



Environment,  
Climate Change & Water  
National Parks & Wildlife Service



# Ellerslie Nature Reserve

## Plan of Management





**ELLERSLIE NATURE RESERVE**  
**PLAN OF MANAGEMENT**

**NSW National Parks and Wildlife Service**

**Part of the Department of Environment, Climate Change and Water**

**May 2010**

**This plan of management was adopted by the Minister for Climate Change and the Environment on 18<sup>th</sup> May 2010.**

### **Acknowledgments**

The NPWS acknowledges that this reserve is in the traditional country of the Wiradjuri people.

This plan of management is based on a draft plan prepared by the staff of the South West Slopes Region of the NSW National Parks and Wildlife Service (NPWS), part of the Department of Environment, Climate Change and Water.

Cover photograph by Jo Caldwell, NPWS.

For additional information or any inquiries about this reserve or this plan of management, contact the NPWS Murrumbidgee Area Office, 7a Adelong Road Tumut, NSW, 2720 or by telephone on 6947 7000.

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## FOREWORD

Ellerslie Nature Reserve is located 17 kilometres northwest of Adelong on the South West Slopes of NSW and covers an area of 1877 hectares.

Ellerslie Nature Reserve forms part of a fragmented network of conservation reserves in the South West Slopes bioregion. Six distinct forest ecosystems are found within the reserve and a diverse range of native animals including 5 amphibian species, 10 reptile species, 15 mammal species and 85 bird species.

The reserve also contains a number of Aboriginal sites, the remains of a possible property boundary tree, and an inscribed plaque which commemorates the grazing history of the area.

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

A draft plan of management for Ellerslie Nature Reserve was placed on public exhibition from 17<sup>th</sup> October 2008 until 16<sup>th</sup> February 2009. The submissions received were carefully considered before adopting this plan.

This plan contains a number of actions to achieve the State Plan priority to “Protect our native vegetation, biodiversity, land, rivers and coastal waterways”, including flora and fauna surveys and control of introduced plant and animal species which are impacting upon habitat values.

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

A handwritten signature in black ink, appearing to read 'Frank Sartor', with a long horizontal flourish extending to the right.

**Frank Sartor MP**  
**Minister for Climate Change and the Environment**



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## 1. MANAGEMENT CONTEXT

### 1.1 LEGISLATIVE AND POLICY FRAMEWORK

The management of nature reserves in NSW is in the context of a legislative and policy framework, primarily the *National Parks and Wildlife Act 1974* (NPW Act), the NPW Regulation, the *Threatened Species Conservation Act 1995* (TSC Act) and the policies of the National Parks and Wildlife Service (NPWS). The policies are based on 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) may require the assessment and mitigation of the environmental impacts of works proposed in this plan.

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

### 1.2 MANAGEMENT PURPOSES AND PRINCIPLES

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

Under the Act, nature reserves are managed to:

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

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

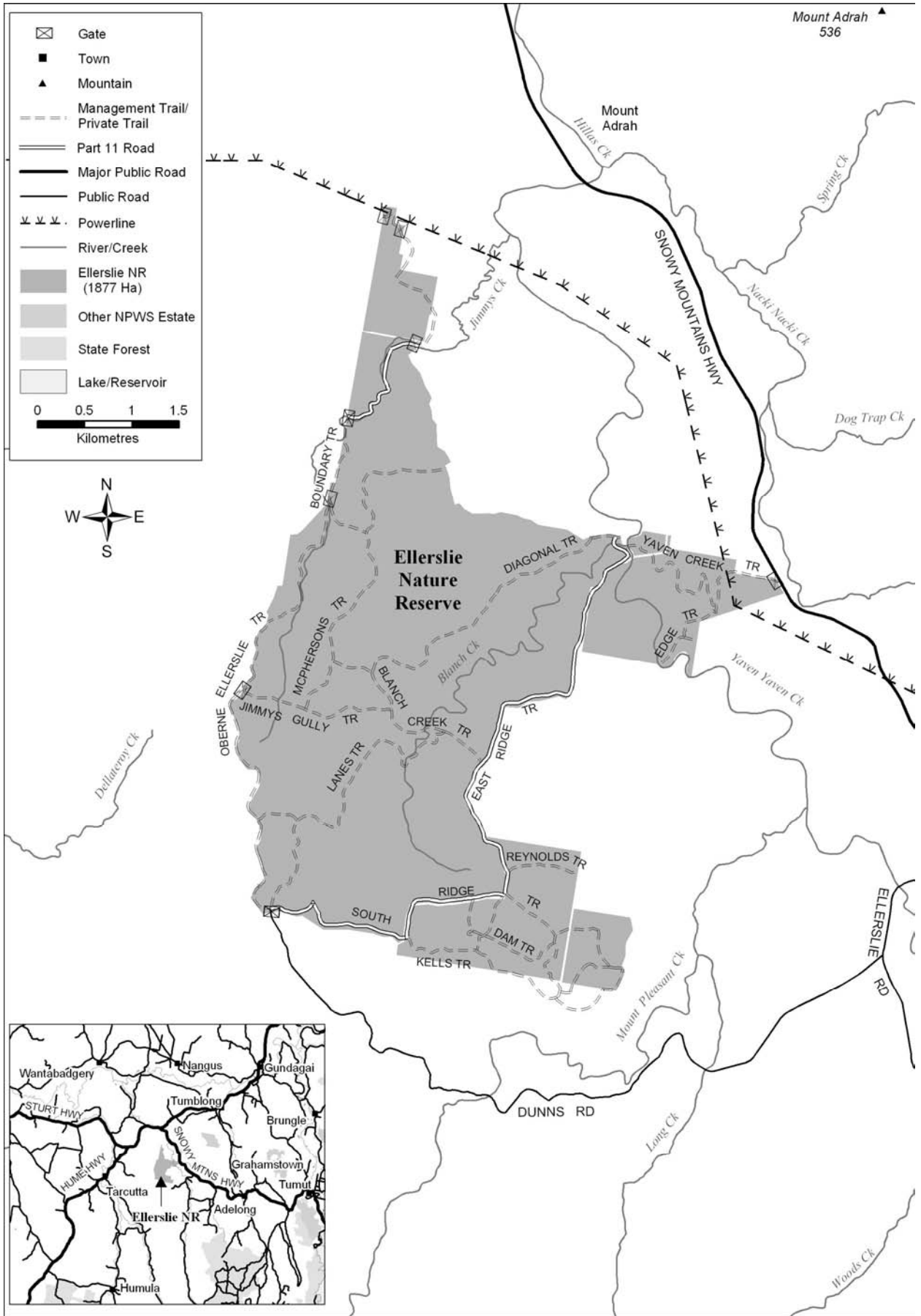


### **1.3 REGIONAL FOREST AGREEMENTS**

Regional Forest Agreements (RFAs) 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 process 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 assessments 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.

The Southern Regional Forest Agreement covers the planning area. The process leading up to the RFA provided for major additions to the reserve system, including the establishment of Ellerslie Nature Reserve.

# RESERVE MAP



Ellerslie Nature Reserve: Plan of Management

## 2. ELLERSLIE NATURE RESERVE

### 2.1 LOCATION, GAZETTAL AND REGIONAL SETTING

Ellerslie Nature Reserve (referred to as "the reserve" in this plan) is located 17 kilometres northwest of Adelong in the South West Slopes of NSW. The reserve covers an area of 1877 hectares on the western side of the Snowy Mountains Highway and encompasses part of the Ellerslie Range.

The reserve was established on 1<sup>st</sup> January 2001 as part of the Southern Regional Forest Agreement, with an initial size of 1278 hectares. Prior to this gazettal most of the reserve was managed as Ellerslie State Forest, by the then State Forests of NSW (now Forests NSW). Since the original gazettal several additions have been made through purchase of private lands.

The reserve forms part of a fragmented network of conservation reserves in the South West Slopes bioregion. There are also areas of remnant native vegetation on private property to the east, west and south of the reserve. The lands surrounding the reserve are predominantly used for private pine plantations and mixed dryland farming, and there has been a long history of clearing in the region to make way for agriculture.

The reserve is within the geographical area of the Murrumbidgee Catchment Management Authority, Hume Livestock Heath and Pest Authority, Gundagai and Tumut Shire Councils, and the Brungle-Tumut Local Aboriginal Land Council.

Several roads though Ellerslie Nature Reserve are used to access private property. These roads that are currently vested in the Minister on behalf of the Crown for the purposes of Part 11 of the NPW Act. These roads do not currently form part of the gazetted area of Ellerslie. They were created by the *National Parks Estate (Southern Region Reservations) Act 2000* (NPE Act) to ensure that essential access arrangements which existed immediately before the reserve was gazetted could continue. The NPE Act provides that, following assessment, these roads must be either added to or excluded from the reserve.

### 2.2 MANAGEMENT DIRECTIONS

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

- protection of threatened species;
- control of introduced plant and animal species;
- continued research to expand knowledge of ecological processes and management prescriptions that maintain or enhance species diversity;
- the reduction as far as possible of unplanned fire in the reserve;
- liaison with neighbours for cooperative implementation of pest control and broader management programs to promote reserve values.

### 3. NATURAL AND CULTURAL VALUES

#### 3.1 LANDFORM, GEOLOGY AND SOILS

Ellerslie Nature Reserve is situated on the lower ranges west of the Australian alpine region. The reserve is orientated in a north/south direction and has an altitudinal range between 270 metres and 550 metres. A ridgeline bisects the reserve from north to south and falls to undulating country to the east and west. A number of streams originate in or pass through the reserve, eventually draining into Yaven Yaven Creek to the east. Yaven Yaven Creek passes through the eastern portion of the reserve and is the only permanent source of running water.

The majority of the reserve is underlain by upper Ordovician sediments dominated by quartzite, slate, phillite and greywacke. The northern section is underlain by upper Silurian conglomerates, sandstones, siltstones and minor volcanics. The soils of the reserve are red and yellow podzolic duplex soils (Stelling 1998).

#### 3.2 NATIVE PLANTS

A combination of environmental factors such as climate, geology, topography and land use has resulted in a variety of vegetation communities and some significant plant associations within the reserve. In 2004 EcoGIS (2004) undertook a comprehensive vegetation survey and mapping project for selected reserves in the South West Slopes region, including this reserve. This project provided the NPWS with species and distribution data and a high level of knowledge of the vegetation types in the reserve.

Six distinct forest ecosystems were identified within the reserve and these can be summarised as:

1. **Apple box moist sedge-grass-herb forest** – containing a canopy of apple box *Eucalyptus bridgesiana*, Blakely's red gum *E. blakelyi*, red box *E. polyanthemos*, and yellow box *E. melliodora*. The mid-storey consists of silver wattle *Acacia dealbata* and tea tree *Leptospermum continentale*. The ground layer is dominated by forbs such as sheep's burr *Acaena ovina*, kidneyweed *Dichondra repens*, tall sundew *Drosera auriculata*, and western bear's ear *Cymbonotus preissianus*. This forest type commonly occurs in the riparian zones of the major creek lines within the reserve. This community has importance because in most places it has been significantly cleared and altered in the past due to the grazing value of the riparian zone.
2. **Norton's-rough barked red box valley floor moist forest** – containing a canopy of Norton's box *Eucalyptus nortonii*, red box *E. polyanthemos ssp vestita*, red stringybark *E. macrorhyncha*, and apple box *E. bridgesiana*. The mid-storey consists of hoary guinea flower *Hibbertia obtusifolia*, silver wattle *Acacia dealbata* and a bush pea *Pultenaea cunninghamii*. The ground layer consists of small St John's wort *Hypericum gramineum*, native carrot *Daucus glochidiatus*, stinking pennywort *Hydrocotyle laxiflora*, twyning glycine *Glycine clandestina*, *Poranthera microphylla* and wattle mat rush *Lomandra filiformis ssp coriacea*, as well as velvet wallaby grass *Danthonia pilosa var pilosa*, common wheat grass *Elymus scaber var scaber* and long-hair plume-grass *Dichelachne sieberiana*. This forest type is usually

associated with lower southern aspects and only populates a small area in the southwest corner of the reserve.

3. **White box-Blakely's red gum herb-grass woodland** – containing a canopy of Blakely's red gum *Eucalyptus blakelyi*, white box *E. albens*, red stringybark *E. macrorhyncha* and red ironbark *E. sideroxylon*. The mid-storey consists of the bush peas *Goodia medicaginea* and *Pultenaea subspicata*, and grass tree *Xanthorrhoea glauca* ssp *angustifolia*. The ground layer consists of nodding blue lily *Stypandra glauca*, tall sundew *Drosera auriculata*, wattle mat rush *Lomandra filiformis* ssp *filiformis*, rock fern *Cheilanthes austrotenuifolia*, ivy goodenia *Goodenia hederacea* ssp *hederacea*, and daphne heath *Brachyloma daphnoides*. This vegetation group is found on the exposed lower slopes of the reserve where the gradients are gentler. It is extensive across the central and northern parts of the reserve.
4. **Red box-scribbly gum-dry grass-forb forest** – containing a canopy of Blakely's red gum *Eucalyptus blakelyi*, red ironbark *E. sideroxylon*, Norton's box *E. nortonii*, scribbly gum *E. rossii* and white box *E. albens*. The mid-storey consists of a bush pea *Pultenaea altissima*, grass tree *Xanthorrhoea glauca* ssp *angustifolia* and prickly moses *Acacia ulicifolia*. The ground layer consists of mulga fern *Cheilanthes sieberi* ssp *sieberi*, native carrot *Daucus glochidiatus*, ivy goodenia *Goodenia hederacea* ssp *hederacea*, nodding blue lily *Stypandra glauca*, *Senecio species E*, native flax *Linum marginale*, wattle mat rush *Lomandra filiformis* and grey tussock grass *Poa sieberiana* var *sieberiana*. This community type occurs on the ridges and exposed aspects and is most common in the southern part of the reserve. It is very similar to the white box-Blakely's red gum woodland of the lower slopes, however this ridge community tends to have a more dominant cover of scribbly gum and red ironbark.
5. **Long-leaved box-silver wattle moist grass-herb forest** – containing a canopy of red stringybark *Eucalyptus macrorhyncha* and long-leaved box *E. gonicalyx*. The mid-storey consists of silver wattle *Acacia dealbata*, and hoary guinea flower *Hibbertia obtusifolia*. The ground layer consists of stinking pennywort *Hydrocotyle laxiflora*, daphne heath *Brachyloma daphnoides*, wattle mat rush *Lomandra filiformis* ssp *coriacea*, dwarf blue trumpet *Brunoniella pumilio*, *Danthonia pilosa* var *pilosa*, *Gonocarpus tetragynus*, *Senecio tenuiflorus* and plumegrass *Dichelachne hirtella*. This community is found on the sheltered southerly and easterly aspects of the reserve, mostly in the northeastern section. The group is characterised by a dense carpet of grasses and forbs, in contrast with the more sporadic, open understorey found in the more exposed parts of the reserve.
6. **Red stringybark-scribbly gum-rough barked red box dry forb-tussock grass open forest** – containing a canopy of red box *Eucalyptus polyanthemos* ssp *vestita*, scribbly gum *E. rossii* and red stringybark *E. macrorhyncha*. The mid-storey consists of common raspwort *Gonocarpus tetragynus*, urn heath *Melichrus urceolatus*, prickly hibbertia *Hibbertia acicularis*, a bush pea *Pultenaea foliolosa* and rosemary grevillea *Grevillea rosmarinifolia*. The ground layer consists of common native violet *Goodenia hederacea* ssp *hederacea*, wattle mat-rush *Lomandra filiformis* ssp *coriacea*, grey tussock grass *Poa sieberiana* var *sieberiana*, daphne heath *Brachyloma daphnoides*, blunt greenhood *Pterostylis curta*, tall greenhood *Pterostylis longifolia* and small ruddy-hood *Pterostylis pusilla*. This forest type only populates a small area on the central eastern side of the reserve.

Occurrences of white box, red box and Blakely's red gum in the reserve are regarded as a component of the White Box-Yellow Box-Blakely's Red Gum Woodland association that is listed as an Endangered Ecological Community under the TSC Act. No other threatened flora species have been recorded in the reserve to date.

A Priorities Action Statement has been prepared that identifies strategies and actions to promote the recovery of threatened plant species, populations and ecological communities and manage key threatening processes, including the White Box-Yellow Box-Blakely's Red Gum Endangered Ecological Community. In addition, more detailed recovery plans may be prepared for threatened species or communities.

The lands surrounding Ellerslie Nature Reserve has been somewhat cleared for agricultural or forestry activities. The conservation of areas for native vegetation in the vicinity of the reserve is important because it protects a greater range of habitats for threatened species in the region that are impacted by loss of habitat.

### 3.3 NATIVE ANIMALS

The reserve contains a diverse range of native animals including 5 amphibian species, 10 reptile species, 15 mammal species and 85 bird species. A comprehensive list of native fauna recorded in the reserve is included in Appendix 1 of this document. Given the high diversity of fauna species identified, the habitat value of the reserve is considered high. The reserve forms part of a broader habitat for these species and others are likely to exist around the reserve.

Surveys undertaken in 2004 and the Atlas of NSW Wildlife records reveal a number of threatened species occurring in the reserve that are listed as vulnerable under the *Threatened Species Conservation Act*. Threatened species recorded in the reserve include:

**Table 1: Threatened fauna species recorded in Ellerslie Nature Reserve.**

Species Name	Common Name
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo
<i>Climacteris picumnus</i>	Brown Treecreeper
<i>Stagonopleura guttata</i>	Diamond Firetail
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)
<i>Neophema pulchella</i>	Turquoise Parrot
<i>Petaurus norfolcensis</i>	Squirrel Glider
<i>Petaurus australis</i>	Yellow-bellied Glider
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-Bat

The Priorities Action Statement also identifies strategies and actions to promote the recovery of threatened animal species and populations.

## **3.4 CULTURAL HERITAGE**

### **3.4.1 Aboriginal Heritage**

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

Aboriginal artefacts have been located across a broad range of landscapes within the South West Slopes Region. A preliminary survey undertaken by Dearling (2003) revealed a number of Aboriginal sites within the reserve. These included 9 open artefact scatters, 1 scarred tree and 2 isolated finds. The steep and hilly nature of the reserve means that Aboriginal people were more likely to have made use of the flatter country outside of the reserve area (Dearling 2003).

The reserve lies within Wiradjuri country and falls within the area of the Tumut Brungle Local Aboriginal Lands Council.

### **3.4.2 Historic Heritage**

The first Europeans to have entered the area around reserve were the explorers Hamilton Hume and William Hovel, who passed through the region in 1824 and 1825 (Smith 2003).

Historic maps of the area show that much of the land within the present boundaries of Ellerslie Nature Reserve was held as either conditional purchases or conditional lease prior to 1954. On 24<sup>th</sup> December 1954 parts of the existing reserve were appropriated and resumed as a Bird and Animal Sanctuary, and on the 19<sup>th</sup> August 1955 the majority of the reserve area was declared as Ellerslie State Forest (No 945) (Smith 2003).

The remains of a possible boundary tree with an inscribed plaque is situated in the central eastern section of the reserve. The plaque was originally placed to commemorate 100 years of occupation of 'Yabtree' station by the Horsley family. The tree containing the plaque was burnt down in 1959 and the plaque was subsequently cemented into the stump (Smith 2003).

The marking of the Yabtree property boundary was described by Commissioner Binningham in a NSW Government Gazette of 30 September 1848 where it states that a tree on Yaven Yaven Creek marks one of the corners of this property (the homestead for the property is located at Nangus, some 21 kilometres north of the reserve). It is unknown whether the tree mentioned by Commissioner Binningham in his 1848 description of Yabtree and the remains of the tree in which the cement plaque has been placed are one and the same. However it is conceivable that they are, and as such they represent a historic event that occurred over 150 years ago in the area (Smith 2003).

### **3.5 EDUCATION AND USE**

Public walking access to the reserve is available from the Snowy Mountains Highway, 17 kilometres west of Adelong. There is parking space for a limited number of vehicles near the gated entrance and access from there is on foot.

Reserve identification signs are located at the main entrance points. There are no public facilities in the reserve. All trails within the reserve are management trails and are not for public vehicular use, with the exception of the Part 11 roads referred to in section 2.1 and shown on the map.

The primary purposes of nature reserves are conservation of wildlife and natural environments and provision of opportunities for education and scientific research into these resources. The reserve currently receives low levels of use for activities such as nature study, walking and bird watching.

Camping is not allowed in the reserve. Organised group activities such as school visits and bird watching groups will be permitted in the reserve subject to consent from NPWS to carry out these activities. This consent process will assist NPWS in minimising impacts and managing users' conflict and safety.

### **3.6 RESEARCH**

Research into the natural and cultural features of the reserve and their maintenance requirements is important for the on-going development of appropriate management techniques. Research undertaken to date includes flora surveys, fauna surveys and fuel sampling. This research provides a fundamental framework for making informed management decisions. Additional research would assist with further refinement of management principles and practices in the future. The NPWS may carry out ongoing monitoring and research programs as time and resources permit. Encouragement of research by other organisations and individuals may provide valuable information for management.



## 4. THREATS TO RESERVE VALUES

### 4.1 INTRODUCED PLANTS

An introduced plant species is defined in this plan as any plant species not native to the reserve. Introduced species within the reserve and on adjoining land are of concern because they have the potential to have detrimental effects on ecological values and can spread to and from neighbouring land. The *Noxious Weeds Act 1993* places an obligation upon public authorities to control noxious weeds on land that they occupy to the extent necessary to prevent such weeds spreading to adjoining lands. NPWS also has a priority to control environmental weeds (not necessarily declared noxious) which threaten natural habitats.

The NPWS South West Slopes Region Pest Management Strategy (2003 & 2007) identifies priority pest species and programs for action through set criteria. By following a similar process the prioritisation of reserve pest species programs may be established and directly linked into the regional strategies (refer to the South West Slopes Region Pest Management Strategy). This risk analysis has considered such issues as (yet not limited by) the control of weeds in endangered ecological communities, significant remnant vegetation associations, threatened/endangered species habitat and areas of community/neighbour concern. The risk of new weed incursions will also be considered.

Introduced plant species recorded in the reserve include blackberry *Rubus fruticosus*, tree of heaven *Ailanthus altissima*, Paterson's curse *Echium plantagineum*, St. Johns wort *Hypericum perforatum*, sweet briar *Rosa rubiginosa*, saffron thistle *Carthamus lanatus* and a range of pasture grasses. Since gazettal, weed control programs have focussed on reducing the extent and distribution of these species, particularly tree of heaven and blackberry.

### 4.2 INTRODUCED ANIMALS

An introduced animal is any animal species not native to the reserve. Introduced animals may impact upon native fauna populations through predation or competition for food or shelter. The Regional Pest Management Strategy (2003 & 2007) identifies the pest animal species known to occur within the region, including the reserve, and ranks them in terms of their potential to damage land, alter natural processes and/or disturb native animal populations and habitats. Management strategies for each species are outlined in this document as well as preferred methods of control. Introduced animals in the reserve include foxes, cats, rabbits, domestic stock and goats.

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

Rabbits occur in the cleared valleys of the reserve and at this stage no control programs have been undertaken. Rabbit populations will be monitored and control programs undertaken as required ensuring that populations do not impact upon the reserve. Competition and grazing by the European rabbit has been declared a key threatening process under the TSC Act and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Domestic stock straying from neighbouring properties continue to enter and graze parts of the reserve. Grazing leads to a marked decrease in diversity of plant species, and nitrification of soils occurs where stock congregate overnight.

The NPWS has undertaken an annual program of aerial shooting of feral goats for the last five years, and so far a total of 370 goats have been destroyed. This program will continue while this method of control is cost effective and achieves the desired result, however, once numbers become low other control options may be considered. The NPWS would be willing to participate in a broader co-operative program of goat control along the Ellerslie range, as it is an ongoing issue for this reserve. Competition and habitat degradation by feral goats has been declared a key threatening process under the TSC Act and EPBC Act. Feral goats present a threat to plant communities given the large number of plant species that are palatable to them. Feral goats can cause significant habitat degradation, decrease soil stability, alter habitat of native flora/fauna and contribute to erosion.

#### **4.3 FIRE MANAGEMENT**

Fire is a natural feature of many Australian vegetation communities and environments. It may be essential to the survival of some plant communities and benefit some fauna species. Inappropriate fire regimes, however, can lead to the loss of many other plant and animal species and communities. Fire can also damage cultural heritage features and management facilities within the reserve and can threaten visitors and neighbouring assets.

Recorded wildfire data is limited prior to 2000, however, fire scars indicate that wildfires have occurred within the reserve in the last 20-30 years. In December 1998 a wildfire on private property burnt a small portion in the north of the reserve, this also occurred in 2001. Only one ignition has been recorded in the reserve since its gazettal in 2001. This fire was started by lightning and burnt 1 hectare. During the same period two other fires were started by lightning on private property adjoining the reserve.

There are a number of assets within 1 kilometre of the reserve boundary, mostly associated with agriculture (homesteads, sheds, pastures) and a pine plantation. These assets were considered when NPWS developed the fire management strategy for this reserve (NPWS 2006). This map-based strategy outlines life, property and natural and cultural resource protection strategies specific to the reserve.

NPWS maintains cooperative arrangements with surrounding landowners and Rural Fire Service (RFS) brigades and is actively involved in the Riverina Highlands Zone Bush Fire Management Committee. Cooperative arrangements include approaches to trail maintenance, asset protection, fuel management, support for neighbour fire management efforts and information sharing.

#### **4.4 CLIMATE CHANGE**

Climate change has been listed as a key threatening process under the TSC Act. Projections of future changes in climate for NSW include higher temperatures, increasing sea levels and water temperatures, elevated CO<sub>2</sub>, more intense but possibly reduced annual average rainfall, increased temperature extremes and higher evaporative demand (Department of Environment and Conservation 2007). These changes are likely to lead to greater intensity and frequency of fires, more severe droughts, reduced river runoff and water availability, regional flooding, increased erosion and ocean acidification.

Climate change may significantly affect biodiversity by changing population size and distribution of species, modifying species composition, and altering the geographical extent of habitats and ecosystems. The potential impact of climate change is difficult to assess since it depends on the compounding effects of other pressures, particularly those with small population sizes or with slow growth rates.

Adjusting our management of the environment through programs to reduce the pressures arising from other threats such as habitat fragmentation, invasive species, bushfires, pollution and urban expansion will help reduce the severity of the effects of climate change.

## 5. MANAGEMENT STRATEGIES AND ACTIONS

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
<p><b>Soil and water conservation</b></p> <p>There are no major soil erosion or water quality issues within the reserve even though the terrain is very steep. The reserve is generally dry, except for Yaven Yaven Creek which runs all year.</p>	<p>Soil erosion is minimised.</p>	<ul style="list-style-type: none"> <li>➤ Undertake all trail works in a manner that minimises erosion and water pollution.</li> </ul>	High
<p><b>Native plants</b></p> <p>The reserve possesses a high diversity of native flora including grassy white box woodland remnants which are listed as an endangered ecological community under the TSC Act.</p> <p>Some areas of the reserve have been disturbed by past use and are cleared of any native trees.</p> <p>The reserve boundary is fenced to varying standards. Evidence of grazing from domestic stock exists in the reserve.</p>	<ul style="list-style-type: none"> <li>➤ Native plant and animal species and communities are conserved.</li> <li>➤ Domestic stock does not enter the reserve.</li> <li>➤ Structural diversity and habitat values are restored in areas subject to past disturbance.</li> <li>➤ Neighbours support the conservation of remaining areas of privately owned native vegetation near the reserve.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Encourage vegetation surveys for predicted threatened plant species.</li> <li>➤ Manage the white box woodland remnants and any other TSC listed species found in the reserve in accordance with the Priority Action Statement.</li> <li>➤ Enter into fencing agreements with relevant neighbours in accordance with the NPWS Boundary Fencing Policy, to ensure domestic stock are kept out of the reserve.</li> <li>➤ Implement a program to restore native vegetation in the cleared areas of the reserve.</li> <li>➤ Liaise with neighbours, Landcare groups, Catchment Management Authorities and other agencies to encourage retention and if possible expansion of native vegetation close to the reserve.</li> </ul>	<p>Medium</p> <p>High</p> <p>High</p> <p>Medium</p> <p>Medium</p>

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
<p><b>Native Animals</b></p> <p>The reserve possesses a high diversity of native fauna.</p> <p>A number of threatened species exist within the reserve. These include arboreal mammals and birds. Threats to these species are well documented. The effect of fire on these species is unclear.</p> <p>The reserve is generally linked to other tracts of native vegetation, allowing movement of native animals between potential habitats.</p>	<ul style="list-style-type: none"> <li>➤ Native animal species are conserved.</li> <li>➤ There is greater understanding of species diversity, and distribution and ecological requirements.</li> <li>➤ Structural diversity and habitat values are restored in areas subject to past disturbance.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Implement measures in recovery plans and Priority Action Statements for threatened species.</li> <li>➤ Encourage surveys for predicted threatened animal species and research into fire effects.</li> <li>➤ Work with neighbours and catchments management committees to encourage conservation of remnant native vegetation in the vicinity of the reserve, particularly the conservation of the grassy white box woodland remnants.</li> </ul>	<p>High</p> <p>Medium</p> <p>Low</p>
<p><b>Cultural Heritage</b></p> <p>Several Aboriginal sites have been recorded in the reserve.</p> <p>One historic heritage site (a plaque) has been recorded in the reserve. This site is associated with the local Horsley family.</p>	<ul style="list-style-type: none"> <li>➤ Aboriginal and historic features and values are identified and protected.</li> <li>➤ Understanding of the cultural values of the reserve is improved.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Record, conserve and protect Aboriginal sites found within the reserve in consultation with the Tumut Brungle Local Aboriginal Lands Council.</li> <li>➤ Retain the plaque and the stump on which it is located.</li> <li>➤ Encourage further surveys and research into the cultural heritage of the reserve.</li> </ul>	<p>High</p> <p>High</p> <p>Low</p>

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
<p><b>Introduced Plants and Animals</b></p> <p>The reserve contains a number of weed species including blackberry, St Johns wort, sweet brier, saffron thistle and tree of heaven. Control programs have commenced for these species in accordance with regional priorities.</p> <p>The reserve contains a number of introduced animal species including rabbits, red foxes, goats and feral cats.</p> <p>Straying cattle and sheep enter the reserve and graze for varying periods of time. Grazing leads to a marked decrease in diversity of plant species and nitrification of soils occurs where stock congregate.</p> <p>Some areas of the reserve have been disturbed from past use and are cleared of any native trees.</p>	<ul style="list-style-type: none"> <li>➤ To minimise adverse impacts of pests on biodiversity and other park values while complying with legislative responsibilities.</li> <li>➤ The impacts of introduced species on native species particularly threatened species and neighbouring lands is minimised.</li> <li>➤ Introduced plants and animals are controlled where possible eliminated.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Control introduced plant and animal species in accordance with the South West Slopes Regional Pest Management Strategy. Priority will be given to reduction of blackberry, tree of heaven, St Johns wort and control of goats, foxes and rabbits.</li> <li>➤ Seek the cooperation of other authorities and neighbours in implementing weed and pest animal programs.</li> <li>➤ Monitor the reserve for noxious and significant environmental weeds. Treat any new outbreaks where possible.</li> <li>➤ Enter into boundary fencing agreements in accordance with NPWS boundary fencing policy and implement strategies to exclude stock.</li> <li>➤ Implement a native restoration program in the cleared areas of the nature reserve to improve habitat for native animals and assist in controlling weed species.</li> </ul>	<p>High</p> <p>Medium</p> <p>Medium</p> <p>High</p> <p>Medium</p>

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
<p><b>Fire Management</b></p> <p>Research suggests frequent or regular fire can lead to the loss of a particular plant and animal species and communities.</p> <p>Recorded wildfire data is limited, however fire scars indicate few fires have occurred within the reserve in the last 20-30 years.</p> <p>The reserve is close to a private pine plantation and other assets. A fire management strategy has been prepared for the reserve.</p> <p>There are a number of dams in the reserve.</p>	<ul style="list-style-type: none"> <li>➤ Life, property and natural and cultural values are protected from fire.</li> <li>➤ Natural and cultural values within the reserve are protected from fire.</li> <li>➤ Fire regimes are appropriate for conservation of native plant and animal communities.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Implement the fire management strategy for the reserve.</li> <li>➤ Continue to participate in the Riverina Highlands Bush Fire Management Committee. Maintain coordination and cooperation with the Rural Fire Service brigades, fire control officers and neighbours with regards to fire management.</li> <li>➤ Encourage further research into the ecological effects of fire in the reserve.</li> <li>➤ Maintain the management trails shown on the map (refer page 3).</li> <li>➤ Manage the nature reserve to protect biodiversity in accordance with the identified fire interval guidelines stipulated in the fire management strategy.</li> <li>➤ Retain the dams for fire fighting purposes.</li> </ul>	<p>High</p> <p>High</p> <p>Low</p> <p>High</p> <p>High</p> <p>High</p>
<p><b>Climate Change</b></p> <p>Climate change has been listed as a key threatening process under the TSC.</p>	<ul style="list-style-type: none"> <li>➤ The implications of climate change on natural systems are reduced.</li> <li>➤ The effects of climate change are better understood.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Continue to implement fire, pest and weed management programs to increase the reserve's ability to cope with future disturbances, including climate change.</li> <li>➤ Encourage research into appropriate indicator species within the reserve to monitor the effects of climate change.</li> </ul>	<p>Medium</p> <p>Medium</p>

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
<p><b>Education and Use</b></p> <p>Signage is located at the entry points to the reserve indicating the reserve boundary and activities permitted and not permitted in the reserve.</p> <p>There are no visitor facilities and no public vehicular access within the reserve. The reserve currently receives limited use by the public.</p>	<ul style="list-style-type: none"> <li>➤ Visitor use is appropriate and ecologically sustainable.</li> <li>➤ The local community is aware of the significance of the area and of management programs.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Maintain reserve identification at the reserve boundaries.</li> <li>➤ Provide information on appropriate use of the reserve.</li> <li>➤ Continue to allow uses such as walking and bird watching, as these activities are compatible with the purposes and principles for nature reserves. Camping, public vehicular access, horse riding, cycling and solid fuel fires will not be allowed.</li> <li>➤ Exclude vehicle access except for essential management requirements of the reserve.</li> <li>➤ Permit day bushwalks and informal picnics (no facilities will be provided).</li> <li>➤ Permit organised group and educational visits, subject to limits on numbers and other conditions as necessary.</li> <li>➤ Monitor levels of illegal use and access and take action when required.</li> </ul>	<p>High</p> <p>Medium</p> <p>High</p> <p>High</p> <p>Medium</p> <p>Medium</p> <p>Medium</p>



Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
<p><b>Management Operations and Other Uses</b></p> <p>The reserve is managed by the Murrumbidgee Area office of the NPWS South West Slopes Region based in Tumut.</p> <p>The reserve contains a number of management trails for fire suppression, weeds and feral animal control and other management operations</p> <p>There are a number of Part 11 roads in the reserve that are vested in the Minister which allow neighbouring landowners access through the reserve (refer map). The NPWS is no under any obligation to maintain part 11 roads but may enter into maintenance agreements with these users.</p> <p>Currently two powerlines transverse though the reserve.</p>	<ul style="list-style-type: none"> <li>➤ Management facilities operations adequately serve management needs and have minimal impact.</li> <li>➤ All access arrangements are formalised.</li> <li>➤ A good relationship is maintained with reserve neighbours.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Maintain the management trails shown on the reserve map (page 3 of this plan) for management purposes.</li> <li>➤ Consult with neighbours to determine the existing use of Part 11 roads and develop appropriate legal agreements for continued access and future maintenance in accordance with the NPE Act.</li> <li>➤ Power line access is dealt with in accordance with section 153 of the NPW Act.</li> <li>➤ Maintain liaison with neighbours to deal with matters of mutual concern.</li> <li>➤ Continue to remove internal fences in the reserve as necessary.</li> </ul>	<p>High</p> <p>High</p> <p>High</p> <p>High</p> <p>Low</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.

## 6.0 REFERENCES

Bradstock, R., Kenny, B. & Tasker, E. (2003) *Guidelines for Ecological Sustainable Management. Final Report for NSW Biodiversity Strategy*. Department of Environment and Conservation, Hurstville.

Briggs, J.D. & Leigh, J.H. (1996) *Rare or Threatened Australian Plants*. Revised edition. CSIRO, Melbourne.

Department of Environment and Conservation NSW (2007) *Adaptation Strategy for Climate Change Impacts on Biodiversity in NSW* (February 2007 draft).

Dearling, C. (2003) *Preliminary European Cultural Heritage (Desktop) study of selected reserves*, unpublished report to NSW NPWS.

EcoGIS (2004) *Mapping of Vegetation Ecosystems in New and Existing Conservation Reserves*, NPWS, SWS Region. Unpublished Report to NPWS.

NPWS (2005) *Fire Management Manual*. NSW National Parks and Wildlife Service, Hurstville.

NPWS (2006) *Ellerslie Nature Reserve Fire Management Strategy*, NSW National Parks and Wildlife Service, South West Slopes Region, Tumut.

NPWS (2003) *South West Slopes Region Pest Management Strategy*, NSW National Parks and Wildlife Service, South West Slopes Region, Tumut.

NPWS (2007) *South West Slopes Draft Pest Management Strategy 2008-2011*, NSW National Parks and Wildlife Service, South West Slopes Region, Tumut., Unpublished draft report for SWS Region.

Smith, L.M. (2003) *Preliminary (Desktop) European Cultural Heritage Study of Identified NPWS Parks and Reserves*, NSW South West Slopes Region, Unpublished report. For SWS Region.

Stelling, F. (1998) *South West Slopes Revegetation Guide*, Murray Catchments Committee & Department of Lands & Water Conservation, Albury.

## Appendix 1 – Fauna Species Lists

Amphibian species recorded in the reserve include:

Scientific Name	Common Name
<i>Litoria peronii</i>	Peron's Tree Frog
<i>Crinia parinsignifera</i>	Eastern Sign-bearing Froglet
<i>Crinia signifera</i>	Common Eastern Froglet
<i>Limnodynastes dumerilii</i>	Bullfrog
<i>Limnodynastes tasmaniensis</i>	Spotted Marsh Frog

Reptile Species recorded in the reserve include:

Scientific Name	Common Name
<i>Chelodina longicollis</i>	Eastern Snake-necked Turtle
<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake
<i>Christinus marmoratus</i>	Marbled Southern Gecko
<i>Carlia tetradactyla</i>	Southern Rainbow-skink
<i>Ctenotus robustus</i>	Robust Ctenotus
<i>Egernia striolata</i>	Tree-crevice Skink
<i>Hemiergis decresiensis</i>	Three-toed Earless Skink
<i>Lampropholis guichenoti</i>	Pale-flecked Garden Sunskink
<i>Morethia boulengeri</i>	South-eastern Morethia Skink
<i>Varanus varius</i>	Lace Monitor
<i>Pseudonaja textilis</i>	Eastern Brown Snake
<i>Demansia psammophis</i>	Yellow-Faced Whipsnake

Native mammals recorded in the reserve include:

Scientific Name	Common Name
<i>Acrobates pygmaeus</i>	Feathertail Glider
<i>Antechinus flavipes</i>	Yellow-footed Antechinus
<i>Macropus giganteus</i>	Eastern Grey Kangaroo
<i>Wallabia bicolor</i>	Swamp Wallaby
<i>Tadarida australis</i>	White-striped Freetail-bat
<i>Petaurus norfolcensis</i>	Squirrel Glider
<i>Trichosurus vulpecular</i>	Common Brushtail Possum
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat
<i>Chalinolobus morio</i>	Chocolate Wattled Bat
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat
<i>Nyctophilus gouldi</i>	Gould's Long-eared Bat
<i>Vespadelus vulturnus</i>	Little Forest Bat
<i>Vombatus ursinus</i>	Common Wombat

Birds recorded in the reserve include:

<b>Scientific Name</b>	<b>Common Name</b>
<i>Acanthiza lineata</i>	Striated Thornbill
<i>Acanthiza nana</i>	Yellow Thornbill
<i>Acanthiza pusilla</i>	Brown Thornbill
<i>Acanthiza reguloides</i>	Buff-rumped Thornbill
<i>Gerygone fusca</i>	Western Gerygone
<i>Gerygone olivacea</i>	White-throated Gerygone
<i>Sericornis frontalis</i>	White-browed Scrubwren
<i>Smicrornis brevirostris</i>	Weebill
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk
<i>Accipiter fasciatus</i>	Brown Goshawk
<i>Aquila audax</i>	Wedge-tailed Eagle
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar
<i>Anas superciliosa</i>	Pacific Black Duck
<i>Hirundapus caudacutus</i>	White-throated Needletail
<i>Egretta novaehollandiae</i>	White-faced Heron
<i>Artamus cyanopterus</i>	Dusky Woodswallow
<i>Gymnorhina tibicen</i>	Australian Magpie
<i>Strepera graculina</i>	Pied Currawong
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo
<i>Eolophus roseicapillus</i>	Galah
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
<i>Coracina papuensis</i>	White-bellied Cuckoo-shrike
<i>Lalage tricolor</i>	White-winged Triller
<i>Eurostopodus mystacalis</i>	White-throated Nightjar
<i>Climacteris picumnus</i>	Brown Treecreeper
<i>Cormobates leucophaeus</i>	White-throated Treecreeper
<i>Geopelia placida</i>	Peaceful Dove
<i>Phaps chalcoptera</i>	Common Bronzewing
<i>Corcorax melanorhamphos</i>	White-winged Chough
<i>Corvus coronoides</i>	Australian Raven
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo
<i>Chalcites lucidus</i>	Shining Bronze-Cuckoo
<i>Cuculus pallidus</i>	Pallid Cuckoo
<i>Dicaeum hirundinaceum</i>	Mistletoebird
<i>Grallina cyanoleuca</i>	Magpie-lark
<i>Myiagra inquieta</i>	Restless Flycatcher
<i>Myiagra rubecula</i>	Leaden Flycatcher
<i>Rhipidura albiscapa</i>	Grey Fantail
<i>Rhipidura leucophrys</i>	Willie Wagtail
<i>Neochmia temporalis</i>	Red-browed Finch
<i>Stagonopleura guttata</i>	Diamond Firetail
<i>Falco berigora</i>	Brown Falcon
<i>Falco cenchroides</i>	Nankeen Kestrel

<i>Dacelo novaeguineae</i>	Laughing Kookaburra
<i>Todiramphus sanctus</i>	Sacred Kingfisher
<i>Hirundo neoxena</i>	Welcome Swallow
<i>Petrochelidon nigricans</i>	Tree Martin
<i>Malurus cyaneus</i>	Superb Fairy-wren
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill
<i>Anthochaera carunculata</i>	Red Wattlebird
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater
<i>Lichenostomus fuscus</i>	Fuscous Honeyeater
<i>Lichenostomus leucotis</i>	White-eared Honeyeater
<i>Lichenostomus melanops</i>	Yellow-tufted Honeyeater
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)
<i>Melithreptus lunatus</i>	White-naped Honeyeater
<i>Philemon corniculatus</i>	Noisy Friarbird
<i>Merops ornatus</i>	Rainbow Bee-eater
<i>Daphoenositta chrysoptera</i>	Varied Sittella
<i>Oriolus sagittatus</i>	Olive-backed Oriole
<i>Colluricincla harmonica</i>	Grey Shrike-thrush
<i>Falcunculus frontatus</i>	Eastern Shrike-tit
<i>Pachycephala pectoralis</i>	Golden Whistler
<i>Pachycephala rufiventris</i>	Rufous Whistler
<i>Pardalotus punctatus</i>	Spotted Pardalote
<i>Pardalotus striatus</i>	Striated Pardalote
<i>Eopsaltria australis</i>	Eastern Yellow Robin
<i>Microeca fascinans</i>	Jacky Winter
<i>Petroica boodang</i>	Scarlet Robin
<i>Petroica goodenovii</i>	Red-capped Robin
<i>Podargus strigoides</i>	Tawny Frogmouth
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe
<i>Alisterus scapularis</i>	Australian King-Parrot
<i>Glossopsitta pusilla</i>	Little Lorikeet
<i>Neophema pulchella</i>	Turquoise Parrot
<i>Platycercus adscitus eximius</i>	Eastern Rosella
<i>Platycercus elegans</i>	Crimson Rosella
<i>Psephotus haematonotus</i>	Red-rumped Parrot
<i>Gallinula tenebrosa</i>	Dusky Moorhen
<i>Ninox boobook</i>	Southern Boobook
<i>Cincloramphus mathewsi</i>	Rufous Songlark
<i>Zosterops lateralis</i>	Silvereye