete patches of weeds including serrated tussock *Nassella trichotoma,* blackberry *Rubus fruticosus,* Paterson's curse *Echium plantagineum* and saffron thistle *Canthamus lanatus*. These infestations are treated with herbicide on an annual basis.

Weed infestations are concentrated in areas of previous disturbance, particularly in past grazing land and along the powerline easements and trails, and along current agricultural/timbered boundaries.

South West Slopes Region has formulated a Pest Management Strategy for all reserves under its control. The strategy outlines the types of weeds commonly occurring in the reserve network, strategies for their control, and priorities for the direction of funding to best achieve pest reduction targets. The document also outlines the Service's commitment to the control and management of feral animals and weeds within and around its reserves in the region. The noxious weed species known to exist in the are included in this strategy.

A review of environmental factors for weed control within the reserve has been prepared and implementation of weed control programmes will be consistent with these documents.

Policies

- The floristic and structural diversity of vegetation will be maintained.

- Areas where significant plant species or communities are identified will be protected from disturbance

- Introduced plant species will be controlled, and if possible eliminated, where they threaten the integrity of native communities, have the potential to spread rapidly or have been declared noxious, in line with priorities listed in the regional pest management strategy.

- Stock grazing and bee keeping will not be permitted in the reserve

- Where available and effective, non-residual herbicides will be used for weed control.

Actions

- Weed control programmes will be implemented as detailed in the pest management strategy for the region, and by the most environmentally suitable methods as detailed in the review of environmental factors.

- The efficacy of thinning areas of dense regrowth will be assessed, using methods such as poisoning, felling or burning. Monitoring of the impacts on floristic and structural diversity will be undertaken.

4.1.3 Native and Introduced Animals

Native mammals recorded in the reserve include eastern grey kangaroos, *Macropus giganteus,* red-necked wallaby, *M.rufogriseus*, swamp wallaby, *Wallabia bicolor,* eastern pygmy possum *Cercartetus nanus,* ringtail possum *Pseudocheirus peregrinus*, brushtail possum *Trichosurus vulpecula,* bush rat *Rattis fuscipes*, yellow footed marsupial mouse *Antechinus flavipes* and echidna *Tachyglossus aculeatus.*

The reserve has an extensive birdlife with over 55 species being recorded to date. Of these, the ecological requirements of ground nesting birds such as quail and quail thrush may require consideration in relation to any proposed fire management strategies.

The common eastern froglet *Randiella signifera* and *R. parinsignifera* have been recorded in the reserve. Snakes include the red-bellied black snake and brown snake.

Threatened species recorded in the reserve include koala *Phascolarctos cinereus* and powerful owl *Ninox strenua*, both listed as vulnerable under the *Threatened Species Conservation Act*, *1995*.

A colony of koalas living in the reserve was reported to have been destroyed in the 1979 wildfire. Since then, koalas have been recorded intermittently in the reserve surrounds. A koala survey conducted in 1999 identified a small colony (estimated population of between 5 and 20) utilising the central and southern sections of the reserve. The northern section was not included in the survey. The report suggested that the 1979 wildfire reduced the carrying capacity of affected areas for koalas. The presence of dense thickets of regrowth timber also appears to reduce habitat quality for koalas – in field survey, koala scats were found under trees with a broader cleared area around, potentially for added protection from predators.

It is possible that other threatened species not recorded in the reserve may occur there intermittently as a result of food and nesting requirements. These species include the superb parrot *Polytelis swainsonii* regent honeyeater *Xanthomyza phrygia,* painted honeyeater *Grantialla picta*, square-tailed kite *Lophoictinia isura*, greater long-eared bat *Nyctophilus timoriensis* and yellow-bellied sheathtail bat *Saccolaimus flaviventris.*

Under the *Threatened Species Act 1995*, recovery plans are to be prepared for species listed under the act. Actions identified in adopted plans for species, which occur in the reserve, will be implemented.

Due to the small and isolated nature of the reserve, fauna is particularly vulnerable to extinction through events such as large bushfires, disease, predation or changing environmental conditions. The normal processes of recolonisation, that may take generations for slower -moving fauna such as amphibians and invertebrates, may be prevented by cleared land between the reserve and other bushland.

Adjoining areas of vegetation are significant for achieving protection of important habitats outside the nature reserve. Methods for achieving this protection include encouraging landholders to undertake conservation agreements, promotion of Total Catchment Management and Landcare principles in association with local organisations and other land management agencies.

While surveys conducted to date provide a good basis for management, further research will expand the knowledge base and enable improved management decisions to be made.

Introduced Animals

Introduced animals currently occurring within the reserve include foxes, rabbits and cats.

Foxes are common in the reserve, as well as on adjoining lands, and their presence is likely to impact on a range of fauna including small lizards, frogs and small mammals. Predation by foxes on native animals has been identified as a key threatening process under the Threatened Species Conservation Act and, as such, a Threat Abatement Plan has been formulated. This plan proposes actions to reduce the impacts of fox predation on threatened species and to help conserve biodiversity more generally.

Rabbits occur in flats on the reserve that adjoin cleared land. There are few warrens or burrows. A control programme for rabbits commenced in 1999. As well, the rabbit calicivirus is spreading in the area, and its effect on the rabbit population will be monitored.

The control of these species, and particularly foxes and cats, is difficult as they have the capacity to readily recolonise the narrow reserve from surrounding lands. The success of pest species management operations is thus dependent upon a coordinated approach by all land managers in the area. Due to potential impacts of control programmes on non-target fauna, fox control programmes will only be undertaken where it can be demonstrated that they are done on such a scale and frequency to significantly reduce fox populations in the reserve over the longer term.

The South West Slopes Region Pest Management strategy also identifies the pest animal species known to occur within the region and ranks them in terms of their potential to damage land, alter natural processes and/or disturb native animal populations and habitats. Management strategies for each species are outlined in this document as well as preferred methods of control and eradication.

Policies

- The Service recognises that the reserve is an integral part of the Central Tablelands land system and that its ecological value depends upon protection of other important habitat areas within the system. The Service will thus seek to protect significant habitat areas outside the nature reserve, through the cooperation of landholders.

- The principles of Total Catchment Management, Native Vegetation Management and Landcare are supported by the National Parks and Wildlife Service and will be promoted in cooperation with local organisations.

- Habitat for all native animals, particularly threatened species such as the koala, will be protected and enhanced through a combination of fire management and introduced plant and animal control.

- The Service will continue to work closely with Yass Rural Lands Protection Board and neighbouring landholders to control introduced animal species.

Actions

- To protect koalas and their habitat, an array of fire management strategies will be implemented to minimise the size, intensity and frequency of unscheduled fires.

- Actions listed in the Regional Pest Management Strategy that apply to species known to exist within the reserve will be implemented

- On-going rabbit control will be undertaken.

- Co-operative fox control programmes will be undertaken where it is demonstrated that long-term reductions in fox numbers in the reserve will be achieved, and where the benefits of this for reserve fauna outweigh any risks associated with impacts on non-target fauna.

- Undertake targeted fauna survey in the reserve focussing on threatened species

4.1.4 Fire Management

Fire management within the reserve is directed towards maintaining or enhancing species' biodiversity within the reserve while achieving ongoing protection of life and property within and adjoining the reserve. A draft fire management plan has been prepared for the reserve, which addresses these considerations in detail.

Fire history

The pre-European fire pattern for the reserve is not known. Nor is there information available prior to 1924, when current reserve neighbours moved to the area. However, in 1888 a large fire passed through the area and it is possible that this affected the reserve.

Prior to the reserve's gazettal in 1970, several small fires are reported to have occurred at intervals of five to ten years, starting on the southern side from the Hume Highway. Only three wildfires have been recorded since 1970, one burning only 6 ha, and another 75ha. The only notable wildfire occurred in 1979 and was ignited at Yass Junction, approximately 9 km WNW of the reserve. It passed through the northern and central sections of the reserve before swinging to the north - east after a wind change. The south - east flank was then contained along the powerline easement.

Maintenance of species habitat and diversity

Fire is one of the most powerful agents effecting change to ecosystems, and given the small size and isolation of remnant vegetation in the reserve, it is critical that fire is managed to avoid local extinctions of species.

Fire frequency, intensity and season of occurrence are major factors known to affect the distribution and composition of plant and animal communities.

In broad terms, it is known that too frequent fire may reduce biodiversity, as some plant species will not be mature enough to reproduce. Too infrequent fire may also reduce biodiversity, as plants are not exposed to the triggers that some species require for reproduction.

Assessment of the vegetation within the reserve indicates that areas unburnt since prior to 1924 have a very similar species composition to those areas more recently, and more frequently burnt. This suggests that the vegetation

within the reserve is adapted to extremely long intervals between fire. Recent research in the reserve shows that triggers such as drought and frost have enabled ongoing germination and resprouting of a broad range of species. Similarly the fire frequency in the reserve has not been so short that species have been lost through too frequent fire.

While the vegetation in the reserve will take longer to recover from a very intense fire, moderate to high intensity fires may encourage germination of species. The presence of dense thickets of *Daviesia leptophylla* in the northern section of the reserve is attributed to a germination event following the high intensity wildfire of 1979. Low intensity fires may not trigger germination events, and thus favour species that resprout after fire over those requiring germination. The repeated application of certain intensities of fire can therefore significantly influence the species' composition of the vegetation.

The interval between fires is also known to affect animal populations. In general, too short an interval between fires may cause lack of food resources for animals dependent on shrub and litter foods, as well as increase the risk of predation due to lack of cover. However, too long intervals between fires may enable the shrub layer to grow too tall to provide suitable habitat for small, ground dwelling mammals, in particular.

The intensity of fires may similarly favour some faunal species through their effects on food and habitat quality. However, high intensity wildfires may also cause death of wildlife. Fires that are widespread may impact on the ability of animal species to recolonise, particularly in a small, isolated reserve such as Mundoonen. Survey data suggests that the 1979 wildfire reduced the carrying capacity of koalas in affected areas. An important management strategy for protection of the koala population is therefore to minimise the size, severity and frequency of fires in the reserve.

Considerations such as the above lay the foundations for ecological burning regimes. Within Mundoonen, a precautionary approach will be applied. In general, as much of the reserve will be maintained in as old an age class as possible. Research will be undertaken to continue to assess the impacts of the application or exclusion of fire on the flora and fauna. If clear indications are observed that fire regimes need to be modified, appropriate steps will be undertaken.

Fire responsibilities

Fire records for the Mundoonen area show that the fire incidence for the reserve and surrounding area is very low (refer to 4.1.4 fire history).

The Service, like other landowners in NSW is bound by *the Rural Fires Act* 1997 and is required to take all practicable steps to prevent the occurrence of fires on, and to minimise the danger of spread of fires on or from, the reserve.

The Service is an active participant in the Yass and Gunning District Fire Committees constituted under the *Rural Fires Act.* These committees are responsible for developing and coordinating cooperative fire management between fire authorities in the shire areas, which include Mundoonen Nature Reserve. These committees are currently preparing a draft plan of operations and draft bush fire risk management plan as required by the *Rural Fires Act.* It is intended that the Mundoonen Nature Reserve Fire Management Plan, prepared in conjunction with the plan of management, will form part of the Service's input into these plans.

A variety of fire management strategies have been developed to enhance fire suppression capability within the reserve. These include the establishment and maintenance of an effective fire trail system, monitoring of fuel levels, identification of fuel reduction zones, and the development of cooperative detection and fire fighting arrangements.

The reserve has an established trail network that can be used to contain fires to relatively small areas. Turning bays have been installed on these trails to increase fire-fighting safety. Perimeter fire trails on the boundary of forested and cleared lands are also being developed in conjunction with the local district Bush Fire Committee to enhance asset protection capabilities.

Fuel reduction zones have been identified along various trails in the reserve to increase their effectiveness as fire control lines. Due to the presence of fire loving plants such as *Daviesia leptophylla,* the use of herbicides is being trialled to effect this fuel reduction. As areas burnt in 1979 have higher fuel loads than those unburnt for many years, test burns have been identified to test the efficacy of fire as a fuel reduction method prior to any fuel reduction burns being undertaken. A larger fuel reduction area adjoining the powerline easement has been identified pending results of the test burn to assist in preventing fire spreading into the southern sector of the reserve.

Policies

- Fire will be managed in accordance with the fire management plan to:
  - protect human life and property within and adjoining the reserve;
  - protect biodiversityprotect threatened species;
  - protect historic features and Aboriginal sites;
  - protect the catchment values of the reserve; and
  - improve understanding of the influence of fires on the diversity of tableland dry sclerophyll forest.

- Close contact will be maintained with council fire officers, volunteer bush fire brigades and neighbouring landholders. The Service will continue to actively participate in the Yass and Gunning District Bush Fire Committees.

- All unscheduled fires will be extinguished as quickly as possible.

- Heavy machinery will not be used for fire suppression in areas of significant natural or cultural heritage.

Actions

- The existing trail network will be maintained.

- Strategic fuel reduction operations identified in the fire management plan will be implemented, consistent with the provisions of the reserve fire management plan and the district bush fire risk management plan.

- Fire field days for reserve neighbours and fire fighting personnel will be held at regular intervals.

- To protect koalas and their habitat, an array of fire management strategies will be implemented to minimise the size, intensity and frequency of fires. These strategies are detailed in the reserve fire management plan, which will be completed by 2003.

4.2 CULTURAL HERITAGE

Cultural heritage includes both Aboriginal and non-Aboriginal history and associated activities and works. It comprises important sites, structures and relics that may have aesthetic, historic, scientific and social significance to present and future generations.

4.2.1 Historic Places

A section of the Old Gap Road, the first route of the Hume Highway, passes through the Reserve. It was used briefly in the 1830's and is regarded as being of local historical importance. The road has been used as a public road and fire trail or many years and has been extensively graded. No signs remain of its initial construction, and no specific management is required.

In addition the reserve includes charcoal-burning sites which were used in the 1940's to convert logs to charcoal for producer gas during the period of petrol rationing.

Policy

- Historic places will be conserved in accordance with the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance and the *Heritage Act, 1977*.

Actions

- The charcoal pits will be assessed to determine their historic significance.

- The condition of Old Gap Road and the charcoal pits will be monitored and protection works undertaken as necessary.

4.2.2 Aboriginal Sites

There are no Aboriginal sites recorded in the reserve. Some open camp sites and a quarry are located within 5 km of the reserve. The lack of recorded sites may reflect the limited extent of ground survey undertaken in the area, or potentially indicate a low use of the reserve area due to its relatively harsh environment. Sites recorded within Yass and Gunning shires include scarred trees, shelters with art or deposits and open campsites.

Mundoonen Nature Reserve lies within the boundary of the Ngunawal people, but is in close proximity to the borders of the Gundungurra and Wiradjuri people. The reserve falls within the area administered by the Onerwal Aboriginal Land Council.

Policies

- Local Aboriginal Land Councils and other relevant Aboriginal community groups will be consulted and actively involved in all aspects of Aboriginal site management.

- All known Aboriginal sites will be protected from disturbance.

- Works involving ground disturbance will be preceded by a survey for Aboriginal sites.

Actions

- Consultation with local Aboriginal communities will be undertaken to investigate and identify the cultural values in the reserve.

- Sample survey and recording for Aboriginal sites will be undertaken in the reserve.

4.3 USE OF THE AREA

The major categories of uses that may be appropriate in Service areas dedicated as nature reserves are:

- education and promotion of the area, the Service and the conservation of natural and cultural resources;
- research; and
- management operations by the Service and other authorities with statutory responsibilities in the area.

The extent to which these categories of use will be provided for in Mundoonen Nature Reserve is indicated below.

4.3.1 Education and Promotion

The primary purposes of nature reserves are conservation of wildlife, natural environments and significant cultural features, and scientific research into these. Educational use is appropriate where it does not conflict with conservation.

Mundoonen Nature Reserve is visited by community bird watching groups and bushwalkers. Bushwalking is recognised as appropriate use of the reserve as it provides walkers with the opportunity for nature observation. Pedestrian access for these activities is provided from the Hume Highway. Public vehicle access is not permitted except for organised educational visits, such as fire field days. No visitor facilities are provided in the reserve. There is a car park just outside the reserve fence on the edge of the Hume Highway.

Promotion of the conservation value of the reserve will lead to greater appreciation by neighbours and the public and encourage sympathetic adjacent land management and visitor behaviour.

Policies

- Use of the reserve for the purposes of nature observation and educational purposes will be encouraged.

- The conservation values of the reserve will be promoted via forums including District Bush Fire Management Committees and field days to increase public appreciation and encourage sympathetic management of adjoining lands.

- Self-reliant day bushwalking and related low-impact activities will be permitted in the reserve but will not be promoted.

- No facilities will be provided for visitors to the reserve.

- Vehicle use by visitors will only be permitted on formed roads and trails.

Actions

- Park identification and visitor information signs will be maintained at access points to the reserve.

- Community liaison will be conducted in a range of forums on an ongoing basis.

4.3.2 Research

Research into the natural and cultural features of the reserve and their maintenance requirements is important for the ongoing development of appropriate management techniques.

Research to date includes flora and fauna surveys, assessment of some fire attributes of flora species, and assessments of fuel loadings in the reserve. Pure scientific research has also been conducted in the reserve, the results of which are not strongly related to management for the conservation of wildlife.

The research conducted to date provides an effective framework for making informed management decisions. However, additional research building on this base will enable the further refinement of management principles and practices in the future. The Service may carry out ongoing monitoring and research programmes as time and resources permit. Encouragement of research by other organisations and individuals may provide valuable information for management. Important research topics have been detailed in other relevant sections of this plan.

Policies

- Mundoonen Nature Reserve will be available for appropriate research.
- Manipulative research will not be permitted unless it is in accordance with management objectives and programmes.
- Research programmes will be subject to environmental impact assessment.
- Researchers will be encouraged to design programs to provide information that is of direct benefit to management.
- Close liaison will be maintained with researchers to obtain as much mutual information and assistance as possible. The results of research will be required to be provided to the reserve managers.
- Research structures or markers must be removed upon completion of the research project.
- Researchers may only use vehicles on formed tracks.

Action

- A prospectus will be prepared as a guide to priority research projects in the reserve for use by students and other researchers.

4.3.3 Management Operations

Mundoonen Nature Reserve is managed from the Queanbeyan Area office. A number of management tracks dissect the reserve. Trails are constructed to wet weather standards. An assessment of the management value of the trails has been undertaken and all open trails have been determined to be strategically located for fire suppression operations or are important for pest control and other management operations. The management track system is shown on the map, page 5.

During pest control programmes it is sometimes necessary to use vehicles off the trails. Any such use will be in accordance with environmental impact assessment and not result in permanent track creation.

Three powerline easements run through the reserve. Access to these is available via constructed trails along the easements or to individual towers. Geodetic stations are located at Mt Margules, Mt Mundoonen and Gap Range. Access for maintenance is by foot. Access to the telecommunications towers on Mt Margules is via a trail through the reserve.

The Hume Freeway intersects the reserve and provides a major access point to the reserve.

Policies

- The management track system will not be reduced or expanded unless a review is taken of management requirements and assessment of environmental impacts undertaken.

- Essential management vehicle use off the track system will be undertaken in a manner that avoids creation of new tracks. Areas subject to such use will be rehabilitated if necessary.

Actions

- A Memorandum of Understanding will be formulated between the Service and power suppliers defining local arrangements and protocols for trail maintenance works.

- Liaison will be undertaken between the Service and the RTA to ensure that any works undertaken on or near the road reserve do not impact on the values of the nature reserve.

5. PLAN IMPLEMENTATION

This plan of management is part of a system of management developed by the National Parks and Wildlife Service. The system includes the National Parks and Wildlife Act, management policies, established conservation and recreation philosophies, and strategic planning at corporate, Regional and Area levels.

The implementation of this plan will be undertaken within the annual programs of the Service's Queanbeyan Area. Priorities, determined in the context of area and regional strategic planning, will be subject to the availability of necessary staff and funds and to any special requirements of the Director-General or Minister.

Area programs are subject to ongoing review, within which, works and other activities carried out in Mundoonen Nature Reserve are evaluated in relation to the objectives laid out in this plan.

The environmental impact of all development proposals will continue to be assessed at all stages of development and any necessary investigations undertaken in accordance with established environmental assessment procedures.

Section 81 of the Act requires that this plan shall be carried out and given effect to and that no operations shall be undertaken in relation to the nature reserve unless they are in accordance with the plan. However, if after adequate investigation, operations not included in the plan are found to be justified, this plan may be amended in accordance with section 76(6) of the Act.

As a guide to the implementation of this plan, relative priorities for identified activities are summarised below:

ACTIVITIES

High Priority

1. Trails constructed during wildfire suppression will be closed and rehabilitated immediately.

2. To protect koalas and their habitat, an array of fire management strategies will be implemented to minimise the size, intensity and frequency of unscheduled fires.

3. The existing trail network will be maintained.

4. Strategic fuel reduction operations identified in the fire management plan will be implemented, consistent with the provisions of the reserve fire management plan and the district bush fire risk management plan.

5. A Memorandum of Understanding will be formulated between the Service and power suppliers defining local arrangements and protocols for trail maintenance works.

6. Liaison will be undertaken between the Service and the RTA to ensure that any works undertaken on or near the road reserve do not impact on the values of the nature reserve.

Medium Priority

7. Erosion associated with Gap Creek will be monitored and remedial works undertaken as required.

8. Weed control programmes will be implemented as detailed in the pest management strategy for the region, and by the most environmentally suitable methods as detailed in the review of environmental factors.

9. The efficacy of thinning areas of dense regrowth will be assessed, using methods such as poisoning, felling or burning. Monitoring of the impacts on floristic and structural diversity will be undertaken.

10. Actions listed in the Regional Pest Management Strategy that apply to species known to exist within the reserve will be implemented.

11. On-going rabbit control will be undertaken, on a cooperative basis where possible.

12. Co-operative fox control programmes will be undertaken where it is demonstrated that long-term reductions in fox numbers in the reserve will be achieved, and where the benefits of this for reserve fauna outweigh any risks associated with impacts on non-target fauna.

13. Fire field days for reserve neighbours and fire fighting personnel will be held at regular intervals.

14. The condition of Old Gap Road and the charcoal pits will be monitored and protection works undertaken as necessary.

15. A prospectus will be prepared as a guide to priority research projects in the reserve for use by students and other researchers.

Low Priority

16. Consultation with local Aboriginal communities will be undertaken to investigate and identify the cultural values in the reserve.

17. Sample survey and recording for Aboriginal sites will be undertaken in the reserve.

18. Undertake targeted fauna survey focussing on threatened species.

19. The charcoal pits will be assessed to determine their historic significance.

20. Community liaison will be conducted in a range of forums on an ongoing basis.

21. Park identification and visitor information signs will be maintained at access points to the reserve.

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.

6. REFERENCES

Doherty , M(1996). *Vegetation survey and mapping of Mundoonen Nature Reserve.* A report prepared for the NSW NPWS, Queanbeyan District.

Harden, G.J. (1990-1994). *Flora of NSW. Vol 1-4.* Royal Botanic Gardens/University of NSW Press, Sydney.

South East Forests Conservation Council Inc (1999). *Distribution surveys and management recommendations for the koala (Phascolarctos cinereus) in the Mundoonen Nature Reserve*. Unpublished report to the NPWS, Queanbeyan Area.