NSW NATIONAL PARKS & WILDLIFE SERVICE

Tollingo Nature Reserve and Woggoon Nature Reserve

Planning Considerations

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Cover photo: Mallee shrubland in Woggoon Nature Reserve. Claire Davis /DPIE

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How to use this report

This planning considerations report outlines the matters considered in preparing the Tollingo Nature Reserve and Woggoon Nature Reserve Plan of Management, including the reserves' key values, management principles and management considerations. Further information, including scientific names for common names of species, is provided in the appendices.

It is recommended that readers of this report also read the plan of management. The plan of management describes the desired outcomes for the reserves' values and actions that National Parks and Wildlife Service (NPWS) proposes to undertake to achieve these outcomes. It also sets out the recreational and commercial activities that are permitted in the reserves and any requirements to undertake these activities, including whether consent must be sought from NPWS to undertake them.

This planning considerations report will be updated when appropriate, for example, if we have new information on:

- the values of the reserves (e.g. new threatened species)
- management approaches (e.g. new pest management techniques)
- new programs.

Changes will only be made to this report if they are consistent with the plan of management.

Acknowledgements

Tollingo Nature Reserve is in the traditional Country of the Ngiyampaa People and the Wiradjuri People. Woggoon Nature Reserve is in the traditional Country of the Wiradjuri People.

This report was prepared by staff of NPWS.

Contact us

For more information about this report or Tollingo and Woggoon nature reserves, contact the NPWS Central West Area at Government Office Building, Camp Street, Forbes; PO Box 774, Forbes NSW 2871; or by telephone (02) 6850 2400.

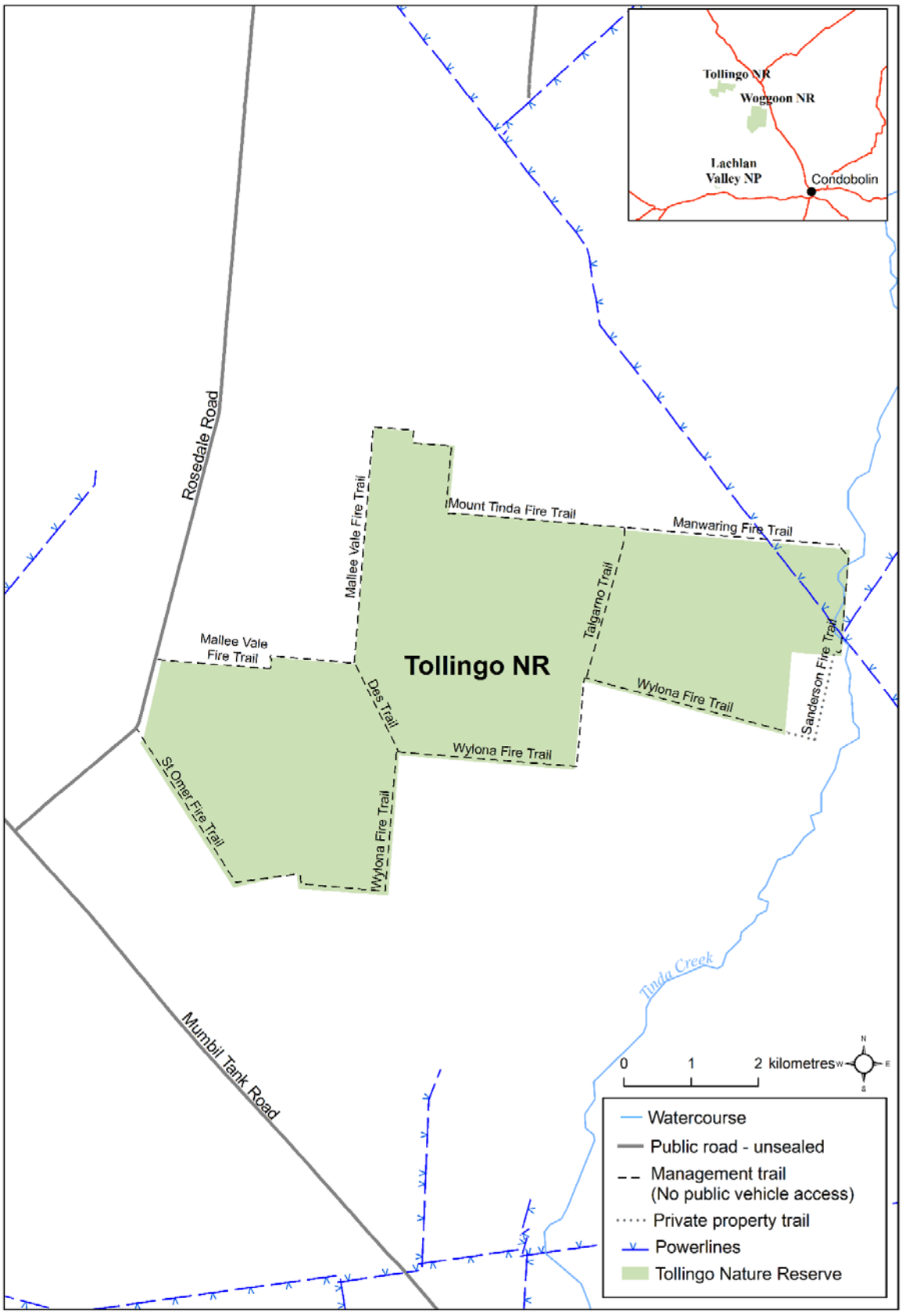


Figure 1 Map of Tollingo Nature Reserve

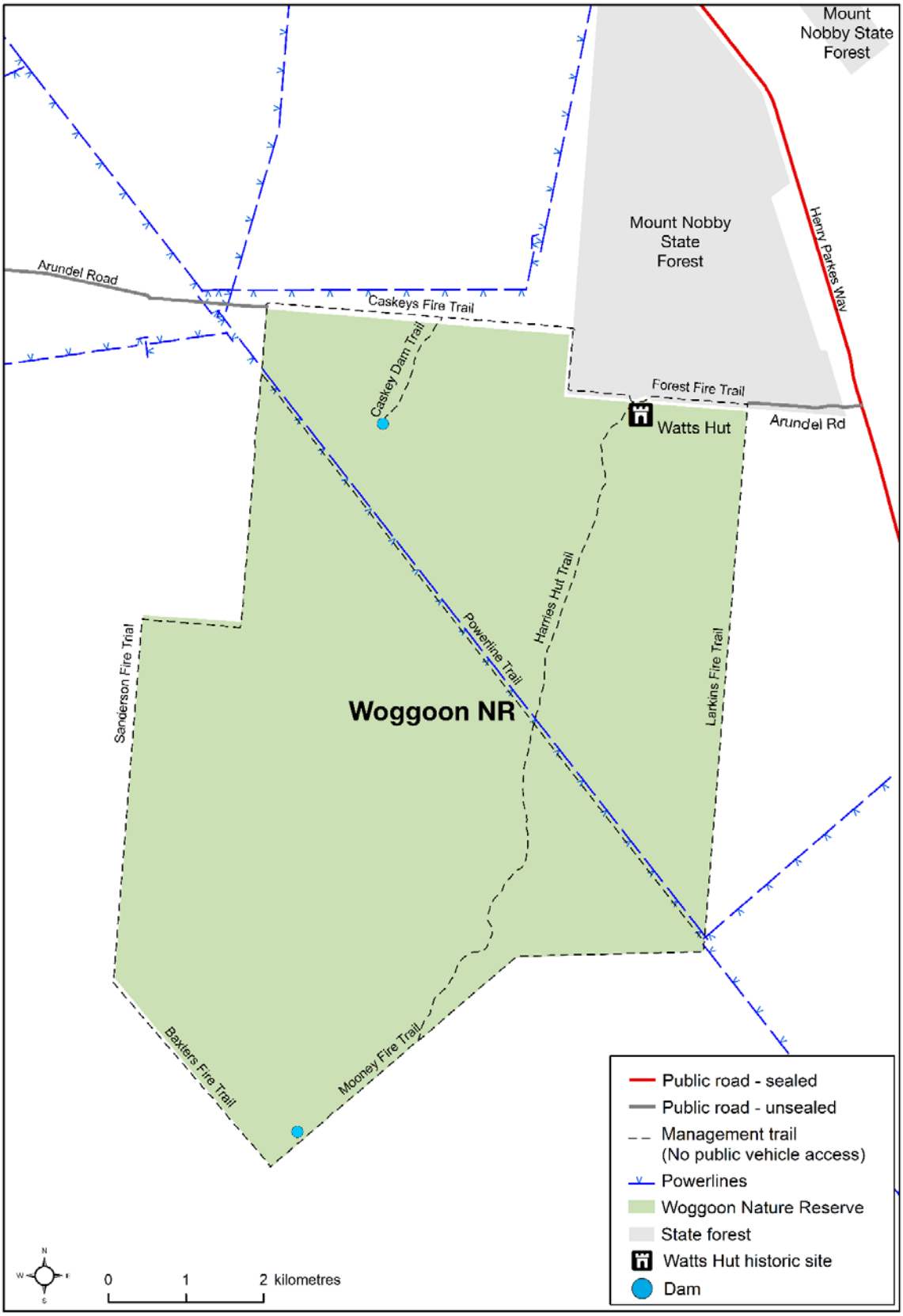


Figure 2 Map of Woggoon Nature Reserve

1. Tollingo Nature Reserve and Woggoon Nature Reserve

Tollingo and Woggoon nature reserves (also referred to as Tollingo and Woggoon in this document) are in Central West NSW, 40–55 kilometres north-west of Condobolin and approximately 33 kilometres from Mount Tilga, the geographical centre of New South Wales. Woggoon Nature Reserve is approximately 6373 hectares and Tollingo Nature Reserve is approximately 3232 hectares (see Figures 1 and 2). The reserves are separated from each other by approximately 10 kilometres at the nearest point.

Tollingo was the name of one of 59 parishes in the County of Cunningham, proclaimed in 1862. *Woggoon* is attributed to mean '*scrub turkey'* in an Aboriginal language. The reserves were formerly Crown land held under various Crown leases, including scrub leases and special leases, dating from the early 20th century. Tollingo Nature Reserve was reserved in 1988 and Woggoon Nature Reserve was reserved in 1974. Additions to Woggoon were reserved in 1981.

Tollingo and Woggoon are in the Cobar Peneplain Bioregion (Thackway & Cresswell 1995). The Cobar Peneplain Bioregion is one of the most poorly conserved bioregions in New South Wales, with just 2.6% conserved. Approximately 33% of the bioregion has been cleared of vegetation, 25% is under intensive agricultural production and 14% is subject to mining (EPA 2015).

Mount Nobby State Forest borders Woggoon Nature Reserve on its north-east corner. The land on all other boundaries of both reserves has been extensively cleared, predominantly for cropping and grazing. As a result, the reserves exist in a mosaic of cleared agricultural lands interspersed with sparsely vegetated road corridors and windbreaks (see Figure 3). This level of clearing and modification has resulted in a high loss of biodiversity and fragmentation of habitat (DECC 2006; Keith 2004; Cunningham et al. 1992). The reserves are relatively isolated and subject to edge effects, making them more vulnerable to intrusions and disturbances.

The reserves are typical of the Cobar Peneplain Bioregion, which is characterised by low relief and a semi-arid climate. Mean daily temperatures range from 15–34°C maximum and 2.8–18.5°C minimum, and mean annual rainfall is only 449 millimetres. The landscape consists of flat to gently undulating red soil, sandy plains.

Due to the high level of disturbance and loss of natural areas in the region, these reserves of largely intact remnant native vegetation are of high importance. They support vital ecosystem processes and provide foraging, nesting and refuge sites for native species that are in short supply in other parts of the landscape. They also support native plant communities that are restricted in their extent or no longer exist elsewhere. Long-term conservation of biodiversity in this region depends on the protection, enhancement and connection of remaining habitat, incorporating vegetation remnants on public and private lands.

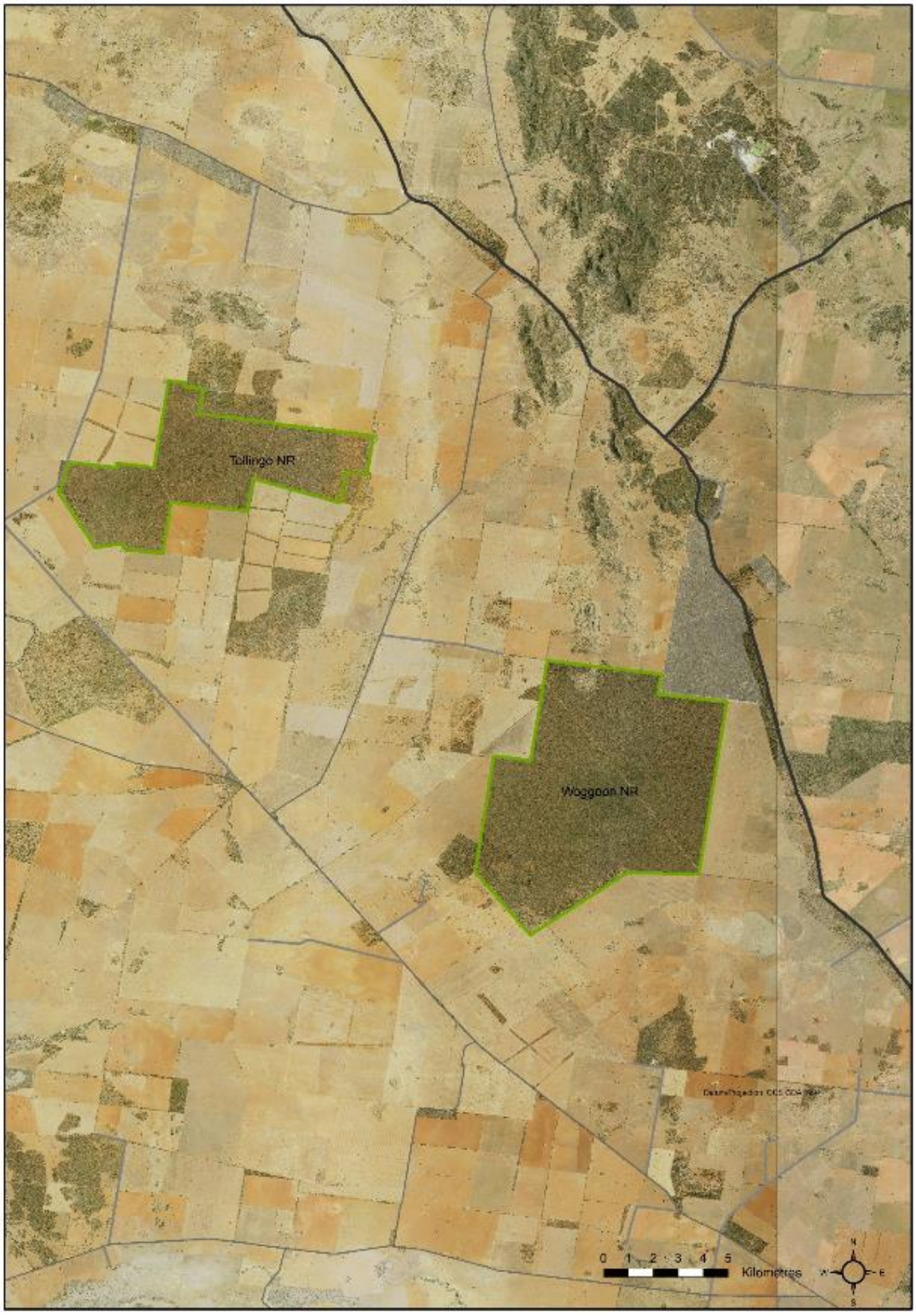


Figure 3 Air photo image showing the reserves in a mosaic of agricultural land (2016)

2. Protecting the natural environment

2.1 Geology and landform

The reserves lie within the Cobar Peneplain Bioregion on the eastern edge of the South Western Plains botanical subdivision, close to the NSW South Western Slopes Bioregion border.

The Cobar Peneplain is a distinctive landscape of undulating downs and flat plains punctuated by stony ridges and ranges, and is formed on the north-westerly extension of the Lachlan Fold Belt. The majority of the Peneplain is 'red country', characterised by shallow, red soils and aeolian (windblown) sands associated with the Darling River and the Murray Basin mantle in the west and south, and alluvium (material deposited by water) from the Bogan River in the east. The area where the reserves are located marks the beginning of the red sandy soils of the mallee sand plains, which develop into extensive dunefield systems further west.

The reserves are within the Lachlan River catchment and approximately 25 kilometres from the Lachlan River to the south. The landscape is very flat within the reserves, and typical of the Cobar Peneplain, with no clearly defined drainage lines. Areas surrounding Woggoon Nature Reserve support ephemeral drainage lines and gilgais, most of which peter out before reaching a watercourse. The only named watercourse in the vicinity of the reserves is Tinda Creek, a narrow, confined creek that forms the eastern edge of Tollingo Nature Reserve, extending north and south of the reserve.

There are two dams in Woggoon Nature Reserve. Towards the north-west corner, Caskeys Dam holds water through most seasons. The smaller dam at the southern tip of the reserve is likely to dry up under extended dry conditions. Neither of these dams is considered a reliable source of water for firefighting purposes. There are no dams within Tollingo Nature Reserve.

The underlying geology of the reserves is mainly unconsolidated material dating from the Quaternary period of the Cainozoic era, 65 million years ago. This material ranges from clay to sand to gravel, derived by in situ weathering or weathering plus gravitational movement (eluvium) or deposited by flowing water (alluvium). This unconsolidated material differs from consolidated material because it has not hardened to form rock, and groundwater can flow through spaces between the grains. The soils are mainly alkaline red earths and sands on these flat landforms, often containing quartz and ironstone. These soils are deep and well-draining sands to loamy sands. A small proportion of deep and hard-setting sandy loam to clay-loam soil occurs on the lower areas of the landscape, such as the depressed flats and shallow drainage lines (Porteners 2001).

In contrast to the surrounding flatness, a small rounded hill rises to 260 metres ASL in the north-west corner of Woggoon Nature Reserve (see Figure 3). This outcrop was formed by volcanic activity in the Early Devonian period of the Palaeozoic era. It consists mainly of tuff, a light porous rock formed by consolidation of volcanic ash ejected from a vent during a volcanic eruption, and some minor siltstone. As there is no other rock in the reserve, this formation is significant as a source of rock used by Aboriginal people in the past (see Section 3.1) and contributes significantly to reptile habitat (see Section 2.3).

2.2 Native plants

The reserves are within the South Western Plains botanical subdivision. Native vegetation in this area has been severely depleted by clearing and grazing resulting in extreme fragmentation and discontinuity. Although small in comparison with other similar reserves in

the region (such as Yathong, Nombinnie and Round Hill nature reserves), Tollingo and Woggoon nature reserves have high conservation values as 2 of the largest and easternmost sand plain mallee remnants within New South Wales, and all vegetation communities within the reserves are considered significant due to their remnant status (Porteners 2001).

In 2001 a comprehensive flora survey, including vegetation mapping, was undertaken for the reserves (Porteners 2001). This survey identified 4 vegetation communities:

- Mallee Shrubland (approximately 2760 hectares in Tollingo and 5340 hectares in Woggoon)
- Poplar Box Woodland
- Red Box – Mallee Woodland
- Grey Box Woodland (Woggoon Nature Reserve only).

These communities are described in detail in Appendix C.

Photo 1 Mallee Shrubland community typical of Woggoon Nature Reserve. C Davis/DPIE.

Mallee refers to semi-arid systems dominated by eucalypt species that produce multiple stems from an underground lignotuber. The reserves are considered to be excellent examples of the mallee shrubland and woodlands of Central West NSW. In these reserves, mallee vegetation includes red mallee, white mallee, narrow-leaved red mallee and mallee pine and is of a sufficiently old age-class to provide valuable habitat for mallee specialists and other native animals (Porteners 2001). It is this vegetation that provides habitat for the endangered malleefowl (see Box 1). The mallee communities in Tollingo and Woggoon nature reserves are very similar but not identical in vegetation composition, with several species also unique to each reserve (Porteners 2001).

Box woodlands occur on fertile soils and are considered to be among the most threatened and poorly conserved vegetation types in Australia. Regionally these woodlands have been severely affected by land clearing, grazing, mining, forestry and altered fire regimes. Isolated

remnants are degraded by introduced herbivores, competition by introduced grasses and spray drift.

The fourth community, Grey Box Woodland occurs only in Woggoon Nature Reserve and is considered to be part of the Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions Endangered Ecological Community (EEC).

Woggoon Nature Reserve supports 163 species of native plants and Tollingo Nature Reserve supports 121 species of native plants. While none are listed as threatened under the *Biodiversity Conservation Act 2016* (BC Act), 21 species of regional significance were recorded during the 2001 vegetation survey (see Table 1).

Protection of regionally significant species is desirable to conserve the genetic variation within their range and ensure their continued existence within New South Wales. Given the parks' relatively small sizes, remote locations and visitation patterns, the approach to vegetation management will be to observe and record changes in the park due to environmental conditions and events and undertake recurrent NPWS pest and weed control programs.

Table 1 Regionally significant plants in the reserves

Common name	Reserve
Restricted distribution within the Western Division of New South Wales	
Common sourbush (or berry broombush)	Tollingo, Woggoon
Mallee box (or Quorn mallee)	Tollingo, Woggoon
Heath everlasting	Woggoon
Downy wax flower	Tollingo
Restricted distribution within the Western Plains region of New South Wales	
Wyalong wattle	Woggoon
Haviland's wattle	Tollingo, Woggoon
Grey ray flower	Woggoon
Small-leaf everlasting	Tollingo, Woggoon
Small-leaved mint bush	Tollingo, Woggoon
Mallee copperburr	Woggoon
Red-berried stick-plant	Tollingo, Woggoon
Spiny mallee pea	Tollingo, Woggoon
Species growing at their geographical limits of distribution	
Ivy goodenia	Tollingo, Woggoon
Pale mat-rush	Tollingo, Woggoon
Poranthera microphylla	Tollingo, Woggoon
Grey wrinklewort	Tollingo
Cactus pea	Tollingo, Woggoon
Native pear	Tollingo
Climbing purple-star	Tollingo
Mallee fringe lily	Tollingo

Common name	Reserve
Native blackthorn	Tollingo, Woggoon

Source: Porteners 2001

2.3 Native animals

As remnant vegetation in an extensively cleared and fragmented landscape, Tollingo and Woggoon nature reserves provide valuable habitat for native animals that was formerly more widespread in Central West NSW. Old-growth vegetation and a plentiful layer of fallen branches and ground litter throughout the reserves enhance their value as habitat in a cleared landscape.

Knowledge about the native animals of the reserves derives mainly from *BioNet Atlas* (DPIE 2019) and the results of 2 fauna surveys undertaken in Woggoon Nature Reserve in 2008 (DECCW 2008) and 2019 (Murrumbidgee Field Naturalists 2020). The survey in 2019 recorded 2 new species (mulga snake and crimson (yellow) rosella). There are more records for birds and bats than other animal groups, reflecting the ability of more-mobile species to travel between vegetated remnants and optimise their use of scarce resources. Other less-mobile native animals such as ground-based mammals have a greater reliance on remnant vegetation for refuge and are subject to edge effects.

In Woggoon Nature Reserve, 144 native animal species have been recorded, including 121 birds, 15 mammals and 8 reptiles. In the absence of a fauna survey for Tollingo Nature Reserve, records are considerably fewer. *BioNet Atlas* records a total of 57 native animal species, which includes 50 birds, 6 mammals and one reptile.

Animals most readily seen in the 2 reserves are woodland birds and macropods. Sightings of spiny-cheeked honeyeater, rufous whistler, red-capped robin and crested bellbird are common. Birds recorded in the reserves include a number of nomadic and migratory species that use the reserves as ‘stepping stones’, such as sacred kingfisher, rainbow bee-eater, noisy friarbird, striped honeyeater, restless flycatcher, various woodswallows and jacky winter.

The rocky hill and dams in Woggoon Nature Reserve are significant in enhancing available habitat for reptiles and amphibians. Reptiles recorded include the southern spiny-tailed gecko, tree dtella, barred wedgesnout, tree skink and wood mulch-slider. Amphibians recorded following wet conditions include the green tree frog, Peron’s tree frog, desert tree frog, giant banjo frog and spotted grass frog.

Photo 2 Fallen timber and coarse woody debris in Woggoon Nature Reserve. C Davis/DPIE.

A total of 21 threatened animals listed under the BC Act and/or the *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act) have been recorded in the reserves (see Table 2). Tollingo and Woggoon nature reserves are significant for providing habitat for malleefowl as there are only a handful of reserves where this species is recorded. Malleefowl are listed as endangered at the state level and vulnerable at the national level (see Box 1 for more information).

The reserves also support a suite of threatened woodland birds, including diamond firetail, grey-crowned babbler, hooded robin and brown treecreeper. Clearing and fragmentation of woodland, open forest, grassland and mallee habitats is a major threat to woodland birds. Loss of coarse woody debris (litter and fallen timber) through grazing by livestock, firewood collection and too-frequent fires all result in degradation of important ground habitat components.

Photo 3 Pied honeyeater. Richard Waring.

Strategies for the conservation of threatened species, populations and ecological communities are set out in a statewide *Biodiversity Conservation Program* (OEH 2017a). Actions listed in strategies are prioritised and implemented through the *Saving our Species* program, which aims to maximise the number of threatened species that are secured in the wild in New South Wales for 100 years (OEH 2013c). As at 2020, there are no *Saving our Species* projects in the reserves.

Many recovery plans for NSW threatened species have previously been prepared and may still provide useful information, but they no longer determine the actions required for the conservation of threatened species in New South Wales. The Commonwealth prepares recovery plans for nationally listed threatened species under the EPBC Act. A national recovery plan has been prepared for the endangered malleefowl to consider its management needs in more detail (Benshemesh 2007).

Table 2 Threatened animals in the reserves

Common name	Reserve	BC Act status	EPBC Act status
Birds			
Black falcon	Woggoon	V	
Brown treecreeper (eastern subspecies)	Tollingo and Woggoon	V	
Chestnut quail-thrush	Woggoon	V	
Diamond firetail	Woggoon	V	
Dusky woodswallow	Woggoon	V	
Gilbert's whistler	Tollingo and Woggoon	V	
Grey-crowned babbler (eastern subspecies)	Woggoon	V	
Hooded robin (south-eastern form)	Tollingo and Woggoon	V	
Little eagle	Woggoon	V	
Major Mitchell's cockatoo	Woggoon	V	
Malleefowl	Tollingo and Woggoon	E	V
Pied honeyeater	Woggoon	V	
Shy heathwren	Tollingo and Woggoon	V	
Speckled warbler	Woggoon	V	
Spotted harrier	Woggoon	V	
Superb parrot	Woggoon	V	V
Varied sittella	Woggoon	V	
Bats			
Corben's long-eared bat	Tollingo and Woggoon	V	V
Inland forest bat	Tollingo and Woggoon	V	
Little pied bat	Woggoon	V	
Yellow-bellied sheathtail bat	Woggoon	V	

Source: *BioNet Atlas* search (DPIE 2019), fauna survey of Woggoon Nature Reserve (DECCW 2008), pied honeyeater record from Cowra Woodlands Bird Program (2012).
BC Act = *Biodiversity Conservation Act 2016*,
EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*
V= Vulnerable, E = Endangered

Box 1. Malleefowl

The malleefowl is a large and distinctive ground-dwelling bird that has become endangered in New South Wales over the last 100–150 years through land clearance and fox predation. In many areas there has been such loss and fragmentation of their habitat that remaining populations are small and isolated, food sources have been depleted and there is an increased risk of predation by foxes (Benshemesh 2007; NPWS 2001).

Apart from habitat loss, fragmentation and degradation, malleefowl populations are also threatened by (OEH 2017b):

- fire, which removes litter for mound construction, shelter from predators and food sources, especially seeds (mounds are not usually constructed in an area within 15–20 years after a fire, and it may be 40 years before maximum densities are attained)
- predation, mainly by foxes and cats but also birds of prey that target eggs and chicks
- vehicle strike when birds cross roads or feed on spilt grain beside roads
- climate change, which in the long term may alter habitat characteristics preferred by the species such that its capacity to support viable populations is reduced
- feral goats competing for food and disturbing nesting mounds
- feral pigs disturbing nesting mounds
- sheep grazing of habitat on private land.

Malleefowl are being managed by National Parks and Wildlife Service (NPWS) in some NPWS reserves as an iconic endangered species under the Saving our Species program and in accordance with a national recovery plan for malleefowl (Benshemesh 2007). Key management actions under the program are control of foxes and other predators, control of feral goats and fire management. NPWS has released captivity-bred birds into Yathong Nature Reserve, another significant mallee reserve in western NSW in an attempt to make the population of malleefowl more secure.

Malleefowl recorded at a mound in Woggoon Nature Reserve by remote camera. DPIE.

NPWS reviews all aspects of the malleefowl program under an adaptive management approach that takes account of new technologies, such as remote sensing, and changing parameters, such as the emergence of pigs as a pest in the mallee lands.

2.3.1 Management considerations and opportunities

Given the reserves' relatively small sizes, remote locations and visitation patterns, the approach to native animal management will be to observe and record changes in the reserves as a result of environmental conditions and events, undertake recurrent NPWS pest control programs and seek additional management resources for specific species, such as through NPWS *Biodiversity Conservation Program* and NSW *Saving Our Species* program. As at 2020, Tollingo and Woggoon nature reserves were not identified as key management sites under the NPWS *Saving our Species* program.

Concerning malleefowl, research and monitoring being conducted at key management sites such as Yathong Nature Reserve and Mallee Cliffs National Park has determined that, as with other specialists in the semi-arid zone, breeding activity is strongly linked to the age-class of mallee habitat, frequency of fire and the timing (both frequency and season) of rainfall.

The presence of malleefowl and the integrity of old-growth mallee vegetation were significant factors which led to the reservation of Tollingo and Woggoon nature reserves. Old-growth mallee with a spinifex understorey is the preferred habitat for malleefowl in the reserves. However, the size of the population and successful use of mounds in the reserves by malleefowl is uncertain. In the absence of systematic targeted surveys, it is not possible to define the populations and their use of the reserves. However, birds were recorded in both reserves as recently as 2018 from a combination of footprints and remote camera monitoring. LIDAR imaging in January 2020 and follow-up ground truthing have confirmed six mounds in Woggoon and none in Tollingo.

NPWS continues to seek additional resources for increased monitoring to provide more information about malleefowl in the reserves to apply appropriate management measures. Pest animal control is the key management effort applied to promote the persistence of malleefowl in the reserves and has flow-on benefits for other species (see Section 2.5).

2.4 Weeds and pest animals

The *Biosecurity Act 2015* and its regulations provide specific legal requirements for the response, management and control of biosecurity risks, including weeds and pest animals. These requirements apply equally to public land and privately-owned land. Under this framework, Local Land Services has prepared regional strategic weed management plans and regional strategic pest animal management plans for each of its 11 regions.

The Central West Regional Strategic Weed Management Plan 2017–2022 (Central West LLS 2017) and Central West Regional Strategic Pest Animal Management Plan 2018–2023 (Central West LLS 2018) identify priority weeds and pest animals for the region and appropriate management responses (i.e. prevention/alert, eradication, containment or asset protection).

Previously the NPWS regional pest management strategy for the Western Rivers region (OEH 2013b) identified pest species and priority programs for Tollingo and Woggoon nature reserves. A new pest management strategy is being developed for the reserves by NPWS which will be consistent with the priorities of the Local Land Services' regional strategic pest and weed management plans, as well as other important programs such as the *Biodiversity Conservation Program* (see Section 2.3).

The overriding objective of the pest management strategy is to minimise adverse impacts of introduced species on biodiversity and other reserve and community values while complying with legislative responsibilities. Additional programs may also be undertaken in cooperation with neighbouring land managers in response to emerging issues.

Weeds

Relatively few weeds are present in the reserves. The most common weeds are those dependent on suitable seasonal conditions, including horehound, Paterson's curse, saffron thistle, fleabane and capeweed. None of these weeds are listed as priority species under the regional Local Land Services plan.

Weeds occur only in small isolated patches and tend to be associated with areas that have been previously cleared and grazed, are on the boundaries of the reserves or along management trails. Overall, weeds are not having a major impact on natural and cultural values in the reserves. Weed infestations are monitored and treated as necessary.

Pest animals

Several introduced pest animals impact the reserves' natural and cultural heritage values, including foxes, goats, cats, pigs and rabbits. The impacts of these species are identified as key threatening processes under the BC Act and/or the EPBC Act, and all of these species are listed as regional priorities for control (Central West LLS 2018).

Foxes constitute a major threat to malleefowl in the parks. Foxes suppress native animal populations, particularly small to medium-sized, mammals, ground-nesting birds and freshwater turtles. Together with cats, foxes are known to have caused the decline and extinction of many native species. Foxes also prey on domestic stock. Foxes are highly mobile and can rapidly repopulate treated areas.

A systematic ground-baiting strategy for foxes is applied in both reserves (OEH 2013b), using buried baits and spring-activated devices known as canid pest ejectors. These methods have proven to be environmentally safe and effective, particularly if baiting is done in cooperation with neighbouring landowners.

Feral goats are frequently sighted in the reserves, though not in large numbers and there is no visible browse line in the native vegetation. Goats are suspected of competing with malleefowl for food resources and could also potentially damage Aboriginal cultural material. Feral goats are a significant problem in the semi-arid regions of central and western NSW, particularly as they can tolerate extended dry conditions and are unimpeded by standard stock fencing. Their foraging habits are extremely destructive, they can breed rapidly and they can cover many kilometres in a day. Grazing by feral goats can severely impact the regeneration of many plant species and sustained use of an area by goats results in erosion.

Feral goats are identified as a priority pest animal in the *Central West Regional Strategic Pest Animal Management Plan* (Central West LLS 2018). The impact of feral goats has been listed as a key threatening process under the BC Act and EPBC Act (NSW SC 2004a; DoE 2009). The feral goat is identified as one of the 100 worst invasive species in the *Global Invasive Species Database* (IUCN 2017).

At this stage, the number of goats does not appear to warrant active control. As with other pest animals, neighbouring landowners are encouraged to carry out goat control on their lands in cooperation with NPWS, however, many landowners view feral goats as a ready source of revenue, especially in marginal grazing country.

Together with foxes, **feral cats** are known to have caused the decline of many native species, including extinctions of mammals and birds on islands. They are responsible for the failure of many threatened species' reintroduction programs and continue to pose a serious

threat to Australian wildlife (Short et al. 1992 and Priddel & Wheeler 2002, both cited in Moseby & Hill 2011). Predation by feral cats has been listed as a key threatening process under both the BC Act and the EPBC Act (NSW SC 2000c; DoE 2009). Feral cats are also identified as a priority pest animal in the *Central West Regional Strategic Pest Animal Management Plan* (Central West LLS 2018).

Cats are exceptionally good hunters and can endure the harsh conditions of the arid outback where other predators fail. The way cats move through the landscape is also less predictable than for foxes, which tend to use trails and roads. Cost-effective, large-scale control methods for feral cats are not yet available. Shooting at night with spotlights has historically been carried out and poison baiting for feral cats has had a measure of success in confined areas. Preliminary work is being undertaken to develop new types of cat bait such as 'Curiosity' (DoEE n.d.) and specially designed cat-baiting stations.

As at 2020, no control of cats is being undertaken in Tollingo and Woggoon. Feral cats have been recorded within Woggoon Nature Reserve and are likely to be a serious threat to malleefowl as well as to woodland birds and other animals.

Feral pigs can have a substantial impact on conservation values through their foraging, wallowing and digging behaviours. They cause major disturbance and damage to soils, roots, sensitive ground flora and wetland environments. Areas disturbed by feral pigs are at risk from subsequent weed invasion and soil erosion. Feral pigs are also a potential host of a number of exotic diseases. They are identified as a priority pest animal in the *Central West Regional Strategic Pest Animal Management Plan* (Central West LLS 2018).

Predation, habitat degradation, competition and disease transmission by feral pigs is listed as a key threatening process under both the BC Act and the EPBC Act (NSW SC 2004b; TSSC 2001b).

Dry conditions have tended to limit pig numbers in the reserves, but they have been recorded passing through the reserves during and after wet conditions. At times feral pigs are known to be an issue for neighbours and cooperative control is, and will continue, to be undertaken using pig traps on adjacent properties. The presence of pigs in the reserves commonly attracts illegal pig hunting and damage to gates and fences can result. Control of pigs will continue to be carried out by NPWS as required.

Photo 4 Pigs on a malleefowl mound in Woggoon Nature Reserve, October 2011. DPIE.

Rabbits accelerate erosion by removing plant cover. They are also suspected of being an important cause in the decline, and limited regeneration, of many native plant species in semi-arid habitats, including cypress pine, wattles, hakeas and belah/rosewood communities. Rabbits are a major food source of large predators, notably foxes and eagles, although predation by these animals alone does not significantly reduce rabbit numbers. Rabbits have been implicated in modifying habitat and reducing food resources important for malleefowl.

Wild rabbits are identified as a priority pest animal in the *Central West Regional Strategic Pest Animal Management Plan* (Central West LLS 2018). Competition and grazing by the feral European rabbit is listed as a key threatening process under the BC Act and the EPBC Act (NSW SC 2002; DoE 2009).

In Tollingo and Woggoon it appears rabbits once favoured the sandy clay soils associated with white cypress pine-dominated areas of Open Box Woodland. Rabbit warrens in the southern section of Woggoon were ripped and fumigated in the early years of the reserve but no rabbit control has been required in recent years. Rabbit activity will continue to be monitored in the reserves and control measures undertaken as required.

2.5 Fire management

The primary objectives of NPWS fire management are to protect life, property and community assets from the adverse impacts of fire, while also managing fire regimes in parks to maintain and enhance biodiversity.

A fire management strategy which defines the fire management approach is prepared for each reserve and is updated periodically (OEH 2014b, c). These strategies outline the recent fire history of the reserves, key assets within and adjoining the reserves, including sites of natural and cultural heritage value, fire management zones and fire control advantages such as management trails and water supply points. The strategies also contain fire regime guidelines for conservation of the vegetation communities found in the reserves based on biodiversity thresholds.

Details about how fire is managed in the reserves are included in Box 2, including recommended fire intervals for the various vegetation communities.

Photo 5 Mallee shrubland, Woggoon Nature Reserve. M Billington/DPIE

Box 2. Fire in the reserves

Aboriginal people are known to have used fire across the Australian continent to promote food animals and other resources by deliberate burning of known habitats, sometimes at a small or very small scale. The Aboriginal fire regimes for semi-arid mallee communities are not well known.

Fire remains an integral part of the Australian environment. It is a major factor in determining the structure and species composition of native vegetation and has long-term effects on animal populations. However, inappropriate fire regimes can lead to impacts on and loss of particular plant and animal species and communities, and high-frequency fires have been listed as a key threatening process under the BC Act (NSW SC 2000b).

Mallee ecosystems are fire prone, and fire in this landscape is a key driver of ecological change. As part of its ongoing responsibilities as a fire authority and land manager, NPWS monitors the condition of vegetation in the reserves, particularly through prolonged dry periods. NPWS develops and implements fire management practices that contribute to conserving biodiversity and cultural heritage across the landscape; and undertakes cooperative and coordinated fire management with other fire authorities, neighbours and the community (OEH 2013a). A fire management strategy that defines the fire management approach for each reserve has been prepared and is updated periodically (OEH 2014b, c).

Research is being undertaken to understand the effects of fire on plants and animals in mallee ecosystems and develop an appropriate fire regime that will not compromise significant conservation values. Research carried out by NPWS in Tarawi Nature Reserve and Mallee Cliffs National Park, as well as the Mallee and Fire Biodiversity Project (La Trobe University 2019) has contributed significantly to the understanding of fire in mallee ecosystems.

In mallee vegetation communities, habitat and fuel characteristics such as leaf litter, hollows, canopy cover and height, bark and spinifex cover all increase in the first 35 years after fire. From about 35 years to 100 years after fire, these characteristics provide optimum habitat for a large number of species including several threatened species. Maximum fuel loads are also attained by 35 years, and they remain high for at least another 65 years (Haslem et al. 2011). Mallee-dominated vegetation communities contain plant species that are generally fire tolerant and some plants might be considered fire dependent, but ongoing research has demonstrated that there is no minimum or maximum fire interval required for the perpetuation of these communities.

In addition to semi-arid woodlands, Woggoon Nature Reserve contains grassy woodlands for which the preferred fire interval is 8–40 years.

In Central West NSW, wildfire is usually ignited during dry lightning storms when daytime temperatures are high and humidity is low, especially when these conditions follow winter rains that have resulted in grass growth creating a continuous fuel layer. Tollingo and Woggoon nature reserves have historically had a very low frequency of wildfires and the majority of vegetation is long unburnt. No major wildfires have been recorded in Woggoon Nature Reserve and the only known major wildfire in Tollingo Nature Reserve was in 1979–80. This fire burned approximately 945 hectares of the reserve.

There is no major infrastructure in either of the reserves, and there is no adequate source of permanent water available for firefighting. For fire management purposes, the reserves are each identified as a land management zone, and NPWS fire management focuses on conserving biodiversity values, especially malleefowl habitat. Malleefowl

prefer a dense but discontinuous canopy and dense and diverse shrub and herb layers. They can use recently burnt areas for foraging, but unburnt habitat is essential for roosting, daytime shelter and nesting.

The fire strategies for the reserves aim to avoid fire in old-age mallee while also maintaining a mix of age classes in the vegetation. This approach is designed to promote habitat diversity in both shrubby semi-arid woodlands and grassy woodlands to benefit a range of animals, and to help build resilience and refugia in a region where mallee ecosystems have been greatly reduced. Prescribed burns in a mosaic pattern may be carried out from time to time in the reserves to benefit malleefowl and other conservation values.

In Woggoon Nature Reserve an asset protection zone has been identified around the site of Watts Hut, and a strategic fire advantage zone along the powerline corridor. In Tollingo, several management trails are identified as strategic fire advantage zones.

NPWS maintains cooperative arrangements with surrounding landowners and the Rural Fire Service and is a member of the Mid Lachlan Valley Team Bush Fire Management Committee.

2.6 Climate change

Human-induced climate change is listed as a key threatening process under the BC Act (NSW SC 2000a) and habitat loss caused by human-induced greenhouse gas emissions is listed under the EPBC Act (TSSC 2001a). NPWS's approach to managing climate change in the reserves is outlined in Box 3.

Photo 6 Brown treecreeper (eastern subspecies). Hellen Fallow/DPIE

Box 3: Climate Change

Climate change modelling has been produced for 12 defined regions in south-east Australia. The following is a snapshot of the predicted changes to climate for the Central West and Orana Region, which covers Tollingo and Woggoon nature reserves (OEH 2014a)

Maximum temperatures are projected to increase in the near future by 0.4–1.0°C	Maximum temperatures are projected to increase in the far future by 1.8–2.7°C
Minimum temperatures are projected to increase in the near future by 0.5–0.9°C	Minimum temperatures are projected to increase in the far future by 1.5–2.6°C
The number of hot days (i.e. > 35°C) will increase	The number of cold nights (i.e. < 2°C) will decrease
Rainfall is projected to decrease in spring	Rainfall is projected to increase in autumn
Average fire weather is projected to increase in summer, spring and winter	Severe fire weather is projected to increase in summer, spring and winter

Source: OEH 2014a. ear future=2020-2039

Far future=2060–2079

The projected changes that are likely to have the greatest effects on the reserves are increases in temperature, the number of hot days and fire weather. Evaporation rates will in turn increase and create drier soil conditions throughout the year. Historically, the region experiences more than 30 very high to extreme fire danger days every year. The number of very high to extreme fire danger days is projected to increase by 10–50% and the conditions conducive to large and intense fires, such as prolonged drought, low humidity, number of hot days and high wind speeds, will more than likely increase (DECCW 2010b). This has implications for the ground-nesting malleefowl and threatened woodland birds, which rely on long unburnt habitats and a mosaic burning pattern to maintain critical resources (see Section 2.3).

Climate change may affect biodiversity significantly by altering the size of populations, the distribution of species and the geographical extent and species composition of habitats and ecosystems. Species most at risk are those unable to disperse or adapt, particularly those with small population sizes such as malleefowl, or with slow population growth rates.

The brown treecreeper and grey-crowned babbler are examples of species recorded in the reserves whose distribution may change under climate change. The western boundary of the range of the brown treecreeper (eastern subspecies) runs approximately 100 kilometres to the east of Woggoon Nature Reserve, roughly through Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell. Along this line the subspecies intergrades with the arid zone brown treecreeper subspecies. As climate change progresses and conditions become drier, the western subspecies could potentially spread further eastwards or the two subspecies could interbreed and the distinction between them becomes redundant.

The overall potential impact of climate change on the reserves is difficult to assess since it depends on the compounding effects of other pressures, particularly barriers to dispersal and pressure from introduced animals. Barriers to dispersal are a significant issue in extensively cleared and fragmented landscapes, such as those in which

Tollingo and Woggoon occur. Animal and plant species in these areas are likely to be at greater risk of extinction than those in more intact ecosystems.

The reserves have been managed as conservation reserves since 1988 (Tollingo) and 1974 (Woggoon) to remove or lessen the effect of threatening processes and protect and restore habitat needed by native plants and animals. NPWS will continue management measures aimed at avoiding fire in old-growth mallee to help build the resilience of the mallee ecosystems. Continuation of programs to reduce the pressures arising from other threats, such as vertebrate pests, are expected to help reduce the severity of the effects of climate change. However, it is a challenge for NPWS to protect the reserves from the worst effects of climate change without greater protection and enhancement of biodiversity values occurring more broadly across the surrounding landscape.

Photo 7 Grey-crowned babbler. G Chapman.

3. Looking after our culture and heritage

3.1 Aboriginal culture and heritage

Woggoon Nature Reserve is in the traditional Country of the Wiradjuri People and Tollingo Nature Reserve is in shared traditional Country of the Wiradjuri and Ngiyampaa peoples.

What is 'Country'? To Aboriginal people, the landscape is made up of many interrelated features. These include land, water, plants and animals, places and stories, historical and current uses, and people and their interactions with each other and place. These features are central to Aboriginal spirituality and contribute to Aboriginal identity. They are inseparable and make up what is known as 'Country'.

The Wiradjuri People are known as the people of the 3 rivers. Their vast traditional Country extends from the Great Dividing Range in the east, and is bordered by the Macquarie, Lachlan and Murrumbidgee rivers. Ngiyampaa Country lies to the west of Wiradjuri Country and is similarly defined by the landscape. It is roughly bounded by the Darling, Barwon, Bogan and Lachlan rivers. Along these river corridors there is shared Country.

Aboriginal people have cultural associations and connections to Country in the reserves, including 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 and need to be managed in an integrated manner across the landscape.

Within the reserves, plants such as sweet quandong and animals such as kangaroos and echidnas were used for food. The medicinal plant sneezeweed is also abundant along shallow drainage lines, particularly Tinda Creek.

Photo 8 ***Gnarma*** **holes on the footslopes of the rocky rise in Woggoon Nature Reserve. M Billington/DPIE**

Aboriginal sites are places with evidence of Aboriginal occupation or places that are related to other aspects of Aboriginal culture. They are important as evidence of Aboriginal history and as part of the culture of local Aboriginal people.

Cultural heritage surveys were conducted in the reserves in 2010 and 2012 in conjunction with the Condobolin Local Aboriginal Land Council and local community members. The survey locations were prioritised using a pre-contact land-use model developed for Tollingo and Woggoon nature reserves. The model identified environmental attributes such as elevation, drainage and vegetation that are expected to have influenced past human occupation of a landscape. The survey, therefore, targeted specific parts of the reserves such as open woodland areas, creek lines and the rocky hill in Woggoon. To date, 34 Aboriginal sites have been identified in Tollingo and 28 in Woggoon, but many additional unidentified sites are likely to be present. Of the recorded sites, the majority are modified trees. Grinding grooves, a hearth and artefacts were also recorded.

The cultural heritage surveys revealed information about Aboriginal people's approaches to the use and conservation of natural resources. Most of the recorded sites are associated with shallow and ancient stream beds that once crossed the landscape, or are around the single granite outcrop that provides relief in an otherwise flat and level plain. Among the rarer Aboriginal heritage sites are the *gnarma* (or *gnamma*) holes used for storing water in Woggoon Nature Reserve. These holes are man-made and believed to have been created by building very hot fires and then pecking out the rock fragments with harder materials. A flat rock was often placed on top to prevent the water dying up. The presence of individual sites and objects, in conjunction with areas of extended occupation and activity, suggest a strong cultural connection to the land. The surveys also helped the local Aboriginal community to reconnect with Country.

3.1.1 Management considerations and opportunities

Although the NSW Government has legal responsibility for the protection of Aboriginal sites and places, NPWS acknowledges the right of Aboriginal people to make decisions about their own heritage. Therefore, it is policy that Aboriginal communities be consulted and involved in the management of Aboriginal sites, places and related issues, and the promotion and presentation of Aboriginal culture and history.

Tollingo Nature Reserve is within the area of a native title claim registered by the Ngemba Ngiyampaa Wangaaypuwan and Wayilwan people (NC2012/001). As at early 2021, this claim is yet to be determined.

Trampling by feral goats may cause damage to Aboriginal cultural material at some of the recorded Aboriginal sites.

3.2 Shared heritage

History has taken place across the landscape. This includes the history of the first Australians – Aboriginal people – and our shared history since European settlement. Cultural heritage comprises places and items that may have historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance. NPWS conserves the significant heritage features of NSW parks and reserves.

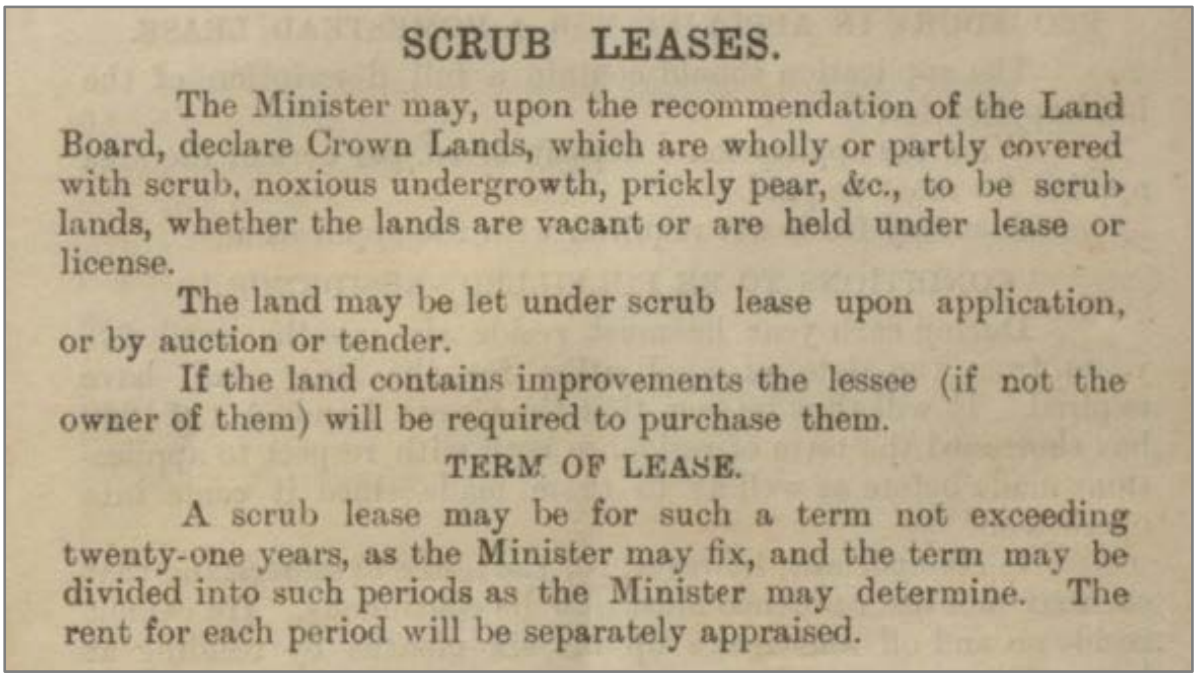
3.2.2 Settlement of the region

With the crossing of the Blue Mountains in 1813 and the construction of a road over the mountains in 1815, pastoralist settlers were soon attracted to the flat Lachlan Plains. Surveyor General of New South Wales John Oxley explored part of the Lachlan Plain in 1817. He made a large circuit from Forbes and Bogan Gate south-west to Griffith, north to Lake Cargelligo and along the Lachlan River to Kiacatoo (Kass 2003), which is 40 kilometres west of Condobolin and about 40 kilometres due south of Tollingo Nature Reserve.

This region was well beyond the 'limits of settlement' defined by the Nineteen Counties declared by Governor Darling in 1826, and therefore the first European settlers in the area would have been squatters. The continuing demand for pasture resulted in large sheep runs being established throughout the NSW Central West, with most of the best land having been taken up by the 1850s (Kass 2003). The passing of the *Crown Lands Act 1861* brought an end to squatting and introduced conditional purchase of Crown land, also known as 'free selection before survey'.

In the second half of the 19th century changes to legislation encouraged more intensive use of smaller farms, resulting in the breaking up of large pastoral runs. The drier Lachlan area was found to be suitable for wheat growing, and as a result the region has been extensively cleared. Wheat, other cereal crops and canola continue to be significant land uses.

In response to the voracious pace of land clearing for wheat, and the need to protect millable timber, the Department of Lands declared a series of timber reserves in the Lachlan area in the last 20 years of the 19th century. Mount Nobby State Forest was set aside in 1884 and dedicated as state forest in 1913. The forest boundary was extended in 1949.



SCRUB LEASES.

The Minister may, upon the recommendation of the Land Board, declare Crown Lands, which are wholly or partly covered with scrub, noxious undergrowth, prickly pear, &c., to be scrub lands, whether the lands are vacant or are held under lease or license.

The land may be let under scrub lease upon application, or by auction or tender.

If the land contains improvements the lessee (if not the owner of them) will be required to purchase them.

TERM OF LEASE.

A scrub lease may be for such a term not exceeding twenty-one years, as the Minister may fix, and the term may be divided into such periods as the Minister may determine. The rent for each period will be separately appraised.

Photo 9 Description of scrub leases, from an early stock and station agent's pamphlet (Frost 1893).

3.2.3 History of the reserves

The land now in the reserves was formerly Crown land held under various leases of variable size, including 'scrub leases' and 'special leases', which passed through a number of hands. From time to time, requests were made by some leaseholders for the land to be proclaimed as a 'reserve' which effectively quarantined the land from purchase. Granting of leases over

the Crown land continued into the 1960s. In 1974 Woggoon Nature Reserve was gazetted, followed by Tollingo Nature Reserve in 1988.

3.2.4 Shared heritage sites

There is little evidence of shared heritage in the reserves, but an early 20th century building known as Watts Hut (or Harrys Hut) remains close to the northern boundary of Woggoon Nature Reserve.

This site was settled as a small pastoral holding in 1924 by McPhillamy, who built the original dwelling in 1928. This structure burnt down sometime between 1930 and 1936. The woolshed nearby was built in 1937 and, after the house burnt down a second time, a lean-to shed was built onto the woolshed. The Crown lease over the property was left to Tom Haddon of Condobolin and sold to the Watts family in 1936. It was occupied by the Watts from 1937 until 1953 (OEH 2011).

Photo 10 Watts Hut 2019, Woggoon Nature Reserve. DPIE

The woolshed and hut structure are of weatherboard and pine slab construction and comprised four rooms: living; bedroom; a room that doubled as a bedroom and wool room; and the shearing shed. Bins and sheep pens also formed part of the overall structure. The dwelling section was a lean-to attached to the main gabled structure of the woolshed. Other ancillary structures distributed around the site include the remains of a ground tank, orchard, chook yards, cowshed, hand pump, a variety of sheds, old vehicles and machinery.

3.2.5 Management considerations and opportunities

An assessment of the heritage values of Watts Hut suggested the site is of local historic significance (DEC 2002). Watts Hut and its surrounding infrastructure pose a potential safety risk to staff and visitors to the reserve, as the main structure has collapsed, some of the remaining rafters are rotten and the site is littered with iron debris and wire. The site is being managed as a ruin.

4. Providing for visitor use and enjoyment

The primary purpose of nature reserves is to conserve ecosystems, species, communities or natural phenomena. They differ from national parks in that there is no requirement to provide for visitor use in nature reserves. Research, educational use, nature study and enjoyment are appropriate uses where they do not conflict with conservation.

Tollingo and Woggoon nature reserves generally experience low levels of visitation by occasional groups of birdwatchers or walkers. Unauthorised access by public vehicles is not allowed in the reserves and visitation is limited to self-reliant, passive, nature-based activities.

As nature reserves, Tollingo and Woggoon will continue to be managed primarily for nature conservation and related activities such as environmental education, nature appreciation and research. There are currently no visitor facilities in the reserves, and none are proposed. A range of recreational opportunities is available in other reserves in the region.

As significant patches of remnant mallee, Tollingo and Woggoon offer opportunities for research of mallee ecosystems and the biodiversity they support, particularly the endangered malleefowl. NPWS encourages environmental research and student fieldwork training projects in the reserves provided they benefit NPWS management and do not cause undue disturbance to reserve values or management operations. Monitoring and data collection in Tollingo and Woggoon have the potential to supplement research conducted in other mallee remnants and to answer questions about the persistence of malleefowl in disjunct populations separated by large tracts of cleared farmland.

Photo 11 Typical management trail in the reserves. M Billington/DPIE

Due to the remoteness of the reserves and absence of water, NPWS does not allow camping in the reserves. Bush camping with prior consent from NPWS will only be considered for conservation purposes, such as to facilitate overnight research activities.

Unauthorised activities known to occur in the reserves from time to time include illegal access by public vehicle, hunting, and vandalism of fences and gates. NPWS strives to maintain good working relationships with neighbouring landowners to control unauthorised activities and their negative impacts on reserve values.

5. NPWS infrastructure and services

Minimal infrastructure has been constructed in the reserves, consistent with the emphasis on protecting conservation values in nature reserves.

The network of management trails includes 36 kilometres in Tollingo and 54 kilometres in Woggoon (see Figures 1 and 2). All management trails in the reserves are for management or other authorised purposes only, particularly fire and pest control activities. Trails can become impassable after rain.

Photo 12 Caskey's Dam in Woggoon Nature Reserve. M Billington/DPIE

NPWS maintains the management trail network in accordance with the reserve fire management strategies. Some sections of management trails are outside the gazetted park boundaries, including Manwaring Fire Trail and Mallee Vale Fire Trail in Tollingo Nature Reserve and Caskeys Fire Trail in Woggoon Nature Reserve. Those that are within a Crown road reserve may be added to the reserve.

Several management trails within Tollingo are being used regularly by neighbours accessing sections of private property that are separated by the reserve. Where current access agreements are not in place, NPWS will update access agreements with relevant adjoining landowners.

Sections of boundary fencing with neighbouring properties have been replaced or upgraded since reservation. Although not required under the *Dividing Fences Act 1991*, NPWS encourages a cooperative approach towards sharing fencing responsibilities, for example by providing fencing material to neighbours. Boundary fencing is generally in good repair, but some sections are in poor condition and livestock from neighbouring properties are occasionally found in the reserves.

There are two dams in Woggoon Nature Reserve: Caskeys Dam in the north-west corner and an unnamed dam off Mooney Fire Trail near the southernmost boundary. These dams are currently unfenced and when water is present they attract vertebrate pests as well as native animals. These dams are not maintained. Neither dam is a reliable source of water for firefighting or weed control activities.

6. Non-NPWS infrastructure and services

A powerline dissects Woggoon Nature Reserve from the south-east to the north-west corners. It continues beyond the reserve in a north-west direction towards Nymagee across private property and passes through the eastern section of Tollingo Nature Reserve.

Within the reserves, the powerline is not covered by a formal easement. In accordance with the *Electricity Supply Act 1995*, a network operator can operate and maintain the existing powerlines whether or not there is a formal easement in place.

No access or maintenance agreement currently exists with the network operator, Essential Energy. However, the company must comply with the *National Parks and Wildlife Act 1974* and Regulation when carrying out any maintenance or replacement work, including the removal of vegetation or the use of trails not open to the public. Consent from NPWS is required for these and some other works. NPWS will seek to formalise an agreement with Essential Energy to ensure that the impacts of access and maintenance activities are kept to a minimum.

Clearing of regrowth vegetation to maintain the powerline corridor is carried out by Essential Energy. This clearing activity has the potential to affect environmental values, for example, through the introduction and spread of weed seeds, damage to standing vegetation, use of herbicides and erosion due to ground disturbance. NPWS consent for powerline maintenance is subject to conditions to limit these impacts.

Appendices

Appendix A Legislation and policy

The following laws and policies apply to how we manage our parks (this is not a complete list):

NSW legislation

- *Biodiversity Conservation Act 2016*
- *Biosecurity Act 2015*
- *Environmental Planning and Assessment Act 1979*
- *Heritage Act 1977*
- *Local Land Services Act 2013*
- *National Parks and Wildlife Act 1974* and NPW Regulation
- *Rural Fires Act 1997*

Commonwealth legislation and policy

- Environment Protection and Biodiversity Conservation Act 1999

NPWS policies and strategies

A range of NPWS policies and strategies may also apply to park management:

- fire management strategies – www.environment.nsw.gov.au/topics/parks-reserves-and-protected-areas/fire/fire-management-strategies
- park management policies – www.environment.nsw.gov.au/topics/parks-reserves-and-protected-areas/park-policies
- regional pest management strategies – www.environment.nsw.gov.au/topics/animals-and-plants/pest-animals-and-weeds/regional-pest-management-strategies

Other laws, policies and strategies may also apply. Please contact NPWS for advice.

More information

- Key threatening processes
- Local Land Services Act
- Pest animals and weeds
- Tollingo Nature Reserve and Woggoon Nature Reserve Plan of Management

Appendix B Scientific plant and animal names

The following table shows the scientific name for common plant and animal names used in this plan.

Common name	Scientific name
Plants	
Belah	*Casuarina cristata*
Cactus pea	*Bossiaea walkeri*
Climbing purple-star	*Rhyncharrhena linearis*
Common sourbush (Berry broombush)	*Choretrum glomeratum*
Downy wax flower	*Eriostemon brevifolius*
Grey box	*Eucalyptus microcarpa*
Grey ray flower	*Cyphanthera albicans* subsp. *tomentosa*
Grey wrinklewort	*Rutidosis helichrysoides*
Haviland's wattle	*Acacia havilandiorum*
Heath everlasting	*Ozothamnus diotophyllus*
Hooked needlewood	*Hakea tephrosperma*
Ivy goodenia	*Goodenia hederacea* subsp. *hederacea*
Mallee box (Quorn mallee)	*Eucalyptus porosa*
Mallee copperburr	*Sclerolaena parvifolia*
Mallee fringe lily	*Thysanotus baueri*
Mallee pine	*Callitris verrucosa*
Mugga ironbark	*Eucalyptus sideroxylon*
Narrow-leaved red mallee	*Eucalyptus leptophylla*
Native blackthorn	*Bursaria spinosa* subsp. *spinosa*
Native pear	*Marsdenia australis*
Pale mat-rush	*Lomandra glauca*
Poplar box	*Eucalyptus populnea* subsp. *bimbil*
	Poranthera microphylla
Porcupine grass	*Triodia scariosa* subsp. *scariosa*
Red-berried stick-plant	*Spartothamnella puberula*
Red box	*Eucalyptus intertexta*
Red mallee	*Eucalyptus socialis*
Rosewood	*Heterodendrum oleifolium*
Small-leaf everlasting	*Ozothamnus tuckeri*
Small-leaved mint bush	*Prostanthera serpyllifolia* subsp. *microphylla*
Sneezeweed	*Centipeda cunninghamii*
Spiny mallee pea	*Templetonia aculeata*
Sweet quandong	*Santalum acuminatum*

Common name	Scientific name
Western grey box	*Eucalyptus microcarpa*
White cypress pine	*Calitris glaucophylla*
White mallee (Congoo mallee)	*Eucalyptus dumosa*
Wyalong wattle	*Acacia cardiophylla*
Birds	
Black falcon	*Falco subniger*
Brown treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*
Brown treecreeper (arid subspecies)	*Climacteris picumnus*
Chestnut quail-thrush	*Cinclosoma castanotum*
Crested bellbird	*Oreoica gutturalis*
Crimson (yellow) rosella	*Platycercus elegans flaveolus*
Diamond firetail	*Stagonopleura guttata*
Dusky woodswallow	*Artamus cyanopterus*
Gilbert's whistler	*Pachycephala inornata*
Grey-crowned babbler (eastern subspecies)	*Pomatostomus temporalis*
Hooded robin (south-eastern form)	*Melanodryas cucullata*
Jacky winter	*Microeca fascinans*
Little eagle	*Hieraaetus morphnoides*
Major Mitchell’s cockatoo	*Lophochroa leadbeateri*
Malleefowl	*Leipoa ocellata*
Mulga snake (king brown snake)	*Pseudechis australis*
Noisy friarbird	*Philemon corniculatus*
Pied honeyeater	*Certhionyx variegatus*
Rainbow bee-eater	*Merops ornatus*
Red-capped robin	*Petroica goodenovii*
Restless flycatcher	*Myiagra inquieta*
Rufous whistler	*Pachycephala rufiventris*
Sacred kingfisher	*Todiramphus sanctus*
Shy heathwren	*Hylacola cautus*
Speckled warbler	*Chthonicola sagittata*
Spiny-cheeked honeyeater	*Acanthagenys rufogularis*
Spotted harrier	*Circus assimilis*
Striped honeyeater	*Plectorhyncha lanceolata*
Superb parrot	*Polytelis swainsonii*
Varied sittella	*Daphoenositta chrysoptera*
Mammals	
Corben’s long-eared bat	*Nyctophilus corbeni*

Common name	Scientific name
Gould’s wattled bat	*Chalinolobus gouldii*
Inland forest bat	*Vespadelus baverstocki*
Kangaroos	*Macropus* spp.
Little pied bat	*Chalinolobus picatus*
Short-beaked echidna	*Tachyglossus aculeatus*
Yellow-bellied sheathtail bat	*Saccolaimus flaviventris*
Reptiles	
Barred wedgesnout	*Ctenotus strauchii*
Southern spiny-tailed gecko	*Strophurus intermedius*
Tree dtella	*Gehyra variegata*
Tree skink	*Egernia striolata*
Wood mulch-slider	*Lerista muelleri*
Frogs	
Desert tree frog	*Litoria rubella*
Giant banjo frog	*Limnodynastes interioris*
Green tree frog	*Litoria caerulea*
Peron’s tree frog	*Litoria peronii*
Spotted grass frog	*Limnodynastes tasmaniensis*

Appendix C Vegetation classes and communities in the park

Common name and description	Values
Mallee Shrubland	
Covers 85% of Tollingo Nature Reserve and 84% of Woggoon Nature Reserve. Found on level to undulating sand plains with calcareous red earths and soils of red sands to sandy loams, deep and well-draining. Co-dominants are red mallee and white mallee and at some sites narrow-leaved red mallee.	Species diversity and understorey density is higher in Tollingo Nature Reserve than Woggoon, which is indicative of time since disturbance. Long unburnt stands contain dense thickets of mallee pine. The densest understorey component is porcupine grass. In Tollingo Nature Reserve this is accompanied by taller shrubs.
Poplar Box Woodland	
Occurs in discrete patches along the southern, northern and eastern boundaries of Woggoon Nature Reserve and the north-east corner of Tollingo Nature Reserve. Associated with lower areas of the landscape such as level sand plains, floodplains and drainage lines. Soils are deep hard-setting red to red–brown sandy loams to clay loams. Community is open woodland to tall open woodland, with an upper tree layer of poplar box, often with a lower layer of white cypress pine and occasionally hooked needlewood.	Displays the highest degree of disturbance across all communities possibly resulting from proximity to boundaries and fire trails. Several sites have been cleared and disturbed with weeds, rabbit warrens and stock trails. There is dense poplar box regeneration in the north-east section of Tollingo Nature Reserve. The diversity of plant species within this community contributes significantly to their regional protection.
Red Box – Mallee Woodland	
The densest patch of this community within Woggoon Nature Reserve is found along the northern boundary adjacent to Mount Nobby State Forest. In Tollingo Nature Reserve it occurs in a strip along the south-west boundary. Tall open woodland dominated by red box. Associated species are red mallee and white mallee.	Differs from Mallee Shrubland vegetation by having a taller woodland structure and a more mature tree age-class. Lower south-west boundary of Tollingo Nature Reserve is an area of tall old-growth red box with a well-developed understorey.
Grey Box Woodland	
Occurs only in small patches in Woggoon Nature Reserve in the far southern section. Open woodland to tall open woodland. The upper vegetation layer consists of western grey box with scattered white cypress pine and mugga ironbark, at 18 to 30 metres high. Understorey dominated by *Eremophila* spp.	This community forms part of the Inland Grey Box Woodland in the Riverina, South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions EEC. Some evidence of clearing where it occurs beside tracks and elsewhere.

Source: adapted from Porteners 2001.

Appendix D Pests and weeds in the park

The following table summarises key information on pests in the park at the time of publication of this plan. Current information on the status of pests and whether they have a threat abatement plan can be found on the Department's website. Further pest information on the park is also available in the relevant NPWS Pest Management Strategy. The Local Land Services Act declares certain animals to be pests.

Pest animals

Common name	Scientific name	KTP (reference)	NSW TAP	Declared pest
Cat	*Felis catus*	Y (NSW SC 2000c)	N	N
European red fox	*Vulpes*	Y (NSW SC 1998, TSSC 2000b)	Y	Y
Goat	*Capra hircus*	Y (NSW SC 2004a, TSSC 2004)	N	Y
Pig	*Sus scrofa*	Y (NSW SC 2004b, TSSC (2001b)	N	Y
Rabbit	*Oryctolagus cuniculus*	Y (NSW SC 2002, TSSC 2000a)	N	Y

KTP = key threatening process listed under the BC Act and the EPBC Act.

RSMP = regional priority identified in the *Central West Regional Strategic Pest Animal Management Plan* (Central West LLS 2018).

NSW SC = NSW Scientific Committee

TSSC = Commonwealth Threatened Species Scientific Committee

NSW TAP = NSW threat abatement plan

Priority weeds

Common name	Scientific name	Regional priority CW
Capeweed	*Arctotheca calendula*	N
Fleabane	*Conyza bonariensis*	N
Horehound	*Marrubium vulgare*	N
Patersons curse	*Echium plantagineum*	N
Saffron thistle	*Carthamus lanatus*	N

CW = weed of regional concern under Central West Strategic Weed Management Plan 2017

N = no

Abbreviations

BC Act	*Biodiversity Conservation Act 2016*
EEC	Endangered ecological community
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
NPWS	National Parks and Wildlife Service
NSW	New South Wales

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