# TINDERRY NATURE RESERVE

# PLAN OF MANAGEMENT

**NSW National Parks and Wildlife Service**

**October 1998**

This plan of management was adopted by the Minister for the Environment on 4 October 1998.

**Acknowledgements:** This plan of management was prepared by the Field Services Division and Queanbeyan District of the NSW National Parks and Wildlife Service in consultation with Southern Zone and Head Office specialist staff.
Photo: Tinderry Nature Reserve. S. Cohen



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## FOREWORD

Tinderry Nature Reserve is located in the Southern Tablelands of NSW, approximately 25 km south of Queanbeyan. It is about 12 796 ha in size.

The reserve protects the highest section of the Tinderry Range, which is one of the most easterly sub-alpine areas of the Southern Tablelands. Tinderry Range has important wildlife corridor and landscape values. The high peaks and granite outcrops of the range are a striking landscape feature in the district.

The reserve has an unusual mix of sub-alpine, montane and coastal vegetation communities and populations of several threatened plant and animal species. It is a key element in the conservation of native plant and animal species in the area. The plan of management provides for protection of biodiversity values and control of introduced species, particularly serrated tussock, pigs and foxes.

The reserve contains an historically important group of former eucalyptus oil distilleries and associated hut sites. A sample of these will be conserved by stabilisation and other works where necessary.

The nature reserve is an important scientific reference area and provides opportunities for research and educational use for the tertiary institutions and schools of Canberra and Queanbeyan.

Public vehicle access and inappropriate recreational use will continue to be restricted in order to protect the important natural and cultural features of the reserve and its scientific value, and to assist management programs such as control of serrated tussock and feral pigs.

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

PAM ALLAN

Minister for
the Environment

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# 1. INTRODUCTION

The 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 the area will be managed in the years ahead.

The procedures for the adoption of a plan of management for a nature reserve are specified in the Act:

* Where a plan of management has been prepared, the Director-General is required to refer the plan to the National Parks and Wildlife Advisory Council for its consideration and advice.

* The Director-General is required to submit the plan to the Minister, together with any comments or suggestions of the Advisory Council.

* The Minister may adopt the plan without alteration or with such alterations as the Minister may think fit, or may refer it back to the Director-General and Council for further consideration.

Once a plan has been adopted by the Minister, no operations may be undertaken within the nature reserve except in accordance with the plan.

A plan of management for Tinderry Nature Reserve was placed on public exhibition from August to November 1977. Twenty one representations were received during the period of exhibition which raised fifteen issues. All comments received were considered by the Minister.

The planning process leading to the development of this plan has involved the collection and use of a large amount of information, which for reasons of document size, has not been included in the plan. For additional information or enquires about any aspect of the plan, contact the Service's Queanbeyan District Office at 6 Rutledge Street, Queanbeyan or by phone on (02) 6299 2929.

# 2. MANAGEMENT CONTEXT

## 2.1 NATURE RESERVES IN NEW SOUTH WALES

Reserving areas for nature conservation as a general purpose was introduced into Australia with the establishment of Royal National Park in 1879. The first nature reserve in NSW was established in 1954 when Cabbage Tree Island near Port Stephens was dedicated as the John Gould Faunal Reserve under the Fauna Protection Act 1948. In 1965, faunal reserves were renamed nature reserves. Two years later nature reserves were included in the National Parks and Wildlife Act 1967 and their management transferred to the newly formed National Parks and Wildlife Service. The Fauna Protection Act was replaced by the National Parks and Wildlife Act of 1974.

Under the National Parks and Wildlife Act, nature reserves are areas of special scientific interest containing wildlife or natural environments or natural phenomena. The purposes of nature reserves are defined in the Act as:

(a) the care, propagation, preservation and conservation of wildlife;

(b) the care, preservation and conservation of natural environments and natural phenomena;

(c) the study of wildlife, natural environments and natural phenomena; and

(d) the promotion of the appreciation and enjoyment of wildlife, natural environments and natural phenomena.

Nature reserves are valuable refuge areas where natural processes, phenomena and wildlife can be conserved and studied. They differ from national parks which include as a major objective the provision of appropriate recreation opportunities.

## 2.2 TINDERRY NATURE RESERVE

### 2.2.1 Location, Dedication and Regional Setting

Tinderry Nature Reserve is located in the Southern Tablelands of NSW, 25 km south of Queanbeyan and 6 km east of the town of Michelago. It contains the highest sections of the Tinderry Range which extends from near Queanbeyan to well south of the reserve.

The reserve was dedicated in 1981 and has a current area of 12 796 ha.

Much of the surrounding countryside is cleared and used mainly for sheep and cattle grazing although there is timbered f reehold and leasehold country adjoining the reserve to the east, north and south. Further east is Tallaganda State Forest along Gourock Range which is part of the Great Divide. Some distance west of the reserve are extensive areas of national park within the ACT. The reserve is reasonably close to the Canberra and Queanbeyan urban areas.

The reserve is within the Yarrowlumla and Cooma-Monaro local government areas.

### 2.2.2 Importance of Tinderry Nature Reserve

Tinderry Nature Reserve is one of several conservation areas which protect important landscapes and native plant and animal communities in the southern section of the Southern Tablelands. Other regional conservation areas include Scabby Range and Bimberi nature reserves, Brindabella and Kosciuszko national parks (all in NSW), and Namadgi National Park and Tidbinbilla Nature Reserve in the ACT.

Tinderry Range is the most easterly of the high ranges of the region and is a sub-alpine outlier separate from the extensive sub-alpine areas on the ranges to the west.

**Biological Values**

The nature reserve's position, midway between the Snowy Mountains and the coastal ranges, combined with its topographic variability and altitudinal range has resulted in an overlap of tableland, coastal and sub-alpine vegetation types and species. The lower western slopes of the range are rain-shadow affected while the higher elevations receive moisture from orographic weather conditions.

At higher altitudes there are easterly occurrences of sub-alpine woodland and montane forest associations. In high, moist central granite areas *Eucalyptus fastigata* occurs with *E*. *dalrympleana and E. pauciflora.*

The reserve contains easterly examples of high altitude sub-alpine swamps or wetlands. These areas have a suite of aquatic species which do not occur elsewhere in the reserve.

The uncommon scrub community of *E. glaucescens - E perriniana* is found on high exposed sites. These sub alpine species have a limited distribution.

Some of the most easterly outliers of black cypress pine *Callitris endlecheri* occur as scattered trees and as almost pure stands on the mid to high slopes on the western side of the range.

In the south-east of the reserve, above Roberts Creek, there are extensive areas of *Banksia marginata* in associated with *E. stellulata and E pauciflora*. This species also borders the sub-alpine swamps.

Rare and threatened plant species (Briggs and Leigh 1996) recorded in the reserve include *Acacia costiniana, Dampiera fusca*, *Eucalyptus latiuscula*, *Olearia montana, O. rhizomatica* and *Taraxacum aristum.*

*Acacia costiniana* is locally endemic and in the reserve it occurs among high granite rock faces in the south-western corner.

There are a number of plants in the reserve which are regionally significant and many of these are at or near their distributional limits. Some of these are *Cyathea australis, Boronia algida, E. glaucescens, E perriniana, Gleichenia dicarpa, Grevillea victoriae, Olearia iodochroa, Kunzea muelleri, Leptospermum micromyrtus, Pultenaea microphylla, Wahlenbergia gloriosa, Tasmannia xerophila* and *Phebalium squamulosum* subsp. *ozothamnoides.* The mountain plum pine *Podocarpus lawrencei* is at the eastern limit of its range.

The occurrence of *E. fastigata* represents a link between coastal stands and montane occurrences of the species in Namadgi, Brindabella and Kosciuszko national parks.

Sphagnum moss occurs at the heads of some wetter high altitude creeks.

Only limited information is available about the animals in the reserve although more than 20 native mammal species and 80 bird species have been recorded.

Threatened native animal species listed under the Threatened Species Conservation Act 1995 which have been recorded include the tiger quoll *Dasyurus maculatus,* greater long-eared bat *Nyctophilus timoriensis*, great pipistrelle *Falsistrellus tasmaniensis*, common bent-wing bat *Miniopterus schreibersii* and powerful owl *Ninox strenua*.

Koalas *Phascolarctos cinereus* were known to have inhabited the area up until at least 1959. They are still sighted in the area to the south but have not been recorded recently in the reserve.

**Landscape Value**

The prominent granite outcrops and steep timbered slopes of the Tinderry Range are a striking landscape feature of the area. The range forms a scenic backdrop for the town of Michelago and is visible from the Monaro Highway and as far away as Cooma. Snow may fall on the range in winter. From the peaks within the reserve there are panoramic views to the west and east.

**Catchment Protection**

Much of Tinderry Range forms an important part of the catchment for Googong Dam. This dam supplies water for Queanbeyan City and contributes to the Canberra domestic water supply.

**Cultural Values**

The reserve is reported to contain a number of Aboriginal sites including ceremonial and burial sites of considerable significance. These sites have not yet been recorded or surveyed but have the potential to provide additional information about Aboriginal use of the Southern Tablelands.

The remains of five or more former eucalyptus oil distilleries are located in the reserve. They demonstrate varying aspects of the direct-fired field still which was commonly used in NSW in the 1950's. A recent survey of eucalyptus stills in the forests of eastern NSW showed that only ten sites are known to have survived from what was an important forest based industry. Eight of these sites are in the area of the southern region of the Service and five of these are in Tinderry Nature Reserve. Accordingly Tinderry Nature Reserve contains a major sample of all remaining sites in eastern NSW. Two of the sites in the reserve are in particularly good condition and clearly illustrate the methods used. The eucalyptus oil industry is one of the few industries based on Australian native plants and is little known to the general public. The stills in the reserve demonstrate a technological process which has not changed since the late 19th century. Although of relatively recent date they are important examples of bush distilleries with excellent interpretative values. Evidence of the eucalypt distillery industry found in the nature reserve also includes areas of cut or pollarded trees surrounding the distillery sites (Pearson, 1982).

An area of granite boulders north east of Tinderry Peak, known as `the beefcask', was used in the 1800s by local cattle duffers for yarding and slaughtering. Salted meat from this activity was sold to miners at the nearby goldfields at Araluen and Majors Creek. This area is of considerable local historic interest.

The reserve in general has local cultural significance as some neighbouring landholders have a tradition of past use including grazing, timber-getting, horse-riding and general appreciation of the area. Records suggest that the area was used for grazing as early as the 1840s. There are also a number of survey marker trees dating back to the 1880s.

**Scientific and Educational Value**

The reserve is a valuable area for scientific research, education and interpretation of natural and cultural landscapes. It is close to the tertiary institutions of Canberra and schools of the region and has a varied and unusual range of environments and vegetation communities.

**Statement of Significance**

Tinderry Nature Reserve contains a group of eucalyptus distilleries of state conservation significance.

The reserve is of regional conservation significance for the following:

- the most easterly reserved area of sub-alpine and montane environments in NSW;

- an unusual overlap of sub-alpine vegetation species and coastal elements;

- several rare, threatened or regionally significant plant species and communities including the regionally endemic species *Acacia costiniana* and species at their distributional limit;

- populations of several animal species listed under the Threatened Species Conservation Act 1995; and

- a number of Aboriginal sites potentially valuable for research into Aboriginal use of the Southern Tablelands.

The reserve is of local conservation and educational significance for its:

- striking granite landscape along the main Tinderry Range;

- historic places associated with past landuse; and

- range of environments for study by local educational institutions.

# 3. OBJECTIVES OF MANAGEMENT

## 3.1 GENERAL OBJECTIVES FOR NATURE RESERVES

The following general objectives relate to the management of nature reserves in New South Wales:

* protection and preservation of scenic and natural features;

* maintenance of natural processes as far as is possible;

* conservation of wildlife;

* preservation of Aboriginal sites and historic features;

* protection of the reserve's value as a scientific reference area and provision of opportunities for scientific research; and

* protection of catchment values.

## 3.2 SPECIFIC OBJECTIVES FOR TINDERRY NATURE RESERVE

In addition to the above general objectives, the management of Tinderry Nature Reserve will be subject to the following specific objectives:

* conservation of a unique tableland range ecosystem where tableland, coastal and sub-alpine vegetation overlap, and maintenance of its ecological processes;

* protection and restoration of dry and tall forest and sub-alpine ecosystems including habitat for threatened and regionally significant plant and animal species and communities with priority to restoration of understorey elements through the control of invasive plants, reduction in impacts of soil disturbance from pigs and overgrazing from herbivores such as rabbits;

* recording and conservation of past Aboriginal use of the area in consultation with Mogo Land Council;

* recording and conservation of evidence of the reserve's non-Aboriginal historic use with priority to eucalyptus stills and landscape evidence of peppermint harvesting;

* protection of the scenic value of the Tinderry massif;

* promotion of community awareness of and appreciation for the reserve's natural, cultural and landscape values, with particular emphasis on providing educational opportunities for adjoining neighbours, schools and local community groups including landcare and bush fire brigades, through educational field days and information exchange; and

* promotion of support for management policies and programs in the local community through field days and newsletters.

## 3.3 OVERALL STRATEGY

The following strategies and programs will be implemented to achieve protection of the natural, cultural and catchment values of the reserve and its significance as a scientific reference area:

- control of introduced plant and animal species and the reduction as far as possible in the frequency of unplanned fire in the reserve;
- continued restriction of public vehicle access;
- encouragement of research to improve understanding of species diversity and management needs;
- archaeological survey and recording of past Aboriginal use;
- preparation of a conservation plan for the reserve's historic sites; and
- liaison with neighbours for the cooperative implementation of pest control programs and fire management, and to promote reserve values.

# 4. POLICIES AND FRAMEWORK FOR MANAGEMENT

This chapter contains the policies and framework for the management of Tinderry Nature Reserve together with relevant background information. Policies are summarised under the following section headings:

4.1 NATURE CONSERVATION
4.2 CULTURAL HERITAGE
4.3 USE OF THE AREA

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

The actions identified in the implementation table at the end of this plan are those to which priority will be given in the foreseeable future. Other management actions may be developed over the life of this plan and will be consistent with the policies outlined below.

Where not specifically provided for in this plan, management will also be in accordance with the National Parks and Wildlife Act and in line with general Service policies.

## 4.1 NATURE CONSERVATION

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, management of landscape values and of fire are also considered in this section.

### 4.1.1 Geomorphology, Soils and Catchment Management

#### Geomorphology and landscape

The reserve is centred on the elevated north-south Tinderry Range in the south east of the Southern Tablelands. The highest and most spectacular section of the range, which is in the reserve, is characterised by huge granite monoliths, extensive balds and shelves and steep slopes. From the west the range rises abruptly from about 800 m on the plains near Michelago to Tinderry Peak (1,620 m) and Tinderry Twin Peak (1,570m) and then drops gradually eastward to the Queanbeyan River. The river forms the eastern boundary of the reserve.

Two major lithologies occur in the reserve. Large areas on the western and eastern sides are composed of Ordovician metasediments and narrower bands in the centre of the reserve are composed of Silurian to Devonian Biotitic Granite.

The predominantly late Ordovician metasediments (greywacke, sandstone, slate, chert and quartzite) were laid down in the Molong-South Coast Trough on the continental shelf area of what was then the Australian section of the ancient super continent Gondwana.

In the Lower Devonian period (about 380 million years ago) a number of massive granite batholiths were intruded into the Ordovician sediments, of which the Tinderry Granite is a good example. The area underwent dramatic folding, faulting, volcanic

activity and in places metamorphosis of the rocks during the long period of `cratonisation' or incorporation into continental Australia.

By the early Tertiary Period the region was reduced, along with much of eastern Australia, to a peneplain. As a result of uplifting and erosion in the Tertiary period, the overlying softer Ordovician rocks were progressively stripped from on top of and around the granite, leaving the resistant granite peaks rising above the general level. The exposed Tinderry Granite intrusion remained a dramatic element in the landscape.

**Soils**

Soils on the higher Tinderry peaks are skeletal soils or alpine humic lithosols derived from granite. At lower elevations, metasediment parent material has developed into lithosols, yellow earths and yellow podsols (crests, upper slopes), red podsolic soils (mid slopes) and earthy sands and yellow earths on the drainage lines. Below this are soils transitional to the brown and grey-brown podsols which occur in lower areas. The best soil development is on the flats below the eastern slopes.

Soils on the steep slopes and deep soils at low altitudes on both the eastern and western sides of the reserve are highly erodible. There are a number of areas of gully erosion, particularly in areas formerly cleared for eucalyptus oil production or grazing. Most areas are fairly stable but soil stability on the higher slopes is affected by pig disturbance and active erosion is occurring in the Burra Creek area (see below).

**Catchment**

The Tinderry Range forms a watershed between the Murrumbidgee and Queanbeyan rivers. The reserve is an important catchment area for Googong Dam which provides water to both Queanbeyan and Canberra. Queanbeyan River and Burra Creek, which flow into the dam, are fed by creeks which start in swamps along the range. Water quality is generally good, although high sediment loads are found in Burra Creek and other streams often carry sediment loads after heavy rains.

The sediment loads in Burra Creek are a result of erosion in high-energy streams within the catchment and the active eroding of a major alluvial in-fill valley in the creek. This creek also flows through a small in-holding within the reserve. Over the years a number of studies have been undertaken on the Burra Creek catchment. These studies suggested that European land-use practices such as ring-barking (clearing) and grazing increased rates of run-off and significantly ‘down-cut’ the main Burra Creek. Prior to European settlement the streams in the Southern Tablelands were generally described as a ‘chain of ponds’ and had not eroded to bed-rock. Erosion in the main Burra Creek channel is still active although clearing, domestic stock grazing and cutting for eucalyptus distilleries ceased some years ago. It is possible that grazing from native herbivores and rabbits may continue to affect run-off rates into the streams.

In the late 1980’s, as part of Commonwealth works to protect Lake Burley Griffin, erosion control works were planned in Burra Creek. Work did not proceed for a number of reasons including cessation of Commonwealth funds. It was recognised that Googong Dam acted as a major sediment trap and protection for the lake, and was not threatened itself by sediment build-up. Furthermore, control of active erosion of Burra Creek alluvial in-fill valley (in the in-holding) was recognised as extremely difficult, particularly as high-energy stream-water entering the valley could not be effectively controlled. Advice from the Department of Land and Water Conservation is that regardless of restoration works it is expected that over time the alluvial sediments in the

in-fill valley may erode completely. Based on this information the Service does not recommend restoration work in the Burra Creek but will assess and as far as possible control factors leading to rapid run-off and soil loss in the Burra Creek catchment and elsewhere in the reserve.

**Policy**

* The high landscape value of the Tinderry Range will be protected.

* All activities in the reserve will be designed and undertaken in a manner which minimises erosion, siltation and water pollution.

* Where erosion occurs as a result of human or feral animal disturbance, the impacts of this disturbance will, as far as possible, be monitored and controlled.

### 4.1.2 Vegetation

Survey and mapping of the reserve's vegetation communities has been undertaken, including survey for threatened and regionally significant species (CSIRO, 1997).

The lower western slopes of the range lie in a rain-shadow. They are predominantly covered with an open forest association of red stringybark *Eucalyptus macrorhyncha* and brittle gum *E. mannifera,* often with scribbly gum *E rossii.* Bundy *E. nortonii* and black cypress pine *Callitris endlicheri* occur less frequently. The understorey can be dominated by the tussock grass *Chionochloa pallida* with herbs such as *Lomandra* sp*., Leucopogon sp*. and *Hibbertia obtusifolia*, or is shrubby with species such as hickory tanning wattle *Acacia falciformis* and red stemmed wattle *A. rubida.*

At intermediate altitudes on both the western and eastern sides of the range are large areas of broad-leaved peppermint *E. dives* low open forest with occasional candle bark *E. rubida.* The understorey is either grassy with *Chionochloa pallida* and scattered herbs, or shrubby with *Cassinia* spp. and other species.

In many areas the broad-leaved peppermint is young, stunted or multi-stemmed, as a result of cropping for peppermint oil (see 4.2.2). Peppermint cropping together with clearing for grazing may also account for several large cleared areas within the reserve as well as areas invaded by tea tree, banksia and kunzea.

Regeneration in some areas previously cleared for grazing or cut for eucalyptus oil is very slow in the cool climate of the reserve. Cold air drainage and grazing by macropods and rabbits may also be hindering regeneration.

An open forest of snow gum *E. pauciflora* and mountain gum *E. dalrympleana* occurs at higher altitudes and covers large areas along the main range and high ridges, predominantly on granite. In the highest areas snow gum occurs in pure stands as a woodland. Mountain gum dominates at lower altitudes on better soils where it commonly occurs as tall open forest. The understorey is either dominated by snow grasses *Poa* sp. or is shrubby with a wide variety of species such as silver wattle *Acacia dealbata, Lomatia myricoides,* bitter pea *Daviesia mimosoides, Persoonia sylvatica* and *Oxylobium ellipticum.* Brown barrel *E. fastigata* occurs with snow gum and mountain gum in small patches south-east from Tinderry Peak.

On rocky outcrops within the snow gum-mountain gum association there is an open scrub community of Tingaringi gum *E. glaucescens*-spinning gum *E. perriniana* with

species such as *Leptospermum micromyrtus, Eriostemon myoporoides* and *Kunzea muelleri*. Small areas of wet heath and sedgeland such as the area known as Bluebell Swamp occur in poorly drained areas. Species include *Leptospermum* spp., *Epacris brevithoa,* heath myrtle *Baeckea utilis, Restio australis* and sedges *Carex* spp.

Areas of sphagnum moss at the heads of some wetter high altitude creeks are prone to damage from trampling.

As elevation decreases to the east snow gum and mountain gum merge into *E. dives* forest and then to a low open forest of apple box *E. bridgesiana,* candle-bark gum and broad-leaved peppermint. Small areas of narrow leaved peppermint *E. radiata* and mountain gum occur in the northeast of the reserve.

An association of manna gum *E. viminalis* and black sallee *E. stellulata* occurs along the creeks except at the highest altitudes. Shrubs such as *Pomaderris aspera* also occur.

The locally endemic species *Acacia costiniana* occurs in the south of the reserve on exposed slopes amongst granite boulders. Most of the population, however, is found in the timber reserve to the south.

Most of the other significant species are also found on the granite. It is important to avoid disturbance of these areas.

**Connections with other forested land**

Most of the land to the west of the reserve has been cleared for grazing, as has the Uriala Valley to the north and the Tinderry Creek valley to the east. The areas east of Mt Woolpack, the Calabash area to the south and the Uriala Ridge to the north are timbered.

Timbered sections of the Tinderry Range outside the reserve connect the reserve southwards to large tracts of forested public land along the Great Divide and Coastal Escarpment, and northwards to the Queanbeyan escarpment. Thus the Tinderry Range is an important link between the escarpment and coastal lands east of the divide and the ranges of the Southern Tablelands.

Retention of adjacent and connecting areas of native vegetation are important for long term maintenance of the viability of the plant and animal communities of the reserve. In turn the reserve acts as a refuge from which species can disperse to other areas. Sympathetic management of adjacent timbered leasehold and freehold would assist in the retention of the important corridor values of the Tinderry Range and adjacent areas.

**Weeds**

The introduced plant of main concern in the reserve is serrated tussock *Nassella trichotoma.* Other weeds include St Johns wort *Hypericum perforatum*, Paterson's curse *Echium plantagineum,* nodding thistle *Carduus nutans* and briar *Rosa rubiginosa*.

Serrated tussock occurs extensively in the eastern section of the reserve and an intensive management program is being implemented for its control. Serrated tussock crowds out native grasses and can spread rapidly to new areas. It may occur in areas inaccessible by vehicle. In the past aerial spraying has been undertaken in cooperation with Cooma-Monaro Shire Council and the Department of Agriculture. Ground-based spraying has been used for follow-up programs. There is evidence that repeated aerial

spraying may affect native tussock grasses. Aerial spraying is being replaced with intensive ground spraying and other control methods.

An integrated program for the long-term control of serrated tussock is being developed. Detailed mapping of infestations is underway, with follow-up ground control programs. Other measures needed include identification of the main weed sources, control of tussock along movement corridors, recording of site conditions where it is found, assessment of the range of control measures and establishment of long term objectives. Total eradication may not be a feasible goal but containment and systematic eradication of tussock in small infestations which are likely to spread or can be rehabilitated, is desirable. This requires repeated treatment of areas which are recent range extensions and then working back to more established areas. The effectiveness of spraying infested areas without rehabilitation also needs to be assessed.

Preventative measures such as cleaning of equipment, minimising the use of tracks to avoid transfer of seed and avoidance of site disturbance are also important for long-term control of serrated tussock.

**Policy**

* The diversity of native vegetation types occurring in the reserve will be conserved.

* Areas of significant species or communities within the reserve will be protected from disturbance.

* Sympathetic management of timbered leasehold and freehold land adjacent to the reserve will be encouraged.

* Introduced plant species which have the potential to invade uninfected areas or threaten the viability of native species and communities, or are declared noxious weeds, will be controlled. Priority will be given to control of serrated tussock to minimise spread and systematically eradicate infestations, especially those which are potentially invasive.

* Co-operative control of weeds with neighbours and other relevant authorities will be pursued.

* Research will be encouraged into:

    - the diversity, distribution and management requirements of the species and communities of the reserve; and

    - methods for control of introduced species in the reserve.

**Action**

* The conservation of nearby lands will be encouraged by such means as voluntary conservation agreements and environmental planning instruments.

* Serrated tussock infestations and annual control programs will be mapped and recorded onto a GIS database.

* An integrated management program for serrated tussock will be finalised and implemented; it will consider a range of control measures including prevention, rehabilitation and monitoring methods, and the effects of herbicides on natural landscapes.

* Pending preparation of the serrated tussock management program, the following will be undertaken:

  - systematic treatment and re-treatment of range extensions, working back to more established areas; and

  - roadside spraying to reduce spread and infestation along linear movement routes.

* On-going control of briar will be undertaken and of other weeds as necessary.

### 4.1.3 Native and Introduced Animals

Few fauna surveys have been carried out in the reserve and knowledge of the species diversity is limited.

Mammals recorded include many woodland species such as the eastern grey kangaroo *Macropus giganteus*, swamp wallaby *Wallabia bicolor*, red-necked wallaby *Macropus rufogriseus*, wallaroo *Macropus robustus*, ringtail possum *Pseudocheirus peregrinus*, greater glider *Petauroides volans*, sugar glider *Petaurus breviceps*, feathertail glider *Acrobates pygmaeus*, wombat *Vombatus ursinus*, echidna *Tachyglossus aculeatus*, brown antechinus *Antechinus stuartii*, bush rat *Rattus fuscipes* and water rat *Hydromys chrysogaster*. Platypus *Ornithorynchus anatinus* are found in the Queanbeyan River. Bats observed include the chocolate wattled bat *Chalinolobus morio* and white-striped mastiff bat *Tadarida australis* as well as the three threatened species listed in section 2.2.2.

Under the Threatened Species Act 1995 recovery plans are to be prepared for species listed under the Act. Where adopted plans refer to threatened species occurring in the reserve appropriate actions will be implemented.

Eastern grey kangaroos appear numerous in and surrounding the reserve. The population size and extent of grazing pressure on the vegetation in the reserve is, however, unknown.

The threatened tiger quoll *Dasyurus maculatus* is recorded from the south-east of the reserve and it is likely that its range extends well into the reserve. This single record from 1981 is of a sub-adult individual with extensive mange patches. Tiger quolls are also recorded from state forest on ranges to the east. The reserve contains habitat suitable for quolls and also for the Rosenberg's monitor *Varanus rosenbergi*. Specific surveys are needed to determine the presence or absence of these species in the area.

About 80 species of birds have been observed. These are mainly forest and woodland species such as the stubble quail *Coturnix pectoralis*, wonga pigeon *Leucosarcia melanoleuca*, yellow-tailed black cockatoo *Calyptorhynchus funereus*, red-rumped parrot *Psephotus haematonotus*, little lorikeet *Glossopsitta pusilla*, pallid cuckoo *Cuculus pallidus*, boobook owl *Ninox novaeseelandiae*, spine-tailed swift *Hirundapus caudacutus*, sacred kingfisher *Halycon sancta*, scarlet robin *Petroica multicolor*, yellow-faced honeyeater *Lichenostomus chrysops*, spotted pardalote *Pardalotus punctatus*,

buff-rumped thornbill *Acanthiza reguloides*, chestnut-rumped hylacola *Sericornis pyrrhopygius* and red-browed firetail *Emblema temporalis*.

Several species of water birds have been recorded such as the little pied cormorant *Phalacrocorax melanoleucos* and black duck *Anas superciliosa*.

Raptors recorded include the wedge-tailed eagle *Aquila audax*, brown falcon *Falco longipennis*, Australian kestrel *Falco cenchroides* and brown goshawk *Accipiter fasciatus.*

Very little is known about the reptiles and amphibians of the reserve. To date the following species have been recorded: red-bellied black snake *Pseudechis porphyriacus*, eastern brown snake *Pseudonaja textilis,* copperhead *Austrelaps superbus,* blotched blue-tongued lizard *Tiliqua nigrolutea,* common eastern froglet *Crinia signifera,* brown froglet *Crinia parinsigniferra,* eastern banjo frog *Limnodynastes dumerilli* and Verreaux's tree frog *Litoria verreauxii.*

**Introduced animal species**

Introduced animals reported in the reserve include pigs, rabbits, goats, foxes, dogs and cats. Of these, pigs cause the most significant disturbance and are a major concern in the reserve. Pigs dig over the soil, uprooting and disturbing shrubs, soil and small trees, encouraging erosion and weeds. They are of particular concern in the montane and sub-alpine areas where there is extensive disturbance and there are several significant plant communities and species. In the cool climate, areas damaged by pigs take a long time to recover.

An annual pig trapping program, which over the last ten years has captured between about 80 and 100 pigs per annum, has reduced numbers. Pigs are also numerous, however, in adjacent timbered country and additional work is required to control pigs migrating into the reserve. A cooperative control program which considers a range of control methods is needed to reduce numbers in the area. This will require close liaison with neighbours, the Rural Lands Protection Board and other land managers. Illegal pig hunting in the reserve disperses pigs and disrupts the pig control programs.

Rabbits have been observed throughout the reserve extending to the high peaks and in particular there are widespread signs in cleared areas in the east. There appear, however, to be few warrens or burrows. The rabbit calicivirus is spreading to the area. Monitoring of its effect on the rabbit population and complementary control methods are needed.

Foxes are believed to be more common in the eastern parts of the reserve and their presence is likely to impact on a range of fauna including small lizards, frogs and potentially tiger quolls. The number of cats and their impact on native fauna are unknown.

The number of wild dogs using the reserve is thought to be very low and there have been no reports in recent years of dog attacks on neighbouring sheep properties. Wild dogs can be divided into three groups - dingos, hybrids with domestic dogs, and feral dogs. The Service considers the dingo to be part of the native fauna of NSW which it has a responsibility to conserve. The dingo is not a declared noxious species under the Rural Lands Protection Act 1989 as long as it remains on Service land. The Service recognises, however, that wild dogs from Service lands sometimes impact on livestock

in adjacent areas and accepts the need for management to minimise their attacks on stock. It is Service policy to remove feral dogs from its lands.

Occasionally sheep, goats and cattle stray into the reserve and in a recent survey one goat was observed in the higher peaks. Some wooded sections of the reserve boundary are unfenced. There are now a number of deer farms adjacent or close to the reserve and escapees may enter the reserve in the future.

**Policy**

* The reserve will be managed to maintain the diversity of habitats and species and conserve populations of native animal species.

* Appropriate recovery planning actions for threatened species will be implemented

* The habitats of threatened native animal species will be protected from disturbance.

* Research will be encouraged into the diversity and management needs of native animals in the reserve, particularly the effects of populations of eastern grey kangaroos on the vegetation and their likely impact on other grazing mammals.

* Introduced animals will be controlled especially where they have a significant impact on native species and neighbouring land. In particular, populations of feral pigs, foxes and rabbits will be kept to as low a level as possible to reduce their impacts.

* Research will be encouraged into effective pig control methods within and surrounding the reserve.

* Pest control programs will be carried out in cooperation with reserve neighbours, the Rural Lands Protection Board and other lands managers.

* Control programs for pest species will be designed and implemented in such as manner as to minimise the impact on native species.

* Where necessary, control of wild dogs will be undertaken in perimeter areas of the reserve.

* Fencing assistance will be provided where possible for boundaries with grazing properties.

**Action**

* Survey will be undertaken for native animals in the reserve with emphasis on tiger quolls, Rosenberg's monitor and other threatened species.

* Pig control will be continued. The program will be expanded to intensify control work within the reserve and undertake cooperative control with adjacent landholders and managers. Increased emphasis will be placed on control of pigs in the high altitude sections of the reserve.

* Information will be gathered on pig numbers, their impacts and seasonal movements within and adjacent to the reserve. A variety of pig control methods will be trialed.

* A free bait station program will be implemented to assess numbers of foxes and wild dogs within and adjacent to the reserve. Control programs will be undertaken as required.

* The impacts of rabbits will be assessed and monitored, and control programs will be undertaken as needed.

### 4.1.4 Fire Management

Management of fire is an important and complex issue. It must aim to achieve both long term conservation of natural communities and ongoing protection of life and property within and adjacent to the reserve. A draft fire management plan has been prepared for the reserve and will be finalised following public exhibition.

Fire is a natural process, one of the factors of the Australian environment to which native plant and animal communities have become adapted. The correct management of fire is essential to avoid the extinction of plant and animal species.

**Fire history**

The pre-European fire pattern for the reserve area is not known. Aborigines are likely, however, to have had burning regimes which encouraged plants which supported grazing animals in areas in which they hunted game and kept corridors open in lands they travelled through. From research conducted elsewhere it appears that the frequency and intensity of fire is now different from traditional Aboriginal burning practices. It is likely that fires in the reserve increased significantly after European settlement. The vegetation structure and diversity shows signs of repeated burning within the fire free period generally needed for species recovery.

In the period 1957 to 1980 there were several major fires which adversely effected the vegetation and fauna populations of the reserve. The general area was burned in 1957 by an extensive fire started by eucalyptus oil distillers. This fire brought an end to the eucalyptus oil distillation industry in the area. Koalas are reported to have become locally extinct following the fire.

The majority of recorded unplanned fires started illegally or outside the reserve. Few fires were started from lightning strikes.

**Maintenance of species habitat and diversity**

Fire frequency, intensity and season of occurrence are major factors influencing the distribution and composition of plant and animal communities. Too frequent fire, however, will reduce biodiversity because some plant species will not be mature enough to be able to reproduce. Too infrequent fire will also lead to a lower biodiversity as some species die out.

The vegetation types in the reserve are likely to take longer to recover from high intensity fires, particularly crown fires. Conversely very mild fires can reduce biodiversity if their intensity is insufficient to stimulate re-growth.

Fires that are widespread in extent may impact on the ability of animal species to re-colonise. Animal populations require refuges from which they can expand after a fire, and it will be necessary to manage the reserve for these.

Fires that burn late in the season are less likely to affect animal populations which often disperse in late summer and autumn, but plants may respond less vigorously to fires when the weather is cooler. Catling (1991) has reported that hot spring fires are likely to result in a more vigorous response by understorey species, and hence a greater variety of habitats and biodiversity than cool autumn fires. Investigations by Morrison et al (1996) have shown that the frequent cool autumn fires preferred for fire protection in the Hawkesbury sandstone areas near Sydney can have the effect of reducing the abundance of long-lived woody shrub species.

Considerations such as the above lay the foundations for ecological burning regimes. A variety of fire regimes is needed in order to conserve floristic diversity and provide diversity of habitat for animals. Fire management aims to maintain this diversity by restricting planned and, if possible, unplanned fires to only a part of the distribution of a vegetation type within the reserve at any one time. This approach will ultimately result in a mosaic of age classes for each of the vegetation types of the reserve.

The subalpine and montane communities along the range should be subject to fire as seldom as possible as many of the species are fire sensitive and recovery is slow. Significant or threatened plant species and communities generally occur on or near the granite massif. Threatened animal species may occur anywhere in the reserve but are more likely to be found on the granitic sites with moist forests. Protection of the landscape value of the higher areas, the erodible granite soils and water supply catchment values are also factors.

Other areas of the reserve need time to recover from the effects of past fire events.

**Fire responsibilities and strategies**

Under the *Rural Fires Act*, 1997, the Service is a fire authority and is responsible for controlling fires in the reserve and ensuring that they do not cause damage to other land or property. The Service can act to suppress fires up to eight kilometres from the reserve in collaboration with local brigades and neighbours of the reserve and local brigades have a ‘first attack’ role in suppressing fires within the reserve.

The Service is an active participant in the Yarrowlumla and Cooma-Monaro District Fire Committees which have been set up under the Rural Fires Act to coordinate and monitor fire management and fire control on a district basis. The Act provides for the preparation and adoption of a plan of operations and a bush fire risk management plan for each local government area. It is intended that the Tinderry Nature Reserve Fire Management Plan will form part of the Service’s inputs into these bush fire management plans.

A variety of fire management strategies have been developed including fuel reduction, an extensive fire trail system, detection and cooperative arrangements. Some, or at times, all of these will be applied where appropriate to best protect life, property and natural and cultural assets within and adjacent to the reserve. In perimeter areas, fuel reduction programs and boundary fire breaks will be established in cooperation with neighbours. The reserve has an extensive and well maintained system of management tracks which can be used for prescribed burning and control of wildfires. These are shown on the summary map.

Developments and sub-divisions to the west of the reserve are a potential source of unplanned fire which may affect the ecological values identified in the central area of the reserve. Strategies are needed to protect this area and reduce the opportunity for unplanned fire. Strategic area burning was carried out on the lower western side of the reserve in 1988 and 1990 in order to reduce the likelihood of fires entering the reserve from neighbouring properties. Small areas of strip burning have been undertaken in other parts of the reserve along fire trails. Frequent or extensive prescribed burning would, however, damage the significant vegetation communities of the reserve and result in erosion on the steep slopes.

Properties to the east and south of the reserve may be at risk from fires starting in or passing through the reserve. There are at present, however, no major developments to the east of the reserve and neighbouring properties to the east are generally located within cleared areas. Any subdivision occurring on the eastern side of the reserve increases the difficulty of protection of this area from possible fires escaping from the reserve.

There is some fire risk to the Calabash rural sub-division to the south of the reserve from fires travelling south or south east through the reserve. A fire management plan for this area is desirable.

**Policy**

* Fire will be managed in the reserve to:

    - protect human life and property within and adjacent to the reserve;
    - protect rare species and fire sensitive species and communities;
    - maintain those plant communities and plant or animal species which require a particular fire frequency or intensity;
    - create or maintain diversity of habitats for native animals;
    - protect Aboriginal sites and historic places;
    - protect the scenic values of the Tinderry massif;
    - protect catchment values; and
    - protect specified scientific research and reference points from damage.

* Close contacts will be maintained with the Burra Volunteer Bushfire Brigade, Council fire officers, and land use planning and development authorities. The Service will continue to actively participate in the Yarrowlumla and Cooma-Monaro District Bush Fire Committees.

* When determining the appropriate strategy and actions for fire suppression operations, consideration will be given to the potential for damage to natural and cultural heritage and the necessity or otherwise for immediate action.

* Use of retardants will be avoided in heath areas and within 100 m of water courses and swamps.

* Within sub-alpine and montane areas wildfires will be contained to as small an area as is feasible and consistent with minimising damage caused by suppression operations.

* As far as possible areas disturbed by fire suppression operations will be rehabilitated as soon as practicable after the fire.

* Prescribed burning may be carried out in areas of identified high fire risk to protect adjacent properties, cultural heritage, fire sensitive vegetation and species diversity.

* Prescribed burning programs will be based upon assessment of fuel hazard and risks to life and property and biophysical values.

* Where appropriate the Service will seek to involve neighbours in cooperative hazard reduction works for mutual protection.

* Prescribed burning will not be undertaken in low risk areas or within *E. pauciflora* associations, other sub-alpine and montane associations, areas of *Callitris endlicheri* or rare and threatened plant species.

* Records will be kept of all fires within the reserve.

* Fire trails will be maintained to a high standard of stability and trafficability.

* Research will be encouraged into the effects of fire on *Acacia costiniana* and other rare and threatened plant species.

* Community awareness and appreciation of fire management in relation to the maintenance of natural and cultural values of the reserve will be promoted.

* The Service will actively advise against development in high fire risk areas close to the reserve boundaries that are likely to result in increased risk to life and property from fire, as a contribution to local government planning and development approval processes.

**Actions**

* The draft fire management plan for the reserve will be finalised by June 1999.

* Trail maintenance and a fire risk management program will be prepared and implemented.

## 4.2 CULTURAL HERITAGE

Cultural heritage comprises important components of the environment that may have aesthetic, historic, scientific and social significance to present and future generations. Cultural heritage may include both Aboriginal and non-Aboriginal history.

### 4.2.1 Aboriginal History

The area of the reserve was occupied by the Ngarigo tribal group whose lands covered most of the eastern Monaro. Today it falls into the area of the Mogo Local Aboriginal Land Council. Archaeological sites are important to Aboriginal communities as they are a testament to their culture's great antiquity. Aboriginal people may have traditional spiritual links with an area and hold knowledge which is important for nature conservation.

Two camp sites have been recorded near creeks and there are numerous artefact scatters along the ridgelines. A rock formation on the range which is shaped like a head is reported to be of Aboriginal significance. Unconfirmed oral history has indicated that at least one burial area is located in the reserve and that the range was used for ceremonial purposes.

Aboriginal site survey is needed to improve information about the distribution and types of Aboriginal sites in the reserve. This needs to be combined with collection of information from local Aboriginal people about the area's past use and its significance.

While the Service has legal responsibility for the protection of Aboriginal sites it acknowledges the right of Aboriginal people to make decisions about their own heritage. It is therefore policy that Aboriginal communities be consulted about decisions regarding the management of Aboriginal sites and related issues and how the Aboriginal culture and history of an area controlled by the Service will be promoted and presented.

**Policy**

* The Service will liaise with the Mogo Local Aboriginal Land Council and other relevant Aboriginal community organisations about all aspects of management of Aboriginal heritage and active involvement of Aboriginal people in site management will be encouraged.

* Aboriginal sites will be protected from disturbance by human activities or feral animals.

* Work involving ground disturbance will be preceded by an inspection for Aboriginal sites.

* The location of Aboriginal sites will not be publicised except where:

    - the agreement of the Mogo Local Aboriginal Land Council and other relevant Aboriginal community organisations has been obtained; and

    - a conservation study has been prepared and any management works necessary to protect the site from damage have been implemented; and

- the site will be interpreted to promote public knowledge and appreciation of Aboriginal culture.

**Action**

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

* Information about the use and significance of the area will be sought from Aboriginal people.

### 4.2.2 Non-Aboriginal History

Parts of Tinderry Nature Reserve are a modified landscape which demonstrate European use of the area in the nineteenth and twentieth centuries, particularly grazing and the eucalyptus distillery industry.

There are a number of structures and other evidence of past non-Aboriginal use of the reserve but there is very little information about dates, people involved and events. Historical research, particularly oral history, is needed.

Captain Currie passed through the area south of Queanbeyan in 1823, noting it as `fine forest country intersected by stony ranges'. Some large properties in the district were held under lease from the 1830s. Other valley floor areas were purchased as selections in the 1860s. Subdivision of some areas into smaller properties began in the 1960s as the population of Canberra grew.

Sheep grazing occurred in much of the reserve, probably dating back nearly 150 years. Parts of the reserve were cleared or ring-barked for grazing and other areas harvested for timber and leaf for the eucalyptus oil distilleries mentioned in section 2.2.2. These areas include land around Groggy, Stoney and Roberts creeks and adjacent to the Queanbeyan River. Other areas were used for rough grazing. Some old sheep yards are located above Roberts Creek and there may have been cattle yards and a hut near Bluebell Swamp. There are a number of fencelines in the reserve.

A large number of red stringybark trees on the lower western slopes have been stripped of bark; evidence of the use of bark for the roofing of homes and sheds.

There are a number of survey datum trees in the south west of the reserve which date back to 1886. A dray trail is shown on a map dating from the 1830s, along the present route of the Jacobs Ladder Fire Trail.

The landscape and vegetation changes from this past use together with the material remains provide important interpretative and educational opportunities for the community and researchers.

The dates of construction of the eucalyptus stills is not known, although two appear to date from the 1930s. Eucalyptus stills were located near reliable water supplies and large peppermint leaf-gathering areas. The areas around the stills and the eastern slopes generally show the influence of the eucalyptus oil industry, with areas of coppiced peppermint trees, stumps and regeneration. Eucalyptus distilling generally ceased in the area following an extensive wildfire in 1957. The stills are subject to deterioration by corrosion, vegetation growth and soil movement and are vulnerable to vandalism. Protection and conservation measures will be needed.

The ‘beefcask’ (see 2.2.2) is located near Blue Bell Swamp, high in the reserve, and it is likely that it consisted of a yard and original ‘hanging tree’ (possibly a wattle no longer standing) sheltered behind large granite boulders. It is thought that ‘rustlers’ or cattle thieves moved stock to the ‘beefcask’, slaughtered and butchered them and then took the meat either by horse or bullock to the towns to be sold. There is a paucity of written information about the area, the story being handed down orally. It is now part of the local colour and mythology of the area although there are no visible remains.

A hut and several associated structures are located on leased land within the nature reserve near the Queanbeyan River (see section 4.3.3). These are related to use of the area as a retreat and may be of cultural significance in the future. Assessment of the structures and determination of a conservation strategy will be needed upon termination of the lease. This should be based on discussions with the current leaseholders.

**Policy**

* The historic places of the reserve will be conserved in accordance with the Burra Charter of Australia ICOMOS.

* Any development work proposed for the reserve will be preceded by a check for historic places.

* The eucalyptus oil distilleries and other historic sites will be conserved.

* Upon termination of the lease on portions 20, 42, 43 Parish of Wise, the cultural significance of the hut and other structures will be assessed and a management strategy determined.

**Action**

* All eucalyptus distilleries and associated hut ruins as well as other evidence of the industry such as lopped trees and other impacts on natural features will be recorded and, where appropriate, protection measures undertaken.

* All other items of cultural significance will be recorded and, where appropriate, protection measures undertaken.

* A historic sites conservation management plan will be prepared and implemented, including planning for the conservation of landscape evidence of peppermint harvesting.

* The condition of the eucalyptus oil distilleries and survey datum trees will be monitored and any protection, stabilisation or other conservation work will be undertaken as necessary to retard deterioration.

* Historical research, including oral history, will be undertaken into non-Aboriginal use of the reserve.

## 4.3 USE OF THE AREA

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

* education about the environment and promotion of the area, the Service and the conservation of natural and cultural heritage;

* 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 Tinderry Nature Reserve is indicated below.

### 4.3.1 Promotion, Neighbour Liaison and Educational Use

Promoting public awareness of the Service's conservation responsibilities, the values of an area and visitor opportunities is a major aspect of management. Because of the limited opportunities for public use of the reserve (see 4.3.2), on-site interpretive facilities and extensive promotion of use are not appropriate. Provision of general information and liaison with neighbours and relevant community organisations are, however, very important.

The nature reserve is not far from the cities of Canberra and Queanbeyan and is used for educational purposes by local community groups, schools and tertiary institutions. It has the potential to provide opportunities for improving understanding of the important role of nature reserves in an area where many people are unfamiliar with this concept. In order to promote community understanding and appreciation, a limited number of organised educational visits to the reserve will be provided.

The reserve is valued as a special place by nearby neighbours, especially those who have had a long association with the area. Many of these neighbours can provide valuable insights into the past use of the area and interpretation of the present landscape. Those who have settled more recently in the area have shown considerable interest in and enjoyment of the reserve through participation in field and education days, and ranger-guided Discovery programs in the reserve.

A neighbours database for the reserve has been established to enable communication with adjacent and nearby neighbours. Information will be sent to neighbours on a variety of matters including current management programs, opportunities to visit the reserve and public exhibition of plans of management

Close liaison with landcare groups and other interested stakeholders on matters of mutual interest is equally important and will be maintained.

**Policy**

* Community understanding and appreciation of the natural and cultural heritage and the conservation value of the reserve and support for management policies and programs, will be promoted by such means as media releases, discovery programs and field days.

* Close liaison will be maintained with neighbours, landcare groups and stakeholders concerning matters of mutual interest.

* Educational visits to the reserve by schools and tertiary institutions will be permitted. These must be by walking unless part of organised vehicle trips under Service supervision.

* Specific opportunities will be provided for neighbour, community group and school educational visits to the reserve by vehicle. Such visits must be in the company of Service staff or agents and will be limited to a maximum of 5 per year, with a maximum of 5 vehicles at a time.

**Actions**

* A limited number of neighbour and community organisation visits to the reserve will be provided each year to promote appreciation of the reserve's natural history, cultural landscape and current management.

* A limited number of general community educational field days to the reserve will be organised annually.

* Information about management programs will be provided to neighbours as required and at least annually.

* The neighbours' database will be maintained and regularly updated.

* An information brochure for general distribution will be prepared about the special features of the reserve and explaining opportunities for use.

### 4.3.2 Existing Public Use

The primary purposes of nature reserves are the conservation of wildlife, natural environments and significant cultural features, and scientific research into these. Recreational use is appropriate where it does not conflict with conservation and is a means for promoting appreciation of the natural environment.

Tinderry was gazetted as a nature reserve in order to provide a sample of alpine environments where management programs and scientific research would be undisturbed by recreational use. The reserve contains a number of important vegetation communities, habitats and historic places which could be severely damaged by increased fire frequency as a result of escape from camp fires, spread of weeds or removal or vandalism of historic structures and relics. Because of the extremely steep grades and highly erodible soils increased use of the management tracks could result in excessive erosion and prohibitive maintenance costs.

For the above reasons public use of the reserve is generally limited to minimal impact day bushwalking and educational visits. Public vehicle access is not permitted except for organised educational visits (see 4.3.1).

Public access is generally restricted to three locations where the reserve joins a public road or public land. Access is available at two points along the Burra Road on the western side of the reserve. There are no tracks into the reserve at these locations apart from a short track to an inholding. Access is also available through the crown

timber reserve which adjoins the nature reserve on the Michelago-Jerangle Rd near Calabash.

Walkers may also gain access to the reserve via management trails through private land. Permission from the landholder is of course required. The amount of bushwalking in the reserve is thought to be low. The peaks are an attraction for walkers and the reserve provides less crowded and more self-reliant walking opportunities than those in other areas close to Canberra and Queanbeyan.

Yarrowlumla Shire Council is planning to provide a system of recreation tracks which will be 1 m wide tracks through remnant vegetation in crown road leases. These proposed tracks are planned to be multi-purpose and for public access so they may be bridle trails or walking tracks. The Service will liaise with the Council regarding minimising the impacts of any such tracks on the nature reserve.

There is a considerable amount of illegal vehicle entry and vehicle use of the management trail system, commonly associated with pig hunting, with consequent damage to tracks and disruption of the feral animal control program (see section 4.1.3). A coordinated program is required to reduce these illegal activities.

In the past a small section in the north west of the reserve has been used for orienteering events, including staging the Pacific Orienteering Championships at Burra Creek in 1980. Continuation of orienteering is considered incompatible with the restriction of other types of recreational use of the reserve which do not have as their primary purpose appreciation of the natural environment.

Horseriding in the reserve has occurred occasionally in the past. Horseriding is also not appropriate the above reasons and because of the sensitivity of the environments of the reserve to disturbance and the high potential for erosion and weed introduction.

**Policy**

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

* No public use facilities will be provided.

* Public vehicle use (except for organised educational visits discussed in 4.3.1) will not be permitted in the reserve.

* Horseriding, mountain bikes, rock climbing, abseiling, orienteering, rogaining and other inappropriate or environmentally damaging activities will not be permitted.

**Action**

* Signs will be erected at common public entry points into the reserve providing information about the value of the reserve, permitted activities and minimum impact bushwalking.

* The Service will liaise with Yarrowlumla Shire Council regarding the potential impacts resulting from any proposed multi-purpose public access tracks adjacent to the reserve.

### 4.3.3 Research

Research into the reserve's natural and cultural features and their maintenance requirements is important for development of appropriate management practices. Unfortunately the Service can carry out very little research because of limited staff and financial resources. Encouragement of research by other organisations such as student projects may provide valuable information for management. Important research topics have been included in other relevant sections of this plan.

**Policy**

* Tinderry Nature Reserve will be available for appropriate research.

* Research programs will be subject to environmental impact assessment.

* Researchers will be encouraged to design programs to provide information directly useful for management purposes.

* 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 managers of the reserve.

* Use of management tracks by researchers will not be permitted during wet periods.

* Research structures or markers must be removed upon completion of the research project.

**Action**

* A list of high priority research topics will be provided to tertiary institutions likely to undertake activities in the reserve.

### 4.3.4 Management Operations

The only management facilities located in the reserve are vehicle trails. Management access to the trail system can be gained from a number of points off the Burra, Uriala, Captains Flat and Michelago-Captains Flat roads.

Most of the trails were constructed during the 1970's, prior to reservation. Others are a result of grazing, wood collection and eucalyptus distilling activities. The trails rapidly deteriorate if used in wet conditions. An assessment of the management value of the trails has been undertaken and most have been determined to be strategically located for fire suppression operations or are important for pest control and other management operations. Trails which are not part of the strategic management system will be closed. The management trail system is shown on the summary map.

It is necessary at times during pest control programs to use vehicles off the management track system. Any such use must be in accordance with environmental impact assessment requirements and not result in permanent track creation.

Landholder vehicle access to in-holdings on the western side of the reserve is permitted with restrictions on dogs and fire arms.

Portions 20, 42, 43 Parish of Wise adjacent to the Queanbeyan River were donated to the Service on the condition of a long-term lease back arrangement to the former owner. The licence contains a number of conditions for use of the land and provides for control of erosion, weeds and feral animals.

A geodetic station is located on Tinderry Peak. Access for maintenance is by foot.

**Policy**

* Management tracks will not be used during wet periods.

* The management track system will not be altered or new tracks created unless a full review is undertaken of environmental factors and priority management needs.

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

**Action**

* Those vehicle tracks which are not part of the strategic management system will be closed and rehabilitated.

## 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 District levels.

The implementation of this plan will be undertaken within the annual programs of the Service's Queanbeyan District. Priorities, determined in the context of district 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.

District programs are subject to ongoing review, within which, works and other activities carried out in Tinderry 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 the 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. If, however, 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:

| **Activity** | **plan ref** |
|---|---|
| HIGH PRIORITY | |
| * Serrated tussock infestations and annual control programs will be mapped and recorded onto a GIS database. | 4.1.2 |
| * An integrated management program for serrated tussock will be finalised and implemented; it will consider a range of control measures including prevention, rehabilitation and monitoring methods, and the effects of herbicides on natural landscapes. | 4.1.2 |
| * Pending preparation of the serrated tussock management program, the following will be undertaken:<br>- systematic treatment and re-treatment of range extensions, working back to more established areas;<br>- roadside spraying to reduce spread and infestation along linear movement routes. | 4.1.2 |
| * Survey will be undertaken for native animals in the reserve with emphasis on tiger quolls, Rosenberg's monitor and other threatened species. | 4.1.3 |
| * Pig control will be continued. The program will be expanded to intensify work within the reserve and undertake cooperative control with adjacent | |

landholders and managers. Increased emphasis will be placed on control of pigs in the high altitude sections of the reserve. 4.1.3

* Information will be gathered on pig numbers, their impacts and seasonal movements within and adjacent to the reserve. A variety of pig control methods will be trialed. 4.1.3

* The draft fire management plan for the reserve will be finalised by June 1999. 4.1.4

* Trail maintenance and prescribed burning programs will be prepared and implemented. 4.1.4

* A historic sites conservation management plan will be prepared and implemented, including planning for the conservation of landscape evidence of peppermint harvesting. 4.2.2

* Historical research, including oral history, will be undertaken into non-Aboriginal use of the reserve. 4.2.2

MEDIUM PRIORITY

* On-going control of briar will be undertaken and of other weeds as necessary. 4.1.2

* A free bait station program will be implemented to assess numbers of foxes and wild dogs within and adjacent to the reserve. Control programs will be undertaken as required. 4.1.3

* The impacts of rabbits will be assessed and monitored, and control programs will be undertaken as needed. 4.1.3

* Sample survey and recording will be undertaken for Aboriginal sites in the reserve. 4.2.1

* Information about the use and significance of the area will be sought from Aboriginal people. 4.2.1

* All eucalyptus distilleries and associated hut ruins as well as other evidence of the industry such as lopped trees and other impacts on natural features will be recorded and, where appropriate, protection measures undertaken. 4.2.1

* All other items of cultural significance will be recorded and, where appropriate, protection measures undertaken. 4.2.1

* The condition of the eucalyptus oil distilleries and survey datum trees will be monitored and any protection, stabilisation or other conservation work will be undertaken as necessary to retard deterioration. 4.2.1

* A limited number of neighbour and community organisation visits to the reserve will be provided each year to promote appreciation of the reserve's natural history, cultural landscape and current management. 4.3.1

* A limited number of general community educational field days to the reserve will be organised annually. 4.3.1

* Information about management programs will be provided to neighbours as required and at least annually. 4.3.1

* The neighbours' database will be maintained and regularly updated. 4.3.1

* The Service will liaise with Yarrowlumla Shire Council regarding the potential impacts resulting from any proposed multi-purpose public access tracks adjacent to the reserve. 4.3.2

LOW PRIORITY

* The conservation of nearby lands will be encouraged by such means as voluntary conservation agreements and environmental planning instruments 4.1.2

* An information brochure for general distribution will be prepared about the special features of the reserve and explaining opportunities for use. 4.3.1

* Signs will be erected at common public entry points into the reserve providing information about the value of the reserve, permitted activities and minimum impact bushwalking. 4.3.2

* A list of high priority research topics will be provided to tertiary institutions likely to undertake activities in the reserve. 4.3.3

* Those vehicle tracks which are not part of the strategic management system will be closed and rehabilitated. 4.3.4

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