FLORA and FAUNA SURVEY of "OPHIR RESERVE"

by

R.W. Medd, C.C. Bower and J.I. Kenna

in association with

Orange Field Naturalist and Conservation Society Incorporated

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EXECUTIVE SUMMARY and RECOMMENDATIONS

Ophir Reserve is a particularly interesting parcel of land, and should be prized for its recreational and nature conservation attributes, as well as for its historical significance as Australia's first commercial goldfield. Mature stands of *Casuarina cunninghamiana* (river she-oak) line its especially attractive watercourses, one of which flows permanently and constitutes a valuable local natural resource. As a significant area of remnant bushland, the reserve is also of value as much of the landscape in the Orange district has been cleared and there are no major gazetted conservation reserves or wilderness areas close to Orange.

However, it is apparent the current trustees attach little value to these prizes, for there is severe degradation of Ophir Reserve occurring under the existing plan of management. A number of degrading influences are evident due to livestock grazing, off-road vehicles, mining activities, weed invasion, feral animals, wood harvesting and soil erosion. These effects are detrimentally impacting on the flora and fauna abundance and diversity in the reserve, and are documented in the report via results of our ground survey work and observations during the period April to December 1997.

The reserve consists of several important habitats and vegetation associations of regional significance. These include:

- **a substantial area of *Eucalyptus albens* (white box) woodland;**
- **a valuable *Casuarina cunninghamiana* (river she-oak) riparian habitat, consisting of Lewis Ponds, Summer Hill and Ophir Creeks, which is a unique regional feature since there are few permanent waterways in the central tablelands;**
- ***Eucalyptus blakelyi/E. melliodora* (red gum/yellow box) woodland/low forest, which covers the majority of the reserve area; and**
- **a significant habitat of rugged rocky overhangs along the three permanent creeks in the reserve, as well as in Eau de Cologne and Black Springs Gullies.**

Although the main tree structural elements of all three vegetation types in the reserve are basically intact, all habitats have suffered understorey degradation. However, they could be satisfactorily restored with appropriate management. This would represent a significant contribution to biodiversity conservation at a regional and national scale, since the box woodlands in particular, which originally covered much of eastern Australia, are poorly conserved.

A number of shrubs and herbs identified in the reserve have notable regional significance. Ten species in particular illustrate the importance of the vegetation in the reserve, which represents a unique admixture of species derived principally from southern and western floristic influences. Many of these plants are either uncommon or are the only known occurrence of the species in the Orange district. One species is nationally rare and endangered. All of the ten species highlighted are locally vulnerable, and further degradation of the reserve could result in their local extinction.

By and large we found the abundance and diversity of most small mammal, reptile and bird species to be well below frequencies known for the region, and this impoverishment is attributed to the degradation of the understorey flora in the reserve. The surprisingly low occurrence of lizards and ground orchids was particularly seen as an indicator of the poor functional status of the reserve's terrestrial ecosystems.

Without exception the understorey shrub, herb and grass layers in all three vegetation associations are highly degraded. In the riparian habitat the narrow alluvial shelves are dominated by introduced weeds, predominantly annual herbs and grasses. In the woodland and

low forest areas, much of the understorey is relatively free of weeds, although there are pockets that have been dominated by annual grasses and forbs. Thickets of *Rubus fruticosis* (blackberry) are particularly evident on the rugged terrain in and adjacent to the watercourses. Other noxious weeds, notably *Rosa rubiginosa* (sweet briar), which is widespread and common throughout the reserve, occur along with less common infestations of *Nassella trichotoma* (serrated tussock) and *Hypericum perforatum* (St John's Wort). Feral animals including goats, foxes, rabbits, hares and rats were observed in the reserve. The influx of volunteer *Pinus radiata*, notably around the Tinker's Point Road area, has the potential to further spread and degrade the native forest/woodlands.

It is considered that at least in the woodland and low forest habitats there is likely to be sufficient reserves of seed in the soil seed bank to enable regeneration of the understorey, provided a sympathetic management plan is implemented to nurture this process.

To counteract the damage and degradation, and to foster conservation of the unique and regionally valuable habitats within Ophir Reserve, we recommend that:

1. ***Livestock grazing be permanently discontinued throughout the reserve;***
2. ***Off-road vehicles be restricted to designated roads;***
3. ***All tracks, trails and stream banks be closed to unauthorised off-road vehicles;***
4. ***All tracks and trails be reviewed with a view to revegetating those not considered as essential for fire and land management use by authorised vehicles;***
5. ***A plan be devised and implemented to arrest weed invasion and improve the control of noxious weeds and feral animals;***
6. ***Areas cleared of native vegetation, particularly those between Cemetery Road and Tinker's Point Road, be cleared of exotic species and revegetated;***
7. ***A fire plan be developed by professionals qualified in fire management of native vegetation that is sympathetic towards the conservation and revegetation of the reserve;***
8. ***A system of walking trails be developed within the reserve and promoted for recreational use, with a view to highlighting the historical values and conservation of biodiversity;***
9. ***A policy be developed to permit the continuation of traditional mining activities in the reserve, paying particular attention to ways of minimising the environmental impact of these activities and to revegetation of abandoned sites;***
10. ***A Constituted Trust be established of* "Friends of Ophir Reserve" *to oversee the management of the reserve. This should be comprised of representatives from the major interest groups including nature conservation, natural history, social history, industrial archaeology, cultural heritage, neighbours, orienteering, bush walking, fishing, mining, fossicking and Cabonne Council.***
11. ***The flora and fauna of the reserve be resurveyed two years after the abolition of livestock grazing.***

INTRODUCTION

The Orange Field Naturalist and Conservation Society Incorporated (OFNCS) was commissioned in April 1997 by Cabonne Council to provide an account of the flora and fauna of Ophir Reserve.

The Ophir Reserve consists of two blocks of Crown Land totalling 560 ha gazetted as Reserve No. 65909 for public recreation and is under the trusteeship of the Cabonne Council. The primary block of 526 ha is the focus of this report. It is located on the 1:25000 scale topographical maps of Ophir and Gowan, is situated approx. 26 km north/north east of Orange, and can be accessed from the north west using Ophir Road or the south east using Lower Lewis Ponds Road.

The OFNCS has an ongoing project to document the native flora of remnant bushland within the Orange region. The survey involves extensive field exploration of the flora, development of an herbarium collection and a computer database of the remnant flora. The Ophir Reserve had not previously been subjected to a thorough survey as part of this work.

This report compiles the plant alliances observed in the Ophir Reserve remnant bushland areas and includes checklists of recorded native bird, mammal, reptile, amphibian and plant species together with details of distribution, abundance, habitat and conservation status. The regional significance of the flora and fauna in the Ophir Reserve is discussed and comment is made on species considered to be vulnerable.

METHOD

At least 15 field excursions have been undertaken in the Ophir Reserve area during the winter and spring seasons of 1997 to survey the native flora and fauna in all habitats of the primary reserve. Excursions were conducted mid-week, in addition to weekends, to alleviate the effects of disturbance from recreational activities in the reserve. Common widespread plant species were recorded as observations and other species of particular interest were preserved as herbarium specimens. Separate recordings were compiled for the three main vegetation types in the reserve, as well as for the fenced enclosure and the Ophir Cemetery. All herbarium specimens and observations have been recorded in the database.

Two pit trap lines and 25 small mammal traps were set up and observed in the Black Springs Gully area of the reserve over the long weekend in June. At the same time a further 25 small mammal traps were located in the *Eucalyptus albens* (white box woodland) area in the northern sector of the reserve. These were cleared soon after dawn on three consecutive mornings. Three night spot-lighting excursions were undertaken to record nocturnal species of birds, mammals, amphibians and reptiles. Observations were made on weeds and feral animals during all of the excursions.

We regard the survey as being reliable and credible as members of the OFNCS have considerable experience in plant, bird, reptile and mammal surveying and identification, and collectively have amassed an intimate knowledge of the region's native flora and fauna.

PHYSIOGRAPHY OF OPHIR RESERVE

Ophir Reserve is situated midway along the northern transition of the Central Tablelands/Central Western Slopes botanical subdivisions whose boundary loops around the Macquarie River Valley (Figure 1). In the west it is dissected by two valleys comprising the Lewis Ponds Creek (ephemeral flow) draining from the south, and Summer Hill Creek (permanent flow) draining from the south west, including (at present) effluent discharge from Orange Sewerage Works. The two creeks join just upstream of the main road causeway crossing at the present camping/picnic grounds of the reserve. From there Ophir Creek (permanent) flows eastward, dissecting the reserve and thence in the north eastern sector forming the eastern boundary of the reserve (Figure 2), progressing northward from the reserve to the Macquarie River (Figure 1). In

addition, Eau de Cologne and Black Springs Gullies dominate the southern sector of the reserve, and these drain into Ophir Creek.

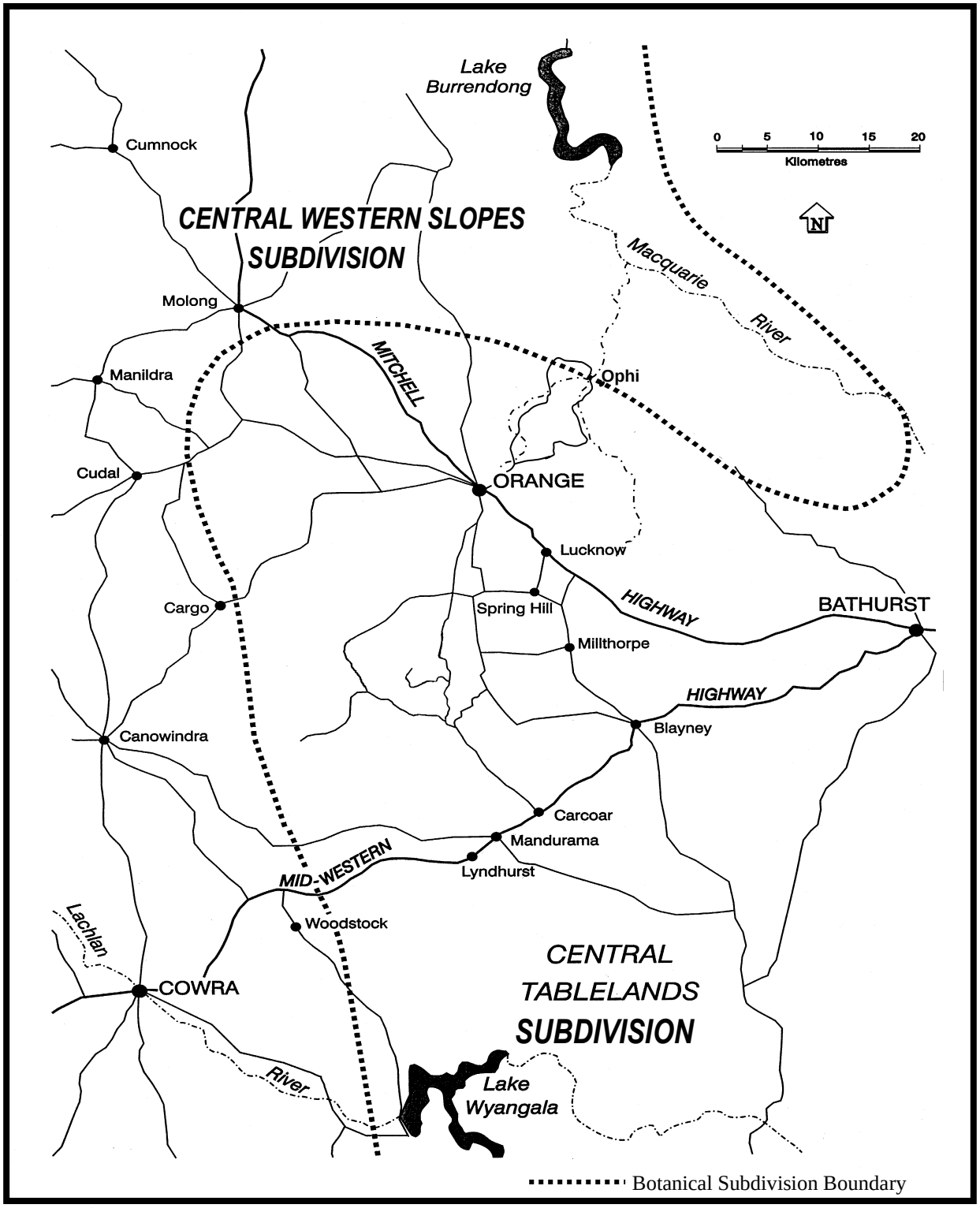

Figure 1. Regional map depicting the Central Western Slopes and Central Tablelands botanical subdivision boundary and location of Ophir.

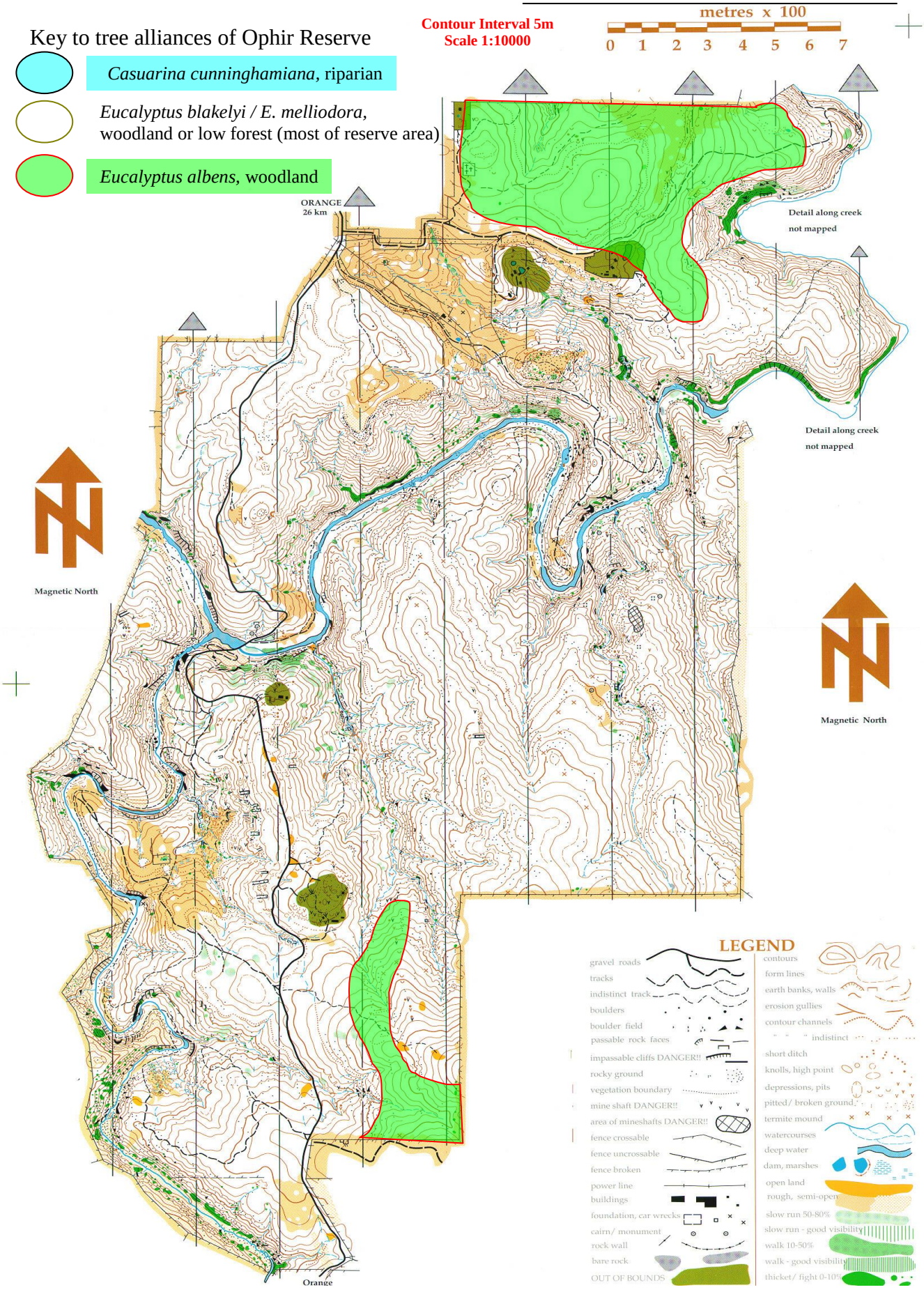

Figure 2. Major tree alliances and habitat details of the Ophir Reserve.

The altitude varies between approx. 700 m and 500 m and is characterised by steep topography along the gullies and especially along the creeks, providing a variety of aspects and habitats. On the ridges the soils are mostly impoverished and skeletal, being derived from slates, sandstones and conglomerates of the Devonian Cunningham Formation, other than for one significant basaltic outcrop associated with the *Eucalyptus albens* woodland in the reserve's north. The ridges are dominated by dry sclerophyll forests or woodland with a sparse understorey of low shrubs, herbs and grasses. Vegetation in the valleys consists of taller forests with a more diverse understorey of herbs, grasses and shrubs, notably on the numerous partially protected rocky outcrops on the precipitous banks of the creeks and gullies. The riparian habitat is highly disturbed and is characterised by narrow alluvial flats, which are dominated by introduced weeds.

HABITATS OF SPECIAL SIGNIFICANCE

The reserve is topographically diverse and contains three particular habitats worthy of comment.

The predominant topographical feature of the reserve is its steep rocky outcrops rimming the creeks and gullies which provide a variety of north and south-sloping dryland habitats. Unfortunately many of these habitats are inundated with thickets of blackberries (Plate 2). It is evident this noxious weed has been poorly controlled for a number of years, notably on the potentially more valuable areas of these habitats along Ophir Creek.

The northern portion of the reserve comprises a plateau of Tertiary basalt remnants with deeper and possibly more fertile soil which supports an important area of open *E. albens* (white box) woodland. Under the current management arrangements, this valuable area has suffered severe degradation from overgrazing. Nationally the *E. albens* woodlands are poorly conserved and this area is of intrinsic value.

The riparian habitat is of exceptional significance as there are no major rivers in the tablelands region (Plate 3). Permanent streams in a reserve offer a special value for conservation as well as recreation. There are several kilometres of permanent waterway in Ophir Reserve, all lined with mature and regenerating stands of *Casuarina cunninghamiana* (river she-oak).

LAND USE HISTORY

Much of the Ophir Reserve area has been heavily logged in the past, either for firewood or 'pit-propping' during previous mining activities or hardwood for building and fencing material. The existing tree cover is therefore mainly re-growth timber with isolated old-growth trees and occasional old-growth stands in the less accessible areas.

The reserve has been damaged, and continues to suffer considerable abuse, as a result of grazing leases, mining activities and from vehicular impact (Plate 4). Soil erosion is extensive in certain areas, notably in the south-eastern sector draining to Lewis Ponds Creek (Plate 5). There is evidence of illegal activities such as firearm discharge and the harvesting of fallen and standing dead timber in various parts of the reserve.

Recreational use is extensive along the creeks for fossicking, camping, picnicking, fishing, trail bike riding and four wheel driving. More limited recreational uses for bushwalking, photography, historical excursions or naturalising occur in the reserve, however the reserve is a regular venue for orienteering activities.

Plate 2. Blackberry thickets have been neglected and now dominate the foreshores of the valuable riparian habitat and important rocky cliff overhangs along the water courses throughout the reserve. *We recommend a plan be devised and implemented to arrest weed invasion and improve the control of noxious weeds and feral animals.*

Plate 3. Permanent water courses are a valuable feature and habitat within the Ophir Reserve, not only for recreation but for the conservation of biodiversity. *We recommend a system of walking trails be developed within the reserve and that these be promoted for recreational use.*

Plate 4. Considerable damage is imposed on the riparian habitat by off-road vehicles traversing the numerous tracks throughout the reserve. *We recommend these tracks be closed to all traffic other than authorised service vehicles.*

Plate 5. Soil erosion is a major degrading force in the reserve, and is being exacerbated through overgrazing by livestock. Note the absence of understorey vegetation below the tree canopy. *We recommend livestock grazing be permanently discontinued throughout the reserve.*

FLORA

Regional Context

Much of the landscape in the Orange district has been cleared for agricultural, horticultural and silvicultural activities. Islands of remnant bushland are dominated by Mount Canobolas and environs and the nearby Mullion Range complex, neither of which are in pristine condition. There are no major gazetted conservation reserves or wilderness areas close to Orange. However, there are two small nature reserves (Barton NR and Freemantle NR) and two flora reserves in the northern Mullion Range.

The natural vegetation of the Orange district comprises mainly eucalypt forests and woodlands. No detailed description of the flora has been published but it is known to be a transitional zone containing elements from the sandstone flora to the east, the cool temperate flora to the south and the semi-arid western slopes flora. The southern and western elements predominate in the flora of the Ophir Reserve.

The remnant forests and woodlands consist of eight alliances (Bower and Semple, 1993), the most widespread on the dry, rugged ranges being *Eucalyptus rossii/E. macrorhyncha*. This alliance contains a large number of associated trees including, *E. dives, E. goniocalyx, E. polyanthemos, E. bridgesiana, E. viminalis, E. albens, E. mannifera* and *Callitris endlicheri.* It is not uncommon for *E. rossii* to be absent from many of these associations. Much of the more fertile areas above 800m alt., that have been cleared for horticultural, agricultural or silvicultural purposes, were dominated by the *E. fastigata/E. viminalis* alliance. *E. fastigata* is absent from the alliance in the Orange region and associated species include *E. pauciflora, E. dalrympleana* subsp. *dalrympleana, E. robertsonii* subsp. *hemisphaerica, E. viminalis, E. dives, E. rubida* subsp. *canobolensis, E. rubida* subsp. *rubida, E. melliodora, E. bridgesiana and E. aggregata*.

The *E. blakelyi/E. melliodora* and *E. albens* alliances are typically dominant on land below 800m alt. in the areas cleared for agriculture. Most permanent streams below 800m alt. are lined by the *Casuarina cunninghamiana* alliance.

Three of the local tree alliances are represented on Ophir Reserve. The majority of the remnant bushland on Ophir Reserve is in the *Eucalyptus blakelyi/E. melliodora* alliance. A significant *E. albens* alliance covers the small area of woodland at the northern end of the reserve and *Casuarina cunninghamiana* occurs along Summer Hill, Lewis Ponds and Ophir Creeks (Figure 2).

Description and Significance of Tree Alliances in the Reserve

1. ***Eucalyptus albens* (white box)**

   This alliance occurs primarily as a pure stand on the basaltic soils at the northern end of the reserve. The *E. albens* alliance is poorly conserved nationally and this area is one of the last remaining near natural stands of *E. albens* in the Orange area. Small pockets also occur at higher altitudes in the southern reaches of the reserve where they intergrade with the *E.blakelyi/E melliodora* alliance. This alliance is typically classed as open woodland.

2. ***Eucalyptus blakelyi/E. melliodora* (red gum/yellow box)**

   This alliance covers the majority of the reserve, and would have dominated the surrounding agricultural lands to the north, south and east. It occurs on a variety of soils and terrain. However, a number of associated tree species occur sporadically throughout the reserve within this alliance. *E. viminalis* occurs in the moister gullies and along the steep banks above parts of Ophir Creek. *E. macrorhyncha, E. bridgesiana, E. goniocalyx and E. polyanthemos* tend to be scattered throughout, although *E. polyanthemos* also occurs in almost pure patches on the higher ridges. A small number of *E.*

mannifera trees occur in the fenced regeneration enclosure. These species in particular indicate that the alliance, as represented on the reserve, is an intergrade from the *E. rossii/E. macrorhyncha* alliance which does not occur in the reserve but which covers much of the Mullion Range area to the west and north west of Ophir Reserve. Small numbers of *Brachychiton populneus* and *Callitris endlicheri* occur sporadically throughout the reserve. *Eucalyptus dealbata* also occurs sporadically in this alliance in the reserve, being confined mainly to rocky slopes above the creeks. The alliance is characteristically open woodland or low open forest.

3. ***Casuarina cunninghamiana*** **(river she-oak)**

This alliance is confined to a narrow strip along the main water courses of Lewis Ponds, Summer Hill and Ophir Creeks. *C. cunninghamiana* serves an important role in stabilising the banks of creeks and rivers, and for this reason is a protected tree in New South Wales. Permits are required from the Department of Conservation and Land Management before this tree can be removed.

Conservation Status of Alliances and their Importance for Fauna

All three alliances occurring in the reserve are widespread in central western New South Wales and beyond, but only the *C. cunninghamiana* alliance is well conserved in National Parks and Nature Reserves. The *E. blakelyi/E. melliodora* alliance, although widespread, is poorly conserved in its pristine state in the central western region. The *E. albens* alliance, which was once common in eastern Australia, is very poorly conserved with less than 0.01% of the original area remaining in pristine condition.

These woodlands were highly sought after for agricultural development by the early settlers. Now remnants only exist on areas such as Ophir Reserve because of the rugged topography and poorer soils which made agriculture impractical. Hence the few remnants left have significance for biodiversity conservation and as a reminder of how the country originally looked.

One of the paradoxes of the Australian environment is that the greatest diversity of flora is often associated with poor soils, and areas of higher soil fertility support less diverse flora. The reverse is generally true for wildlife where the greatest diversity is found on the more fertile soils which produce more biomass of higher quality from the less diverse flora. This generalisation applies throughout central western N.S.W. where the poorer remnant forests and woodlands have high floral diversity with many low shrub species in the understorey and a wide range of small herbs, but relatively low densities of grasses. The box woodlands in contrast have primarily a grassy understorey with few low shrubs and some medium height shrubs such as wattles.

More importantly, therefore, remnant areas such as Ophir Reserve provide the main habitats for fauna in the central west since the majority of the land has been cleared for agriculture, horticulture or silviculture. This constriction and loss of habitat has resulted in a serious decline in the region of many species such as the Regent Honeyeater, Superb Parrot, Swift Parrot, Barking Owl, Squirrel Glider, Bridled Nailtail Wallaby, Koala, Greater Glider, Tasmanian Bettong, Rufous Hare Wallaby and various bat species. Table 1 lists wildlife species suspected to have occurred in the area but now believed to be locally extinct. Native mammals which once occurred in the area and which survive either in the Central West of N.S.W. or elsewhere are shown in Table 2. Eleven of these mammal species were recorded during the survey in Ophir Reserve. Similarly, an extensive list of native birds known to occur in the Central West is shown in Table 3. These birds have been recorded in a 185 (east/west) by 110 (north/south) kilometre rectangle centred on about Canowindra. Birds observed in the reserve during the survey period are noted. Eighty species of the 219

recorded in the region were observed in Ophir Reserve during the survey period.

The majority of bird and mammal observations made during the survey period show their apparent status to be lower in the reserve than their current national status.

Table 1. Probable extinctions of native mammals in Ophir Reserve

Species	Current National status	Status In Ophir Reserve
Eastern hare-wallaby	Extinct	Extinct
Bridled nailtail wallaby	Endangered	Extinct
White-footed rabbit-rat	Extinct	Extinct
Gould's mouse	Extinct	Extinct
Dingo	Common	Extinct

Table 2. List of extant native mammals likely to have occurred in the Central West region pre-settlement and species observed during the survey and their status in Ophir Reserve

Species	Current National status	Extant in Central West region	Observed Status in Ophir Reserve
Platypus	Common	x	Common
Echidna	Common	x	Moderately common
Yellow-footed antechinus	Common	x	Uncommon
Common dunnart	Moderately common	x	
Fat-tailed dunnart	Moderately common	x	
Brush-tailed phascogale	Common/localised	?	
Koala	Common/localised	x	
Wombat	Common	x	
Ringtail possum	Common	x	Uncommon
Greater glider	Abundant	x	
Sugar glider	Common	x	Moderately common
Squirrel glider	Rare	?	
Brushtail possum	Abundant	x	Moderately common
Feathertail glider	Moderately common	x	
Red-necked wallaby	Abundant	x	Moderately common
Eastern grey kangaroo	Abundant	x	Moderately common
Euro/Wallaroo	Common	x	Moderately common
Swamp wallaby	Common	x	Moderately common
Little red flying fox	Common	x	
Yellow-bellied sheath-tailed bat	Rare	?	
White-striped mastiff-bat	Common	?	
Little mastiff-bat	Common	?	
Gould's long-eared bat	Common	?	
Lesser long-eared bat	Abundant	?	
Common bent-wing bat	Abundant	x	
Gould's wattled bat	Abundant	x	
Chocolate wattled bat	Common	x	
Little broad-nosed bat	Common	x	
Little cave eptesicus	Abundant	x	
Little forest eptesicus	Common	x	
Water rat	Common	x	Moderately common
Southern bush rat	Abundant	x	

Table 3. Bird species recorded and current national status in the 1^0 latitude by 1^0 longitude block centred on 33^0 30' S and 148^0 30' E (near Canowindra) (data source: Royal Australasian Ornithologists Union) and species and status observed during the survey period in Ophir Reserve.

Species	Current national status	Observed status in Ophir Reserve
Emu	Moderately common	
Bush thick-knee	Endangered NSW	
Quails		
Stubble quail	Moderately common	
Brown quail	Moderately common	Uncommon
Painted button-quail	Uncommon/Common	
Little button-quail	Uncommon/Common	
Doves and Pigeons		
Peaceful dove	Common/Abundant	
Diamond dove	Scarce	
Bar-shouldered dove	Uncommon	
Common bronzewing	Common	
Crested pigeon	Common/Abundant	Common
Water Birds		
Dusky moorhen	Abundant	Moderately common
Eurasian coot	Common/Abundant	
Australasian grebe	Common/Abundant	Uncommon
Hoary-headed grebe	Moderately common	Rare
Great cormorant	Common/Abundant	
Little black cormorant	Common/Abundant	
Pied cormorant	Common/Abundant	
Little pied cormorant	Common/Abundant	
Darter	Uncommon	
Australian pelican	Moderately common	
Silver gull	Common	
Red-kneed dotterel	Moderately common	
Masked lapwing	Abundant	
Banded lapwing	Moderately common	
Lesser golden plover	Rare	
Double-banded plover	Rare	
Red-capped plover	Scarce	
Black-fronted plover	Common/Abundant	
Lathams snipe	Moderately common	
Painted snipe	Vulnerable NSW	
Glossy ibis	Common/Uncommon	
Sacred ibis	Common/Abundant	Uncommon
Straw-necked ibis	Common/Abundant	Uncommon
Royal spoonbill	Uncommon	
Yellow-billed spoonbill	Moderately common	
Little egret	Uncommon/Scarce	
Intermediate egret	Moderately common	
Great egret	Common/Abundant	
Cattle egret	Common	
White-faced heron	Common/Abundant	Uncommon

Table 3 continued.

Species	Current national status	Observed status in Ophir Reserve
Pacific heron	Common/Abundant	
Rufous night heron	Moderately common	
Australasian bittern	Vulnerable NSW	
Maned duck	Common/Abundant	Uncommon
Black swan	Common	
Pink-eared duck	Uncommon	
Plumed Whistling duck	Uncommon/Rare	
Australian shelduck	Uncommon	
Pacific Black duck	Common/Abundant	Common
Chestnut teal	Moderately common	
Grey teal	Common/Abundant	
Australasian shoveler	Moderately common	
Freckled duck	Vulnerable NSW	
Hardhead	Common	
Blue-billed duck	Vulnerable	
Musk Duck	Uncommon	
Birds of Prey		
Spotted harrier	Moderately common	
Marsh harrier	Moderately common	
Brown goshawk	Uncommon	Uncommon
Collared sparrowhawk	Uncommon	
Wedge-tailed eagle	Moderately common	Uncommon
Little eagle	Moderately common	Uncommon
White-bellied sea-eagle	Scarce/Uncommon	
Whistling kite	Moderately common	
Black kite	Common	
Black-shouldered kite	Moderately common	Common
Letter-winged kite	Rare	
Australian hobby	Moderately common	
Grey falcon	Vulnerable NSW	
Peregrine falcon	Uncommon	Uncommon
Black falcon	Uncommon	
Brown falcon	Moderately common	Uncommon
Australian kestrel	Moderately common	Common
Owls		
Southern boobook	Moderately common	
Barking owl	Rare	
Barn owl	Common	
Lorikeets, Cockatoos, Parrots and Rosellas		
Musk lorikeet	Uncommon	
Little lorikeet	Moderately common	Common
Glossy black cockatoo	Vulnerable NSW	
Sulphur-crested cockatoo	Common	Abundant
Pink cockatoo	Scarce	
Galah	Abundant	Abundant
Cockatiel	Common	

Table 3 continued.

Species	Current national status	Observed status in Ophir Reserve
Superb parrot	Vulnerable NSW	
Crimson rosella	Common	Abundant
Eastern rosella	Common	Moderately common
Mallee ringneck	Common	
Red-rumped parrot	Abundant	Moderately common
Mulga parrot	Scarce	
Blue bonnet	Common	
Turquoise parrot	Vulnerable NSW	
Swift parrot	Vulnerable	
Budgerigar	Moderately common	
Frogmouth and Nightjar		
Tawny frogmouth	Common	
Australian owlet-nightjar	Moderately common	
Bee-eater and Rollers		
Rainbow bee-eater	Common	Uncommon
Dollarbird	Common	Moderately common
Kookaburra and Kingfishers		
Azure kingfisher	Uncommon	Moderately common
Laughing kookaburra	Common/Abundant	Moderately common
Red-backed kingfisher	Moderately common	
Sacred kingfisher	Common	Uncommon
Swifts		
White-throated needletail	Moderately common	
Fork-tailed swift	Uncommon	
Cuckoos		
Pallid cuckoo	Common/Abundant	Moderately common
Fan-tailed cuckoo	Common	Uncommon
Black-eared cuckoo	Uncommon	
Horsefield's bronze-cuckoo	Uncommon	
Shining bronze-cuckoo	Uncommon	
Common koel	Scarce	
Swallows		
Welcome swallow	Common/Abundant	Abundant
White-backed swallow	Moderately common	
Tree martin	Common/Abundant	Uncommon
Fairy martin	Common/Abundant	
Fantails		
Grey fantail	Common/Abundant	Abundant
Rufous fantail	Moderately common	
Willie wagtail	Common/Abundant	Common
Flycatchers		
Leaden flycatcher	Moderately common	
Satin flycatcher	Uncommon	
Restless flycatcher	Common/Abundant	Uncommon
Jacky winter	Common/Abundant	Moderately common

Table 3 continued.

Species	Current national status	Observed status in Ophir Reserve
Robins		
Scarlet robin	Moderately common	
Red-capped robin	Common/Abundant	Uncommon
Flame robin	Moderately common	
Rose robin	Moderately common	
Hooded robin	Moderately common	
Eastern yellow robin	Moderately common	Moderately common
Whistlers		
Golden whistler	Common/Abundant	Uncommon
Rufous whistler	Moderately common	Moderately common
Gilbert's whistler	Uncommon	
Grey shrike-thrush	Abundant	Moderately common
Crested bellbird	Uncommon	
Mud-nest Builders		
Australian magpie-lark	Abundant	Common
White-winged chough	Common/Abundant	Abundant
Apostlebird	Common	
Shrike-tit		
Crested shrike-tit	Moderately common	
Cuckoo-shrike		
Ground cuckoo cuckoo -shrike	Moderately common	
Black-faced cuckoo -shrike	Abundant	Moderately common
White-bellied cuckoo-shrike	Moderately common	Uncommon
Trillers		
Cicadabird	Uncommon	
White-winged triller	Abundant/Moderately common	
Spotted quail-thrush	Moderately common	
Babblers		
Grey-crowned babbler	Moderately common	
White-browed babbler	Common/Abundant	
Thrush		
White's thrush	Moderately common	
Chats		
White-fronted chat	Common	
Crimson chat	Moderately common	
Orange chat	Uncommon	
Warblers		
White-throated gerygone	Common	Uncommon
Western gerygone	Common	
Little grassbird	Moderately common	
Australian reed-warbler	Common	
Whiteface		
Southern whiteface	Common	Uncommon

Table 3 continued.

Species	Current national status	Observed status in Ophir Reserve
Thornbills		
Weebill	Abundant	Uncommon
Yellow thornbill	Common	Moderately common
Brown thornbill	Common/Abundant	Moderately common
Inland thornbill	Common/Abundant	
Chestnut-rumped thornbill	Common/Abundant	
Buff-rumped thornbill	Abundant	Uncommon
Yellow-rumped thornbill	Abundant	Moderately common
Scrubwrens		
White-browed scrubwren	Common/Abundant	Moderately common
Chestnut-tailed hylacola	Uncommon	
Speckled warbler	Common	Uncommon
Larks and Pippits		
Brown songlark	Abundant	
Rufous songlark	Abundant	
Singing bushlark	Common	
Richard's pippit	Abundant	Uncommon
Cisticolas		
Golden-headed cisticola	Scarce	
Fairy-wrens		
Superb fairy-wren	Abundant	Abundant
White-winged fairy-wren	Scarce	
Woodswallows		
White-breasted woodswallow	Moderately common	
Masked woodswallow	Moderately common	
White-browed woodswallow	Abundant	
Black-faced woodswallow	Moderately common	
Dusky woodswallow	Abundant	Moderately common
Sitellas and Treecreepers		
Varied sittella	Common/Abundant	Uncommon
Brown treecreeper	Abundant	Moderately common
White-throated treecreeper	Abundant	Abundant
Red-browed treecreeper	Common	
Flowerpeckers		
Mistletoe bird	Abundant	
Pardalotes		
Spotted pardalote	Abundant	Abundant
Striated pardalote	Common	Abundant
White-eyes		
Silvereye	Abundant	Abundant
Honeyeaters		
White-naped honeyeater	Common/Abundant	Common
Black-chinned honeyeater	Moderately common	
Brown-headed honeyeater	Common/Abundant	Moderately common
Striped honeyeater	Common	

Table 3 continued.

Species	Current national status	Observed status in Ophir Reserve
Painted honeyeater	Vulnerable NSW	
Regent honeyeater	Endangered	
Fuscous honeyeater	Common	Moderately common
Yellow-faced honeyeater	Common/Abundant	Abundant
White-eared honeyeater	Common/Abundant	Common
Yellow-tufted honeyeater	Common	
Yellow-plumed honeyeater	Common	
Grey-fronted honeyeater	Scarce	
White-plumed honeyeater	Common/Abundant	Common
Spiny-cheeked honeyeater	Common/Abundant	
Blue-faced honeyeater	Common	
Noisy miner	Abundant	Abundant
Yellow-throated miner	Moderately common	
Wattlebirds		
Red wattlebird	Abundant	Abundant
Friarbirds		
Noisy friarbird	Common/Abundant	Abundant
Little friarbird	Common	Uncommon
Finches		
Diamond firetail	Common	
Zebra finch	Common/Abundant	
Double-barred finch	Common	Rare
Red-browed firetail	Common/Abundant	Abundant
Orioles		
Olive-backed oriole	Moderately common	
Bell-magpies (Currawongs)		
Pied currawong	Common	Abundant
Grey currawong	Moderately common	Uncommon
Butcherbirds		
Pied butcherbird	Common	
Grey butcherbird	Moderately common	
Magpies		
Australian magpie	Abundant	Common
Raven		
Australian raven	Abundant	Common
Little raven	Abundant	

No small nocturnal mammals were observed in the *E. albens* woodland where an introduced rat was the only mammal trapped. In the Black Springs Gully area two female *Antechinus flavipes* (yellow-footed Antechinus) were repeatedly trapped, one over successive nights in traps some 300 m apart in the gully and an adjacent knoll. No species were recorded from the pit fall traps. This indicates that native small mammal populations are virtually non-existent in the *E. albens* woodland and probably quite low elsewhere (Table 2).

Table 4. Checklist of reptiles observed in Ophir Reserve during the course of the survey

Species	Current national status	Observed Status in Ophir Reserve
Nobbi lashtail	Common	Uncommon
Lace monitor	Common	Uncommon
Eastern water dragon	Common	Moderately common
Southern rainbow skink	Common	Uncommon
Robust Ctenotus	Abundant	Uncommon
Copper-tailed skink	Abundant	Uncommon
Cunningham's skink	Common	Uncommon
Cool-temperate water-skink	Common	Moderately common
Shingleback lizard	Common to Abundant	Uncommon
Copperhead snake	Common	Uncommon
Red-bellied black snake	Very sparse to abundant	Moderately common
Eastern brown snake	Very sparse to abundant	Uncommon[1]
Gecko		Uncommon[1]

[1]Reputed status for reserve, but not sighted during survey

Table 5. Checklist of frogs observed in Ophir Reserve

Species	Current National status	Observed Status in Ophir Reserve
Peron's tree frog	Common	Common
Common froglet	Abundant	Common
Eastern banjo frog	Common	Common
Spotted grass frog	Common	Common
Bibron's toadlet	Common	Common

Lizards and dragons in particular were notably uncommon (Table 4), and again this is undoubtedly due to the lack of ground litter and habitat as a result of overgrazing. By contrast, frogs were relatively common along the permanent creeks (Table 5).

Significant Features of Ophir Reserve Flora

A checklist of the native flora, arranged by plant family into pteridophytes (ferns), dicotyledons (broadleaf herbs, shrubs and trees) and monocotyledons (lilies and grasses) is given in Table 6. The list gives details of the distribution of each species, its abundance, habitat and national and regional conservation status.

We have identified 176 species in the Ophir Reserve area, comprising 6 pteridophytes, 52 monocotyledons and 124 dicotyledons. The dominant families are Fabaceae (subfamily Faboideae 12 species; subfamily Mimosoideae 10 species), Asteraceae (14 species), Poaceae (22 taxa), Myrtaceae (12 species) and Lomandraceae (7 species). In view of the limited time frame for the survey,
the extremely dry spring season and the severe overgrazing of the area we consider this census is unlikely to be complete.

Of the dominant groups the Lomandraceae (grass-like rushes) expresses a higher diversity in Ophir Reserve than at most similar locations within the region. Rarely are more than four species ever observed together

in the region. Given the extent of permanent water in the reserve and the associated rocky creek banks it is surprising not to find a greater diversity of ferns. Perhaps this is also symptomatic of the severe overgrazing.

The scarcity of ground orchids in the reserve is noteworthy. Obviously the overgrazing has had a severe impact on these populations, as despite the dry season, populations elsewhere in the district have flourished this year.

Regionally Rare or Significant Species

The Ophir Reserve area supports at least ten regionally significant plant species. Two are thorny shrubs, and two other species were found only in the Ophir Cemetery enclosure. One is classified as being rare on a national scale. There could well be others that were not identified during the survey because the area was denuded due to heavy grazing. Clearly the reserve holds an important representation of the local flora and its further degradation would result in a significant depletion of the regional biodiversity. In this section the reasons for classifying each species as regionally rare or significant are presented.

1. ***Acacia amoena.*** Boomerang wattle

Isolated plants of this tall shrub are scattered throughout the reserve. A small stand occurs on the rocky overhang of Lewis Ponds Creek, just upstream of its confluence with Summer Hill Creek. Small stands of this species are known to occur in the Fourth Crossing area and in areas downstream of the reserve, but overall it is uncommon in the Orange district. It is frost hardy and is distributed primarily across the tableland region and is not considered endangered.

2. ***Boerhavia dominii.*** Tarvine

This variable creeping prostrate summer growing perennial is widespread throughout the state, particularly in the western regions but this is the only known record in the Orange district. It is highly edible and one plant only was observed in a rocky outcrop along Lewis Ponds Creek.

3. ***Davesia genistifolia.***
An egg and bacon flower

This bush pea is extremely rare elsewhere in the Orange district. Isolated plants have been observed in tenuous habitats such as rocky outcrops in agricultural lands and embankments along railway rights-of-way. Within Ophir Reserve it is locally common, and has survived the ravages of grazing by virtue of its prickly stems. Although rare within the Orange district it is not at risk at the state or national levels.

4. ***Dicanthium setosum.*** A bluegrass

Although this is another widespread and relatively common perennial grass we have not previously recorded it from the Orange area. It occurs mainly in woodland and grassland areas from the Central Western Slopes northwards to Queensland.

5. ***Discaria pubescens.***
Australian anchor plant

Like *Davesia genistifolia*, this woody shrub has survived the ravages of grazing by virtue of its prickly stems. Only one other record of the plant in the Orange region is known from a single plant in the Borenore Caves Reserve. Although uncommon in Ophir Reserve, a small isolated stand of the shrub occurs. However, this consists of only a few plants adjacent to one of the roads in the reserve and hence is exceedingly vulnerable to any roadworks and off-road vehicular traffic. This is a significant population given that the species is registered as being rare at the state and national levels.

6. ***Galium migrans.*** A bedstraw

A single population of this prostrate herb occurs in a side gully on the

northern side of Ophir Creek, not far downstream of the picnic areas. This is the only known occurrence of the species in the Orange area and it has not been recorded in the Central Tablelands/Central Western Slopes botanical subdivisions (Harden 1990-93). However it is considered to be widespread in the coastal regions and is not endangered.

7. ***Haloragus serra.*** A raspweed

Two small stands of this straggly low growing perennial shrub occur on the reserve, one in Black Springs Gully and another on the rocky cliffs above Lewis Ponds Creek. These are the only known stands of the species in the Orange district, although it is regarded as being common in the Central Tablelands /Central Western Slopes botanical subdivisions.

8. ***Linum marginale.*** Native flax

Although widespread this perennial herb is not considered to be common in NSW. It normally occurs in the western regions of the state and has not been recorded in the Central Tablelands botanical subdivision (Harden 1990-93). Several plants of the species were observed only in the cemetery enclosure in the reserve.

9. ***Lomandra cylindrica.*** A matrush

This species is known to occur only sparsely elsewhere in the Orange district. Scattered plants occur in the north eastern areas of the reserve in rocky areas overhanging Ophir Creek. It is known to occur in the southern tablelands and south coast districts and is not considered endangered. However it should be regarded as being uncommon in the local region.

10. ***Pimelia simplex*** ssp. ***simplex.***
Desert rice flower

This is the only known record of the species in the Orange area. The species is common on the western plains of N.S.W. and is commonly associated with livestock poisoning. Several plants of the species were observed only in the cemetery enclosure in the reserve. It is a small upright herb.

Table 6. Checklist of plant species observed and their abundance in the three major habitats and the fenced regeneration enclosure and cemetery in the Ophir Reserve, together with their national and regional conservation status.

Family	*Scientific name*	Common name	Low forest	Box Woodland	Riparian	Fenced	Cemetery	National and regional status
PTERIDOPHYTES		Ferns						
Adiantaceae	*Adiantum aethiopicum*	Common maidenhair	o		f			N,n
Aspleniaceae	*Asplenium flabellifolium*	Necklace fern	o		o			N,n
Dennstaedtiaceae	*Pteridium esculentum*	Bracken fern			c			N,n
Sinopteridaceae	*Cheilanthes austrotenuifolia*	Rock fern	c	c		x		N,n
	Cheilanthes distans	Bristly cloak fern	r					N,n
	Pellaea falcata	Sickle fern	f		f			N,n
CONIFEROPSIDA		Conifers						
Cupressaceae	*Callitris endlicheri*	Black cypress pine	o					N,n
MAGNOLIOPSIDA		Flowering plants						
MAGNOLIIDAE		Dicotyledons						
Amaranthaceae	*Alternanthera denticulata*	Lesser joyweed			r			N,n
Apiaceae	*Daucus glochidiatus*	Native carrot	a			x		N,n
	Hydrocotyle laxiflora	Stinking pennywort	c			x	x	N,n
Asteraceae	*Calotis lappulacea*	Yellow burr-daisy	o	o				N,n
	Cassinia arcuata	Sifton bush	c	c			x	N,n
	Cassinia longifolia	Shiny Cassinia	o	o				N,n
	Cassinia quinquefaria	Rosemary Cassinia	o					N,n
	Chrysocephalum apiculatum	Yellow buttons	c	o				N,n
	Chrysocephalum semipapposum	Yellow buttons	c					N,n
	Cymbonotus lawsonianus	Bears-ear	a	a		x		N,n
	Cymbonotus preissianus	Australian bears-ear	o	o				N,n
	Gnaphalium sphaericum	Common cudweed	o					N,n
	Leptorhynchus squamatus	Scaly buttons	c	c			x	N,n

Table 6. Continued

Family	*Scientific name*	Common name	Low forest	Box Woodland	Riparian	Fenced	Cemetery	National and regional status
Asteraceac, continued	*Microseris lanceolata*	Yam daisy	c	r				N,n
	Olearia elliptica	Sticky daisy bush	o					N,n
	Senecio hispidulus var. *hispidulus*	Hill fireweed	o					N,n
	Senecio quadridentatus	Cotton fireweed	c	o		x	x	N,n
	Vittadinia spp.	Fuzzweeds	c	c		x	x	N,n
Boraginaceae	*Cynoglossum australe*	Australian hound's tongue	o	o				N,n
Campanulaceae	*Wahlenbergia communis*	Tufted bluebell	a	a				N,n
	Wahlenbergia luteola		o	o				N,n
	Wahlenbergia stricta ssp. *stricta*	Tall bluebell	a	a				N,n
Caryophyllaceae	*Stellaria pungens*	Prickly starwort	a	a			x	N,n
Casurinaceae	*Casuarina cunninghamiana* ssp. *cunninghamiana*	River she-oak	o		a			N,n
Clusiaceae	*Hypericum gramineum*	Small St John's wort	a	a	o	x	x	N,n
Colchicaceae	*Burchardia umbellata*	Milkmaids	c	o				N,n
	Wurmbea dioica	Early Nancy	o	o				N,n
Convolvulaceae	*Convolvus erubescens*	Pink bindweed	o	o				N,n
	Dichondra repens	Kidney weed	c	c				N,n
Crassulaceae	*Crassula sieberiana*	Australian stonecrop	o	o				N,n
Dilleniaceae	*Hibbertia obtusifolia*	Grey guinea-flower	c	o		x		N,n
	Hibbertia calycina						x	N,n
Droseraceae	*Drosera auriculata*	Sundew	o			x		N,n

Table 6. Continued

Family	*Scientific name*	Common name	Low forest	Box Woodland	Riparian	Fenced	Cemetery	National and regional status
Epacridaceae	*Brachyloma daphnoides*	Daphne heath	o	o			x	N,n
	Leucopogon virgatus	Beard heath	c	c				N,n
	Lissanthe strigosa (Pink & white forms)	Peach heath	c	c		x	x	N,n
	Melichrus urceolatus	Urn heath	c	c		x	x	N,n
Euphorbiaceae	*Beyeria viscosa*	Pinkwood	o					N,n
Fabaceae subfamily	*Hardenbergia violacea*	False sarsparilla	o			x		N,n
	Indigofera adesmiifolia	Indigo	o	r		x		N,n
	Indigofera australis	Australian indigo	o	o		x		N,n
Faboideae	*Bossiaea prostrata*		o					N,n
	Pultenea procumbens	Heathy bush-pea	c	c				N,n
	Pultenea subternata	Downy grey bush pea	c					N,n
	Daviesia genistifolia	Broom bitter pea	o				x	N,v
	Daviesia leptophylla	Narrow leaf bitter pea	o	o			x	N,n
	Dillwynia phylicoides var. *retorta*		c	o			x	N,n
	Glycine clandestina	Twining glycine	a	c			x	N,n
	Glycine tabacina	Variable glycine	a	c			x	N,n
	Hovea linearis	Erect Hovea	a	a		x	x	N,n
Fabaceae subfamily	*Acacia amoena*	Boomerang wattle	o					N,v
	Acacia buxifolia	Box leaf wattle	o			x		N,n
	Acacia dealbata	Silver wattle	c					N,n
	Acacia decora	Western golden wattle	c	c			x	N,n
	Acacia genistifolia	Spreading wattle	a	a		x		N,n
	Acacia gunnii	Ploughshare wattle		r		x		N,n
	Acacia implexa	Hickory wattle	o	o				N,n
	Acacia ulicifolia	Prickly moses		r		x		N,n
	Acacia uncinata	Gold-dust Wattle		r				N,n
	Acacia vestita	Weeping Boree	a	a				N,n

Table 6. Continued

Family	*Scientific name*	Common name	Low forest	Box Woodland	Riparian	Fenced	Cemetery	National and regional status
Geraniaceae	*Erodium crinitum*	Blue storksbill	a					N,n
	Geranium solanderi var. *solanderi*	Native Geranium	c		c	x		N,n
	Pelargonium australe	Native storksbill	a					N,n
Goodeniaceae	*Goodenia bellidifolia*		o	o				N,n
	Goodenia hederacea	Ivy Goodenia	a	a		x		N,n
Haloragaceae	*Gonocarpus tetragynus*		a					N,n
	Haloragus serra		r					N,n
Lamiaceae	*Ajuga australis*	Austral bugle	c	c		x		N,n
	Scutellaria humilis	Skull cap	c	c			x	N,n
Linaceae	*Linum marginale*						x	N,v
Lobeliaceae	*Isotoma axillaris*	Showy isotome	c					N,n
Loranthaceae	*Amyena cambagei*	She-oak mistletoe			o	x		N,n
	Amyena miquelii	Box mistletoe		a				N,n
	Amyena pendulum	Drooping mistletoe	o					N,n
Lauraceae	*Cassytha pubescens*						x	N,n
Myoperaceae	*Myoporum montanum*	Western boobialla	c	c				N,n
Myrtaceae	*Callistemon sieberi*	River bottlebrush			c			N,n
	Euclayptus albens	White box		a		x	x	N,n
	Eucalyptus blakelyi	Blakely's red gum	a	c		x	x	N,n
	Eucalyptus bridgesiana	Apple box	c	f				N,n
	Eucalyptus dealbata	Tumbledown gum	o					N,n
	Eucalyptus goniocalyx	Bundy	o	o		x		N,n
	Eucalyptus macrorhyncha	Red stringybark	c	o		x		N,n

Table 6. Continued

Family	*Scientific name*	Common name	Low forest	Box Woodland	Riparian	Fenced	Cemetery	National and regional status
Myrtaceae, continued	*Eucalyptus mannifera*	Brittle gum	r			x		N,n
	Eucalyptus melliodora	Yellow box	a					N,n
	Eucalyptus polyanthemos	Red box	c			x		N,n
	Eucalyptus viminalis	Ribbon gum	c					N,n
	Kunzea ericoides	Burgan	c	c				N,n
Nyctaginaceae	*Boerhavia dominii*	Tarvine	r					N,v
Onagraceae	*Epilobium billardierianum*	Hairy willow herb	c	o	c			N,n
Oxalidaceae	*Oxalis corniculata*	Creeping Oxalis	c	c	c			N,n
Pittosporaceae	*Bursaria spinosa*	Blackthorn	a	o		x		N,n
	Bursaria lasiophylla		o					N,n
Plantignaceae	*Plantago varia*	Variable plantain	c	c			x	N,n
Polygonaceae	*Persicaria decipiens*	Slender knotweed			o			N,n
	Rumex brownii	Swamp dock	c	c	c			N,n
Ranunculaceae	*Clematis aristata*		a	a				N,n
	Clematis glycinoides	Headache vine	c	c				N,n
	Ranunculus lappaceus	Common buttercup	o	o			x	N,n
Rhamnaceae	*Cryptandra amara*	Pretty Cryptandra	c	c				N,n
	Cryptandra spinescens		o	o				N,n
	Discaria pubescens	Australian anchor plant	r					R,v
	Pomaderris phylicifolia	Pomaderris	o		o			N,n
Rosaceae	*Acaena novae-zelandiae*		c					N,n
	Acaena ovina	Sheep's burr	c	c			x	N,n

Table 6. Continued

Family	*Scientific name*	Common name	Low forest	Box Woodland	Riparian	Fenced	Cemetery	National and regional status
Rubiaceae	*Asperula conferta*	Common woodruff	a	c			x	N,n
	Galium gaudichaudii	Rough bedstraw	a	o	c		x	N,n
	Galium migrans		r					N,v
Rutaceae	*Correa reflexa*	Common Correa	o		o			N,n
Santalaceae	*Exocarpus cupressiformis*	Native cherry	o					N,n
Sapindaceae	*Dodonaea viscosa* ssp. *angustissima*	Sticky hop-bush	o					N,n
Scrophulariaceae	*Veronica calycina*	Hairy speedwell	c	c				N,n
Stackhousiaceae	*Stackhousia monogyna*	Creamy candles	f	f				N,n
Thymelaeceae	*Pimelea simplex* ssp. *simplex*						x	N,v
Urticaceae	*Urtica incisa*	Stinging nettle	o		c			N,n
Violaceae	*Hymenanthera dentata*	Tree violet	a	a	a			N,n
	Viola hederacea	Ivy-leaved violet	a	c	c			N,n
LILIIDAE		Monocotyledons						
Asphodelaceae	*Bulbine bulbosa*	Bulbine lily	a	a			x	N,n
	Bulbine glauca	Rock lily	f					N,n
Cyperaceae	*Carex appressa*	Tall sedge	c		c			N,n
	Carex inversa	Knob sedge					x	N,n
	Cyperus exaltatus	Tall flat sedge			o			N,n
	Eleocharis acuta	Common spike-rush			c			N,n
	Lepidosperma laterale	Broad saw-sedge	c	c				N,n

Table 6. Continued

Family	*Scientific name*	Common name	Low forest	Box Woodland	Riparian	Fenced	Cemetery	National and regional status
Juncaceae	*Juncus prismatocarpus*		o					N,n
	Juncus usitatus	Tussock rush	a	a		x		N,n
	Juncus sp.							
	Luzula densiflora		c					N,n
	Luzula flaccida		c					N,n
	Luzula meridionalis	Field wood-rush	?	?		x		N,n
Lomandraceae	*Lomandra confertifolia* ssp. *pallida*		o	o				N,n
	Lomandra cylindrica		c					N,v
`	*Lomandra filiformis*	Wattle mat-rush	c	c			x	N,n
	Lomandra fluviatilis		?	?				N,n
	Lomandra glauca	Pale mat-rush	c	c				N,n
	Lomandra longifolia	Spiny-headed mat-rush	c	c				N,n
	Lomandra multiflora	Many-flowered mat-rush	c	c		x		N,n
	Lomandra repens	Irongrass	o					N,n
	Caladenia caerulea	Blue caladenia	o			x		N,n
	Caladenia fuscata		o			x		N,n
	Diuris sp.	Donkey orchids	o	o			x	N,n
	Pterostylis sp.	Greenhood orchids	o		x	x		N,n
Phormiaceae	*Dianella longifolia*		o				x	N,n
	Dianella revoluta	Flax lily	c	c		x	x	N,n
	Stypandra glauca	Nodding blue lily	o	o				N,n
Poaceae	*Aristida ramosa*	Speargrass	a	a	o			N,n
	Aristida vagans	Three-awn speargrass	c	c				N,n
	Bothriochloa macra	Red grass	c	c				N,n
	Chionochloa pallida	Redanther wallaby grass	c	c		x		N,n
	Cymbopogon refractus	Barbed wire grass			o			N,n
	Danthonia eriantha	Hill wallaby grass	a	a				N,n
	Danthonia spp.	Wallaby grasses	c	c				

Table 6. Continued

Family	*Scientific name*	Common name	Low forest	Box Woodland	Riparian	Fenced	Cemetery	National and regional status
Poaceae, continued	*Dichanthium setosum*	A bluegrass	r					
	Dichelachne micrantha	Shorthair plumegrass	o	o			x	N,n
	Dichelachne sieberiana						x	N,n
	Echinopogon ovatus	Forest hedgehog grass		o	c			N,n
	Elymus scaber	Common wheatgrass	c	c				N,n
	Microlaena stipoides var. *stipoides*	Weeping grass	o	o	c			N,n
	Panicum sp.							
	Pennisetum alopecuroides	Swamp foxtail	o		f			N,n
	Phragmites australis	Common reed			o			N,n
	Poa labillardieri	Tussock	a	a	a		x	N,n
	Poa sp.		c	c		x		
	Sporobolus creber	Slender rat's tail grass	o		o			N,n
	Stipa scabra ssp. *falcata*	Speargrass	c	c				N,n
	Stipa scabra ssp. *scabra*	Speargrass	c	c				N,n
	Themeda australis	Kangaroo grass	c	c		x	x	N,n
Typhaceae	*Typha domingensis*	Narrow-leaved Cumbungi			o			N,n
Zannichelliaceae	*Zannichellia palustris*				r			N,n

Key:

Abundance — r = rare; o = occasional; f = frequent; c = common; a = abundant

Occurrence — x = observed in area

Conservation status — Capital letters refer to national status, lower case letters refer to regional status.
N or n = not endangered; K or k = poorly known; V or v = vulnerable; R or r = rare (Briggs and Leigh 1996).

DISCUSSION and CONCLUSIONS

Ophir Reserve represents a significant area of remnant bushland in the Orange district. It is intrinsically valuable because it lies on the boundary of the Central Tablelands and Central Western Slopes botanical subdivision and contains a mixture of floristic elements. These include influences of the cool temperate flora to the south and the more arid flora to the west. This is reflected in the tree associations on the reserve and, more importantly, in the ten species highlighted above as being of special regional significance. ***Acacia amoena, Galium migrans*** and ***Lomandra cylindrica*** are typical of species occurring in cool temperate areas to the south and ***Davesia genistifolia, Linum marginale, Boerhavia dominii*** and especially ***Pimelia simplex*** ssp. ***simplex*** are species more commonly found in the semi-arid and arid western areas of the state.

The reserve also has national intrinsic historical value as being the site where the first commercial deposits of gold were discovered and mined in Australia. However, neither the historical status nor its floristic significance has been recognised in the management of the land, with the result that it has suffered considerable degradation and disturbance. These degrading forces have been allowed to occur to the present with the consequence that several components of the flora and fauna are being threatened.

As a consequence of the degradation, Ophir Reserve can only be considered as a secondary remnant, since although its tree cover is relatively intact and sound, the reserve has been disturbed to some considerable extent. The shrub understorey in particular has been severely depleted across most of the reserve by livestock grazing (Plates 6 and 7). Sadly, this degradation is continuing under the current land management policy. As a result, soil erosion is increasing (Plate 5), weed invasion is expanding (Plate 2), habitats are being depleted and the risk is increasing of further regional extinctions of flora and fauna. The fact that two species were recorded only in the cemetery enclosure indicates that these, and probably other species, have already been eliminated from the primary reserve.

The scarcity of lizards and small ground mammals is of particularly concern and this can only be attributed to the destruction of understorey habitat and the absence of a sufficient supply of food to support more than skeletal populations of a number of species. Clearly these species too are teetering and must be considered to be highly vulnerable.

The spectra of bird species in the reserve is on the low side for the region (Table 2). Moreover, the abundance of many species observed in the reserve was generally low, often limited to solitary observations, in the case of some water birds. Clearly the habitat disturbance has also been impacting on the breeding success of many bird species in the reserve. The near absence of small ground mammals no doubt accounts for the lack or low density of owls in the reserve.

Reasonable populations of five frog species were recorded in the riparian habitats, indicating this habitat is in a functional state (Table 5).

Sparse populations of several of the large native mammals were observed in the reserve (Table 2). With the exception of the platypus, all of the species observed were considered to be somewhat lower than expected for the region. Our resources did not extend to an assessment of the status of bat populations in the reserve. The marsupial populations are itinerant and sparse. No doubt if fodder levels were improved these populations would expand, in the absence of livestock grazing, with every likelihood they would adequately reduce the understorey to prevent any perceived fire hazard. Contrary to livestock grazing, a natural system of grazing would obviously sustain and conserve biodiversity.

The paucity of ground orchids, lizards and small mammals is a strong indication of a dysfunctional ecosystem where the ‘health’ of

the environment is unstable and the survival of species is threatened.

The Riparian Habitat

Predictably this is one of the most popular features in the reserve. The ribbons of *Casuarina cunninghamiana* along permanent water courses provide an ideal environment for any number of recreational uses (Cover Plate 1 and Plate 3). Generally this habitat is open to abuse and destruction from a number of sources, most notably trail bike riding, four wheel driving, littering, fossicking and open fires associated with picnicking and camping activities (Plate 3).

The native flora on the narrow alluvial flats is frequently displaced by introduced weeds including annual grasses, thistles, hemlock and numerous broadleaf species of the mustard family. The noxious weed *Hypericum perforatum* (St John's wort) also commonly occurs along these narrow flats. On the margins of the flats there is rampant *Rubus fruticosis* (blackberry) growth which extends into the rock shelves and overhangs (Plate 2). Many of these areas are difficult to access, making management of these weeds difficult. Nonetheless, it is essential that a rigorous program be put in place to manage these noxious weeds, not only to comply with the Act, but to conserve the biodiversity of possibly the most valuable habitat in the reserve.

There is evidence of damage and death to isolated large trees of *C. cunninghamiana* in certain parts of the reserve, and in one area a mature stand of trees extending over 100 m has been killed. It is difficult to pinpoint the causes of this destruction, and there may well be several contributing factors. Damage to root systems through the bulldozing of an extensive network of tracks along the creeks, and subsequent vehicular traffic is likely to be the primary factor. Such damage is known to allow infection of root rotting diseases, which can be spread by vehicles (eg. *Phytophthora cinnamomi* dieback in Jarrah forests and heath lands). As this tree is a protected species, this unnatural destruction must be halted.

Eucalyptus albens Woodland Habitat

The effect of grazing is especially evident in the *E. albens* woodland, which under natural conditions could be expected to be highly productive, as explained earlier in the report.

As indicated in Table 7, slightly less than two thirds of the species or species complexes out of 100 or so recorded in such woodlands were observed in the *E. albens* woodlands on Ophir Reserve. However, there was little ground cover in this habitat throughout the study period and the continued reduction in herb and grass biomass through grazing in spring and early summer all but eliminated any opportunity for seed production. A further great concern is that conserved fodder is being introduced into this area. Not only is this against the terms of the current grazing lease, but it is encouraging livestock to frequent this area, putting additional pressure on the vegetation. Because this is one of the more elevated regions of the reserve the area has been adopted as one of several livestock camps in the reserve. This has not only exacerbated denudation of vegetation but is leading to unnatural nutrient enrichment of the area. Moreover, there is a high risk that exotic species will be introduced in the fodder, and with nutrient enrichment in the absence of adequate ground cover, there is every likelihood this will result in accelerated weed invasion. The presence of a range of exotic thistle and annual grass species in some highly disturbed areas, provides evidence that this invasive process is already occurring. Large, established bushes of the noxious plant, *Rosa rubiginosa* (sweet briar) also occur in this habitat (as well as elsewhere in the reserve) indicating there has been a lack of control of this weed over several years. If these invasive trends are allowed to continue this habitat will quickly degrade beyond repair. Furthermore, there is evidence that vehicular traffic, harvesting of firewood and fossicking activities occurring in the *E. albens* woodland area is contributing to the impoverished status of the avian and small mammal fauna in the habitat. The removal of dead timber is particularly habitat depriving for small

mammals. Foxes, rabbits and a dog were also observed in this habitat, adding further pressures to the survival of small mammals.

Notwithstanding these ravages, the basic floristic structure of this woodland is essentially intact and, as indicated in Tables 6 and 7, there is still reasonable diversity in the native flora. Given protection through fenced enclosures, the restriction of vehicular access and mining activities and judicious management to check weed invasion, there is a good likelihood this area would regenerate successfully and could make a noteworthy contribution to biodiversity conservation. In view of the poor national conservation of *E. albens* woodlands, this significant area of Crown Land is deserving of more enlightened management. If remedial action is not soon forthcoming additional species of flora and fauna will become locally extinct, as indicated by the presence of two locally uncommon species only in the cemetery enclosure.

The *Eucalyptus blakleyi / E. melliodora* Woodland, Low Forest Habitat

Over 90% of the reserve area falls into this category. Like the *E. albens* habitat the understorey has been severely degraded by overgrazing (Plate 7). In parts this is also leading to severe soil erosion (Plate 5). Similarly to the *E. albens* woodland, the depletion of vegetation in this habitat has impacted on the avian, reptile and small mammal fauna, which we found to be considerably impoverished by expected regional standards. In general, the main flora biodiversity is confined to rocky outcrops along the creeks and gullies where the terrain offers some protection from grazing. However, as is the case for the *E. albens* woodland, the main structural elements of this habitat are intact and with the removal of grazing it is predicted this area would regenerate over time as there is likely to be a reserve of seed of many species in the soil seed bank. By and large the habitat is relatively free of major weed problems, other than for blackberry infestations in gullies. Scattered plants of three other noxious weeds, namely sweet briar, St John's Wort and *Nassella trichotoma* (serrated tussock) are not uncommon in this habitat. One area to the west of the reserve bounded by Lewis Ponds Road and Summer Hill Creek is particularly degraded with vast denuded areas which are highly prone to erosion. The understorey of the area west of Lewis Ponds Creek has almost entirely been replaced by annual grass weeds in particular. Other cleared areas have stands of *Pinus radiata* which are providing a source of seed and infestion of surrounding woodlands.

There is a good likelihood much of this woodland/low forest would regenerate satisfactorily if the disturbances were eliminated and weeds kept under check. Other cleared areas would need a program of rehabilitation to restore them. We consider the fenced enclosure to be an interesting experiment, but this will not provide a long term solution to sustaining the natural beauty and biodiversity of such a locally valuable reserve.

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Plate 6. Off-road vehicles commonly traverse the bushland, irrespective of tracks and trails. The occupier of the pictured vehicle was frequently observed in the reserve with hunting dogs and carrying firearms. *We recommend off-road vehicle be restricted to designated roads.*

Plate 7. Much of the reserve is covered by *Eucalyptus blakelyi / E. melliodora* (red gum / yellow box) woodland or low forest, the tree component of which is in reasonable condition. The shrub, herb and grass understorey has however been severely depleted through overgrazing. *We recommend the areas cleared of native vegetation be revegetated.*

Table 7. Native plant species typically occurring in *Eucalyptus albens* woodland and the species observed in this habitat in Ophir Reserve. Source: Prober and Thiele (personal communication).

Scientific name	Common name	Occurrence in Ophir Reserve
Trees		
Eucalyptus albens	White box	✓
Eucalyptus blakelyi	Blakely's red gum	✓
Eucalyptus bridgesiana	Apple box	✓
Eucalyptus melliodora	Yellow box	✓
Acacia leucoclada	Northern silver wattle	
Acacia implexa	Hickory wattle	✓
Acacia mearnsii	Late black wattle	
Brachychiton populneus	Kurrajong	✓
Santalum lanceolatum	Sandalwood plum bush	
Shrubs		
Acacia decora	Western silver wattle	✓
Acacia hakeoides	Hakea wattle	
Bursaria spinosa	Sweet bursaria	✓
Cassinia arcuata	Biddy bush	✓
Daviesia genistifolia	Broom bitter pea	✓
Hibbertia riparia	Erect guinea-flower	✓
Indigofera sp.	Australian indigo	✓
Myoporum montanum	Water-bush	✓
Olearia sp.	Daisy-bush	✓
Templetonia stenophylla	Leafy templetonia	
Herbs and grasses		
Arthropodium minus	Small vanilla lily	
Aristida behriana		
Aristida ramosa	Purple wire grass	✓
Asperula conferta	Common woodruff	✓
Brachycome sp.	Daisy	✓
Bulbine bulbosa	Bulbine lily	✓
Burchardia umbellata	Milkmaids	✓
Carex inversa	Knob sedge	✓
Cheilanthes sieberi	Mulga fern	✓
Chloris truncata	Windmill grass	
Chrysocephalum apiculatum	Common everlasting	
Chrysocephalum semipapposum	Clustered everlasting	
Convulvus erubescens	Pink bindweed	✓
Crassula sieberiana	Australian stonecrop	✓
Cymbonotus lawsonianus	Bears-ear	✓
Cynoglossum suaveolens	Sweet hounds-tongue	✓
Danthonia spp.	Wallaby grasses	✓
Daucus glochidiatus	Austral carrot	✓
Desmodium brachypodum	Large tick trefoil	
Desmodium varians	Slender tick trefoil	
Dianella longifolia	Pale flax-lily	✓
Dianella revoluta	Spreading flax-lily	✓
Dichelachne micrantha	Shorthair plumegrass	✓
Dichopogon fimbriatus	Chocolate lily	✓
Diuris spp.	Donkey orchids	✓
Drosera peltata	Pale sundew	
Elymus scaber	Common wheatgrass	✓
Epilobium billardiarianum	Hairy willow herb	✓
Eunadia nutans		
Geranium retrorsum	Grassland cranesbill	
Geranium solanderi	Australian cranesbill	✓

Table 7. Continued.

Scientific name	Common name	Occurrence in Ophir Reserve
Gnaphalium gymnocephalum	Cudweed	
Goodenia pinnatafida	Scrambled eggs	
Goodenia sp.		✓
Helichrysum spp.	Everlasting	
Hydrocotyle foveolata	Yellow pennywort	
Hydrocotyle laxiflora	Sticking pennywort	✓
Hypericum gramineum	Small St John's wort	✓
Leptorhynchos elongatus		
Leptorhynchos squamatus	Scaly buttons	✓
Linum marginale	Native flax	✓
Lomandra filiformis	Wattle Mat-rush	✓
Lomandra longifolia	Spiny-headed mat-rush	✓
Lomandra multiflora	Many Flowered mat-rush	✓
Lotus australis	Austral trefoil	
Luzula meridionalis	Field wood-rush	
Maireana microphylla	Eastern cottonbush	
Microlaena sp.	Weeping grass	
Microseris lanceolata	Yam daisy	✓
Microtis unifolia	Common onion orchid	
Oxalis perennans	Wood sorrel	
Picris sp.	Hawkweed	
Pimelea curviflora	Curved Rice-flower	
Plantago varia	Variable plantain	✓
Poa sieberiana	Snow grass	
Poa labillardieri	Tussock poa	✓
Pterostylis spp.	Greenhood orchids	
Ranunculus lappaceus	Buttercup	✓
Ranunculus sessilifloris		
Rumex brownii	Slender dock	✓
Salsola kali	Prickly saltwort	
Schoenus apogon	Common bog-rush	
Senecio quadridentatus	Cotton fireweed	✓
Sida corrugata	Variable sida	
Solanum sp.		
Solenogyne gunnii	Solenogyne	
Sorghum leiocladum	Wild sorghum	
Sporobolus sp.	Slender rat's tail grass	
Stackhousia monogyna	Candles	
Stipa spp.	Spear grasses	✓
Swainsona galegifolia	Smooth darling pea	
Swainsona reticulata		
Themeda australis	Kangaroo grass	✓
Thysanotus tuberosus	Common fringed lily	
Tricoryne elatior	Yellow rush-lily	
Triptilodiscus pygmaleus	Common sunray	
Velleia paradoxa	Spur velleia	
Vittadinia cuneata	Fuzz-weed	✓
Wahlenbergia spp.	Bluebells	✓
Wurmbea dioica	Early Nancy	✓
Climbing Plants		
Glycine clandestina	Twining glycine	✓
Glycine tabacina	Variable glycine	✓
Jasminum lineare	Desert jasmine	

