

THE CENTRAL MONARO RESERVES

**Bobundara Nature Reserve, Ironmungy Nature Reserve,
Myalla Nature Reserve, Wullwye Nature Reserve,
Paupong Nature Reserve, Ngadang Nature Reserve and
Nimmo Nature Reserve**

PLAN OF MANAGEMENT

National Parks and Wildlife Service

Part of the Department of Environment and Climate Change NSW

July 2008

This plan of management was adopted by the Minister for Climate Change and the Environment on 21st July 2008.

ACKNOWLEDGMENTS

Inquiries about these reserves or this plan of management should be directed to the Snowy River Area Manager at the NPWS Snowy Mountains Regional Office, Jindabyne or by telephone on 6450 5555.

Cover photograph of Bobundara Nature Reserve.

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FOREWORD

Bobundara, Ironmungy, Myalla, Wullwye, Paupong, Ngadang and Nimmo Nature Reserves are located in the area known geographically as “The Monaro”, an elevated plateau in the south east of NSW located between the Australian Alps and the coastal escarpment. The seven reserves have a combined area of 3,935 hectares and are situated west and south-west of Cooma.

All seven the reserves arose out of the Southern Region Forest Agreement, and were identified for reservation because they contain plant communities under represented in the region. These communities include Eastern Tableland Dry Shrub/Grass Forest and Central Tablelands/ACT Montane Dry Shrub Forest, both of which are very poorly represented in conservation reserves.

As tree covered islands in an undulating grassland, the reserves are important from a habitat and landscape perspective. They also provide important natural linkages for fauna movements.

A draft plan of management for the Central Monaro Reserves (Bobundara, Ironmungy, Myalla, Wullwye, Paupong, Ngadang and Nimmo Nature Reserves) was placed on public exhibition from 11th November 2005 until 20th February 2006. The submissions received were carefully considered before adopting this plan.

This plan contains a number of actions to achieve “Better environmental outcomes for native vegetation, biodiversity, land, rivers, and coastal waterways” (Priority E4 in the State Plan) including control of erosion and weeds within the reserves, boundary fencing, and liaison with local authorities to maintain and improve water quality in the reserves’ catchments.

This plan of management establishes the scheme of operations for Bobundara, Ironmungy, Myalla, Wullwye, Paupong, Ngadang and Nimmo Nature Reserves. In accordance with section 73B of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.

Verity Firth
Minister for Climate Change and the Environment

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1. MANAGEMENT CONTEXT FOR THE RESERVES

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* (NPW Act), the NPW Regulation, the *Threatened Species Conservation Act 1995* (TSC Act) and the policies of the Department of Environment and Climate Change. Section 72AA of the NPW Act lists the matters to be considered in the preparation of a plan of management. The policies arise 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* (EPA Act) requires the assessment and mitigation of the environmental impacts of any works proposed in this plan.

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted the plan, no operations may be undertaken within the seven reserves except in accordance with the plan. The plan will also apply to any future additions to these seven reserves. Where management strategies or works are proposed for the nature reserves or any additions that are not consistent with the plan, an amendment to the plan will be required.

1.2 MANAGEMENT PURPOSES AND PRINCIPLES

Nature reserves are reserved under the NPW Act (Section 30) 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.

The primary purpose of nature reserves are conservation of wildlife, natural environments, cultural heritage and to provide opportunities for education and scientific research into these resources. Visitor use is appropriate where it does not conflict with these objectives and promotes understanding and appreciation of the reserve's significance.

1.3 REGIONAL FOREST AGREEMENTS

All of the reserves arose out of the Southern Region Forest Agreement. Regional Forest Agreements are one of the principle means of implementing the National Forest Policy Statement of 1992. Under this Statement, Commonwealth, State and Territory governments agree to work towards a shared vision for Australia's forests. This aims to maintain native forest estate, manage it in an ecologically sustainable manner and develop sustainable forest-based industries. The Statement provided for joint Comprehensive Regional Assessments (CRAs) of the natural, cultural, economic and social values of forests. These assessments formed the basis for

negotiation of Regional Forest Agreements that provide, amongst other things, for Ecologically Sustainable Forest Management.

All of the reserves covered by this plan were reserved as nature reserves on 1st January 2001 under the *National Parks Estate (Southern Region Reservations) Act 2000* (NPE Act) as part of the Southern Region Forest agreement.

Included in the planning area are several roads that are vested in the Minister for Climate Change, Environment and Water on behalf of the Crown for purposes of Part 11 of the NPW Act. These roads do not currently form part of the gazetted area of the reserves. They were created by the NPE Act to ensure that essential access arrangements which existed immediately prior to gazettal could continue. The NPE Act provides that these roads must either be added to the relevant reserve or excluded from the reserve.

2. THE RESERVES AS A GROUP

2.1 REGIONAL SETTING

The seven reserves have a combined area of 3,935 hectares. Bobundara, Ironmungy, Myalla and Wullwye Nature Reserves are located in the area known geographically as “The Monaro”, an elevated plateau in the south east of NSW located between the Australian Alps and the coastal escarpment (see Map 1). These four reserves are located in an area that is identified geologically as the “The Monaro Volcanics”, dominated by rock of volcanic origin, mostly intrusive granite overlying earlier deposits of sedimentary origin with some overlying basalt (Dearling 2003). They conserve areas of ridge and hilltop woodland surrounded by natural grasslands. As tree covered islands in an undulating grassland, they are important reserves from a habitat and landscape perspective.

Paupong and Nimmo Nature Reserves are located in the eastern foothills of the Snowy Mountains and both lie within three kilometres of Kosciuszko National Park. They provide important natural linkages between the national park and native vegetation on the surrounding rural landscape.

Ngadang Nature Reserve is located on the Snowy River approximately eight kilometres downstream of the Jindabyne dam wall.

The vegetation in these reserves is a mixture of savannah woodlands or grasslands and is closely associated with the montane and tableland communities of the Snowy River catchment.

2.2 LANDSCAPE

Natural and cultural heritage and ongoing use are strongly inter-related and together form the landscape of an area.

Much of the Australian environment has been influenced by past Aboriginal and non-indigenous land use practices, and the activities of modern day Australians continue to influence bushland through recreational use, the introduction of exotic plants and animals and in some cases air and water pollution.

These reserves of the Monaro are important landscape elements as tree covered ridgelines in an otherwise largely treeless environment. The reserves closer to Kosciuszko National Park form timbered ridgelines that protrude into grazing country.

The location, geology, landform, climate and plant and animal communities of the area, have determined how it has been used by humans. All of the reserves have been influenced by previous Aboriginal and non-Aboriginal activities including burning, clearing and grazing.

Both Aboriginal and non-indigenous people value natural areas in terms of aesthetic, social, spiritual, recreational and other natural values. Cultural values may be attached to the landscape as a whole or to individual components, for example to plant and animal species important to Aboriginal people. This plan of management aims to conserve both natural and cultural values.

The information presented under the cultural heritage sections for each reserve is drawn from a preliminary survey using systematic archaeological survey techniques and may not adequately describe the values of the land to past and present local Aboriginal people.

Assessment of non-indigenous heritage values for the reserves has not yet been carried out, however incidental surveying has provided some information on their historic values.

It is hoped that Aboriginal and non-indigenous people with ties to the land covered by the reserves will contribute to a more comprehensive understanding of the cultural heritage values of the reserves.

Bobundara, Ironmungy, Myalla, Wullwye and Ngadang Nature Reserves fall within the Bega Local Aboriginal Land Council area. Nimmo and Paupong Nature Reserves fall within Merrimans and Eden Local Aboriginal Land Council areas respectively.

2.3 FIRE MANAGEMENT

Fire is a natural feature of the Monaro environment. A combination of low rainfall (generally below 600 millimetres per year), dry forest types, open woodland and grasslands means that fire can occur in the region throughout much of the year.

While illegal malicious fire activity does occur in some areas, it is considered minimal, with the majority of wildfire caused by accidental fire escape, for example, escaped campfires and ignition from farm machinery or lightning. The fires of 2003, which covered a wide area within southern NSW, did impact on some areas of the Monaro including the eastern fall of the Snowy Mountains and areas to the south and east of Berridale.

Landscape scale fires (greater than 100,000 hectares) do occur in the region, generally involving the more remote terrain within the Snowy Mountains. Fires of such size tend to occur on a frequency of between 25 - 50 years. Smaller fires, less than 50,000 hectares, are more common with a frequency less than 20 years. With much of the Monaro comprised of grassland and open woodlands, and with good access, fire size is generally small with most fires contained to less than 10,000 hectares.

Legislation and Policy

Fire management undertaken by the NPWS is covered by a wide range of legislation. Such legislation includes fire, land management, criminal, and environmental Acts of both state and federal parliament. The full list of legislation and the implications to fire management planning are included in section 1.3 of the NPWS Fire Management Manual, which may be viewed at any NPWS office or on the NPWS website: www.nationalparks.nsw.gov.au.

The NPW Act requires the preparation of a Plans of Management for each nature reserve. Section 72AA requires that fire management should be considered when preparing such plans.

The methodology used to develop fire management strategies is covered by NPWS Policies, which are applied at corporate and regional level. These policies are also in the NPWS Fire Management Manual.

Other than the NPW Act, the other legislation significant to fire management on NPWS estate is the *Rural Fires Act 1997*. This recognises the NPWS as a fire fighting authority responsible for controlling and suppressing fires on areas that it manages, and responsible for implementing bush fire risk management programs to protect life and property. Other issues that arise from the Rural Fires Act are the formation of Bush Fire Management Committees. These committees include representatives of all fire agencies, volunteer fire fighters, conservation and farmer groups. For the reserves included in this Plan of Management, two BFMC apply, being Snowy River and Cooma Monaro. As a result of similar terrain and fire management issues, these two Bush Fire Management Committees have amalgamated. Under the Rural Fires Act, these committees are responsible for developing Bush Fire Operations Plans and Bush Fire Risk Management Plans. NPWS is represented on these Bush Fire Management Committees and has participated in developing all plans.

Fire Management Strategies

Fire management strategies define the management approaches for each reserve. Depending on the complexity of fire management issues, strategies may be of three different forms. When determining the type of strategy to be developed for each reserve, consideration is given to the size of a reserve, fire history and fire potential, proximity of assets and the potential contention or likelihood of challenge to fire management practices

More complex reserves with significant fire management issues will have a Type 3 fire management strategy. This will generally take the form of a booklet that includes reference material used in developing fire management zones and approaches.

Reserves where the level of risk of fire is assessed as medium to high will have a Type 2 strategy developed. These strategies are presented in a single map format, showing fire management units, fire advantages, assets and fire management zones, with supporting text outlining fire management approaches.

Reserves where the risk of fire for the reserve is assessed as low, or where fire management strategies are not complex and can be simply defined and presented, will have a type 1 fire strategy developed. This will generally be in the form of text, within a reserve plan of management.

In cases where reserves are located close together and have similar levels of complexity, opportunities are taken to group like reserves together.

Within this plan of management, seven nature reserves are included. Type 2 fire management strategies have been developed for Bobundara and Myalla Nature Reserves, Ironmungy Nature Reserve, Paupong Nature Reserve and Nimmo Nature Reserve. A Type 1 fire management strategy is included in this plan for the Ngadang and Wullwye Nature Reserves.

3. BOBUNDARA NATURE RESERVE

3.1 LOCATION AND GAZETTAL

Bobundara Nature Reserve (204 hectares) is located in the Parish of Myalla, County of Wallace, 29 kilometres south of Cooma and 24 kilometres southeast of Berridale (Map 2). The boundary follows the sealed Bobundara Road, and has a poorly fenced border of just over 6 kilometres. Bobundara Nature Reserve also shares a 4.1 kilometre boundary with privately owned bushland (750 hectares) in the north, and another 800 metres on the southeast with Myalla Creek.

Bobundara Nature Reserve was previously part of the 590 hectare Bobundara State Forest, which was originally gazetted in 1921. It was declared a nature reserve under the NPW Act in 2001 as a result of the Comprehensive Resource Assessment (CRA) process. Before reservation, the nature reserve was managed as part of the Bobundara Pastoral Holdings (No 380).

The main reason for the declaration of Bobundara as a nature reserve was because it contains two plant communities under represented in the region.

The reserve forms part of the Snowy River catchment and lies within the Cooma-Monaro local government area.

3.2 NATURAL AND CULTURAL HERITAGE

Landform, Geology and Soils

The geology of the area is characterised by sedimentary rocks, which rise 200m above the basalt plains to the south west of the reserve. The reserve is moderately steep in terrain with exposed outcrops of igneous rocks and defined by Bobundara Hill. It is florally diverse with soils poor in nutrients. The soils are predominantly yellow/red duplex topsoils.

Bobundara Nature Reserve is part of the Bobundara Creek catchment, a main tributary of the Snowy River and can be divided into three sub-catchments: Myalla Creek in the south, Mt Pleasant Creek in the northeast and Woolpack Creek in the north (Zylstra 2001). Recorded annual rainfall varies from 480 millimetres on the lower slopes to 516 millimetres on the summit ridge.

Native Plants

Bobundara Nature Reserve contains the following two under-represented plant communities: Eastern Tableland Dry Shrub/Grass Forest (snow gum *Eucalyptus pauciflora*/ ribbon gum *E. viminalis*/ silver wattle *Acacia dealbata*/ kangaroo grass *Themeda australis*) and South-East Tablelands Dry Shrub-Tussock Grass Forest (dominated by scribbly gum *E. rossii*/ brittle gum *E. mannifera*/ bush pea *Pultenaea procumbens*/ red-anther wallaby grass *Joycea pallida*). These communities were considered to be "still extremely poorly represented in the case of Dry Shrub/Grass Forest and still somewhat under represented in the case of Dry Shrub/Tussock Grass Forest in a formal reserve system" (NPWS Inventory 2000, as cited in Zylstra 2001).

Aside from these two communities, Hall (2002) describes the majority of the reserve as a vegetation community of broad-leaved peppermint (*E. dives*) with red-anther wallaby grass (*Joycea pallida*); or ribbon gum (*E. viminalis*) with broad-leaved peppermint (*E. dives*) and a mix of shrub or grassy understorey. Candlebark (*E. rubida*) occurs in these communities as a minor species, and snow gum (*E. pauciflora*) can be found in areas on the western side of the reserve.

The north-eastern corner of the reserve is clear of trees due to the fact that this area coincides with the edge of the basalt geology which has resulted in a grassland rather than woodland (Zylstra 2001).

Native Animals

Four native mammal species and 12 bird species have been recorded in Bobundara Nature Reserve (Hall 2002). Of the bird species there were two declining bird species: the eastern yellow robin (*Eopsaltria australis*), and the rufous whistler (*Pacycephala rufiventris*). There is evidence of a high number of wombats (*Vombatus ursinus*) and eastern grey kangaroos (*Macropus giganteus*). Tiger quolls (*Dasyurus maculatus*) may occur in the reserve, as scats were located on a ridgeline (Dawson, J. Pers. Comm. 2001, in Zylstra 2001). The CRA process predicted that Bobundara Nature Reserve contained suitable habitat for 11 species listed as threatened under the TSC Act (see Appendix I for a list of threatened species recorded in the region).

Connections between Land and People

A preliminary Aboriginal cultural heritage study of the reserve was carried out in 2002 by Dearling. The study concluded that Bobundara Nature Reserve was a suitable area for Aboriginal occupation, with the most attractive habitation sites being on the basal slopes/spurs on the eastern side of the reserve.

The study found a total of 56 artefacts recorded in three open artefact scatters. All sites were associated with the ridge and spurs to the north and east of Bobundara Hill. Five different stone raw materials were identified as having been used in the manufacture of artefacts, and it was observed that the raw material must have been imported from outside of the local area because none of the raw materials are found on the reserve. The results of Dearling's survey (Dearling, 2003) found that the archaeology of the Bobundara Nature Reserve generally conforms to that of the surrounding region.

Aside from a decommissioned trig station (originally dedicated on 1st July 1893) and significant due to the quality of its stonework and undamaged form, no other significant historic sites have been identified (Zylstra 2001).

3.3 INFRASTRUCTURE

The eastern and southern boundaries of the reserve are fenced where they are in common with agricultural land. All fences between the reserve and agricultural land are in a stockproof state. No fence exists on the north-western boundary along the Bobundara to Cooma Road.

No other infrastructure exists on the reserve.

3.4 PUBLIC USE

Pedestrian public access is available off the Bobundara to Cooma Road. There is no public access road leading into the reserve although an old trail leads to the decommissioned trig. The trail leading to the trig site is available for public pedestrian use.

3.5 THREATS TO RESERVE VALUES

Soil and Vegetation Disturbance

Due to its steepness, lack of grassy understorey and the erodibility of the yellow/red duplex topsoils, there is a moderate to high risk of gully erosion in the reserve.

The most obvious disturbance is along the western boundary of the reserve, where accelerated erosion has been caused by activity associated with construction of the Bobundara to Cooma road, erection of fences, and installation of an underground telephone cable. In addition, heavy grazing over extended periods and the planting of exotic trees has occurred in the southwest corner of the reserve.

Introduced Plants and Animals

There are 12 species of introduced plants in the reserve (See Appendix II). These are generally confined to two areas of concentrated infestation near the western boundary. Serrated tussock (*Nassella trichotoma*) and African love grass (*Eragrostis curvula*), which were prevalent, have been the subject of effective spraying since the gazettal of the reserve. The central part of the reserve is relatively free of weeds (Zylstra 2001) aside from some minor occurrences of blackberry (*Rubus fruticosus*), sheep sorrel (*Acetosella vulgaris*) and great mullein (*Verbascum thapsus*).

Of the 12 introduced plant species on the reserve, most of these species do not have any appreciable environmental impact on the ecology of the reserve (Hall 2002). Priority species for control identified in the Snowy Mountains Region Pest Management Strategy include: serrated tussock, African love grass and blackberry.

Very little activity by feral animals exists through the central part of the reserve, however, outside of the central area there is evidence of rabbits and foxes.

Fire

Before 90% of the reserve burnt in January 2007, there was no evidence in the reserve of any major fires in recent years. This observation was supported by the fact that indicative flora species (including leafy bossiaea *Bossiaea foliosa* and mountain mirbelia *Mirbelia oxylloboides*) were not proliferating on the reserve (Zylstra 2001). The accumulation of forest leaf litter and available fine fuels along with many fallen trees also supported this. Fuel reduction over 25% of the reserve on the western boundary and adjacent to the road was conducted during the autumn of 2003.

The fire management strategy for the reserve identifies the entire area as a Strategic Wildfire Management Zone (SWMZ) due to the potential for arson fire ignition from the Bobundara to Cooma Road. The objective for the zone is to minimise the effect of wildfire on grazing property to the east and south of the reserve.

The recommended fire regime for all plant community types within Bobundara Nature Reserve is between 10 and 50 years, with species decline expected if fire occurs before 10 years and longer than 50 years.

4. IRONMUNGY NATURE RESERVE

4.1 LOCATION GAZETTAL

Ironmungy Nature Reserve (710.4 hectares) is located within the Parish of Maffra, County of Wellesley, in the Snowy River Shire (Map 3). The reserve is surrounded by private land with 4km of the Snowy River forming the western boundary and is located 15 kilometres south east of Dalgety.

The reserve was declared a Forest Reserve (No 250) on the 15th September 1875 and then proclaimed a State Forest (No 563) on the 5th October 1917. Hall (2002) found that the reserve had been lightly logged for firewood or fencing, with black cypress pine (*Callitris endlicheri*) being the main timber used.

The main reason for the declaration of Ironmungy as a nature reserve was because it contains two plant communities which are under represented in the region.

Ironmungy is one of two nature reserves in the middle reaches of the Snowy River and forms part of the Snowy River catchment.

4.2 NATURAL AND CULTURAL HERITAGE

Landform, Geology and Soils

Escarpments formed by granitic rock outcrops dominate the area. To the north there is a high knoll formed from granitic tors typical of those found throughout the reserve. The terrain becomes more rugged towards the Snowy River. Soils are generally poor in nutrients.

The vegetation and topography of the reserve is reminiscent of some of the areas of the Western Slopes of NSW. Low gradient slopes with savannah woodland and several large drainage lines characterise the landscape geology of the area. The top of the escarpment is about 820 metres above sea level (ASL), with the highest point at 915 metres ASL and the lowest point at the Snowy River at about 740 metres ASL (Dearling 2003).

Native Plants

Ironmungy Nature Reserve contains Eastern Tableland Dry Shrub/Grass Forest (silver wattle *Acacia dealbata*/ kangaroo grass *Themeda australis*) and South-East Tablelands Dry Shrub/Grass/Herb Forest (apple box *E. bridgesiana*/ snow gum *E. pauciflora*/ candle bark *E. rubida*) which have been cited as “a feature that is still very/extremely poorly represented in a formal reserve system” (NPWS Inventory 2000).

The vegetation of Ironmungy Nature Reserve is comprised mostly of white box (*E. bridgesiana*) and black cypress pine (*Callitris endlicheri*) as the dominant overstorey species in the non-riparian section (Hall 2002). The reserve contains some of the most easterly distribution of white box/black cypress pine woodlands found on the eastern side of the main range (Dearling 2003).

One vulnerable plant species, silky swainson pea (*Swainsona sericea*), has been recorded in the reserve.

Native Animals

Ironmungy Nature Reserve provides suitable habitat for 11 threatened species. The most significant regionally are the koala (*Phascolarctos cinereus*) and the spotted-tailed quoll (*Dasyurus maculatus*), both of which are listed as vulnerable under the TSC Act. Incidental fauna observations by Hall (2002) identified 8 bird species of which 2 are listed as threatened under the TSC Act 1995. These are the hooded robin (*Melanodryas cucullata*) and the diamond firetail (*Stagonopleura guttata*). See Appendix I for a summary of threatened species in the region.

Connections between Land and People

Dearling (2003) stated that Ironmungy Nature Reserve was an attractive area for prehistoric Aboriginal people. He concluded that the area within Ironmungy is typical of parts of the Boloka Range which offered refuges to which Aboriginal tribes brought their children and old men and women during the cold winter months. The proximity of the Snowy River and the presence of suitable campsites would have made the area very attractive to Aboriginal people. The archaeology, according to Dearling (2003), suggests the savannah woodland environment on the reserve provided a warmer refuge in winter compared to other sites.

A total of 145 artefacts were recorded in 6 open artefact scatters and 1 isolated find, and a total of 5 different raw materials were identified, being quartz, volcanic, quartzite, silicrete and chert. The artefacts found at the sites in the reserve have a low density and the assemblage appears to be consistent with this part of the Monaro region (Dearling 2003).

There are no known sites of significance in terms of non-indigenous cultural heritage.

4.3 INFRASTRUCTURE

The reserve is fenced along the northern and eastern boundaries and between several small properties along Maffra Road. The Snowy River forms the south-western boundary and, although the boundary is not fenced on the reserve side of the river, a fence exists on the property on the west of the river. All boundaries that are common with agricultural land are fully fenced and in a stock-proof state.

No other infrastructure exists on the reserve.

4.4 PUBLIC USE

There is very little use of the reserve although access is available from the Maffra to Bungarby Road. Use of the reserve may increase as the community learns of its existence.

4.5 THREATS TO RESERVE VALUES

Soil and Vegetation Disturbance

The major form of disturbance has been caused by erosion along some of the streams. Erosion is extensive in some parts of the reserve and gullying has occurred up to four metres deep and several metres wide in some places. Some work has commenced on halting gully erosion with the help of local Aboriginal people as part of an employment scheme. Further erosion control works will be required to address erosion problems in the reserve. In the eastern end of the reserve, some clearance of vegetation has occurred but there has been no extensive clearance of native flora (Dearling 2002).

Introduced Plants and Animals

There is little evidence of grazing from large herbivores, however rabbits (*Oryctolagus cuniculus*) appear to be impacting on the diversity of grass/herb species and on seedling regeneration of shrubs and tree species.

Due to the widespread infestation of serrated tussock (*Nassella trichotoma*), the floral diversity may be reduced in some heavily affected areas, typically in the heads of drainage lines feeding into the Snowy River.

Willows (*Salix* sp) have grown prolifically along the banks of the Snowy River, but have been controlled as part of a broader control program along the river since 2002.

There are 12 introduced plant species on the reserve (Hall 2002). Most of these species do not have any appreciable environmental impact on the ecology of the reserve. (Appendix II). Priority species for control in the reserve as identified in the Snowy Mountains Region Pest Management Strategy include: serrated tussock (*Nassella trichotoma*), African love-grass (*Eragrostis curvula*) and blackberry (*Rubus fruticosus*). Foxes are known to exist on the reserve and an annual fox baiting program has been conducted in June - August (prior to lambing) since 2001 in conjunction with neighbours.

Fire

There is no evidence of any major fires in recent years across the reserve. Black cypress pine (*Callitris endlicheri*) is generally intolerant to fire although regeneration from seed after fire is abundant.

Stands of mature and senescent black cypress pine throughout the reserve demonstrate that the area has not been subject to a high intensity fire within the past 20 - 25 years.

The separate draft fire management strategy prepared for this reserve identifies all of the reserve as Heritage Management Zone (HMZ).

Recommended fire regimes for both forest types in the reserve is between 22 to 50 years, with species decline expected if fire occurs before 22 years or longer than 150 years.

5. MYALLA NATURE RESERVE

5.1 LOCATION AND GAZETTAL

Myalla Nature Reserve is located 2 kilometres north west of the Bobundara Road and 17 kilometres south east of Berridale in the Parish of Arable, County of Wallace (Map 4) in Snowy River Shire. Prior to being declared as a nature reserve, the area was a State Forest (No. 902 dedicated on 8th August 1883). Ingrams Creek forms the southern boundary of the reserve, and there is very little evidence of vegetation clearance, although the terrace along both sides of the stream is devoid of trees which may be due to a frost hollow effect along the creek (Dearling 2003). In 1921 the area was reserved for soil conservation and then in 1951 was reserved for Public Utility (Dearling 2003).

5.2 NATURAL AND CULTURAL VALUES

Landform, Geology and Soils

The landscape geology is formed from undifferentiated sediments of the Adaminaby Group; on the main ridge isolated basaltic deposits are present (Dearling 2003). The reserve contains major ridges and the Ingrams Creek Valley, which defines the vegetation communities.

Water provided within the Myalla Reserve comes from Ingrams Creek, which is a permanent water source. Based on the soil erosion deposition, various streams along the ridge would at times carry large quantities of water (Dearling 2003).

The reserve is characteristic of the forested rolling hill areas of the Monaro. Myalla Nature Reserve is found in the northern section of a timbered ridge with Bobundara Nature Reserve on the southern end. This timbered ridgeline forms an important element in the grassland landscape in terms of visual amenity.

Native Plants

The main reason for the declaration of Myalla as a nature reserve was because it contains two under represented plant communities in the region. These communities are the Eastern Tableland Dry Shrub/Grass Forest (snow gum *E. pauciflora*/ ribbon gum *E. viminalis*/ silver wattle *Acacia dealbata*/ kangaroo grass *Themeda australis*) as well as the South-East Tablelands Dry Shrub-Tussock Grass Forest (scribbly gum *E. rossii*/ brittle gum *E. mannifera*/ bush pea *Pultenaea procumbens*/ red-anther wallaby grass *Joycea pallida*) which have been cited as “a feature that is still extremely poorly represented in the case of Dry Shrub/Grass Forest and still somewhat under represented in the case of Dry Shrub/Tussock Grass forest in a formal reserve system”. (NPWS Inventory 2000 as cited in Zylstra 2001).

Myalla Nature Reserve is comprised mostly of scribbly gum (*E. rossii*) and red-anther wallaby grass (*Joycea pallida*). Vegetation changes occur where snow gum (*E. pauciflora*) tends to dominate on the lower slopes adjacent to Ingrams Creek with occasional candlebark (*E. rubida*) and ribbon gum (*E. viminalis*) according to Hall (2002).

Native Animals

There has been no fauna survey undertaken for the reserve. The CRA predicted that Myalla Nature Reserve contained suitable habitat for 7 threatened species listed under the TSC Act. Incidental fauna observations in 2002 identified 3 mammals and 22 bird species, of which 4 bird species are considered declining. These are the eastern yellow robin (*Eopsaltria australis*), rufous

whistler (*Pacycephala rufiventris*), restless flycatcher (*Myiagra inquieta*), and dusky woodswallow (*Artamus cyanopterus*). See Appendix I for a summary of threatened species in the region.

Connections between Land and People

Dearling (2002) considered the valley along Ingrams Creek to be suitable for Aboriginal occupation. Given that it may be a major frost hollow, the terraces beside the creek would be expected to show a low level of exploitation. A total of 9 artefacts were recorded in three open scatters and one isolated find, and 6 different stone raw materials were used.

There are no sites of non-indigenous cultural heritage significance recorded.

5.3 INFRASTRUCTURE

The boundary of the reserve is only partly stock-proof fenced. The remainder of the boundary is either poorly fenced or has no fence.

No other infrastructure exists in the reserve.

5.4 PUBLIC USE

The reserve is surrounded by private property with no access from public roads or trails. As a result there is no public use of the reserve.

5.5 THREATS TO RESERVE VALUES

Soil and Vegetation disturbance

The degree of disturbance is minimal, however the establishment of a vehicle track along the terrace and the construction of boundary fences and gates have caused some minor disturbance. There is little evidence of logging in the reserve according to Hall (2002), although old logged stumps of snow gum (*E. pauciflora*) and broad-leaved peppermint (*E. dives*) are evident.

At present no soil erosion mitigation works are required on the site.

Introduced plants and animals

Currently, sheep have access to the adjacent grassy flats and foot slopes in the reserve abutting private land due to the lack of a stock-proof fence. Within these disturbed areas extensive weed infestations are evident.

The most invasive weeds within the reserve according to Hall (2002) occur sporadically on the slopes and hilltops. These include serrated tussock (*Nassella trichotoma*) and saffron thistle (*Carthamus lanatus*) and hawthorn (*Crataegus monogyna*). A total of 17 introduced species have been identified according to Hall (2002) (see Appendix II).

Most of these species do not have any appreciable environmental impact on the ecology of the reserve. Priority species for control identified in the Snowy Mountains Region Pest Management Strategy include: serrated tussock (*Nassella trichotoma*).

In 2003 a weed control program targeting serrated tussock was carried out along Ingram's Creek, which forms the southern boundary of the reserve. Follow up control work will be done annually. It is expected that serrated tussock control will be an ongoing requirement on the reserve.

A fox baiting program has been undertaken on the reserve since 2003. Fox control baiting will continue to be undertaken as required in conjunction with neighbours and will vary depending on fox numbers and lambing times.

Fire

Hall (2002) noted that in some areas of the reserve there had been fires of low intensity in the past 15 years, however all the reserve burnt in January 2007. A separate draft fire management strategy has been prepared for this reserve. The entire reserve has been identified and listed in the reserve's fire management strategy as a Heritage Management Zone (HMZ).

The recommended fire regime for both plant communities on the reserve is between 5 and 50 years, with species decline expected if fire occurs within 5 years or longer than 50 years.

6. WULLWYE NATURE RESERVE

6.1 LOCATION AND GAZETTAL

Wullwye Nature Reserve (155.3 hectares) is located 12 kilometres south of Berridale in the Parish of Wullwye, County of Wallace, in the Snowy River Shire and contains the northern and eastern flanks of Wullwye Hill (Map 5). In 1882 the reserve was part of the Woolway and Arable Pastoral Holdings (Dearling 2003). In 1917 the area was declared a State Forest (No. 564).

Surrounded by pastoral land, it is an isolated, forested reserve away from other forested areas. The closest reserves are Bobundara and Myalla Nature Reserves in the east, 6 kilometres away. The reserve is dominated by Wullwye Hill and generally is considered in reasonable condition, as there is little evidence of grazing (Hall 2002).

The main reason for the declaration of Wullwye as a nature reserve was because it contains three plant communities under-represented in the region (Hall 2002).

6.2 NATURAL AND CULTURAL VALUES

Landform, Geology and Soils

Two different rock types are common to the area. On the eastern side, the reserve is composed mostly of metasediments of the Adaminaby Group, with blocky rocky type deposits evident. On the western side the reserve is composed more of granitic deposits. The terrain of the reserve rises from about 800 metres above sea level to 1067 metres at the Wullwye Trig (Dearling 2003).

There is extensive but minor gully erosion along the lower slopes and an ephemeral spring is located to the south west of Wullwye Hill according to the Parish Map (Dearling 2003). As an isolated, timbered hill it is an important visual element in the landscape.

Native Plants

The reserve contains examples of three poorly represented plant communities within the region. These communities are the Eastern Tableland Dry Shrub/Grass Forest (snow gum *E. pauciflora*/ ribbon gum *E. viminalis*/ silver wattle *Acacia dealbata*/ kangaroo grass *Themeda australis*), South-East Tablelands Dry Shrub-Tussock Grass Forest (scribbly gum *E. rossii*/ brittle gum *E. mannifera*/ bush pea *Pultenaea procumbens*/ red-anther wallaby grass *Joycea pallida*) and South-Eastern Tablelands Dry Shrub/Grass/Herb Forest (apple box *E. bridgesiana*/ candle bark *E. rubida*/ bidgee widgee *Acaena novae-zelandiae*), which have been ascribed to the reserve according to Hall (2002).

Wullwye Nature Reserve is comprised mostly of broad-leaved peppermint (*E. dives*) and ribbon gum (*E. viminalis*) as the dominant overstorey species (Hall 2002).

Native Animals

There has been no fauna survey for this reserve, however there is a potential for declining species to be present in this area such as the eastern yellow robin (*Eopsaltria australis*). See Appendix I for a summary of threatened species in the region. The CRA predicted that Wullwye Nature Reserve contained suitable habitat for 17 species listed under the TSC Act, including the regent honeyeater.

As a timbered island in a large expanse of treeless plains, it provides an important refuge for native wildlife particularly macropods and native birds.

Connections between Land and People

Dearling (2003) considered that the area was not attractive for extended exploitation, as there appeared to be a lack of reliable permanent water in the vicinity. According to the study, however, a total of 24 artefacts were recorded in 5 open artefact scatters and one isolated find, also 3 stone raw materials were identified. Sites are more closely associated with elevated areas above those susceptible to cold air drainage. Wullwye Nature Reserve conforms to those of similar areas in the Monaro Region.

No sites of non-indigenous cultural heritage significance have been recorded so far.

6.3 INFRASTRUCTURE

The reserve is fully fenced and all fences are in a stock-proof state. No other infrastructure exists on the reserve.

6.4 PUBLIC USE

There is very little use of the reserve as it has no access from public roads or trails.

6.5 THREATS TO RESERVE VALUES

Soil and Vegetation disturbance

There is extensive but minor gully erosion along the lower slopes of Wullwye Hill. Another disturbance is located in an area of an old track that led from the eastern side of the Wullwye trig, according to Dearling (2003). There is little evidence of grazing on the eastern side of the reserve, however the western side of the reserve has been heavily grazed.

Introduced Plants and Animals

A total of 15 introduced species have been identified on the reserve (Hall 2002) (see Appendix II). Most of these species do not have any appreciable environmental impact on the ecology of the reserve. The priority species for control, identified in the Snowy Mountains Region Pest Management Strategy, is serrated tussock (*Nassella trichotoma*). An annual serrated tussock control program has been in place in the reserve since 2001. The program has focused on the western and northern boundaries of the reserve.

Fire

Wullwye Nature Reserve is comparatively small at 155 hectares. Access to the reserve is via public access roads close to the southern boundary, or via private property through paddocks to the other three sides. There is no internal trail network within the reserve. The reserve is surrounded by four neighbouring private properties, comprised entirely of agricultural grazing land.

There is no recorded fire history for the reserve and there is no evidence of recent fire. Previous land management was as Wullwye State Forest, however, there is no record of previous hazard reduction burning. As such, this reserve is within fire thresholds. Any proposed hazard reduction

burn program would need to be in conjunction with neighbours due to the lack of boundary trails or fire advantages.

The fire season for this reserve is generally described to be within the months of December and March, although, as with other areas of the Monaro, it is possible for fire to occur under strong windy conditions throughout the year.

Given the small sized of the reserve, combined with distance from the reserve to any assets, and the lack of fire threat, the entire reserve is zoned as Heritage Management Zone (HMZ).

Wullwe Nature Reserve is approximately 45 minutes from Jindabyne. In the event of fire, it is likely that Rural Fire Brigade Units will undertake initial attack operations prior to the arrival of NPWS crews. The reserve is within the Brothers Rural Fire Brigade area, of Snowy River Rural Fire Service. Response by Brigades into the Nature Reserve and undertaking fire suppression operations is covered by the Bush Fire Management Committee District Operations Plan.

Under severe conditions, fire behaviour may be such that the most effective suppression strategy may be in surrounding grassland, where better access is available.

The recommended fire regime for the plant community of the reserve is 5 to 50 years with species decline expected if fire occurs within 5 years or longer than 50 years. The area within the reserve will be available for fuel reduction after 2009.

7. PAUPONG NATURE RESERVE

7.1 LOCATION AND GAZETTAL

Paupong Nature Reserve (1839.5 hectares) is located 16 kilometres south of Jindabyne and within 4 kilometres of Kosciuszko National Park (Map 6). The reserve is linked to KNP by a fire trail and shares many of the attributes of the southern section of Kosciuszko National Park. Paupong Nature Reserve is located within the Parishes of Blakefield and Wilson, County of Wallace in the Snowy River Shire. Several portions within the parishes have been included in the reserve. These are: Portions 4, 42 and 90 in Parish of Blakefield and Portions 98, 105, 113, 116, 117 in the Parish of Wilson.

The main reason for the declaration of Paupong as a nature reserve was because it contains two plant communities under-represented in the region.

7.2 NATURAL AND CULTURAL VALUES

Landform, Geology and Soils

Much of the reserve is located in sedimentary deposits of the Adaminaby Group, consisting of sandstones, mudstones and shale. Outcrops of intrusive granitic material are also evident along the two major creeks displaying characteristics of decomposing granite soils. The topography consists mainly of a series of knolls and saddles. The terrain rises from 900 metres above sea level along Gully Creek, 1000 metres above sea level in the shallower eastern valley and up to 1253 above sea level at the highest point in the reserve.

Permanently available water comes from the rock pools along Gully Creek, and on the eastern side the area is characteristic of an ephemeral wetland (Dearling 2002).

Native Plants

Paupong Nature Reserve contains the following two under represented plant communities: Eastern Tableland Dry Shrub/Grass Forest (snowgum *E. pauciflora*/ ribbon gum *E. viminalis*/ silver wattle *Acacia dealbata*/ kangaroo grass *Themeda australis*) as well as the Central Tablelands/ACT Montane Dry Shrub Forest (mountain gum *E. dalrympleana*/ broad-leaved peppermint *E. dives*/ grey guinea flower *Hibbertia obtusifolia*) which have been cited as “a feature that remains extremely poorly/still poorly represented in a formal reserve system” (NPWS Inventory 2000, as cited in Zylstra 2001).

A further five plant communities have been found in the reserve (NPWS Inventory 2002). These are: Lower Snowy Dry Shrub/Tussock Grass forest (long-leaved box *E. goniocalyx*/ red-anther wallaby grass *Joycea pallida*); Lower Snowy White Box Dry shrub/Herb woodland (white box *E. albens*/ white cypress *Callitris glaucophylla*/ Dean's wattle *Acacia deanei*); Tableland Acacia Moist Herb forest (snow gum *E. pauciflora*/ mountain gum *E. dalrympleana*/ silver wattle *Acacia dealbata*/ *Helichrysum scorpiodes*); Western Montane Moist shrub forest (snow gum *E. pauciflora*/ mountain gum *E. dalrympleana*/ gorse bitter-pea *Davesia ulicifolia*/ lomandra *Lomandra longifolia*) and Western Montane Dry Fern/Grass Forest (broad-leaved peppermint *E. dives*/ mountain gum *E. dalrympleana*/ narrow leaved peppermint *E. robertsonii*/ bracken fern *Pteridium esculentum*/ poa tussock *Poa sieberiana*).

The majority of Paupong Nature Reserve is old growth Southern Tablelands Dry Eucalypt forest (mountain gum *E. dalrympleana*/ broad-leaved peppermint *E. dives*/ red stringybark *E. macrorhyncha* (Wright and Zylstra 2001). According to their data there are 38 species of native

flora and the ground cover and under-storey features scattered shrubs such as pale-fruit ballart (*Exocarpus strictus*), forest geebung (*Persoonia silvatica*) and lomatia (*Lomantia longifolia*).

The most dominant over-storey vegetation community at 1200 metres is broad-leaved peppermint (*Eucalyptus dives*) and mountain gum (*E. dalrympleana*), and the creek on the western fall of the reserve comprised black sallee (*E. stellulata*) and snow gum (*E. pauciflora*), with adjacent apple box (*E. bridgesiana*). This pattern may repeat itself in other creek and drainage lines according to Hall (2002). On the lower slopes, white box (*E. albens*) and bundy (*E. nortonii*) are the more dominant species (Hall 2002).

Native Animals

There has been no systematic fauna survey in the reserve, however there is potential habitat for 12 threatened species. The most significant regionally are the koala (*Phascolarctos cinereus*) and the spotted-tail quoll (*Dasyurus maculatus*), square-tailed kite (*Lophoictinia isura*) and regent honeyeater (*Xanthomyza phrygia*). See Appendix I for a summary of threatened species.

Connections between Land and People

Dearling (2003) considers, based on the topography, geology and water availability of the reserve, the areas which would have been most attractive for Aboriginal habitation are along Gully Creek in the west and Gully Gap Creek in the east which is a tributary of the Beloka Creek which forms the upper catchment.

Dearling recorded a total of 90 artefacts in eight open artefact scatters and a single isolated find. A total of five different stone raw materials were recorded.

No evidence of non-indigenous cultural heritage has been recorded.

7.3 INFRASTRUCTURE

All boundaries which are adjacent to agricultural land (western, northern and eastern) are fenced to a stock-proof standard. The southern boundary is not fenced. The two properties to the south of the reserve are undeveloped and not used for agriculture.

Several fire trails exist within the reserve (see Map 6). No other infrastructure exists within the reserve.

7.4 PUBLIC USE

Several fire trails through the reserve (Map 6) provide access to private properties. The north-south running trail also provides access to the Kosciuszko National Park boundary and is maintained as a management trail. The road is maintained on-park by NPWS and has been established partially within the reserve boundary as the most cost-effective alignment.

All access to the reserve is via private roads, or trails which traverse private lands. Therefore NPWS cannot promote public access to the reserve.

There is considerable use of the reserve trails by motorcycles both registered and unregistered, and there is concern about this issue from neighbours. Illegal firewood collection also occurs.

Use of the bushland within the reserve for recreational purposes is expected to be limited.

7.5 THREATS TO RESERVE VALUES

Soil and Vegetation disturbance

The major soil disturbance according to Dearling (2003) has occurred along the main ridges and spur lines, along which all access and fire trails have been constructed. Additional disturbance has occurred through construction of tracks and by the erection of fences, mainly along the reserve boundary. There has also been some clearance of native vegetation on the eastern most ridge, and the upper reaches of the eastern valley near the boundary fence.

The reserve has been lightly logged for firewood or fencing. There is the potential for soil erosion and sedimentation associated with the maintenance of the two roads on the reserve.

Introduced Plants and Animals

According to Hall (2002), there are 10 introduced species in the reserve with the most significant weed infestation associated with track disturbance being great mullein (*Verbascum thapsus*) (see Appendix II). There are no significant infestations of exotic plants on the reserve.

Most of these species do not have any appreciable environmental impact on the ecology of the reserve. The priority species for control, identified in the Snowy Mountains Region Pest Management Strategy, is serrated tussock (*Nassella trichotoma*) along the western boundary of the reserve.

The reserve is linked to Kosciuszko National Park via a continuously timbered tract of land. This reserve, along with adjacent timbered private property, provides suitable habitat for wild dogs and foxes.

Wild dog control (trapping) is undertaken through the reserve as part of the Kosciuszko National Park wild dog control program. Foxes are also present on the reserve. Apart from dogs and foxes, there are no other significant pest animal infestations.

It is expected that deer may become an increasing issue in the reserve and surrounding areas in the future due to the lack of fencing along the southern boundary and the presence of deer in Kosciuszko National Park and the forested land in between.

Fire

A contiguous tract of dry eucalypt forest links Paupong Nature Reserve to Kosciuszko National Park. Approximately 90% of the reserve was burnt by wildfire during the 2002-2003 fire season. Sections of the reserve on a westerly aspect burnt with high intensity which removed a large percentage of the above ground vegetative material. Recovery by subterranean tuber growth has been good with 60 - 70% of mature trees surviving in these areas.

A separate draft fire management strategy has been prepared for the reserve. The plan identifies the entire reserve as Strategic Wildfire Management Zone (SWMZ).

The recommended fire regimes for the vegetation communities on the reserve are; 12 to 50 years for ribbon gum, mountain gum, stringybark & peppermint forest; 25 to 150 years for black sallee forest with a fern understorey; and 5 to 50 years for the grassy black sallee forest.

8. NGADANG NATURE RESERVE

8.1 LOCATION AND GAZETTAL

Ngadang Nature Reserve (160 hectares) is located within the Parish of Beloka, County of Wallace in the Snowy River Shire (Map 7). The reserve lies on the southern bank of the Snowy River within a steep-sided granite gorge approximately 8 kilometres downstream of the Jindabyne dam wall. The area covered by the reserve was at one time part of the Mowenbah Pastoral Holding. In 1940, the area was removed from lease and classified as a fisheries reserve.

8.2 NATURAL AND CULTURAL HERITAGE

Landform, Geology and Soils

Ngadang Nature Reserve is topographically located on a series of four steep spurs that terminate close to the south bank of the Snowy River. These spurs are interspersed with at least two major drainage lines. Based on evidence along the most westerly of these streams, a large quantity of water at times cascades down them following heavy rain.

The reserve is situated within an extensive area of granitic intrusive rock. The unit is identified as the Bullenbalong granodiorite and is part of the Kosciuszko Batholith (Dearling 2002). Soils on the reserve are skeletal with sandy loam alluvial soils restricted to small patches along the Snowy River.

Native Plants

Ngadang Nature Reserve contains the following two under represented plant communities: Eastern Tableland Dry Shrub/Grass Forest (snow gum *E. pauciflora*/ ribbon gum *E. viminalis*/ silver wattle *Acacia dealbata*/ kangaroo grass *Themeda australis*) and South-East Tablelands Dry Shrub-Tussock Grass Forest (dominated by scribbly gum *E. rossii*/ brittle gum *E. mannifera*/ bush pea *Pultenaea procumbens*/ red-anther wallaby grass *Joycea pallida*). These communities were considered to be "still extremely poorly represented, in the case of Dry Shrub/Grass Forest and still somewhat under represented in the case of Dry Shrub/Tussock Grass Forest in a formal reserve system" (NPWS Inventory 2000 as cited in Zylstra 2001).

Aside from these two communities, small patches of black sallee (*E. stellulata*) can be found in the lower sections of the major drainage lines.

Native Animals

Ngadang Nature Reserve provides suitable habitat for 11 threatened species. The most significant regionally are the koala (*Phascolarctos cinereus*) and the spotted-tailed quoll (*Dasyurus maculatus*); both of which are listed as vulnerable under the TSC Act.

Connections between Land and People

The Aboriginal artefact assemblage on the reserve is consistent with that for the Snowy River valley as a whole. It would appear that the major spurs and drainage system provided easy access between the Snowy River and the surrounding tablelands. Based on model predictions, sites would be found along the lower levels of the major spurs, especially in areas with fairly level topography and along terraces beside streams and drainage lines above river flood levels and cold air drainage and a survey found 44 artefacts in 2 open scatters (Dearling 2002).

No sites of non-indigenous cultural heritage significance have been recorded so far.

8.3 INFRASTRUCTURE

Stock-proof fencing exists between the reserve and neighbouring agricultural land along the western and southern boundaries. No fencing exists along the Snowy River, which forms the northern and eastern boundaries.

8.4 PUBLIC USE

There is no public access to the reserve other than via the Snowy River. Access along this section of the river is extremely rugged and not popular with fishermen. Nor is it suitable for canoeing due to the highly variable flow rates within the river and possibility for dam water discharge at any time.

Public use of the reserve may increase as a result of increased water flow down the Snowy River.

8.5 THREATS TO RESERVE VALUES

Soil and Vegetation Disturbance

The only disturbance evident in the reserve is associated with the construction of a vehicle track which enters the reserve from private property to the north-west of the reserve and provides access to the Snowy River. In several locations, especially along the lower spur area near the Snowy River and where the track climbs the middle spur, disturbance has been severe.

The 2003 bushfires burnt through the reserve under extremely dry conditions. It will take several years for ground cover to again stabilise steep slopes.

Introduced Plants and Animals

The boundary of the reserve is only partly stock-proof fenced. Currently, sheep have access to the adjacent grassy flats on the southern boundary of the reserve, at the tops of the spurs and gully heads in the reserve abutting private land. Within these disturbed areas extensive weed infestations are evident.

The most invasive weeds on the grassy flats are serrated tussock (*Nassella trichotoma*) and saffron thistle (*Carthamus lanatus*). Associated with the snow gum (*E. pauciflora*), communities of hawthorn (*Crataegus monogyna*) occur on the lower slopes. A total of 9 introduced species have been identified (see Appendix III).

Most of these species do not have any appreciable environmental impact on the ecology of the reserve. Priority species for control identified in the Snowy Mountains Region Pest Management Strategy are: serrated tussock (*Nassella trichotoma*) and African lovegrass (*Ergrostis curvula*).

Since 2001 an annual weed control program targeting serrated tussock has been carried out in the reserve concentrating on the banks of the Snowy River and its major tributaries. Follow up control work will be done annually. It is expected that serrated tussock control will be an ongoing requirement on the reserve.

Goats and pigs are known to exist on the reserve.

Fire

Ngadang Nature Reserve is comparatively small at 160 hectares. Access to the reserve is difficult with no public access roads available. All access to the reserve is by consent of neighbouring landholders. There is also no internal trail network within the reserve. The reserve is surrounded by six neighbouring private properties, comprised of a mixture of agricultural grazing land and steep timbered country. The northern boundary of the reserve is the Snowy River.

Ngadang Nature Reserve was burnt during the 2003 fire season. Most of the area of the reserve was affected by fire, and in some parts fire impact was severe. Known fire history before 2003 is limited. It is considered that the 1939 fires impacted on part of the reserve, but no other fire history is known.

Given that the reserve was burnt in 2003, this reserve is outside fire threshold for the vegetation types present. Any proposed hazard reduction burn program will not be considered until at least 2013. Issues of containment lines and fire advantage will need to be resolved for that program.

Given that neighbouring assets are some distance from the reserve, the reserve is zoned Heritage Management (HMZ).

During the 2002 bushfire, sections of the reserve on a northerly aspect burnt with moderate to high intensity which removed a large percentage of the above ground vegetative material. Recovery by subterranean tuber growth has been good with 60 - 70% of mature trees surviving in these areas.

The recommended fire regimes for the vegetation communities on the reserve including the black sallee forest is 5 to 50 years, with species decline expected if fire occurs within 5 years or longer than 50 years.

9. NIMMO NATURE RESERVE

9.1 LOCATION AND GAZETTAL

Nimmo Nature Reserve (724 hectares) lies within the lower ranges of the Snowy Mountains. It is located 24 kilometres north-west of Berridale, south of the Eucumbene Dam in the Parish of Nimmo, County of Wellesley in the Snowy River Shire (Map 8). The reserve is comprised of two sections on the western side of the Eucumbene River. The northern section lies adjacent to a Council crown road which provides public access to Snowy Plains. The southern section has been partially modified for cattle grazing but it is a predominantly forested area along the western side of the Eucumbene River (Dearling 2003).

9.2 NATURAL AND CULTURAL HERITAGE

Landform, Geology and Soils

Nimmo Nature Reserve is located on shale deposits, which are part of the Adaminaby Group of sediments. In the east and west, these sediments are bounded by outcrops of granitic material. The terrain rises from about 1050 metres above sea level at the Eucumbene River, to 1260 metres to the top of the ridge in the northern section (Dearling 2003).

The Eucumbene River provides permanent water along the eastern boundary of the reserve, and some wetland and bog areas are evident along some of the stream flat margins (Dearling 2003).

Native Plants

The reserve contains the regionally significant Central Tableland Shrub/Grass Dry Forest, which has been cited as “a feature that is still poorly represented in a formal reserve system” (Zylstra 2001).

A further two plant communities have been found in Nimmo Nature Reserve (NPWS Inventory 2000). These are: Montane Acacia/Dry Shrub/Herb/Grass and Western Montane Moist Shrub forests (snow gum *E. pauciflora* / mountain gum *E. dalrympleana* / gorse bitter-pea *Davesia ulicifolia* / lomandra *Lomandra longifolia*).

Nimmo Nature Reserve is comprised mostly of ribbon gum (*E. viminalis*), mountain gum (*E. dalrympleana*), candlebark (*E. rubida*) and black sallee (*E. stellulata*).

One endangered species of plant listed under the TSC Act is recorded in the reserve, the anchor plant (*Discaria nitida*) (Hall 2002).

Native Animals

Some fauna surveying has occurred on the reserve. The CRA process predicted that Nimmo Nature Reserve contained suitable habitat for 15 threatened species, including the koala (*Phascolarctos cinereus*), square-tailed kite (*Lophoictinia isura*) and spotted-tail quoll (*Dasyurus maculatus*). See Appendix I for a summary of threatened species in the region.

Connections between Land and People

Dearling's study (2003) concluded that the environment within the reserve would have been part of a broader and more diverse range of environments used by Aboriginal people. The survey recorded a total of 24 artefacts, including three open artefact scatters and two isolated finds, and five stone raw materials were identified on the reserve. Based on these findings, the level of exploitation appears to be low especially along the ridges. Within the rest of the nature reserve exploitation appears to conform to that in similar forested areas (Dearling 2003).

There is evidence of grazing on the reserve, however no evidence of any other non-indigenous cultural heritage has been recorded.

9.3 INFRASTRUCTURE

A stock-proof fence exists along the eastern boundary of both sections of the reserve (following the Eucumbene River). Other sections of the boundary between the reserve and agricultural land is fenced but not all is stock-proof. The northern boundary of the northern section of the reserve is bounded by the Snowy Plains Road and is partly fenced.

No other infrastructure exists on the reserve.

9.4 PUBLIC USE

A public road runs adjacent to the reserve providing access to extensive freehold land in the Snowy Plains area and to Kosciuszko National Park. The road is maintained by Snowy River Shire.

9.5 THREATS TO RESERVE VALUES

Soil and Vegetation disturbance

Disturbance from firewood collection is evident throughout the reserve. The central and northern sections of the reserve have been cleared. No widespread clearing is evident in other areas of the reserve and disturbance caused by past land use practices is evident but minimal in the southern section.

Introduced Plants and Animals

Zylstra (2001) recorded 13 introduced plant species including sweet briar (*Rosa rubiginosa*), blackberry (*Rubus fruticosus*) and vipers bugloss (*Echium vulgare*) on Nimmo Nature Reserve. See Appendix II.

Willows (*Salix* sp.) exist along the Eucumbene River, some of which occur inside the reserve.

There are known to be foxes, wild dogs and pigs moving through the reserve periodically. Evidence of wild pigs can be seen in moist areas, such as wet tussock grasslands, which have been overturned during foraging. Neither section of the reserve offers areas large enough to sustain a permanent feral pig population.

Fire

A separate draft fire management strategy has been prepared for the reserve that identifies sections of both blocks adjacent to the Snowy Plains Road as Strategic Wildfire Management Zones (SWMZ) due to the risk of unplanned wildfire originating from the road and the proximity to a 32 KVA powerline. The majority of recorded wild fires on the reserve have been a result of arson. The remainder of the reserve is identified as a Heritage Management Zone (HMZ).

The recommended fire regime for the dry forest communities is 22 to 50 years, with species decline expected if fire occurs more frequently than 22 years and also longer than 50 years. The fire regime for the moist shrub forest is between 25 and 60 years.

10. MANAGEMENT ISSUES AND STRATEGIES FOR THE NATURE RESERVES

Current Situation	Desired Outcomes	Strategies	Priority
<p>Soil and water conservation</p> <p>Soil erosion within Bobundara, Myalla, Wullwye, Paupong and Nimmo NRs is negligible and is associated with past disturbances such as road and fence line construction. Erosion potential is moderate due to shale, clay and basaltic soils of these reserves.</p> <p>Ironmungy and Ngadang NRs feature areas of granitic, sandy loam sedimentary soils and therefore have a moderate to high erosion potential. Several areas in Ironmungy NR show severe gully erosion likely to be the result of past land management practices and occasional flood events. Small but severe erosion is evident in Ngadang NR associated with the management trail.</p>	<p>Soil erosion is minimised.</p> <p>Water quality and health of reserve streams is improved.</p>	<p>Undertake all works in a manner that minimises erosion and water pollution.</p> <p>Monitor erosion associated with past disturbances and post fire.</p> <p>Liaise with local authorities to maintain and improve water quality in the reserves' catchments.</p> <p>Undertake remedial erosion control within and adjacent to significant or potential erosion gullies in Ironmungy NR.</p> <p>Undertake remedial erosion control in Ngadang NR in areas associated with past trail construction.</p>	<p>High</p> <p>Medium</p> <p>Low</p> <p>High</p> <p>Medium</p>
<p>Native plant and animal conservation</p> <p>All of the reserves contain plant communities that are under-represented in the region.</p> <p>Bobundara, Ironmungy, Myalla, and Nimmo NRs have been subject to heavy grazing in the past. It is expected that the native vegetation communities on these reserves have been modified as a result of past grazing and fire regimes.</p> <p>Paupong and Ngadang NRs were subject to high intensity fire in 2002/3. Myalla and Bobundara NRs were subject to high intensity fires in 2007.</p> <p>Some threatened species may be present and require survey.</p>	<p>All native plant and animal species and communities are conserved.</p> <p>Structural diversity and habitat values are restored in areas subject to past grazing.</p>	<p>Monitor vegetation recovery in Paupong, Ngadang, Maylla and Bobundara NRs post fires. Information gained from monitoring will be incorporated into the review of the reserve fire management strategy in 2011.</p> <p>Undertake surveys for threatened plant and animal species.</p> <p>Implement measures included in recovery plans for threatened species.</p> <p>Work with neighbours and vegetation management committees to encourage conservation of remnant native vegetation in the vicinity of the reserves.</p>	<p>Medium</p> <p>Medium</p> <p>Medium</p> <p>Medium</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>Introduced species</p> <p>Wild dog control programs have been carried out on Paupong NR since 2002 to complement the Kosciuszko NP wild dog control program.</p> <p>Foxes, rabbits, hares, pigs and goats have been recorded in several of the reserves.</p> <p>A cooperative annual fox baiting program has been carried out on Ironmungy and Wullwye NRs since 2001.</p> <p>All reserves feature low to moderate infestations of weeds. See Appendix II.</p> <p>Ironmungy, Myalla, Ngadang and Wullwye NRs have dense infestations of serrated tussock.</p> <p>An intensive annual spring/summer weed control program for serrated tussock has been ongoing since 2001 in the above reserves. These programs have been supported by weed control works carried out on neighbouring properties.</p> <p>Ironmungy NR features dense serrated tussock infestations in the gully heads associated with drainage lines which feed into the Snowy River.</p> <p>Nimmo and Ironmungy NRs contain low to moderate infestations of willow. Willow control has been completed in the riparian zone associated with the Snowy River within Ironmungy NR.</p>	<p>The impact of introduced species on the reserves and on neighbouring lands is minimised.</p>	<p>Control and where possible eradicate populations of pest animals. Priority will be given to wild dogs, foxes and pigs.</p> <p>Seek the cooperation of other authorities and neighbours in implementing weed control and fox control programs.</p> <p>Control and where possible, eradicate introduced plant species. Priority will be given to species listed as noxious under the <i>Noxious Weeds Act 1993</i> and the Snowy Mountains Region Pest Management Strategy eg serrated tussock, African love grass, blackberry, St Johns wort and Paterson's curse. Priority will also be given to environmental weeds not identified as noxious under the Act.</p> <p>Treat any new outbreaks.</p> <p>Implement a monitoring and mapping program to measure the effectiveness of control programs for introduced plants. Information gained from monitoring will be used to modify future control programs.</p>	<p>High</p> <p>High</p> <p>High</p> <p>High</p> <p>High</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>Fire management</p> <p>Fire is a natural feature of many environments and is essential to the survival of some plant communities. Inappropriate fire regimes, however, can lead to loss of particular plant and animal species and communities. Fire can also damage cultural heritage, recreation and management facilities and can threaten visitors and neighbouring land.</p> <p>There is little evidence of periodic natural fire on Bobundara, Ironmungy, Myalla and Wullwye NRs, however the entire area of Bobundara NR has been affected by periodic fuel reduction burns and arson originating from the Bobundara to Cooma road.</p> <p>Arson is expected to continue to be the dominant cause of fires on Nimmo NR and on the western side of Bobundara NR.</p> <p>Paupong, Ngadang and Nimmo NRs show evidence of periodic fire by prescribed burning.</p> <p>Paupong NR was 90% burnt in the 2002/3 fire season. Ngadang NR was 100% burnt in the 2002/3 fire season.</p> <p>Nimmo NR was 90% burnt in late 2006. Bobundara NR was 100% burnt in January 2007. Myalla NR was 90% burnt in January 2007.</p> <p>Fire management strategies have been prepared for all reserves.</p>	<p>Life, property and natural and cultural values are protected from bushfire.</p> <p>Fire regimes are appropriate for conservation of plant and animal communities.</p> <p>Cultural features are protected from damage by fire.</p>	<p>Use a zoning system for bushfire management planning in NPWS reserves that is compatible with the system adopted by the Bushfire Coordinating Committee for use in District Bushfire Management Committee (DBFMC) bushfire risk management plans.</p> <p>Maintain cooperative arrangements with surrounding landowners and RFS brigades and be actively involved in the Cooma-Monaro and Snowy River District Bush Fire Management Committees. Cooperative arrangements include approaches to fuel management, support for neighbours' fire management efforts and information sharing.</p> <p>Maintain coordination and cooperation with Rural Fire Service brigades, Fire Control Officers and neighbours with regard to fuel management and fire suppression.</p> <p>Suppress all unplanned fires in the reserves as soon as possible.</p> <p>Use prescribed fire where appropriate on the reserves to achieve property protection, maintenance of, or an increase in biodiversity within the reserves.</p> <p>Encourage further research into the ecological effects of fire in the reserve.</p> <p>Review the fire management strategy for each reserve by 2011.</p>	<p>High</p> <p>High</p> <p>High</p> <p>High</p> <p>High</p> <p>Low</p> <p>Medium</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>Cultural heritage</p> <p>All of the reserves exhibit signs of Aboriginal use and visitation but it is unlikely that there were sites of long term habitation with the exception of Ironmungy NR.</p> <p>Ironmungy NR shows evidence of frequent habitation and visitation associated with the Snowy River.</p> <p>A Preliminary Aboriginal Cultural Heritage Study of the reserves was undertaken in 2003.</p> <p>Non-indigenous cultural heritage values of the reserves are yet to be fully assessed.</p>	<p>Aboriginal and historic features and values are identified and protected.</p> <p>Aboriginal people are involved in management of the Aboriginal cultural values of the reserves.</p> <p>Understanding of the cultural significance of the reserves is improved.</p>	<p>Consult and involve the Bega, Merrimans and Eden Local Aboriginal Land Councils and other relevant Aboriginal community members in the management of the Aboriginal heritage of the reserves.</p> <p>Precede all new ground disturbance work by an assessment for cultural features.</p> <p>Encourage further research into the Aboriginal heritage values of the reserves in close consultation with the Bega, Merrimans and Eden Local Aboriginal Land Councils and relevant community members.</p> <p>Assess the cultural heritage value of any newly found cultural heritage sites and prepare management strategies if necessary.</p>	<p>High</p> <p>High</p> <p>Medium</p> <p>High</p>
<p>Visitor use</p> <p>Although the reserves offer opportunities for bush walking, research and education, visitor use of the reserves is very low.</p> <p>Public access is available to the boundaries of Bobundara, Ironmungy, Paupong and Nimmo NRs.</p> <p>There is no gazetted public access to Myalla, Ngadang or Wullwye NRs.</p> <p>Use of the reserves must be carefully managed since they are relatively small and contain areas of significant remnant native vegetation.</p> <p>No visitor facilities are provided in the reserves.</p> <p>Promotion of community understanding and appreciation of the conservation values of the reserves will be important for minimising damage.</p>	<p>The local community is aware of the significance of the area and of management programs.</p> <p>Visitor use is ecologically sustainable.</p>	<p>Permit individual and group visits, subject to limits on numbers and other conditions if necessary to minimise impacts.</p> <p>Visitor access only to be pedestrian off public roads.</p> <p>Prohibit vehicle based camping and horse riding and the use of open fires.</p> <p>No public access tracks will be provided where one does not already exist.</p> <p>Monitor levels and impacts of use.</p> <p>Organise media releases, interpretation material and contact with neighbours and community organisations to increase the public awareness of the significance of the NRs.</p> <p>No recreational facilities will be provided in the reserves.</p> <p>Firewood collection is not permitted in the reserves.</p> <p>Visitors will be required to use fuel stoves for cooking.</p>	<p>Medium</p> <p>High</p> <p>High</p> <p>High</p> <p>Low</p> <p>Medium</p> <p>High</p> <p>High</p> <p>High</p>

Current Situation	Desired Outcomes	Strategies	Priority
<p>Research</p> <p>Further research will improve understanding of the reserves' natural and cultural heritage, the processes that affect them and the requirements for management of particular species.</p> <p>Currently there are no research programs occurring in the reserves.</p>	<p>Research enhances the management information base and has minimal environmental impact.</p>	<p>Encourage research to improve knowledge and management of natural and cultural heritage. Priority will be given to studies of cultural heritage values, physical geography and natural values of the reserves.</p>	<p>Low</p>
<p>Management operations</p> <p>Management trails exist within some of the reserves.</p> <p>Several roads through the reserves are used to access private and leasehold property. The NPE Act states that the Minister cannot close any roads that provide the only practical means of access to a private land holding.</p> <p>Public access roads and fire trails run through Ironmungy, Paupong and Nimmo NRs. Roads do not follow the gazetted road reserve.</p> <p>The boundaries of Bobundara, Ironmungy, Wullwye and Paupong NRs where they are in common with grazed lands are currently fenced to a stock proof standard.</p> <p>The boundaries of Myalla and Nimmo NRs where they are common with grazed lands are currently only partially fenced to a stock proof standard.</p>	<p>Management facilities adequately serve management needs and have acceptable impact.</p> <p>Domestic stock do not enter the reserves.</p>	<p>Maintain trails retained for management purposes (see reserve maps).</p> <p>Negotiate access agreements for historical stock route use where it existed in the reserves immediately prior to gazettal.</p> <p>Where stock encroachment becomes a problem, enter into fencing agreements with neighbours.</p> <p>NPWS will consult with neighbours to determine the existing use of internal roads and appropriate legal arrangements for continued access and future maintenance. NPWS is legally obliged to maintain roads held under Part 11 of the NPW Act but may enter into maintenance agreements with users.</p>	<p>Medium</p> <p>Medium</p> <p>Medium</p> <p>Medium</p>

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.

APPENDIX 1

Vertebrate fauna species of the Snowy catchment

The vertebrate fauna species of the Snowy catchment specific to the reserve areas listed as Endangered or Vulnerable on Schedules 1 & 2 of the TSC Act 1995.

Scientific Name	Common Name	Snowy River Corridor	Legal Status*
<i>Cercartetus nanus</i>	Eastern Pygmy-possum		E
<i>Phascolarctos cinereus</i>	Koala	Y	V
<i>Pseudomys fumeus</i>	Smoky Mouse	Y	E
<i>Litoria reniformis</i>	Southern Bell Frog		E
<i>Xanthomyza phrygia</i>	Regent Honeyeater		E

*E-Endangered as listed under Schedule 1 of the Threatened Species Conservation Act 1995

V-Vulnerable as listed under Schedule 2 of the TSC Act

Y-Yes, exists

APPENDIX II

Introduced Plant Species found on each reserve

Species - Scientific Name	Common Name	Bobundara	Ironmungy	Myalla	Wullwye	Paupong	Ngadang	Nimmo
<i>Acetosella vulgaris</i>	Sheep Sorrel	*	*	*	*			*
<i>Aira sp.</i>		*	*	*	*	*		
<i>Carthamus lanatus</i>	Saffron Thistle			*			*	
<i>Centarium erythaea</i>	Common Centuary	*				*		*
<i>Cirsium vulgare</i>	Black Thistle	*		*				*
<i>Crataegus monogyna</i>	Hawthorn	*		*				
<i>Echium vulgare</i>	Vipers Bugloss				*		*	*
<i>Eragrostis curvula</i>	African Lovegrass	*	*	*	*		*	
<i>Euphorbia drummondii</i>	A Spurge	*						*
<i>Hypochaeris radicata</i>	Catsear	*	*	*	*	*		*
<i>Marrubium vulgare</i>	Horehound	*					*	
<i>Nassella trichotoma</i>	Serrated Tussock	*	*	*	*		*	
<i>Petrorhagia nanteuilii</i>		*	*		*			
<i>Rosa rubiginosa</i>	Sweet Briar	*		*		*	*	*
<i>Rubus fruticosus</i>	Blackberry					*	*	*
<i>Rumex sp.</i>			*		*			
<i>Salvia verbenaca</i>	Wild Sage	*	*		*			*
<i>Sonchus sp.</i>		*		*		*		
<i>Trifolium arvense</i>	Haresfoot Clover	*	*	*	*			*
<i>Verbascum thapsus</i>	Great Mullein	*	*	*	*	*	*	*
<i>Verbascum virgatum</i>	Twiggy Mullein	*	*	*	*		*	*
<i>Vulpia myuros</i>		*	*	*	*			
<i>Bromus sp.</i>		*						
<i>Galium sp.</i>		*	*	*	*	*		

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