# ATTACHMENT C

# FAUNA SPECIES RECORDED WITHIN THE MODIFICATION STUDY AREA

## Table C1: Fauna Species Recorded within the Modification Study Area

| Scientific Name | Common Name | Status[1] | |
|---|---|---|---|
| | | TSC Act | EPBC Act |
| ***Amphibians*** | | | |
| **Myobatrachidae** | | | |
| *Limnodynastes tasmaniensis* | Spotted Grass Frog | - | - |
| *Neobatrachus sudelli* | Sudell's Frog | - | - |
| **Hylidae** | | | |
| *Litoria caerulea* | Green Tree Frog | - | - |
| *Litoria fallax* | Eastern Dwarf Tree Frog | - | - |
| *Litoria latopalmata* | Broad-palmed Frog | - | - |
| *Litoria peronii* | Peron's Tree Frog | - | - |
| ***Reptiles*** | | | |
| **Chelidae** | | | |
| *Chelodina longicollis* | Snake-necked Turtle | - | - |
| **Scincidae** | | | |
| *Lampropholis delicata* | Dark-flecked Garden Sunskink | - | - |
| *Lygisaurus foliorum* | Tree-based Litter-skink | - | - |
| **Agamidae** | | | |
| *Pogona barbata* | Bearded Dragon | - | - |
| **Varanidae** | | | |
| *Varanus gouldii* | Gould's Goanna | - | - |
| *Varanus varius* | Lace Monitor | - | - |
| ***Birds*** | | | |
| **Dromaiidae** | | | |
| *Dromaius novaehollandiae* | Emu | - | - |
| **Anatidae** | | | |
| *Chenonetta jubata* | Australian Wood Duck | - | - |
| *Anas superciliosa* | Pacific Black Duck | - | - |
| **Podicipedidae** | | | |
| *Tachybaptus novaehollandiae* | Australasian Grebe | - | - |
| **Ardeidae** | | | |
| *Ardea pacifica* | White-necked Heron | - | - |
| *Egretta novaehollandiae* | White-faced Heron | - | - |
| **Phalacrocoracidae** | | | |
| *Phalacrocorax sulcirostris* | Little Black Cormorant | - | - |
| **Falconidae** | | | |
| *Falco cenchroides* | Australian Kestrel | - | - |
| *Falco berigora* | Brown Falcon | - | - |
| **Accipitridae** | | | |
| *Elanus axillaris* | Black-shouldered Kite | - | - |
| *Haliastur sphenurus* | Whistling Kite | - | - |
| *Accipiter cirrocephalus* | Collared Sparrowhawk | - | - |
| *Aquila audax* | Wedge-tailed Eagle | - | - |
| *Hieraaetus morphnoides* | Little Eagle | V | - |
| **Charadriidae** | | | |
| *Vanellus miles* | Masked Lapwing | - | - |
| **Columbidae** | | | |
| *Phaps chalcoptera* | Common Bronzewing | - | - |
| *Ocyphaps lophotes* | Crested Pigeon | - | - |
| **Psittacidae** | | | |
| *Eolophus roseicapillus* | Galah | - | - |
| *Cacatua galerita* | Sulphur-crested Cockatoo | - | - |

**Table C1: Fauna Species Recorded within the Modification Study Area (Continued)**

| Scientific Name | Common Name | Status[1] | |
|---|---|---|---|
| | | TSC Act | EPBC Act |
| ***Birds (Continued)*** | | | |
| **Psittacidae (Continued** | | | |
| *Glossopsitta concinna* | Musk Lorikeet | - | - |
| *Platycercus adscitus eximius* | Eastern Rosella | - | - |
| *Psephotus haematonotus* | Red-rumped Parrot | - | - |
| **Cuculidae** | | | |
| *Cuculus pallidus* | Pallid Cuckoo | - | - |
| *Cacomantis variolosus* | Brush Cuckoo | - | - |
| *Eudynamys scolopacea* | Common Koel | - | - |
| **Strigidae** | | | |
| *Ninox novaeseelandiae* | Southern Boobook | - | - |
| **Podargidae** | | | |
| *Podargus strigoides* | Tawny Frogmouth | - | - |
| **Caprimulgidae** | | | |
| *Eurostopodus mystacalis* | White-throated Nightjar | - | - |
| **Apodidae** | | | |
| *Hirundapus caudacutus* | White-throated Needletail | - | M |
| **Coraciidae** | | | |
| *Eurystomus orientalis* | Dollarbird | - | - |
| **Alcedinidae** | | | |
| *Dacelo novaeguineae* | Laughing Kookaburra | - | - |
| *Todiramphus sanctus* | Sacred Kingfisher | - | - |
| **Meropidae** | | | |
| *Merops ornatus* | Rainbow Bee-eater | - | M |
| **Climacteridae** | | | |
| *Cormobates leucophaeus* | White-throated Treecreeper | - | - |
| *Climacteris picumnus victoriae* | Brown Treecreeper (eastern subspecies) | V | - |
| **Maluridae** | | | |
| *Malurus cyaneus* | Superb Fairy-wren | - | - |
| **Pardalotidae** | | | |
| *Pardalotus punctatus* | Spotted Pardalote | - | - |
| *Pardalotus striatus* | Striated Pardalote | - | - |
| **Acanthizidae** | | | |
| *Origma solitaria* | Rockwarbler | - | - |
| *Pyrrholaemus sagittatus* | Speckled Warbler | V | - |
| *Smicrornis brevirostris* | Weebill | - | - |
| *Gerygone olivacea* | White-throated Gerygone | - | - |
| *Acanthiza pusilla* | Brown Thornbill | - | - |
| *Acanthiza reguloides* | Buff-rumped Thornbill | - | - |
| *Acanthiza chrysorrhoa* | Yellow-rumped Thornbill | - | - |
| *Acanthiza nana* | Yellow Thornbill | - | - |
| *Acanthiza lineata* | Striated Thornbill | - | - |
| **Meliphagidae** | | | |
| *Lichenostomus leucotis* | White-eared Honeyeater | - | - |
| *Lichenostomus fuscus* | Fuscous Honeyeater | - | - |
| *Lichenostomus penicillatus* | White-plumed Honeyeater | - | - |
| *Melithreptus brevirostris* | Brown-headed Honeyeater | - | - |
| *Philemon corniculatus* | Noisy Friarbird | - | - |

**Table C1: Fauna Species Recorded within the Modification Study Area (Continued)**

| Scientific Name | Common Name | Status[1] | |
|---|---|---|---|
| | | TSC Act | EPBC Act |
| ***Birds (Continued)*** | | | |
| **Petroicidae** | | | |
| *Eopsaltria australis* | Eastern Yellow Robin | - | - |
| *Petroica goodenovii* | Red-capped Robin | - | - |
| **Pomatostomidae** | | | |
| *Pomatostomus temporalis temporalis* | Grey-crowned Babbler (south-eastern species) | V | - |
| **Pachycephalidae** | | | |
| *Pachycephala rufiventris* | Rufous Whistler | - | - |
| *Colluricincla harmonica* | Grey Shrike-thrush | - | - |
| **Dicruridae** | | | |
| *Rhipidura albiscapa* | Grey Fantail | - | - |
| *Rhipidura leucophrys* | Willie Wagtail | - | - |
| *Grallina cyanoleuca* | Magpie-lark | - | - |
| **Artamidae** | | | |
| *Cracticus torquatus* | Grey Butcherbird | - | - |
| *Cracticus nigrogularis* | Pied Butcherbird | - | - |
| *Gymnorhina tibicen* | Australian Magpie | - | - |
| *Strepera graculina* | Pied Currawong | - | - |
| *Artamus superciliosus* | White-browed Woodswallow | - | - |
| *Artamus cyanopterus* | Dusky Woodswallow | - | - |
| **Campephagidae** | | | |
| *Coracina tenuirostris* | Cicadabird | - | - |
| *Coracina novaehollandiae* | Black-faced Cuckoo-shrike | - | - |
| *Coracina papuensis* | White-bellied Cuckoo-shrike | - | - |
| *Lalage tricolor* | White-winged Triller | - | - |
| **Oriolidae** | | | |
| *Oriolus sagittatus* | Olive-backed Oriole | - | - |
| **Corvidae** | | | |
| *Corvus coronoides* | Australian Raven | - | - |
| **Corcoracidae** | | | |
| *Corcorax melanorhamphos* | White-winged Chough | - | - |
| **Sturnidae** | | | |
| *Sturnus vulgaris** | Common Starling | - | - |
| **Hirundinae** | | | |
| *Hirundo neoxena* | Welcome Swallow | - | - |
| *Petrochelidon ariel* | Fairy Martin | - | - |
| *Petrochelidon nigricans* | Tree Martin | - | - |
| **Zosteropidae** | | | |
| *Zosterops lateralis* | Silvereye | - | - |
| **Sylviidae** | | | |
| *Acrocephalus australis* | Australian Reed-Warbler | - | - |
| *Cincloramphus mathewsi* | Rufous Songlark | - | - |
| *Cisticola exilis* | Golden-headed Cisticola | - | - |
| **Dicaeidae** | | | |
| *Dicaeum hirundinaceum* | Mistletoebird | - | - |
| **Motacillidae** | | | |
| *Anthus australis* | Australasian Pipit | - | - |
| **Estrilidae** | | | |
| *Stagonopleura guttata* | Diamond Firetail | V | - |
| *Taeniopygia bichenovii* | Double-barred Finch | - | - |

## Table C1: Fauna Species Recorded within the Modification Study Area (Continued)

| Scientific Name | Common Name | Status[1] | |
|---|---|---|---|
| | | TSC Act | EPBC Act |
| ***Mammals*** | | | |
| **Dasyuridae** | | | |
| *Antechinus flavipes* | Yellow-footed Antechinus | - | - |
| **Vombatidae** | | | |
| *Vombatus ursinus* | Bare-nosed Wombat | - | - |
| **Petauridae** | | | |
| *Petaurus breviceps* | Sugar Glider | - | - |
| **Pseudocheiridae** | | | |
| *Pseudocheirus peregrinus* | Common Ringtail Possum | - | - |
| **Phalangeridae** | | | |
| *Trichosurus vulpecula* | Common Brushtail Possum | - | - |
| **Macropodidae** | | | |
| *Macropus giganteus* | Eastern Grey Kangaroo | - | - |
| *Macropus robustus* | Common Wallaroo | - | - |
| *Macropus rufogriseus* | Red-necked Wallaby | - | - |
| *Wallabia bicolor* | Swamp Wallaby | - | - |
| **Molossidae** | | | |
| *Tadarida australis* | White-striped Freetail-bat | - | - |
| *Mormopterus sp. 4* | Southern Freetail Bat | - | - |
| **Vespertilionidae** | | | |
| *Chalinolobus dwyeri* | Large-eared Pied Bat | V | V |
| *Chalinolobus gouldii* | Gould's Wattled Bat | - | - |
| *Chalinolobus morio* | Chocolate Wattled Bat | - | - |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V | - |
| *Miniopterus schreibersii oceanensis* | Eastern Bentwing-bat | V | - |
| *Nyctophilus sp.* | Unidentified Long-eared Bat | - | - |
| *Scotorepens balstoni* | Inland Broad-nosed Bat | - | - |
| *Vespadelus troughtoni* | Eastern Cave Bat | V | - |
| **Vespertilionidae** | | | |
| *Vespadelus vulturnus* | Little Forest Bat | - | - |
| **Canidae** | | | |
| *Vulpes vulpes** | Red Fox | - | - |
| **Leporidae** | | | |
| *Lepus capensis** | Brown Hare | - | - |
| *Oryctolagus cuniculus** | Rabbit | - | - |
| **Suidae** | | | |
| *Sus scrofa** | Pig | - | - |
| **Bovidae** | | | |
| *Bos taurus** | European Cattle | - | - |
| *Ovis aires** | Sheep | - | - |
| *Capra hircus** | Goat | - | - |

Note: Nomenclature consistent with Commonwealth Scientific and Industrial Research Organisation (2006) *CSIRO List of Australian Vertebrates A Reference with Conservation Status.*

[1] Threatened Fauna Species Status under the TSC Act and/or EPBC Act (current June 2013).
V = Vulnerable M = Migratory

* introduced species.

# ATTACHMENT D

# WILPINJONG COAL MINE MODIFICATION – BIODIVERSITY OFFSET FAUNA REPORT

# Wilpinjong Coal Mine Modification – Biodiversity Offset Fauna Report

**A Report by Biodiversity Monitoring Services, July 2013**

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## 1. BACKGROUND

As part of the development proposal for a modification to the Wilpinjong Coal Project (the Modification), it is proposed to provide a Biodiversity Offset to compensate for the loss of native vegetation/fauna habitat resulting from the Modification. The Modification involves proposed extensions to the currently approved extent of the open cut pits, as well as other minor changes to the approved operation. A detailed description of the Modification is provided in Section 3 of the main text of the Modification Environmental Assessment. Investigations by Hunter Eco (Hunter Eco, 2013) identified two areas as appropriate for offsetting potential impacts of the Modification on native flora.

These two areas constitute the proposed Biodiversity Offset and include Area E, located to the east of Wilpinjong Coal Mine, and Area D located to the north-east (Figure 1).

This report assesses the faunal values of the proposed Biodiversity Offset against the potential impacts of the Modification on faunal values. The locations of Areas D and E in relation to Wilpinjong Coal Mine are shown on Figure 1.

## 2. APPROACH

Survey effort undertaken within the Offset Areas were similar to that undertaken in the Modification open cut extension areas with the aim of targeting all State and Federal listed threatened fauna species that have been identified as having the potential to occur within the Modification open cut extension areas (Table 1). The benefit of expending similar survey efforts within the Offset Areas and the Modification open cut extension areas is to allow for a comparative assessment to be undertaken. Thus a primary aim of the surveys was to answer the question whether the Offset Areas could potentially offset the loss of faunal values associated with the Modification open cut extension areas, in terms of fauna assemblages. In addition, the surveys assessed the availability and condition of habitats within the Offset Areas in regards to their potential to support a range of fauna species, especially those listed as threatened. Part of the strategies of offsetting is to improve the condition and extent of native fauna habitats (and vegetation communities) over time. Consequently, Offset Areas are usually chosen that have the potential for improvement.

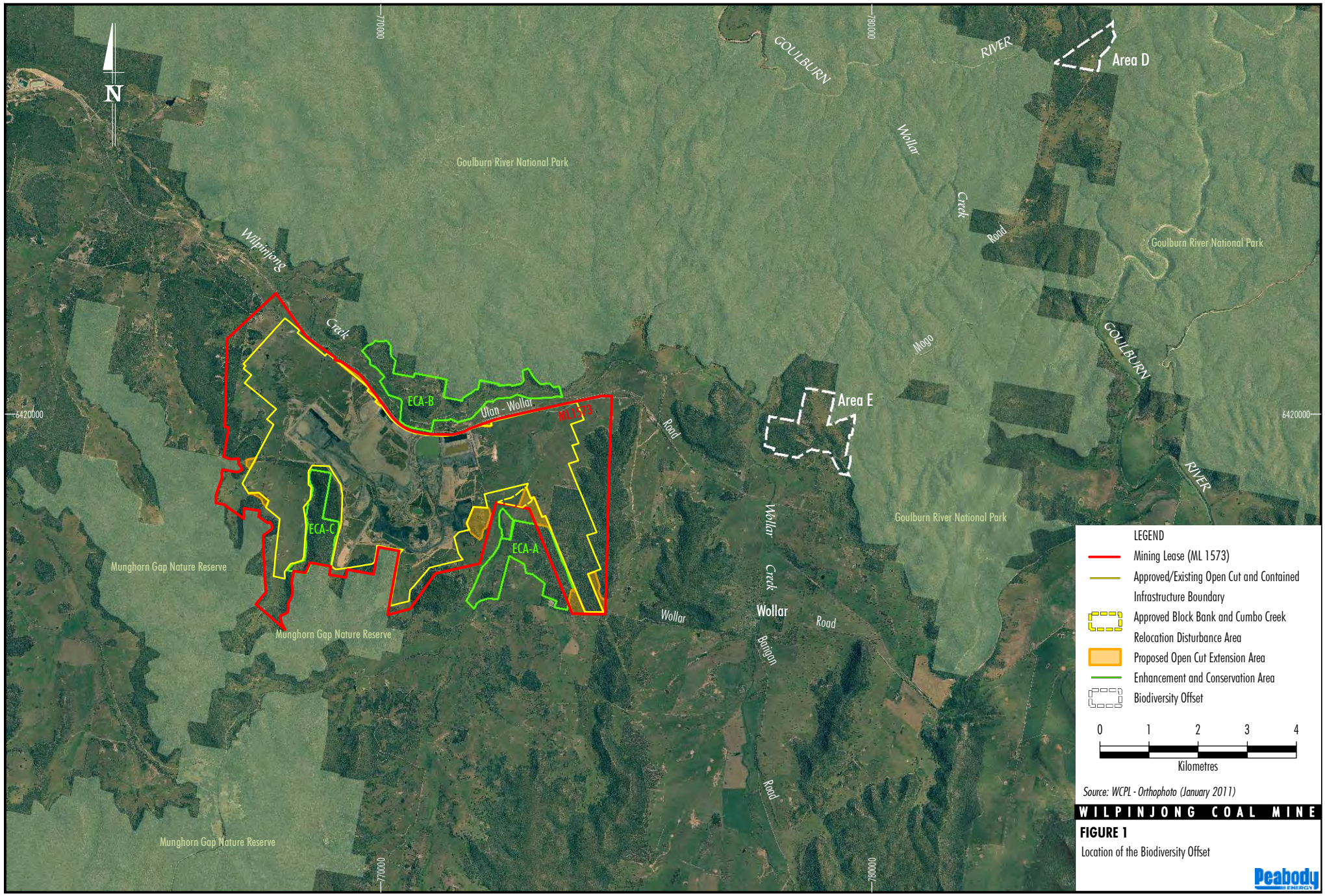


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**Table 1: Vegetation within the Biodiversity Offset**

| Keith Class | Vegetation Community | | Area D (ha)* | Area E (ha) |
|---|---|---|---|---|
| Coastal Valley Grassy Woodlands | 2 | Coast Grey Box Woodland | 34.1 | 1.1 |
| | 15 | Narrow-leaved Ironbark - Box Woodland | | |
| Western Slopes Grassy Woodlands | 5a | Grassy White Box Woodland (EEC/CEEC) | 12.7 | 42.5 |
| | 7 | Derived Native Grassland | | |
| | 8 | Blakely's Red Gum Woodland (EEC/CEEC) | | |
| | 14 | Inland Grey Box Woodland | | |
| | 17 | Yellow Box Woodland (EEC/CEEC) | | |
| Western Slopes Dry Sclerophyll Forests | 5b | Shrubby White Box Woodland | - | 101.9 |
| | 12 | Grey Gum - Narrow-leaved Stringybark Forest | | |
| | 13 | Ironbark-Bloodwood-Redgum Woodland | | |
| North Coast Dry Sclerophyll Forests | 16 | Rough-barked Apple Woodland | - | 1.6 |
| Pilliga Outwash Dry Sclerophyll Forests | 9 | Broombush Scrub | 3.3 | - |
| - | 18 | Shrubby Regeneration | - | 13.6 |
| **TOTAL** | | | **50.1** | **160.7** |

Source: Hunter Eco (2013)
Note: CEEC = Critically Endangered Ecological Community
EEC = Endangered Ecological Community
* Approximately 0.2 ha of this Offset Area is a dam and is excluded from vegetation calculations.

This strategy was also taken into consideration during the development and assessment of the Biodiversity Offset. Of the two areas proposed as the Biodiversity Offset Areas, Area E is the larger (160.7 hectares [ha] compared to 50.1 ha for Area D) and detailed fauna surveys were undertaken in this area. In addition, there is a quantity of an Endangered Ecological Community (EEC) (Grassy White Box Woodland) within this area, particularly associated with the slopes in the south-eastern part (Hunter Eco, 2013). Surveys targeted this community where possible (together with other communities) as it is known to provide habitat for a number of threatened fauna species particularly woodland birds. Apart from the detailed survey areas, a number of observational survey areas were established that provided information on a range of fauna and habitats. Area D was surveyed using observational methods. The observational methods provided information about most fauna in the area (birds, reptiles and amphibians) with a reduced focus on small ground mammals. Small ground mammals were targeted within the detailed survey areas which covered habitat that could potentially support such species as the New Holland Mouse, a Federally listed threatened species (rocky outcrops and cliff lines).Table 2 provides a list of the threatened fauna species considered to have potential to occur at the Modification open cut extension areas and were targeted within the Offset Areas during surveys.

**Table 2: Threatened Fauna Species Targeted within Offset Areas**

| Scientific Name | Common Name |
|---|---|
| *Lophoictinia isura* | Square-tailed Kite |
| *Hieraaetus morphnoides* | Little Eagle |
| *Calyptorhynchus lathami* | Glossy Black-cockatoo |
| *Callocephalon fimbriatum* | Gang-gang Cockatoo |
| *Glossopsitta pusilla* | Little Lorikeet |
| *Neophema pulchella* | Turquoise Parrot |
| *Lathamus discolor* | Swift Parrot |
| *Polytelis swainsonii* | Superb Parrot |
| *Tyto novaehollandiae* | Masked Owl |
| *Ninox strenua* | Powerful Owl |
| *Climacteris picumnus victoriae* | Brown Treecreeper (eastern subspecies) |
| *Chthonicola sagittata* | Speckled Warbler |
| *Melithreptus gularis gularis* | Black-chinned Honeyeater (eastern subspecies) |
| *Anthochaera phrygia* | Regent Honeyeater |
| *Grantiella picta* | Painted Honeyeater |
| *Melanodryas cucullata cucullata* | Hooded Robin (south-eastern form) |
| *Petroica boodang* | Scarlet Robin |
| *Petroica phoenicea* | Flame Robin |
| *Pomatostomus temporalis temporalis* | Grey-crowned Babbler (eastern subspecies) |
| *Daphoenositta chrysoptera* | Varied Sittella |
| *Stagonopleura guttata* | Diamond Firetail |
| *Phascolarctus cinearis* | Koala |
| *Petaurus norfolcensis* | Squirrel Glider |
| *Saccolaimus flaviventris* | Yellow-bellied Sheathtail-bat |
| *Mormopterus norfolkensis* | Eastern Freetail-bat |
| *Miniopterus australis* | Little Bentwing-bat |
| *Miniopterus schreibersii oceanensis* | Eastern Bentwing-bat |
| *Nyctophilus corbeni* | Corben's/South-eastern Long-eared Bat |
| *Chalinolobus dwyeri* | Large-eared Pied Bat |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle |
| *Vespadelus troughtoni* | Eastern Cave Bat |

## 3. METHODOLOGY

The survey methodology is similar to that used in the Modification open cut extension areas and gives the opportunity to directly compare the survey effort and productivity from a fauna perspective between the Modification and offset surveys through statistical analysis. Survey effort includes both detailed and observational survey methods, both of which were conducted at Offset Areas D and E. Surveys at Offset Area D consist primarily of observational survey methods with select detailed survey methods, e.g. remote cameras. The difference is based on the expected habitat opportunities at each of the offset properties. Habitat structural analyses were undertaken at both areas.

A detailed description of survey methods is given in Appendix 1 and a summary of survey methods and survey effort is given in Tables 3a and 3b.

**Table 3a: Survey Methods at Each Offset Area**

| Offset Area E - Detailed Survey Methods | Survey Effort | Offset Area D - Observational Survey Methods | Survey Effort |
|---|---|---|---|
| Ground Elliott Traps (small) | 300 trap nights | - | - |
| Ground Elliot Traps (large) | 12 trap nights | - | - |
| Tree-mounted Elliott Traps | 60 trap nights | - | - |
| Cage Traps | 72 trap nights | - | - |
| Hair Funnels | 60 trap nights | - | - |
| Glider Traps | 24 trap nights | - | - |
| Pitfall Traps | 12 trap nights | - | - |
| Spotlighting | 3.9km; 2 hrs | Spotlighting | ~1km; 2 hrs |
| Remote Cameras | 28 trap nights | Remote Cameras | 8 trap nights |
| Bird Surveys | 10 person days | Bird Surveys | 8 person days |
| Call Detection and Playback | 1 night | Call Detection and Playback | 1 night |
| Herpetological Searches | 10 person days – at least 30 mins in multiple locations | Herpetological Searches | 8 person days – at least 30 mins in multiple locations |
| Bat Call Detection | 2 days | Bat Call Detection | 1 day |
| Habitat Structural Analysis | 1 person day | Habitat Structural Analysis | 1 person day |
| Harp Traps | 2 nights | Harp Traps | 1 night |
| Animal Track Recognition | 10 person days | Animal Track Recognition | 10 person days |
| Bird Surveys | 10 person days | Bird surveys | 8 person days |
| Marsupial Call Detection and Playback | 1 night | Marsupial Call Detection and Playback | 1 night |

**Table 3a: Survey Methods at Each Offset Area (Continued)**

| Offset Area E - Detailed Survey Methods | Survey Effort | Offset Area D - Observational Survey Methods | Survey Effort |
|---|---|---|---|
| Diurnal and Nocturnal Bird Call Detection and Playback | 1 night | Diurnal and Nocturnal Bird Call Detection and Playback | 1 night |
| Opportunistic Observations | 10 person days | Opportunistic Observations | 8 person days |
| Scat Analysis | 10 person days | Scat Analysis | 8 person days |
| Scat and Owl Pellet Identification | 10 person days | Scat and Owl Pellet Identification | 8 person days |
| Scratches | 10 person days | Scratches | 8 person days |
| Burrows and Nests | 10 person days | Burrows and Nests | 8 person days |
| Sand Plots | 10 person days | Sand Plots | 8 person days |
| Point Surveys | 10 person days | Point Surveys | 8 person days |
| Visual Encounter Surveys | 10 person days | Visual Encounter Surveys | 8 person days |
| Direct Observation | 12 person days | Direct Observation | 8 person days |

Note: km – kilometres
hrs – hours
mins - minutes

**Table 3b: Overall Survey Effort within Offset Areas**

| Survey Methods | Survey Effort |
|---|---|
| Ground Elliott Traps (small) | 300 trap nights |
| Ground Elliott Traps (large) | 12 trap nights |
| Tree-mounted Elliott Traps | 60 trap nights |
| Cage Traps | 72 trap nights |
| Hair Funnels | 60 trap nights |
| Glider Traps | 24 trap nights |
| Pitfall Traps | 12 trap nights |
| Spotlighting | 4.9km; 4 hrs |
| Remote Cameras | 36 trap nights |
| Bird Surveys | 18 person days |
| Call Detection and Playback | 2 nights |
| Herpetological Searches | 18 person days – |
| Bat Call Detection | 3 days |
| Habitat Structural Analysis | 2 person days |
| Harp Traps | 3 nights |
| Animal Track Recognition | 20 person days |
| Bird Surveys | 18 person days |

**Table 3b: Overall Survey Effort within Offset Areas (Continued)**

| Survey Methods | Survey Effort |
|---|---|
| Marsupial Call Detection and Playback | 2 nights |
| Diurnal and Nocturnal Bird Call Detection and Playback | 2 nights |
| Opportunistic Observations | 18 person days |
| Scat Analysis | 18 person days |
| Scat and Owl Pellet Identification | 18 person days |
| Scratches | 18 person days |
| Burrows and Nests | 18 person days |
| Sand Plots | 18 person days |
| Point Surveys | 18 person days |
| Visual Encounter Surveys | 18 person days |
| Direct Observation | 20 person days |

Note: km – kilometres
hrs – hours

The surveys were undertaken by Dr Martin Denny and Andrew Lothian between 27th March and 1st April 2013 using NPWS Scientific Licence No. S10282 and Animal Care and Ethics Committee (ACEC) Approval No. AW96/033.

## 4. WEATHER

The weather during the survey period was relatively clear with warm days and cold nights. The weather data from Merriwa (for temperature data) and Wollar (for rainfall data) weather stations is given in Table 4.

**Table 4: Weather During Offset Area Surveys (data from Merriwa Station [061287] and Wollar Baringan st Station [062032], BOM, 2013)**

| Date | Minimum temperature (°C) | Maximum temperature (°C) | Rainfall (mm) |
|---|---|---|---|
| 26/03/2013 | 14.7 | 28.4 | 0 |
| 27/03/2013 | 12.7 | 31.4 | 0 |
| 28/03/2013 | 14.1 | 30.5 | 0 |
| 29/03/2013 | 10.2 | 23.3 | 0 |
| 30/03/2013 | 9.4 | 26.9 | 3.2 |
| 31/03/2013 | 14.4 | 24.3 | 0 |
| 1/04/2013 | 7.7 | 25.5 | 0 |

Note: °C – degrees Celcius
mm - millimetres

## 5. SURVEY SITES

Three detailed survey sites were established within (or immediately adjacent) Offset Area E together with a number of observational survey sites. Observational survey sites and select detailed survey methods (e.g. remote cameras) were also established within Offset Area D. The locations of these sites within each Offset Area are shown in Figures 2a and 2b and the three detailed survey sites are described in Table 5.

**Table 5: Description of Detailed Survey Sites**

| Offset Site E | Vegetation Communities Sampled | Habitats Sampled |
|---|---|---|
| W01[1] | Shrubby White Box Woodland; Grey Gum-Narrow-leaved Stringybark Forest; Yellow Box Woodland (EEC/CEEC) ; Coast Grey Box Woodland; Derived Native Grassland | Grassland; Woodland; Rocky Outcrops; Escarpment; Ephemeral Water Course |
| W02 | Yellow Box; Rough-barked Apple Woodland; Shrubby White Box Woodland; Grey Gum-Narrow-leaved Stringybark Forest; Derived Native Grassland; Ironbark-Bloodwood - Redgum Woodland | Grassland; Woodland; Rocky Outcrops; Escarpment; Ephemeral Water Course; Moist Gully, Caves |
| W03 | Ironbark-Bloodwood - Redgum Woodland; Grey Gum-Narrow-leaved Stringybark Forest; Narrow-leaved Ironbark; Grassy White Box Woodland (EEC/CEEC); Derived Native Grassland; shrubby Regeneration | Grassland; Unburnt and Burnt Woodland, Dam; Rocky Outcrops, Overhangs |

[1]This survey site is located immediately outside the boundary of Offset Area E although still provides useful information representative of the offset area.

## 6. STATISTICAL ANALYSIS

Statistical analysis was undertaken using SigmaPlot 11.0 and Primer 6.1.6, with the following tests applied where necessary:

1. To compare between more than two groups of results a One Way ANOVA was used.
2. To compare between two groups of results then either a Student t-test or a Paired t-test was used.
3. If the data to be analysed was not normally distributed, then either a non-parametric Wilcoxon Signed Rank Test or a Kruskal-Wallis One Way Analysis of Variance on Ranks was used.

**Figure 2a: Survey Sites within Offset Area E**

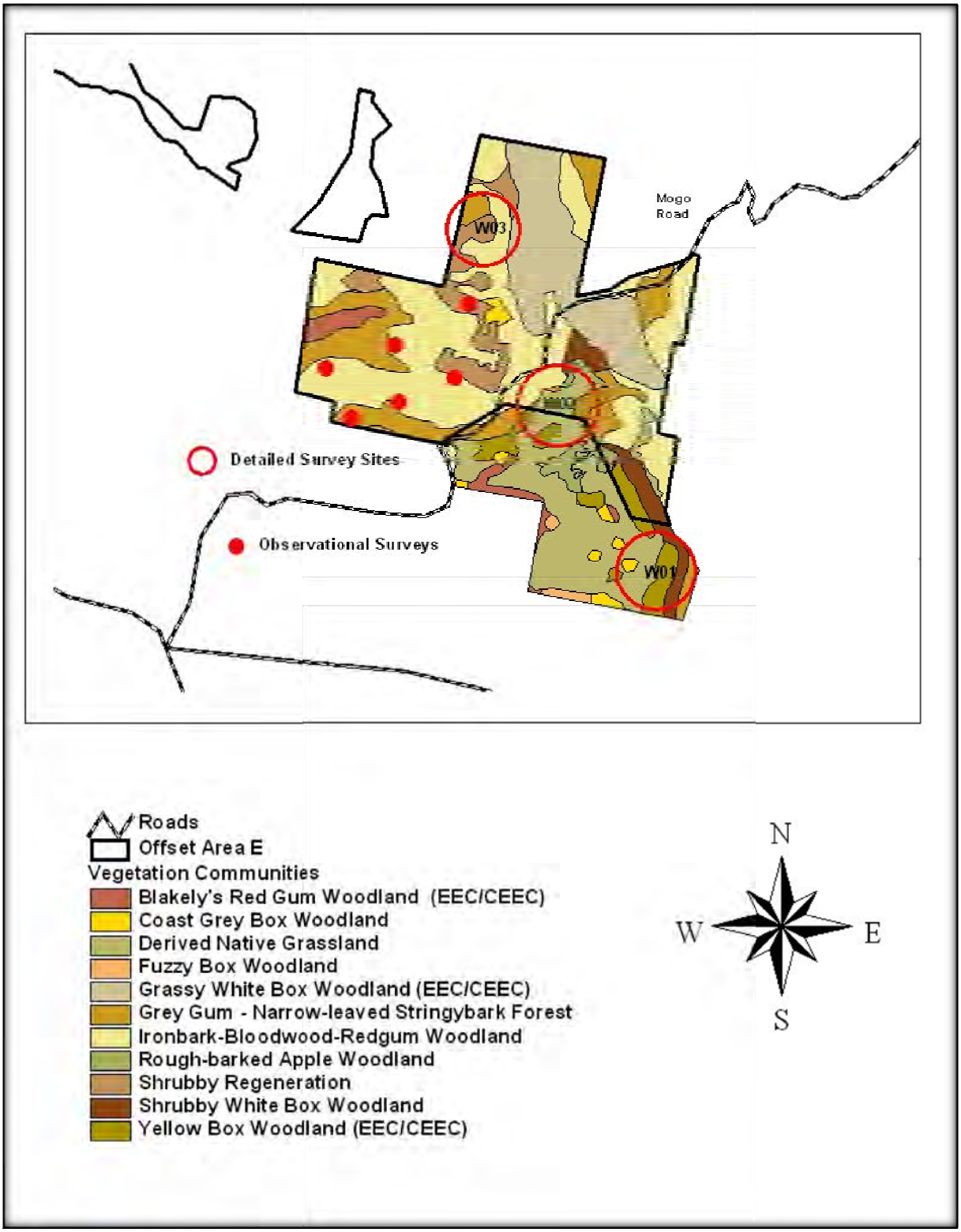
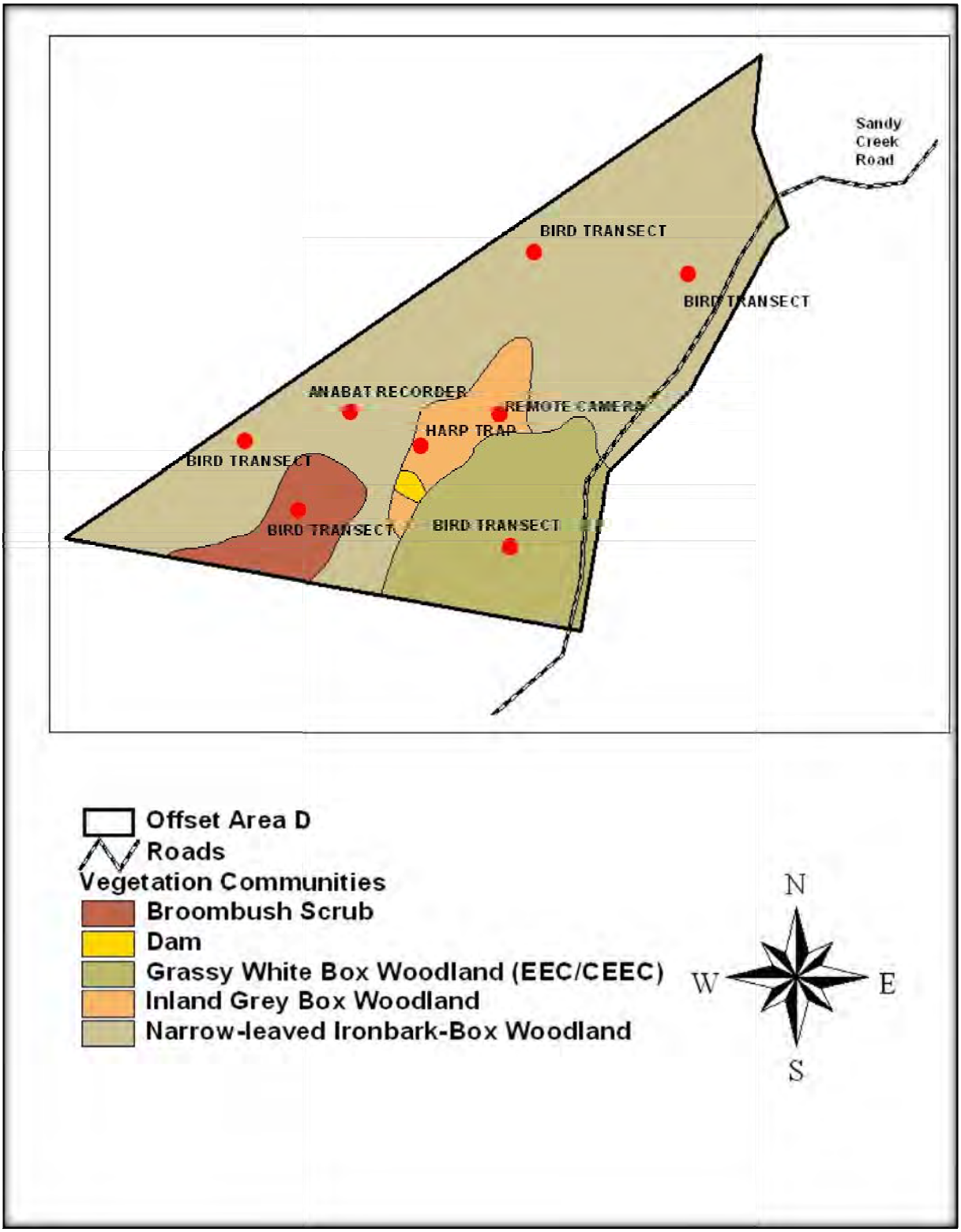


Figure 2b: Survey Sites within Offset Area D



## 7. USE OF INDICES

Most fauna surveys produce a species list that shows what animals are found within a specified area. However, a list alone does not provide the necessary criteria to determine whether an activity is affecting fauna populations over time.

Consequently, it is important to provide a set of criteria that can be used to compare fauna populations within an area over time and between areas i.e. temporally and spatially. The criteria must be relatively simple, easy to interpret and the processes required to develop each criteria must be consistent and repeatable. To ensure such criteria are able to be used to compare biodiversity data between mine areas, a set of quantifiable indices have been developed and adopted for this assessment. The indices are a set of single values, changes in which indicate changes in the fauna populations and their habitats. These changes can then be related to changes in environmental factors, such as climate, land use and landform. In this survey, indices were used to compare the fauna and habitat values of the Offset Areas with that found within the Modification open cut extension areas. If such a comparison found that the attributes of both areas are similar then the proposed Offset Areas should be considered as a viable replacement. Indices that were used in this survey were:

- Species richness of faunal groups.
- Simpson's Index of Dominance.
- Evenness of occurrence of species within an area.
- Capture rates of individual species.
- Contribution to the faunal assemblages by threatened species and species dependent upon woodland.
- Habitat complexity scores.

### a. Species richness of faunal groups

This is the number of species located within each fauna group at each site during each survey.

### b. Simpsons Index of Dominance

Total numbers and species richness (number of species per site) are the simplest measures used to determine biodiversity of a site. However, these indices miss the information that some species may be rare and others common. The Simpson's Index of Dominance (D) takes into account both the abundance patterns and the species richness of a community. This index measures the probability that two individuals randomly selected from a sample will belong to the same species (or some category other than species).

**c. Evenness Score**

An evenness score is also calculated. Evenness is a measure of the relative abundance of different species making up the richness of an area. A low value for evenness means that the sample is dominated by a large number of one or two species. A high evenness value means that most species in the sample have a similar abundance. A high value is indicative of a well maintained population of fauna as an even distribution of species means there is sufficient resources for a high diversity of species to be supported. A low value indicates that, although there may be high numbers of animals in a population there are few species as the numbers are dominated by one or two species and many others are not represented. This indicates that the resources may not be sufficient to allow some species to survive.

**d. Capture rates of individual species**

This index is represented by the percent (%) trapping rates of small native mammals within an area. It is also possible to use the number of individuals of each bird species sighted within the Modification open cut extension areas and Offset Areas to compare occupancy rates. As the survey effort within each Area was approximately similar the results from the surveys are comparable.

**e. Contribution to the faunal assemblages by threatened species, species dependent upon woodland and by declining species**

Lists are available of bird species that are considered to be declining and/or woodland dependent. These lists are used to calculate the proportion of birds located within an area that are considered to be under threat. The higher the proportion, then the greater the value that can be placed on the present habitat in the area.

**f. Habitat complexity scores**

Measurements of habitat characteristics derived from trap site descriptions have been used to provide an index of habitat complexity that can be helpful in determining changes over time of the habitats surveyed over an area. One system used to assess habitat values is that developed by Catling and Burt (1995), called the Habitat Complexity Score. This system scores the following parameters: Tree cover, tall and low shrub cover, ground cover, logs/rocks and litter cover. The scores range from 0 to 3, with a maximum score of 18.

# 8. RESULTS FROM THE SURVEYS

## 8.1 Fauna Listings

A total of 94 bird, 22 native mammal, seven introduced mammal, 15 reptile and four amphibian species were located within the Offset Areas during the survey. A list of fauna species located within both Offset Areas is given in Appendix 2.

Example photos of the two Offset Areas are provided in Appendix 3.

## 8.2 Fauna in the Modification Offset Areas

The fauna located within the Offset Areas compares favourably with that found within the Modification open cut extension areas, with higher species richness for birds and reptiles. Bird diversity was relatively high, particularly within the woodland bird assemblages. This may be due to the undisturbed nature of the Offset Areas as grazing stock has been removed and there are no major developments close by. In addition, the presence of cliff lines and rocky outcrops form important habitats (Yellow-footed Antechinus were only trapped in these habitats). Some dams are found in the areas and supported a variety of water birds and amphibians.

The number of threatened species is relatively high, with 10 threatened bird species located. Only five threatened bird species were located within the Modification open cut extension areas. All are mainly associated with woodland habitats, but also utilize grassland as well. Some microbats were harp trapped and an Eastern Horseshoe Bat was located within an overhang in site W2 (Offset Area E).

The number of reptile species was higher than that located within the Modification open cut extension areas (15 versus 6 species). This may be partly due to the greater presence of rocky habitats in the Offset Areas but such habitats do occur within Area G in the Modification.

# 9. COMPARISON BETWEEN MODIFICATION OPEN CUT EXTENSION AREAS AND OFFSET AREAS

The aim of this section is to determine if the land proposed to be set aside for a Biodiversity Offset Area supports similar fauna assemblages and habitats as that within the impact areas i.e. to determine whether the Offset Area satisfies a 'like for like' strategy. Section 7 lists and describes a series of indices that can be used to quantify biodiversity values and to compare these values between areas. Each of these indices have been derived from the results of the fauna surveys for the Modification open cut extension areas and Offset Areas and are used here to determine whether the offset effectively counterbalances any impacts within the Modification.

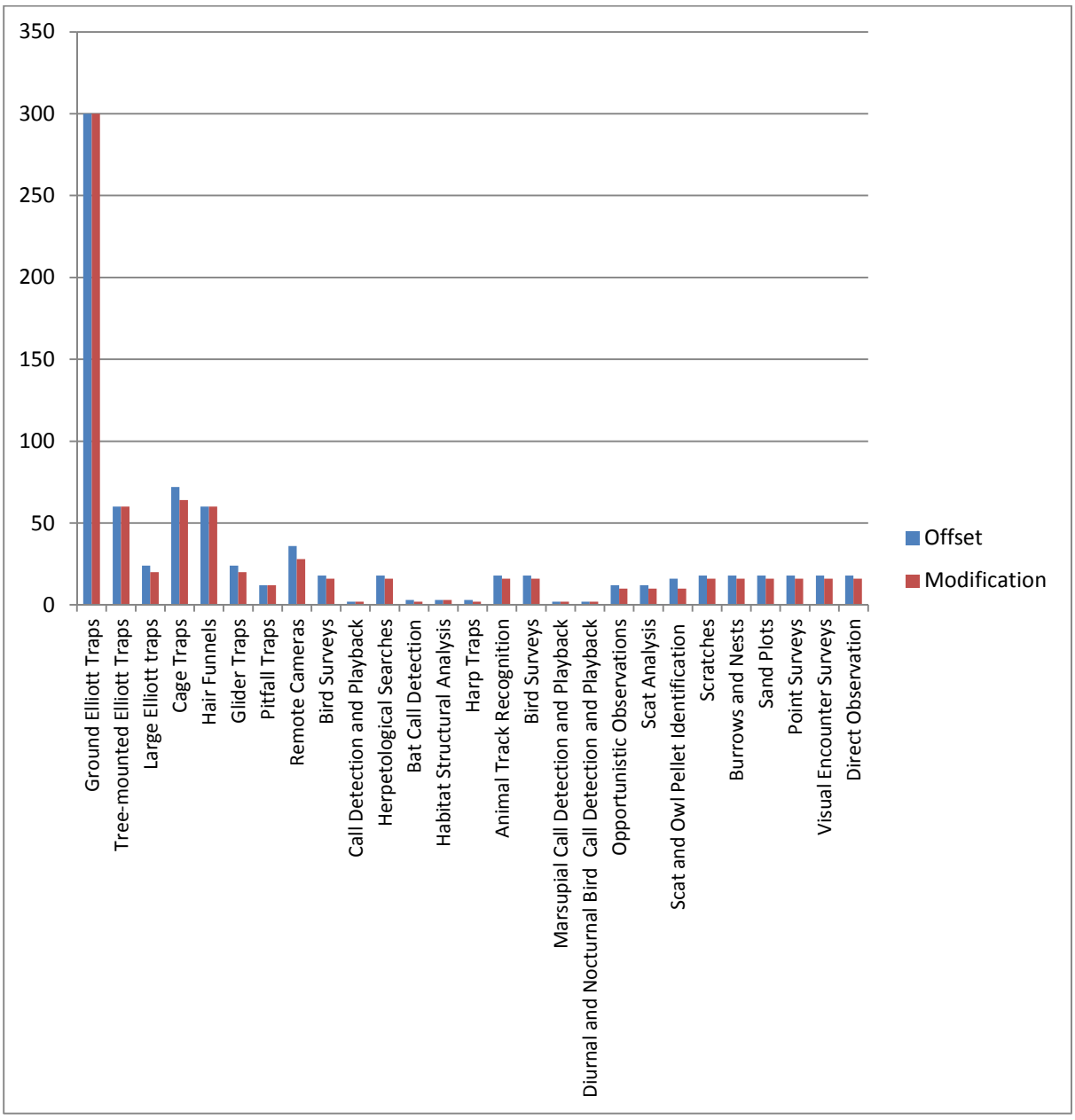
## 9.1 Survey Effort

To provide a comparison between the Modification and Offset Areas the data used must be derived from surveys of approximately equal effort. In the case of the Wilpinjong Modification this was possible as both areas were surveyed in about the same period of time. The efforts for the surveys within the Modification open cut extension areas and the Offset Areas can be compared to determine whether a relatively similar effort was expended at each Area. If this is the case then the results from the surveys at each area can also be compared to determine whether the areas are similar in their overall biodiversity. Survey effort was measured as the number of trap-days (i.e. number of days traps were used), Anabat-days (i.e. number of days Anabats were used), camera-days (i.e. number of days cameras were used) and person-days (i.e. number of days for both surveyors to use a technique).

Figure 3 shows the distribution of trap-days, Anabat days, camera-days and person-days within the Modification and Offset Areas[1]. It can be seen that the degree of survey effort at Modification and the Offset Areas is relatively similar. Statistical analyses show that there are no significant differences between the survey efforts used at the Modification compared with the Offset Areas (non-parametric Mann-Whitney Rank Sum Test). This means that it is possible to compare the results from the surveys at both the Modification and Offset Areas to determine the degree of similarity between them, on the basis of biodiversity values.

[1] Excluding spot lighting due to its relatively lower effort (i.e. measured in hours rather than days)

**Figure 3: Comparison of the Survey Efforts between the Modification and Offset Areas on the basis of trap-days, Anabat-days, camera-days and person-days**




As discussed in Section 7 a set of indices provides an important set of criteria that can be used to compare the use by fauna populations of an area over time and between areas i.e. temporally and spatially. Each of these indices is applied to the data from each area in the following sections.

## 9.2 Species Richness of Faunal Groups

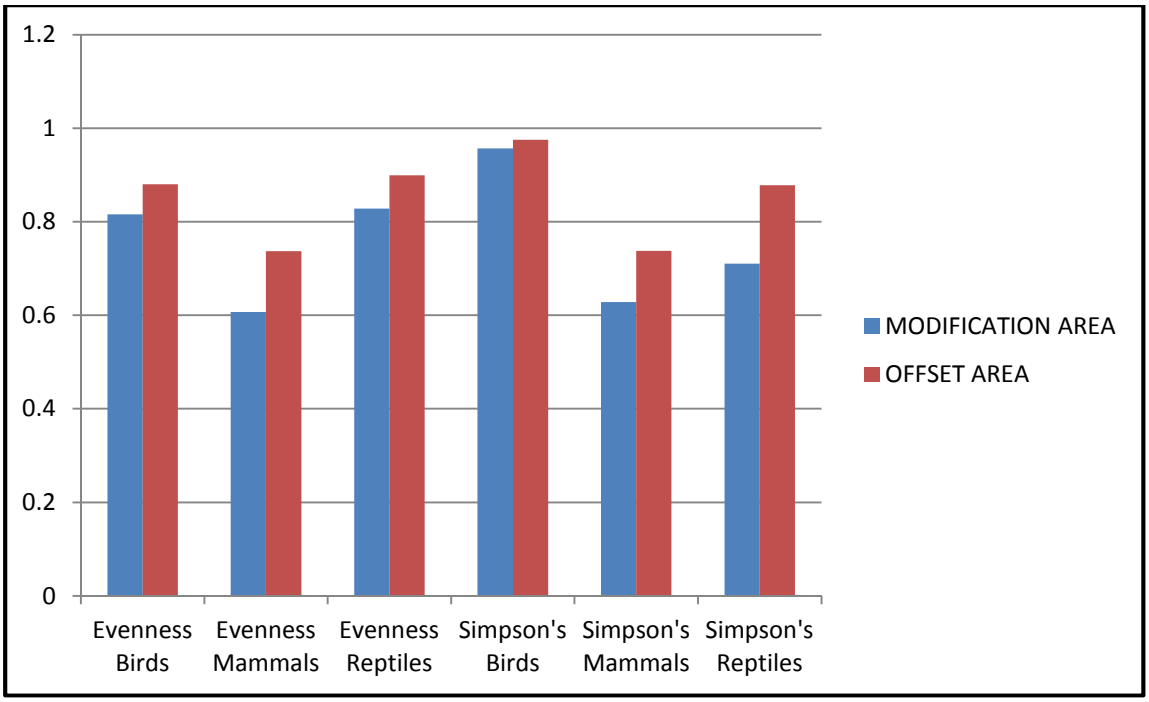
The species richness of bird, native mammal and reptile assemblages for the Modification and Offset Areas are given in Table 6 and shown in Figure 4.

There is a difference in the reptile species richness between the two areas which may be due to greater preferred habitat availability in the Offset Areas, a larger survey area and better climatic conditions. However, there is little difference between the bird and mammal species richness values for each area, with the Offset Area having a slightly higher value for birds (94 versus 87 species). The difference is possibly the result of the presence of water bodies within the Offset Area providing habitat for water birds.

### 9.3 Simpson's Index of Diversity

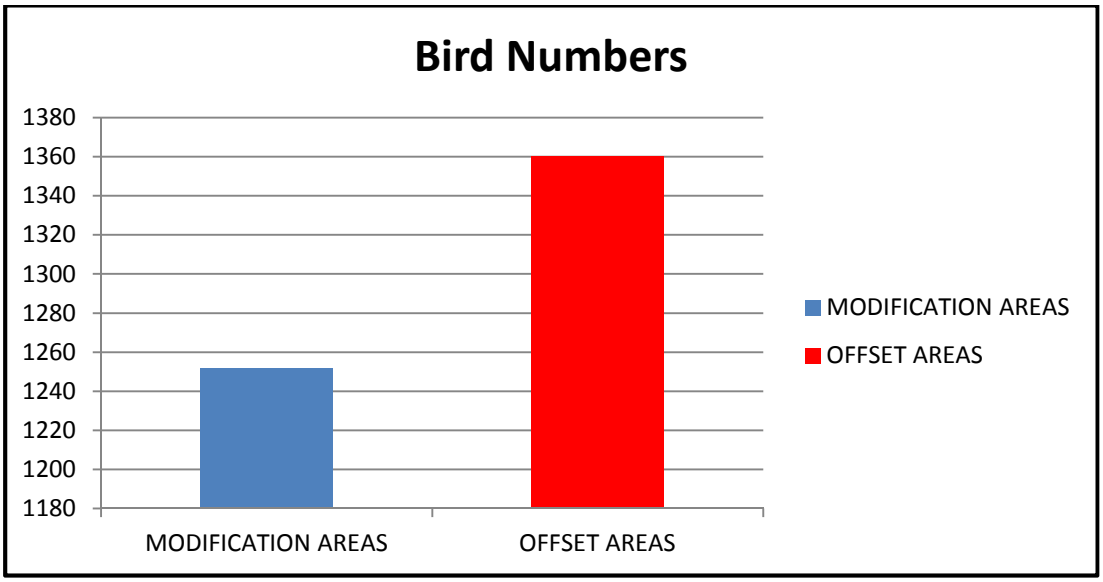
Simpson's Index of Diversity for birds, mammals and reptiles in both areas is given in Table 6 and Figure 4 and shows that there is little difference between the two areas (e.g. Modification 0.957 and Offset Area 0.975 for birds) however all values are greater for the offset.

**Figure 4: Biodiversity Indices for Birds, Mammals and Reptiles**

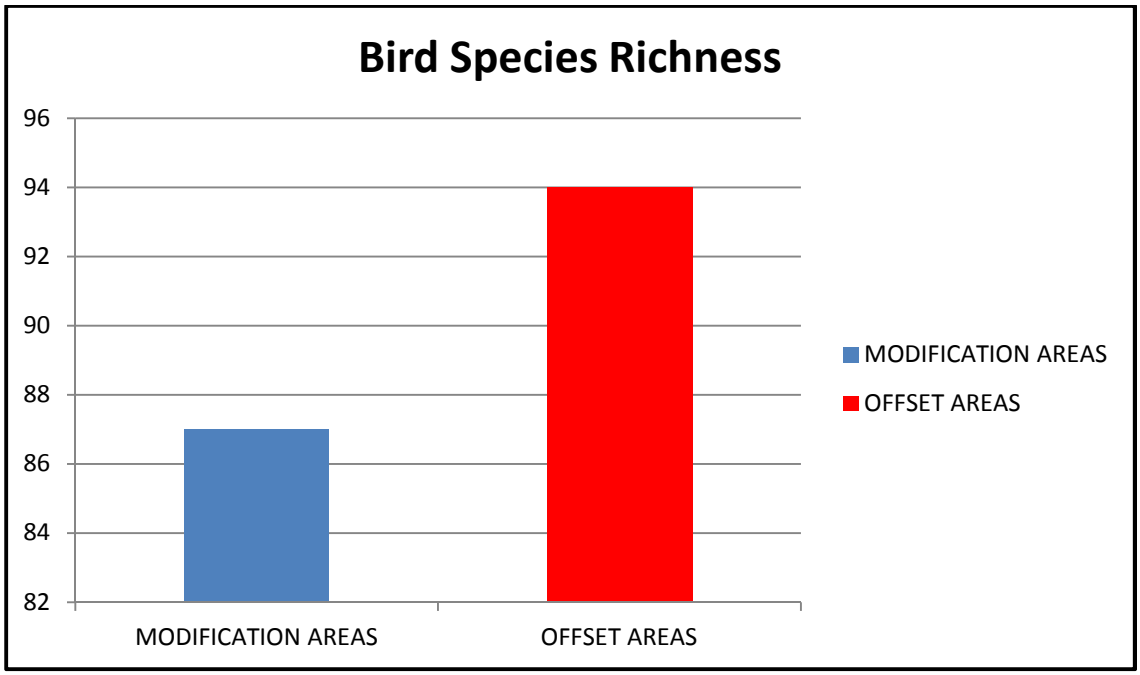



**a. Evenness and Simpson's Index of Diversity**

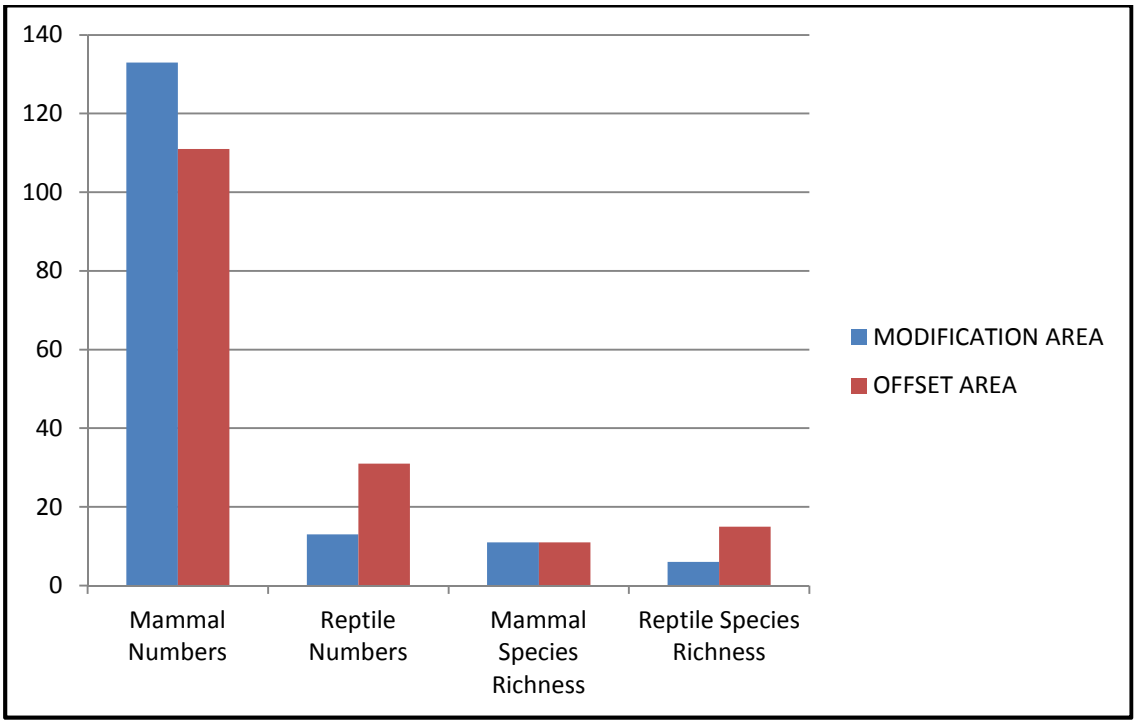
**Figure 4: Biodiversity Indices for Birds, Mammals and Reptiles (Continued)**




**b. Bird Numbers**




**c. Bird Species Richness**




d. Mammal and Reptile Numbers and Species Richness

Table 6: Biodiversity Indices for Modification Open Cut Extension Areas and Offset Areas

| Biodiversity Index | Modification Open Cut Extension Areas | Biodiversity Offset Area |
|---|---|---|
| **Birds** | | |
| Evenness | 0.816 | 0.88 |
| Simpson's Index of Diversity | 0.957 | 0.975 |
| Numbers Recorded | 1252 | 1360 |
| Species Richness | 87 | 93 |
| **Reptiles** | | |
| Evenness | 0.828 | 0.899 |
| Simpson's Index of Diversity | 0.71 | 0.878 |
| Numbers Recorded | 13 | 31 |
| Species Richness | 6 | 15 |
| **Mammals (non-bat)** | | |
| Evenness | 0.607 | 0.737 |
| Simpson's Index of Diversity | 0.628 | 0.738 |
| Numbers Recorded | 133 | 111 |
| Species Richness | 27 | 11 |

### 9.4 Evenness of Occurrence of Species within an Area

Evenness for all groups is higher within the Offset Area when compared to that from the Modification open cut extension area (0.816 versus 0.88 for birds, 0.828 versus 0.899 for reptiles and 0.607 versus 0.737 for mammals). This indicates a higher than normal number of a species within the group e.g. Australian Magpie in the Modification.

Amalgamating and analysing all the values for the various indices it is found that there are no significant differences, although all indices are either equal or higher in the Biodiversity Offset compared to the Modification open cut extension areas (non-parametric Mann-Whitney Rank Sum Test). This indicates that the Offset Areas support a faunal assemblage that is similar to that found within the Modification open cut extension areas. The values at the Biodiversity Offset would however likely improve should research works be undertaken to enhance the existing habitat.

### 9.5 Capture Rates of Individual Species

Usually capture rates are expressed as number of captures of native mammals per trap-day. However, this form of index is not much use in the Modification as few native mammals were trapped. Instead, the number of sightings of each bird species is used. As the survey efforts at the Modification and Offset Areas are similar (see Section 9.1) it is possible to compare the sighting rates at each area.
Appendix 2 shows which bird species were present within the Offset Area during the surveys, each over a period of six days. Appendix 4 gives the bird species and numbers sighted within the Modification and Offset Areas.

Statistical analysis of the data in Appendix 4 shows that there are significant differences between the numbers sighted in the Modification open cut extension area and the Offset Area (non-parametric Mann-Whitney Rank Sum Test $p < 0.001$). This analysis shows that there are higher numbers of birds in the Offset Areas compared to the Modification open cut extension areas.

### 9.6 Contribution to the Faunal Assemblages by Threatened Species and Species Dependent upon Woodland

Lists are available of bird species that are considered to be declining and/or woodland dependent. These lists are used to calculate the proportion of birds located within an area that are considered to be under threat. The higher the proportion, then the greater the value that can be placed on the present habitat in the area.

The list used here is from the western slopes and plains of New South Wales (NSW) ('sheep-wheat belt') as compiled by Reid (2000). Table 7 shows the proportion of declining and woodland dependent birds within the populations surveyed in each area.

**Table 7: Proportion of Woodland Dependent and Declining Birds in Each Area**

| Category | Modification Open Cut Extension Areas | Offset Areas |
|---|---|---|
| Woodland Dependent | 73% | 75% |
| Declining | 19% | 34% |

Although the values for the woodland dependent bird species in the Offset Area are slightly higher, there are no significant differences between the proportions from each area. However, there is a greater proportion of declining bird species within the Offset Areas than in the Modification open cut extension areas

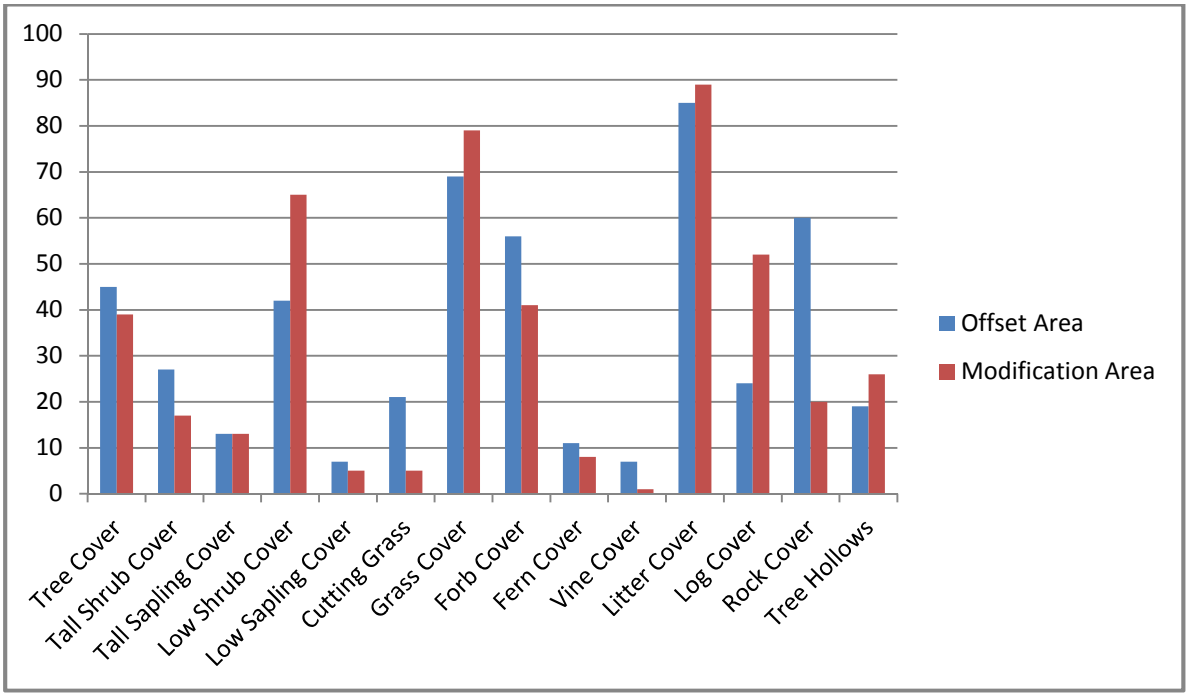
## 9.7 Habitat Characteristics

Table 8 and Figure 5 shows the mean values of the habitat characteristics for the Modification and Offset Areas.

**Table 8: Mean Values of Habitat Characteristics for Modification and Offset Areas**

| Habitat Characteristic | Mean Offset Area | Mean Modification Open Cut Extension Areas |
|---|---|---|
| Tree Cover | 45 | 39 |
| Tall Shrub Cover | 27 | 17 |
| Tall Sapling Cover | 13 | 13 |
| Low Shrub Cover | 42 | 65 |
| Low Sapling Cover | 7 | 5 |
| Cutting Grass | 21 | 5 |
| Grass Cover | 69 | 79 |
| Forb Cover | 56 | 41 |
| Fern Cover | 11 | 8 |
| Vine Cover | 7 | 1 |
| Litter Cover | 85 | 89 |
| Log Cover | 24 | 52 |
| Rock Cover | 60 | 20 |
| Tree Hollows | 19 | 26 |

**Figure 5: Mean Values of Habitat Characteristics for Modification and Offset Areas**




There are no significant differences between the habitat characteristics for each area (paired t-test), including the proportion of trees with hollows.

## 9.8 Habitat Complexity Scores

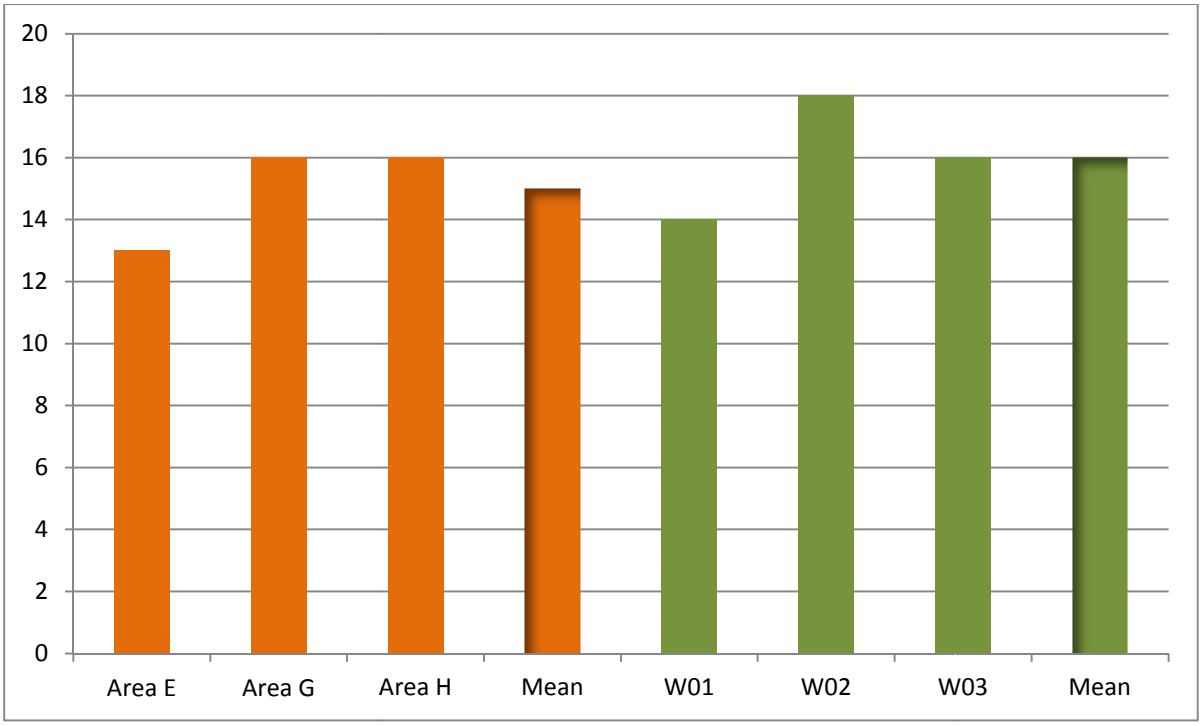
Measurements of habitat characteristics derived from trap site descriptions have been used to provide an index of habitat complexity that can be helpful in determining the values of the habitats surveyed in the study area. One system used to assess habitat values is that developed by Catling and Burt (1995), called the Habitat Complexity Score.
This system scores the following parameters: tree cover; tall and low shrub cover; ground herbage; litter cover; and logs/rocks. The scores range from 0 to 3, with a maximum score for all parameters of 18. The habitat complexity scores for each survey site are given in Table 9.

The Habitat Complexity Scores for the detailed survey sites within the Modification and Offset Areas range between 13 and 18 indicating moderate habitat complexity scores. The values are given in Table 9 and Figure 6. The Habitat Complexity Scores are lowest for Modification open cut extension areas and highest for the Biodiversity Offset Areas.

**Table 9: Habitat Complexity Scores for Sites in Modification and Offset Areas**

| Parameter | Modification Open Cut Extension Areas | | | | Offset Areas | | | |
|---|---|---|---|---|---|---|---|---|
| | Area E | Area G | Area H | Mean | W01 | W02 | W03 | Mean |
| Total | 13 | 16 | 16 | 15 | 14 | 18 | 16 | 16 |

**Figure 6: Habitat Complexity Scores**




## 9.9 Threatened Fauna

Fourteen threatened species were located within the Offset Areas and these are listed in Table 10, together with the threatened species found within the Modification open cut extension areas.

**Table 10: Threatened Species Located within Modification and Offset Areas**

| Threatened Species | Modification Open Cut Extension Areas and Surrounds | Offset Areas and Surrounds |
|---|---|---|
| Little Eagle | X | X |
| Glossy Black-cockatoo | | X |
| Little Lorikeet | | X |
| Powerful Owl | | X |
| Brown Treecreeper (eastern subspecies) | X | X |
| Speckled Warbler | X | X |
| Black-chinned Honeyeater | | X |
| Hooded Robin (south-eastern form) | | X |
| Varied Sittella | | X |

**Table 10: Threatened Species Located within Modification and Offset Areas (Continued)**

| Threatened Species | Modification Open Cut Extension Areas and Surrounds | Offset Areas and Surrounds |
|---|---|---|
| Diamond Firetail | X | X |
| Grey-crowned Babbler (eastern subspecies) | X | |
| Eastern Bentwing-bat | X | X |
| Large-eared Pied Bat | X | X |
| Eastern False Pipistrelle | X | X |
| Eastern Cave Bat | X | X |

Note: The Glossy Black-cockatoo within the Offset Area was recorded by Hunter Eco (2013).

It can be seen that there is a similar diversity of threatened species within each of the Areas although the Offset Areas supports a greater number of threatened species than that found within the Modification open cut extension areas.

In addition to the actual records, the habitats within the Offset Areas provide potential habitat for all of the threatened species recorded within the Modification open cut extension areas.

Threatened fauna for which the Biodiversity Offset provides either known or potential habitat includes:

- Giant Barred Frog (in greater surrounds)
- Little Whip Snake (in greater surrounds)
- Blue-billed Duck (in greater surrounds)
- Black-breasted Buzzard (in greater surrounds)
- Little Eagle
- Glossy Black-cockatoo (recorded within Offset Area)
- Little Lorikeet
- Swift Parrot
- Masked Owl
- Barking Owl (in greater surrounds)
- Speckled Warbler (recorded within Offset Area)
- Regent Honeyeater (recorded within Offset Area)
- Pied Honeyeater (in greater surrounds)
- Pink-tailed Legless Lizard (in greater surrounds)
- Malleefowl (in greater surrounds)
- Square-tailed Kite
- Spotted Harrier (in greater surrounds)
- Bush Stone-curlew (in greater surrounds)
- Gang-gang Cockatoo
- Turquoise Parrot (recorded within Offset Area)
- Superb Parrot
- Powerful Owl (recorded within Offset Area)
- Brown Treecreeper (eastern subspecies) (recorded within Offset Area)
- Black-chinned Honeyeater (eastern subspecies)
- Painted Honeyeater
- White-fronted Chat (in greater surrounds)

- Hooded Robin (south-eastern form) (recorded within Offset Area)
- Flame Robin
- Grey-crowned Babbler (eastern subspecies)
- Diamond Firetail
- Koala
- Squirrel Glider
- Yellow-bellied Sheathtail-bat
- Little Bentwing-bat
- Corben's/South-eastern Long-eared Bat
- Eastern False Pipistrelle
- Eastern Cave Bat
- Pink Robin (in greater surrounds)
- Scarlet Robin
- Varied Sittella (recorded within Offset Area)
- Spotted-tailed Quoll
- New Holland Mouse
- Brush-tailed Rock-wallaby (in greater surrounds)
- Eastern Freetail-bat
- Eastern Bentwing-bat
- Large-eared Pied Bat
- Greater Broad-nosed Bat (in greater surrounds)

### 9.10 Other Factors

During the period of the surveys little domestic stock was located within either area. Cattle are grazed within portions of the Modification open cut extension areas but are not found within the Offset Areas. Higher numbers of pest animal species were found within the Offset Areas when compared with that sighted in the Modification open cut extension area. Table 11 gives the number of sightings of the pest species in each Area. These pest species are those listed as Invasive under the *Commonwealth Environment Protection and Biodiversity Conservation Act, 1999*.

**Table 11: Sightings of Pest Species in Both Areas**

| Pest Species | Modification Open Cut Extension Areas | Offset Areas |
|---|---|---|
| Feral Goat | 1 | 20 |
| Red Fox | 4 | 7 |
| Feral Pig | 1 | 5 |
| Rabbit | 7 | 7 |

The presence of these pest species in the numbers recorded, particularly within the Offset Area, would result in a reduction in biodiversity values of these areas. These numbers are considered likely influenced by the Offset Areas proximity to the Goulburn River Nation Park and the pest control undertaken at the Wilpinjong Coal Mine. Notwithstanding, if the Biodiversity Offset is accepted it is recommended that a pest control program be developed for the Offset Areas. If such numbers can be reduced, through active pest management strategies, then an increase in biodiversity values could be expected.

## 10. CONCLUSION

Although there are some variations in the extent and composition of the habitats found in the Modification open cut extension areas and Offset Areas, it can be concluded that the Biodiversity Offset Areas are a suitable replacement for the Modification open cut extension areas. Analyses of the various indices show that there are no significant differences in the biodiversity characteristics and values. In addition, there is an opportunity to improve the condition of the Biodiversity Offset Areas by the control of pest animal species, particularly Feral Goats and Red Foxes. This would lead to an increase in biodiversity values and satisfy the basic principle of any offset strategy i.e. to improve or maintain environmental outcomes. Area D does not support a large proportion of mature trees (although some mature White Box trees are found within the open paddocks) and conserving the area would have the potential of increased habitat values over time.

In addition, there are no significant differences between the diversity indices for the Modification open cut extension areas and the Offset Areas (non-parametric Wilcoxon Signed Rank Test). There are some differences in the bird numbers and species richness between the Modification open cut extension areas and the Offset Areas with the Offset Area having the higher values.

Overall, the habitat and biodiversity values within the Biodiversity Offset Areas are sufficient to provide adequate compensation for that lost within the Modification open cut extension areas.
In addition, with the revegetation and rehabilitation programs at the Wilpinjong Coal Mine (which would be expanded to include the Modification open cut extension areas) along with the size and quality of the Biodiversity Offset Areas (compared to the Modification open cut extension areas), the Biodiversity Offset Areas would more than satisfy an improve or maintain outcome for faunal values in the medium to long term. This is further discussed in the main text of the Wilpinjong Modification Fauna Assessment.

## References

Bureau of Meteorology (2013) *Weather from Merriwa Station (061287) and Wollar (Barrigan st) Station (062032).* Received 5 July 2013.

Catling, P. C. and Burt, R.J. (1995) *Studies of the ground-dwelling mammals of eucalypt forests in south-eastern New South Wales: the effect of habitat variables on distribution and abundance. Wildlife Research* 22: 271-288.

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## APPENDIX 1: SURVEY TECHNIQUES

### *Elliott Trapping*

Twenty-five small (8 x 10 x 33 centimetre [cm]) Elliott traps were laid in straight lines for five days through the habitats at each site. This is equivalent to 100 trap nights over four consecutive nights at each site. The traps were baited with a mixture of rolled oats, peanut butter and bacon fat, and a small piece of dacron was placed within each trap (as protection against the cold). A freezer bag was placed over the end of each trap to prevent the contents becoming wet from rain. At each trap site a description of the physical characteristics of the habitat within a 1 metre (m) radius was noted. This information is used in the analysis of habitat values. A large Elliott trap was placed at each site (totalling four trap nights per night). The large Elliott traps were baited with chicken, apple and a muesli bar.

### *Tree-mounted Elliott Traps*

To sample small arboreal mammals, five small Elliott traps were mounted on trees at equal distances along each transect (20 trap nights over four consecutive nights at each site). Aluminium tree mounts were attached to trees and a baited Elliott trap was attached to the mount. The tree trunk and trap were sprayed with a honey-water mixture to assist in attracting any nectar or sap feeding arboreal mammals. Again, dacron and freezer bags were used to protected fauna species from cold and wet conditions.

### *Cage Traps*

Tomahawk cage traps were laid on the ground and on a platform attached to trees at each site. The number of Tomahawk traps varied at each site according to the presence of trees large enough to hold a cage trap. The Tomahawk traps were baited with chicken, apple and a muesli bar.

### *Hair Funnels*

Hair funnels (from Faunatech) were used instead of large and small hair tubes. The design of the tapered hair funnels is such that both large and small animals can be detected by a single funnel. Five hair funnels were set out at each site for four nights and baited with a mixture of rolled oats, peanut butter and bacon fat. Where possible, some of the hair funnels were set onto ‘habitat trees’ (these are considered to be trees that showed signs of use by arboreal marsupials and have obvious hollows).

### *Glider Traps*

Tree-mounted plastic tubes were used to capture small arboreal mammals (e.g. Squirrel Glider). These act as vertically mounted pit traps and were baited with a mixture of rolled oats, peanut butter and honey. Two traps were placed at each detailed survey site over four consecutive nights.

### *Pitfall Traps*

Pit traps were constructed from a 20 litre bucket and combined with a 20 m drift fence made from fly-screen wire mesh. These were used where the ground could be dug to a depth to accommodate the buckets.

### *Spotlighting*

Spotlighting from a moving vehicle was undertaken along tracks within the study area. Spotlighting on foot was also undertaken at some detailed fauna survey sites.

### *Remote Cameras*

Digital Scouting Cameras with infrared illumination were set up at Areas D and E and run for 5 days. In addition, a remote camera was set up at a small bait station to record any fauna attracted to the bait.

### *Bird Surveys*

In addition to the results obtained from general observations and spotlighting, listening and observing periods were undertaken at all sites. A 30 minute search was used where the observer walked around each site, as well as observing and listening for calls from a single point (point surveys). At each site up to four periods of observation were undertaken (two in the morning and two in the late afternoon).

### *Call Detection and Playback*

Calls of several species of nocturnal birds were broadcast during the night at areas G and H. Calls were broadcast through a megaphone for approximately five minutes, with a ten minute listening time. Calls from the Powerful Owl (*Ninox strenua*), Masked Owl (*Tyto novaehollandiae*), Tawny Frogmouth (*Podargus strigoides*), Barking Owl (*Ninox connivens*), Eastern Grass Owl (*Tyto capensis*), Australian Owlet-nightjar (*Aegotheles cristatus*), Barn Owl (*Tyto alba*), Southern Boobook (*Ninox boobook*) and the Spotted Nightjar (*Eurostopodus mystacalis*) were broadcast.

### *Herpetological Searches*

Systematic searches for reptiles and amphibians were undertaken within each habitat type at each survey site. Litter was raked and rocks and logs turned over. Loose bark was prised from the trunks of dead trees. Each search took approximately 30 minutes and was repeated at each site. Searches for amphibians took place at night using spotlights (particularly after the one day of rain) and recognition of characteristic calls. Spotlighting searches were also attempted for reptiles, particularly in areas of rock. This technique proved successful at all sites and was used in preference to pit traps and reptile funnels.

### *Bat Call Detection*

An Anabat II Bat Detector with a Compact Flash Storage ZCAIM was placed at site W01, W02 and Area D for one night and any recorded bat calls. Bat calls were analysed by Glenn Hoye, FBN Bat Surveys PL.

### *Harp Traps*

Harp traps usually consist of a 1.8 m square frame made of aluminium mounted on adjustable legs. Monofilament fishing line is strung vertically in the frame in two banks, with the lines c. 2.5 cm apart and the banks separated by c. 10 cm, and with the lines of each bank offset. Below the bottom of the frame is a canvas catch bag lined with plastic. Traps are usually placed in vegetation corridors, over water tanks, and at cave or mine entrances. Bats fly into the fishing lines and slide down into the catch bag from which they cannot escape. Harp traps were placed within site W01 at Area E and in Area D.

### *Animal Track Recognition*

Areas of sand on tracks (sand plots) were inspected for evidence of animal movement. Paw prints and other animal signs e.g. scratches, were identified and recorded.

### *Opportunistic Observations and Scat Analysis*

Any sightings of fauna were recorded whilst moving throughout the survey area and located using a Global Positioning System. Any scats and owl casts were collected and identified, and their contents analysed. Burrows and nests observed were noted and identified, where possible.

## APPENDIX 2: FAUNA LOCATED WITHIN THE TWO OFFSET AREAS

### a. BIRDS

| Scientific Name | Common Name | Status | Offset (Combined) | Area E | Area D |
|---|---|---|---|---|---|
| **Dromaiidae** | | | | | |
| *Dromaius novaehollandiae* | Emu | P | x | x | |
| **Anatidae** | | | | | |
| *Anas superciliosa* | Pacific Black Duck | P | x | x | x |
| *Chenonetta jubata* | Australian Wood Duck | P | x | x | x |
| **Podicipedidae** | | | | | |
| *Tachybaptus novaehollandiae* | Australasian Grebe | P | x | | x |
| **Phalacrocoracidae** | | | | | |
| *Phalacrocorax melanoleucos* | Little Pied Cormorant | P | x | x | |
| **Ardeidae** | | | | | |
| *Egretta novaehollandiae* | White-faced Heron | P | x | x | |
| **Accipitridae** | | | | | |
| *Aquila audax* | Wedge-tailed Eagle | P | x | x | |
| *Elanus axillaris* | Black-shouldered Kite | P | x | | |
| *Hieraaetus morphnoides* | Little Eagle | V | x | x | |
| **Falconidae** | | | | | |
| *Falco berigora* | Brown Falcon | P | x | x | |
| *Falco cenchroides* | Nankeen Kestrel | P | x | x | |
| **Rallidae** | | | | | |
| *Gallinula tenebrosa* | Dusky Moorhen | P | x | x | |
| **Charadriidae** | | | | | |
| *Vanellus miles* | Masked Lapwing | P | x | x | x |
| **Columbidae** | | | | | |
| *Geopelia placida* | Peaceful Dove | P | x | x | |
| *Leucosarcia melanoleuca* | Wonga Pigeon | P | x | x | |
| *Ocyphaps lophotes* | Crested Pigeon | P | x | x | |
| *Phaps chalcoptera* | Common Bronzewing | P | x | x | |
| **Cacatuidae** | | | | | |
| *Cacatua galerita* | Sulphur-crested Cockatoo | P | x | x | x |

| Scientific Name | Common Name | Status | Offset (Combined) | Area E | Area D |
|---|---|---|---|---|---|
| **Cacatuidae (Continued)** | | | | | |
| *Eolophus roseicapillus* | Galah | P | x | x | |
| **Psittacidae** | | | | | |
| *Alisterus scapularis* | Australian King-Parrot | P | x | x | |
| *Glossopsitta concinna* | Musk Lorikeet | P | x | x | |
| *Glossopsitta pusilla* | Little Lorikeet | V | x | | x |
| *Platycercus adscitus eximius* | Eastern Rosella | P | x | x | x |
| *Platycercus elegans* | Crimson Rosella | P | x | x | |
| *Psephotus haematonotus* | Red-rumped Parrot | P | x | x | |
| **Cuculidae** | | | | | |
| *Cacomantis flabelliformis* | Fan-tailed Cuckoo | P | x | x | x |
| *Chalcites basalis* | Horsfield's Bronze-Cuckoo | P | x | x | |
| *Chalcites lucidus* | Shining Bronze-Cuckoo | P | x | x | |
| **Strigidae** | | | | | |
| *Ninox novaeseelandiae* | Southern Boobook | P | x | x | |
| *Ninox strenua* | Powerful Owl | V | x | | x |
| **Tytonidae** | | | | | |
| *Tyto alba* | Eastern Barn Owl | P | x | x | |
| **Podargidae** | | | | | |
| *Podargus strigoides* | Tawny Frogmouth | P | x | | x |
| **Aegothelidae** | | | | | |
| *Aegotheles cristatus* | Australian Owlet-nightjar | P | x | | x |
| **Halcyonidae** | | | | | |
| *Dacelo novaeguineae* | Laughing Kookaburra | P | x | x | x |
| **Meropidae** | | | | | |
| *Merops ornatus* | Rainbow Bee-eater | P | x | x | |
| **Menuridae** | | | | | |
| *Menura novaehollandiae* | Superb Lyrebird | P | x | x | |
| **Climacteridae** | | | | | |
| *Climacteris picumnus* | Brown Treecreeper (eastern subspecies) | V | x | x | x |

| Scientific Name | Common Name | Status | Offset (Combined) | Area E | Area D |
|---|---|---|---|---|---|
| **Climacteridae (Continued)** | | | | | |
| *Cormobates leucophaeus* | White-throated Treecreeper | P | x | x | x |
| **Maluridae** | | | | | |
| *Malurus cyaneus* | Superb Fairy-wren | P | x | x | |
| **Pardalotidae** | | | | | |
| *Pardalotus punctatus* | Spotted Pardalote | P | x | x | x |
| *Pardalotus striatus* | Striated Pardalote | P | x | x | x |
| **Acanthizidae** | | | | | |
| *Acanthiza chrysorrhoa* | Yellow-rumped Thornbill | P | x | | x |
| *Acanthiza lineata* | Striated Thornbill | P | x | x | |
| *Acanthiza nana* | Yellow Thornbill | P | x | x | |
| *Acanthiza pusilla* | Brown Thornbill | P | x | x | |
| *Acanthiza reguloides* | Buff-rumped Thornbill | P | x | x | |
| *Calamanthus pyrrhopygius* | Chestnut-rumped Heathwren | P | x | x | |
| *Gerygone olivacea* | White-throated Gerygone | P | x | x | x |
| *Origma solitaria* | Rockwarbler | P | x | x | |
| *Pyrrholaemus sagittatus* | Speckled Warbler | V | x | x | x |
| *Sericornis frontalis* | White-browed Scrubwren | P | x | x | |
| *Smicrornis brevirostris* | Weebill | P | x | x | |
| **Meliphagidae** | | | | | |
| *Acanthorhynchus tenuirostris* | Eastern Spinebill | P | x | x | x |
| *Anthochaera carunculata* | Red Wattlebird | P | x | x | x |
| *Lichenostomus chrysops* | Yellow-faced Honeyeater | P | x | x | x |
| *Lichenostomus leucotis* | White-eared Honeyeater | P | x | x | x |
| *Lichenostomus melanops* | Yellow-tufted Honeyeater | P | x | x | x |
| *Lichenostomus penicillatus* | White-plumed Honeyeater | P | x | x | x |
| *Melithreptus brevirostris* | Brown-headed Honeyeater | P | x | x | |

| Scientific Name | Common Name | Status | Offset (Combined) | Area E | Area D |
|---|---|---|---|---|---|
| **Meliphagidae (Continued)** | | | | | |
| *Melithreptus gularis gularis* | Black-chinned Honeyeater (eastern subsp.) | V | x | | x |
| *Melithreptus lunatus* | White-naped Honeyeater | P | x | x | x |
| *Manorina melanocephala* | Noisy Miner | P | x | x | x |
| *Philemon corniculatus* | Noisy Friarbird | P | x | x | x |
| **Petroicidae** | | | | | |
| *Eopsaltria australis* | Eastern Yellow Robin | P | x | x | x |
| *Melanodryas cucullata* | Hooded Robin (south-eastern form) | V | x | | x |
| *Microeca fascinans* | Jacky Winter | P | x | x | x |
| *Petroica boodang* | Scarlet Robin | V | x | x | |
| **Pomatostomidae** | | | | | |
| *Pomatostomus superciliosus* | White-browed Babbler | P | x | | x |
| **Neosittidae** | | | | | |
| *Daphoenositta chrysoptera* | Varied Sittella | V | x | x | |
| **Pachycephalidae** | | | | | |
| *Colluricincla harmonica* | Grey Shrike-thrush | P | x | x | x |
| *Falcunculus frontatus* | Eastern Shrike-tit | P | x | x | x |
| *Pachycephala pectoralis* | Golden Whistler | P | x | x | x |
| *Pachycephala rufiventris* | Rufous Whistler | P | x | x | x |
| **Dicruridae** | | | | | |
| *Grallina cyanoleuca* | Magpie-lark | P | x | x | x |
| *Rhipidura albiscapa* | Grey Fantail | P | x | x | |
| *Rhipidura leucophrys* | Willie Wagtail | P | x | x | x |
| **Artamidae** | | | | | |
| *Artamus cyanopterus* | Dusky Woodswallow | P | x | | x |
| *Cracticus nigrogularis* | Pied Butcherbird | P | x | x | x |

| Scientific Name | Common Name | Status | Offset (Combined) | Area E | Area D |
|---|---|---|---|---|---|
| **Artamidae (Continued)** | | | | | |
| *Cracticus torquatus* | Grey Butcherbird | P | x | x | x |
| *Gymnorhina tibicen* | Australian Magpie | P | x | x | x |
| *Strepera graculina* | Pied Currawong | P | x | x | x |
| **Campephagidae** | | | | | |
| *Coracina novaehollandiae* | Black-faced Cuckoo-shrike | P | x | x | x |
| **Oriolidae** | | | | | |
| *Oriolus sagittatus* | Olive-backed Oriole | P | x | x | |
| **Corvidae** | | | | | |
| *Corvus coronoides* | Australian Raven | P | x | x | x |
| **Corcoracidae** | | | | | |
| *Corcorax melanorhamphos* | White-winged Chough | P | x | x | x |
| **Sturnidae** | | | | | |
| *Sturnus vulgaris* | Common Starling | U | x | x | |
| **Hirundinae** | | | | | |
| *Hirundo neoxena* | Welcome Swallow | P | x | x | x |
| *Petrochelidon ariel* | Fairy Martin | P | x | x | |
| *Petrochelidon nigricans* | Tree Martin | P | x | x | x |
| **Zosteropidae** | | | | | |
| *Zosterops lateralis* | Silvereye | P | x | x | x |
| **Motacillidae** | | | | | |
| *Anthus australis* | Australasian Pipit | P | x | x | |
| **Estrilidae** | | | | | |
| *Neochmia temporalis* | Red-browed Finch | P | x | x | |
| *Stagonopleura guttata* | Diamond Firetail | V | x | | x |
| *Taeniopygia bichenovii* | Double-barred Finch | P | x | x | |

Those species highlighted in green are listed as Threatened under New South Wales *Threatened Species Conservation Act, 1995*

V = Vulnerable

P = Protected

U = Introduced

**a. Mammals**

| Scientific Name | Common Name | Status | Offset (Combined) | Area E | Area D |
|---|---|---|---|---|---|
| **Tachyglossidae** | | | | | |
| *Tachyglossus aculeatus* | Short-beaked Echidna | P | x | x | |
| **Dasyuridae** | | | | | |
| *Antechinus flavipes* | Yellow-footed Antechinus | P | x | | |
| **Phalangeridae** | | | | | |
| *Trichosurus vulpecula* | Common Brushtail Possum | P | x | x | x |
| **Pseudocheiridae** | | | | | |
| *Pseudocheirus peregrinus* | Common Ringtail Possum | P | x | x | |
| **Vombatidae** | | | | | |
| *Vombatus ursinus* | Bare-nosed Wombat | P | x | x | |
| **Macropodidae** | | | | | |
| *Macropus giganteus* | Eastern Grey Kangaroo | P | x | x | x |
| *Macropus robustus* | Common Wallaroo | P | x | x | |
| *Macropus rufogriseus* | Red-necked Wallaby | P | x | x | x |
| *Wallabia bicolor* | Swamp Wallaby | P | x | | x |
| **Rhinolophidae** | | | | | |
| *Rhinolophus megaphyllus* | Eastern Horseshoe-bat | P | x | x | |
| **Molossidae** | | | | | |
| *Mormopterus sp. 4* | Southern Freetail Bat | P | X | X | X |
| **Vespertilionidae** | | | | | |
| *Tadarida australis* | White-striped Mastiff Bat | P | x | X | x |
| *Chalinolobus dwyeri* | Large-eared Pied Bat | V | X | X | X |
| *Chalinolobus gouldii* | Gould's Wattled bat | P | X | X | X |
| *Chalinolobus morio* | Chocolate Wattled Bat | P | X | X | |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | V | X | | X |
| *Miniopterus schreibersii oceanensis* | Eastern Bentwing-bat | V | X | X | X |
| *Nyctophilus sp.* | Unidentified Long-eared Bat | P | X | X | X |

| Scientific Name | Common Name | Status | Offset (Combined) | Area E | Area D |
|---|---|---|---|---|---|
| *Scotorepens balstoni* | Inland Broad-nosed Bat | P | X | | X |
| *Scotorepens orion* | Eastern Broad-nosed Bat | P | X | | X |
| *Vespadelus troughtoni* | Eastern Cave Bat | V | X | X | X |
| *Vespadelus vulturnus* | Little Forest Bat | P | x | x | x |
| **Canidae** | | | | | |
| *Canis lupus* | Dingo, domestic dog | U | x | x | |
| *Vulpes vulpes* | Red Fox | U | x | x | |
| **Felidae** | | | | | |
| *Felis catus* | Cat | U | x | x | |
| **Bovidae** | | | | | |
| *Bos taurus* | European cattle | U | x | x | |
| *Capra hircus* | Goat | U | x | x | x |
| **Suidae** | | | | | |
| *Sus scrofa* | Feral Pig | U | x | x | |
| **Leporidae** | | | | | |
| *Oryctolagus cuniculus* | Rabbit | U | x | x | x |

V = Vulnerable
P = Protected
U = Introduced

**b. Reptiles**

| Scientific Name | Common Name | Status | Offset (Combined) | Area E | Area D |
|---|---|---|---|---|---|
| **Cheluidae** | | | | | |
| *Chelodina longicollis* | Eastern Snake-necked Turtle | P | x | x | x |
| **Agamidae** | | | | | |
| *Amphibolurus nobbi* | Nobbi | P | x | x | |
| *Pogona barbata* | Eastern Bearded Dragon | P | x | x | |
| **Gekkonidae** | | | | | |
| *Oedura lesueurii* | Lesueur's Velvet Gecko | P | x | x | |
| *Phyllurus platurus* | Broad-tailed Gecko | P | x | x | |
| **Varanidae** | | | | | |
| *Varanus varius* | Lace Monitor | P | x | x | x |
| **Scincidae** | | | | | |
| *Carlia foliorum* | Litter Skink | P | x | x | |
| *Carlia tetradactyla* | Southern Rainbow Skink | P | x | x | |
| *Cryptoblepharus virgatus* | Cream-striped Shining-skink | P | x | x | |
| *Ctenotus robustus* | Robust Ctenotus | P | x | x | |
| *Ctenotus orientalis* | | P | x | | x |
| *Egernia cunninghami* | Cunningham's Spiny-tailed Skink | P | x | x | |
| *Egernia whitii* | White's Rock-skink | P | x | x | |
| *Lampropholis delicata* | Dark-flecked Garden Sunskink | P | x | x | |
| *Morethia boulengeri* | South-eastern Morethia Skink | P | x | x | |

V = Vulnerable

P = Protected

U = Introduced

### c. Amphibians

| Scientific Name | Common Name | Status | Offset (Combined) | Area E | Area D |
|---|---|---|---|---|---|
| **Hylidae** | | | | | |
| *Litoria latopalmata* | Broad-palmed Frog | P | x | x | x |
| *Litoria lesueuri* | Lesueur's Frog | P | x | | x |
| **Myobatrachidae** | | | | | |
| *Pseudophryne bibronii* | Bibron's Toadlet | P | x | | x |
| *Crinea signifera* | Common Eastern Froglet | P | x | x | |

V = Vulnerable

P = Protected

U = Introduced

## APPENDIX 3: PHOTOS OF THE OFFSET AREAS

Plate 1 – Woodland Habitat within Offset Area E

Plate 2 – Woodland Habitat within Offset Area E

Plate 3 – Grassland Habitat within Offset Area E

Plate 4 – Woodland Habitat within Offset Area E

Plate 5 – Woodland Habitat within Offset Area D

Plate 6 – Woodland Habitat within Offset Area E

Plate 7 – Woodland Habitat within Offset Area E

Plate 8 – Woodland Habitat within Offset Area E

Plate 9 – Woodland Habitat within Offset Area E

Plate 10 – Woodland Habitat within Offset Area D

Plate 11 – Woodland Habitat within Offset Area D

Plate 12 – Woodland Habitat within Offset Area E

| | |
|---|---|
|  |  |
| Plate 13 – Woodland Habitat within Offset Area E | Plate 14 – Woodland Habitat within Offset Area E |

## APPENDIX 4: NUMBERS OF BIRDS LOCATED IN MODIFCATION AND OFFSET AREAS

| BIRD SPECIES | MODIFICATION | OFFSET |
|---|---|---|
| Australasian Grebe | 1 | 2 |
| Australasian Pipit | 7 | 2 |
| Australian King-Parrot | 0 | 21 |
| Australian Magpie | 52 | 64 |
| Australian Owlet-nightjar | 0 | 3 |
| Australian Raven | 18 | 28 |
| Australian Reed-Warbler | 2 | 0 |
| Australian Wood Duck | 18 | 46 |
| Black-chinned Honeyeater | 0 | 1 |
| Black-faced Cuckoo-shrike | 5 | 32 |
| Black-shouldered Kite | 3 | 1 |
| Brown Falcon | 8 | 1 |
| Brown Thornbill | 3 | 20 |
| Brown Treecreeper | 9 | 7 |
| Brown-headed Honeyeater | 1 | 6 |
| Brush Cuckoo | 1 | 0 |
| Buff-rumped Thornbill | 6 | 11 |
| Chestnut-rumped Heathwren | 0 | 1 |
| Cicadabird | 2 | 0 |
| Collared Sparrowhawk | 1 | 0 |
| Common Bronzewing | 1 | 8 |
| Common Koel | 1 | 0 |
| Common Starling | 10 | 13 |
| Crested Shrike-tit | 0 | 2 |
| Crested Pigeon | 2 | 12 |
| Crimson Rosella | 0 | 5 |
| Diamond Firetail | 2 | 1 |
| Dollarbird | 1 | 0 |
| Double-barred Finch | 5 | 11 |
| Dusky Woodswallow | 1 | 2 |
| Dusky Moorhen | 0 | 8 |
| Eastern Barn Owl | 0 | 1 |
| Eastern Rosella | 22 | 68 |
| Eastern Spinebill | 0 | 15 |
| Eastern Yellow Robin | 2 | 16 |
| Emu | 2 | 25 |
| Fairy Martin | 13 | 4 |
| Fan-tailed Cuckoo | 0 | 3 |
| Fuscous Honeyeater | 8 | 0 |
| Galah | 18 | 64 |
| Golden Whistler | 0 | 5 |
| Golden-headed Cisticola | 5 | 0 |
| Grey Butcherbird | 2 | 13 |
| Grey Fantail | 7 | 27 |
| Grey Shrike-thrush | 5 | 16 |
| Grey-crowned Babbler (south-eastern sub-species) | 1 | 0 |

| BIRD SPECIES | MODIFICATION | OFFSET |
|---|---|---|
| Hooded Robin | 0 | 2 |
| Horsfield's Bronze-Cuckoo | 0 | 1 |
| Inland Thornbill | 1 | 0 |
| Jacky Winter | 4 | 14 |
| Little Pied Cormorant | 0 | 2 |
| Laughing Kookaburra | 21 | 24 |
| Little Lorikeet | 0 | 2 |
| Little Black Cormorant | 5 | 0 |
| Little Eagle | 1 | 2 |
| Little Pied Cormorant | 3 | 0 |
| Magpie-lark | 4 | 10 |
| Masked Lapwing | 2 | 10 |
| Mistletoebird | 1 | 0 |
| Musk Lorikeet | 2 | 4 |
| Nankeen Kestrel | 13 | 5 |
| Noisy Friarbird | 4 | 27 |
| Noisy Miner | 11 | 31 |
| Olive-backed Oriole | 2 | 2 |
| Pacific Black Duck | 3 | 12 |
| Peaceful Dove | 0 | 5 |
| Pallid Cuckoo | 2 | 0 |
| Powerful Owl | 0 | 1 |
| Pied Butcherbird | 4 | 18 |
| Pied Currawong | 6 | 23 |
| Rainbow Bee-eater | 1 | 1 |
| Red Wattlebird | 0 | 5 |
| Red-capped Robin | 1 | 0 |
| Red-browed Finch | 0 | 4 |
| Red-rumped Parrot | 4 | 2 |
| Rockwarbler | 1 | 8 |
| Rufous Songlark | 7 | 0 |
| Rufous Whistler | 18 | 24 |
| Sacred Kingfisher | 7 | 0 |
| Scarlet Robin | 0 | 1 |
| Shining Bronze-Cuckoo | 0 | 2 |
| Silvereye | 1 | 18 |
| Southern Boobook | 2 | 1 |
| Speckled Warbler | 5 | 13 |
| Spotted Pardalote | 5 | 57 |
| Striated Pardalote | 8 | 6 |
| Striated Thornbill | 1 | 7 |
| Sulphur-crested Cockatoo | 24 | 70 |
| Superb Fairy-wren | 17 | 30 |
| Tawny Frogmouth | 1 | 1 |
| Tree Martin | 1 | 26 |
| Varied Sittella | 0 | 5 |
| Wedge-tailed Eagle | 2 | 1 |
| Weebill | 2 | 5 |
| Welcome Swallow | 11 | 11 |
| Whistling Kite | 1 | 0 |
| White-bellied Cuckoo-shrike | 1 | 0 |

| BIRD SPECIES | MODIFICATION | OFFSET |
|---|---|---|
| White-browed Babbler | 0 | 6 |
| White-browed Woodswallow | 1 | 0 |
| White-browed Scrubwren | 0 | 4 |
| White-eared Honeyeater | 2 | 38 |
| White-faced Heron | 6 | 4 |
| White-necked Heron | 1 | 0 |
| White-naped Honeyeater | 0 | 16 |
| White-plumed Honeyeater | 1 | 8 |
| White-throated Gerygone | 6 | 7 |
| White-throated Needletail | 1 | 0 |
| White-throated Nightjar | 1 | 0 |
| White-throated Treecreeper | 8 | 18 |
| White-winged Chough | 9 | 63 |
| White-winged Triller | 7 | 0 |
| Willie Wagtail | 24 | 21 |
| Wonga Pigeon | 0 | 1 |
| Yellow Thornbill | 5 | 15 |
| Yellow-faced Honeyeater | 0 | 43 |
| Yellow-rumped Thornbill | 2 | 16 |
| Yellow-tufted Honeyeater | 0 | 33 |