



Report

Red Hill Mining Lease

Terrestrial Fauna Technical Report

07 OCTOBER 2013

Prepared for
BM Alliance Coal Operations Pty Ltd

42627136

URS

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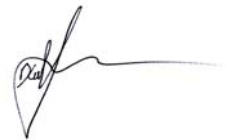


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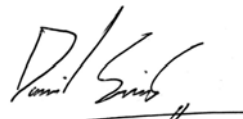


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Abbreviations

Abbreviation	Description
BMA	BM Alliance Coal operations
BoM	Bureau of Meteorology
BPA	Biodiversity Planning Assessment
CAMBA	China-Australia Migratory Bird Agreement
DPI	Department of Primary Industries and Fisheries
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EHP	Department of Environment and Heritage Protection
EIS	Environmental Impact Statement
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESA	Environmentally Sensitive Area
GRB	Goonyella Riverside and Broadmeadow
GRM	Goonyella Riverside Mine
JAMBA	Japan-Australia Migratory Bird Agreement
LP Act	<i>Lands Protection (Pest and Stock Route Management) Act 2002</i>
MNES	Matters of National Environmental Significance
NC Act	<i>Nature Conservation Act 1992</i>
RE	Regional Ecosystem
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
URS	URS Australia Pty Ltd
WTP	Water treatment plant

Abbreviation	Description
°C	degrees celcius
cm	centimetre
km	kilometre
L	litre
ha	hectare
m	metre
mm	millimetre

Executive Summary

The Red Hill Mining Lease (the project) is located adjacent to the existing Goonyella Riverside and Broadmeadow (GRB) mine complex.

BM Alliance Coal Operations Pty Ltd (BMA) proposes to convert the existing Red Hill Mining Lease Application (MLA70421) to enable continuation and incremental expansion of mining operations associated with the existing GRB mine complex. This report investigates the ecological values found within the project Environmental Impact Statement (EIS) study area and the surrounding region.

Systematic fauna surveys were carried out during 2005, 2009 and 2011 for the project's EIS. The aim of these surveys were to document the terrestrial vertebrate fauna (amphibians, reptiles, mammals and birds) and habitat within the proposed EIS study area, with particular reference to the occurrence of conservation significant fauna, and to undertake an assessment of potential impacts of the project.

This study took on a two-part approach; a comprehensive literature review followed by systematic field surveys. The literature review utilised online databases and existing ecological reports to generate a list of conservation significant fauna that have been known to occur or may potentially occur within the EIS study area. Targeted fauna surveys were subsequently undertaken based on the results of the literature review.

The literature review and field surveys identified 17 fauna species known to occur within the survey area listed under the *Environment Protection and Biodiversity Conservation Act 1999* and the *Nature Conservation Act 1992*. This includes 12 bird (nine migratory/marine), two reptile and three mammal species. The literature review also identified the potential presence of a further five conservation significant species.

Introduction

The Red Hill Mining Lease is located adjacent to the existing Goonyella, Riverside and Broadmeadow (GRB) mine complex in the Bowen Basin, approximately 20 kilometres north of Moranbah and 135 kilometres south-west of Mackay, Queensland.

BHP Billiton Mitsubishi Alliance (BMA), through its joint venture manager, BM Alliance Coal Operations Pty Ltd, proposes to convert the existing Red Hill Mining Lease Application (MLA 70421) to enable the continuation of existing mining operations associated with the GRB mine complex. Specifically, the mining lease conversion will allow for:

- An extension of three longwall panels (14, 15 and 16) of the existing Broadmeadow underground mine (BRM).
- A future incremental expansion option of the existing Goonyella Riverside Mine (GRM).
- A future Red Hill Mine (RHM) underground expansion option located to the east of the GRM.

The three project elements described above are collectively referred to as ‘the project’.

Terrestrial vertebrate fauna studies for the Red Hill Mining Lease (the project) Environmental Impact Statement (EIS) were undertaken by URS Australia Pty Ltd (URS) in 2005, 2009 and 2011 to determine faunal values present within the area, undertake an impact assessment and propose mitigation strategies. The studies involved a review of existing fauna data and identification of potential conservation significant fauna species and habitat, followed by field surveys. This report combines data from the 2005, 2009 and 2011 desktop and field investigations.

1.1 Study Aim and Objectives

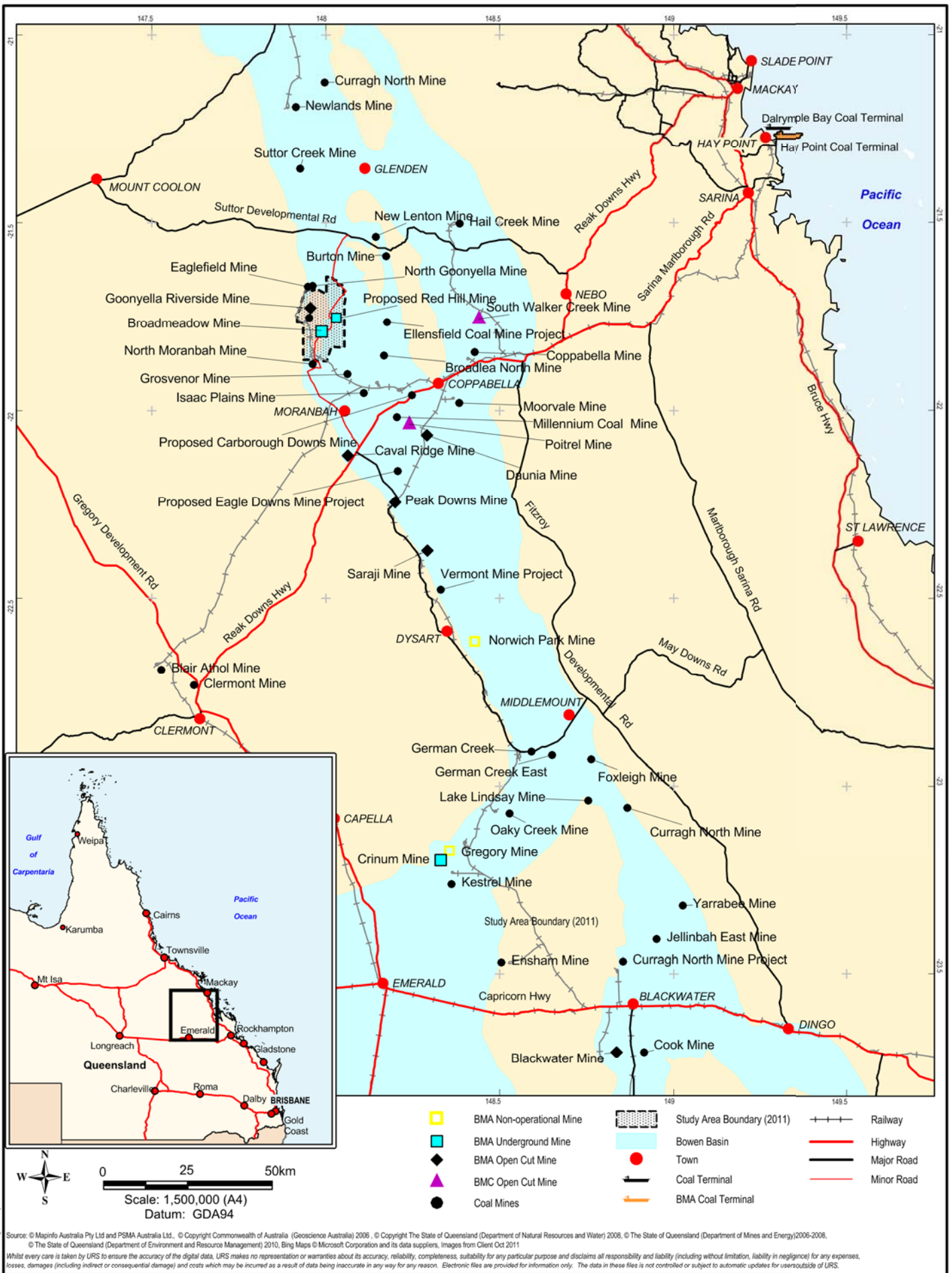
The aim of the fauna study was to document the terrestrial vertebrate fauna assemblages (amphibians, reptiles, mammals and birds) and habitat within the EIS study area, with particular reference to the occurrence of conservation significant fauna and habitat. The objectives of the study were to:

- Review existing terrestrial fauna data for the EIS study area and environs;
- Describe the diversity of amphibians, birds, reptiles and mammals found on the site;
- Identify the presence of conservation significant or poorly known species;
- Identify habitat requirements for conservation significant or noteworthy species;
- Describe the use of areas by migratory birds and terrestrial fauna; and
- Identify feral and exotic animals in the EIS study area.

1.2 The EIS Study Area

The Moranbah area possesses a long history of grazing and extraction of coal. These land uses have significantly altered the natural characteristics of the land with concomitant impacts to vegetation communities, habitat values and native fauna. Further detail on the bio-regional context of the site is provided in Section 9 of the Red Hill Mining Lease EIS.

The EIS study area and its position in the region is presented in **Figure 1-1**.



**RED HILL MINING LEASE
 FAUNA STUDY REPORT**

REGIONAL LOCATION

BHP Billiton Mitsubishi Alliance



ECOLOGICAL ASSESSMENT - FAUNA

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1 Introduction

1.3 Legislative Context

1.3.1 *Environment Protection and Biodiversity Conservation Act 1999*

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for the protection of the environment, especially Matters of National Environmental Significance (MNES). The EPBC Act is administered by the Commonwealth Department of the Environment (formerly Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC)). The Act is designed to provide for the conservation of biodiversity through the protection of threatened species and ecological communities, migratory, marine and other protected species listed under the Act. In general, the Act aims to streamline national environmental assessment and approvals processes, protect Australian biodiversity and integrate management of important MNES and heritage places (DSEWPaC 2011).

1.3.2 *Nature Conservation Act 1992*

The Queensland *Nature Conservation Act 1992* (NC Act) is administered by the Department of Environment and Heritage Protection (EHP) and is the principal legislation for the conservation and management of the State's native flora and fauna. The primary objective of the NC Act is the conservation of biodiversity, namely the preservation of endangered, vulnerable and rare species of flora and fauna as listed under the *Nature Conservation (Wildlife) Regulation 2006*.

1.3.3 *Land Protection (Pest and Stock Route Management) Act 2002*

The Queensland *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) is administered by Queensland Department of Agriculture, Fisheries and Forestry (DAFF) and provides pest management for agricultural lands. The LP Act lists species of flora and fauna that are considered Class 1, 2 or 3 pests under the Act.

Methodology

2.1 Literature Review

A desktop review of ecological data and literature was undertaken to characterise the ecological values and identify the potential presence of conservation significant fauna species and habitats within the EIS study area. The objectives for the desktop study include:

- Review of relevant biodiversity databases and fauna studies for the EIS study area;
- Assessment of the broad conservation values of vegetation communities and habitat present in the EIS study area; and
- Identification of the potential presence of conservation significant fauna species.

2.1.1 Data Sources

Existing data on fauna within the EIS study area was compiled through acquisition and review of the following key references:

- the Department of the Environment online EPBC MNES database (DSEWPaC 2012);
- EHP Wildlife Online database (EHP 2013);
- Queensland Museum fauna records (Queensland Museum 2011);
- The Birds Australia database (Birds Australia 2011);
- Queensland EHP Essential Habitat mapping (EHP 2012);
- Queensland EHP Ecomap Environmentally Sensitive Areas mapping (EHP 2009);
- A variety of fauna studies undertaken for the GRB mine complex; and
- Species distribution maps from current field guides.

In order to identify the range of fauna species present within the EIS study area and the broader region, reviews of the above data sources were conducted for the area as defined by the coordinates presented below (**Section 2.1.2**). Prior to each survey period, new database searches were conducted. Only the most recent search results (2011) have been used in this report to ensure data used is current. The search areas used for each data source do not necessarily correlate to the EIS study area boundary due to the inherent search parameters for each database. A summary of the various databases and fauna studies is presented in **Section 2.1.3**.

2.1.2 Search Areas

The following coordinates define the search areas utilised for each database search:

- EPBC Act Protected Matters Report bounded by the coordinates -21.644, 147.866; -21.889, 147.866; -21.889, 148.054; -21.644, 148.054 retrieved on 1 April 2011;
- Wildlife Online database search bounded by the latitudes -21.644 to -21.889 and longitudes 147.866 to 148.054 retrieved on 21 January 2011;
- Birds Australia database search for one degree square containing the point 21° 38' and 21° 53' and longitudes 147° 52' and 148° 3' retrieved on 1 April 2011;
- Queensland Museum database search bounded by the latitudes 21° 38' and 21° 53' and longitudes 147° 52' and 148° 3' retrieved on 1 April 2011; and
- Queensland EHP Ecomap Environmentally Sensitive Areas (ESAs) for the points:
 - Area 1 -21.759, 147.969;
 - Area 2 -21.384, 148.456;

2 Methodology

- Area 3 -21.644, 148.054;
- Area 4 -21.384, 147.456;
- Area 5 -21.644, 147.866;
- Area 6 -22.266, 148.456;
- Area 7 -22.266, 147.456; and
- Area 8 -21.889, 147.866.

2.1.3 Fauna Databases

EPBC Database

The Department of the Environment MNES database generates a list of protected matters (listed as per the EPBC Act) that may potentially occur in or near the subject area. The database incorporates information from a range of sources including government, research and community organisations.

The MNES database has inherent limitations based on the accuracy of geographic data for some matters. In particular, confirmation of the presence of threatened or migratory species at a given site is not possible from the database, as data presented are for potential occurrences of species within a general area, rather than for known occurrences at a specific site.

The relative reliability of this database must be borne in mind as species highlighted by this search do not necessarily correlate to an actual observation. Species are highlighted by the database if their currently known distribution overlaps with the search area by one degree of latitude or longitude (approximately 100 km). This indication of potential presence does not take into account if suitable vegetation, geology, soil, climate or habitat types are actually present to support the occurrence of a significant species or ecological community.

Wildlife Online

The EHP Wildlife Online database contains recorded wildlife sightings and listings of plants, fungi, protists, mammals, birds, reptiles, amphibians, freshwater fish, marine cartilaginous fish and butterflies in Queensland. The database is based on collated species lists and wildlife records acquired by the EHP through a range of sources including specimen collections, research and monitoring programs and community wildlife recording programs.

Queensland Museum

The Queensland Museum fauna record database provides a list of specimens kept within the Queensland Museum collections for a specified search area. Data provided includes details on collection locality, geographic location and collection date.

Birds Australia

The Birds Australia database provides a list of historical records compiled from bird surveys carried out by volunteers. Birds Australia cross references the historical records and generates a species list for a specified area or point. Data provided includes details on locality, geographic location and collection date.

2 Methodology

Environmentally Sensitive Areas

ESAs include national parks, state forests, world heritage areas, Ramsar wetlands, and nationally important wetlands. ESA maps are generated from the EHP ‘maps of environmentally sensitive areas’ webpage (EHP 2009).

2.1.4 Existing Ecological Reports

The study area has been extensively surveyed for flora, fauna, vegetation communities and natural values. A review of five previous ecological reports was undertaken to encapsulate all species and habitat values that have previously been known to occur on site and are therefore potentially still present. The following reports were reviewed:

- Dry and wet season fauna surveys of the GRM conducted in August 1998 (WBM 1998) and February 2000 respectively (WBM 2000);
- A flora and fauna survey of the proposed “Ramp Four” mining area at GRM, conducted in February 2002 (WBM 2002);
- A review of habitat values for biodiversity and conservation significance for the GRM conducted in 2005 (Ecoserve and LAMR 2005); and
- Targeted vertebrate fauna surveys of selected remnant regional ecosystems on GRM (Ecoserve 2006).

Results from these previous ecological surveys have been incorporated into a complete fauna species list for the area. This can be found in **Appendix A** of this report.

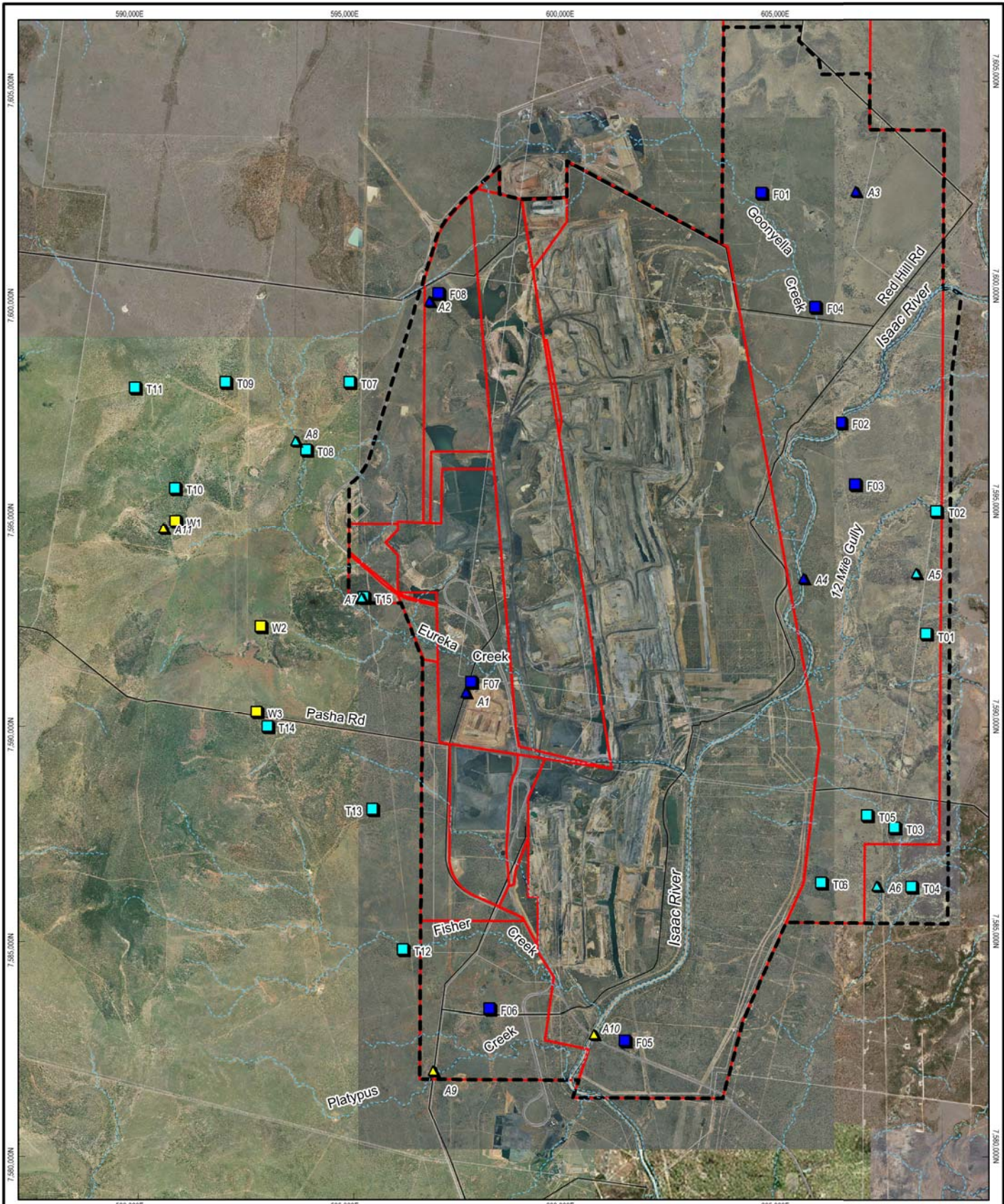
2.2 Field Survey Methodology

2.2.1 Survey Approach

Fauna surveys were conducted by URS in 2005, 2009 and 2011. Prior to each survey event, targeted fauna survey transect sites were identified during desktop studies and aerial photograph analysis, with the objective to target and characterise the key habitat values of the site. Each survey period featured systematic fauna surveys which were undertaken in keeping with standard methodologies for the systematic survey of terrestrial fauna in eastern Australia (Eyre *et al.* 1997; EPA 1999) as well as a number of non-standard observational methods. Methods employed during each survey period included live capture and release trapping, bird census, spotlighting, active searches, call playback and microchiropteran bat call detection, as described in **Section 2.2.2**. The survey methodology and seasonal timing was designed to build on previous fauna surveys in the local environs (WBM 1998; WBM 2000; WBM 2002; Ecoserve and LAMR 2005; Ecoserve 2006).

2.2.2 Fauna Survey Methodology

The fauna surveys utilised a range of standard fauna survey methods. These are described in more detail below. Trapping effort for live capture/release and pitfall trapping is detailed in **Appendix B** of this report. The area in which field surveys were undertaken (survey area) is larger than the EIS study area. The locations for all survey periods are presented on **Figure 2-1**. Survey effort described below denotes the total trap hours and/or person hours for each survey method conducted during all three survey periods.



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0 1.25 2.5km
Scale 1:125 000 (A4)
Projection: MGA94 Zone 55, (GDA94)

- EIS Study Boundary
- BMA Tenure/Tenement

- Fauna Trapping Sites (2011)
- Fauna Trapping Sites (2009)
- Fauna Trapping Sites (2005)
- Anabat Sites (2011)
- Anabat Sites (2009)
- Anabat Sites (2005)

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RED HILL MINING LEASE FAUNA STUDY REPORT

FAUNA TRAPPING AND ANABAT SAMPLING SITES



ECOLOGICAL ASSESSMENT - FAUNA

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2 Methodology

Live Capture/Release Trapping

Small mammals and reptiles were surveyed using live trapping methods including aluminium type A and B Elliott box traps, cage traps and pitfall traps with drift fences. Elliott traps were placed at 10 m intervals along one transect (or two transects in the case of 2005) at each survey site. Traps were baited with a mixture of rolled oats, peanut butter, honey and vanilla essence and were individually placed to sample microhabitat such as dense grass, rocky cover and fallen timber. Traps were operated over a four night period at each of the 27 trap sites, and were checked each morning (2,179 Elliott trap-nights and 32 cage trap-nights in total).

Pitfall trap systems incorporated PVC buckets approximately 40 cm deep (18 L) with a plastic drift fence typically 5 m long x 0.4 m high. Pitfall trapping was undertaken at 19 sites (two to four traps per site) and traps were operated over three or four nights (245 pitfall trap-nights). Pitfall traps were checked for and cleared of captures in the morning and late afternoon. Leaf litter and shallow dishes holding water were placed in each bucket to shelter and reduce the opportunity for dehydration of trapped fauna.

Daytime Bird Census

Diurnal birds were sampled using an area census method supplemented by broad observational surveys. Birds were systematically sampled at each of 27 main sample sites. Censuses were carried out in the early morning (in the first three to four hours after sunrise) due to variation in avian activity during the day. Birds were counted on 1 ha plots at each site, over a period of 20 minutes per sample. Three or four such surveys were undertaken at each of the sample sites, while additional surveys were undertaken at a range of other sites. Incidental observations were noted throughout the survey area.

Spotlight Survey

In order to locate nocturnal fauna, spotlighting on foot using hand-held spotlights was undertaken at all primary sample sites and in other areas of representative habitat. Spotlighting from a slow moving vehicle was undertaken along the main tracks of the survey area. This method was used to locate larger ground and arboreal mammals and nocturnal birds.

Owl Call Playback

Call playback of various owl species' calls was undertaken at primary transect sites and targeted locations during nocturnal surveys. Calls were played for several minutes, followed by a period of listening for responses.

Microchiropteran Bat Call Detection

Microchiropteran bat echolocation calls were recorded using an ultrasonic bat call detector (Anabat SD2 with a ZCAIM interface; Titley Electronics). Anabat detection was conducted across the site between dusk and dawn at 11 targeted locations in woodland habitat favourable for microbat activity.

Active Searches

Active diurnal and nocturnal searching for reptiles, amphibians and small mammals included scanning of trees and ground, searching beneath microhabitat such as rocks, fallen timber and peeling bark and

2 Methodology

digging through leaf litter and soil at tree bases. Searches also focussed on locating and identifying tracks and traces such as nests, scats and tree scratchings. Active searches were undertaken within suitable microhabitat at each primary transects for a period of 30 minutes

Incidental Observations

All fauna observed incidentally throughout the site were recorded. Large mammals were recorded when encountered during trapping, bird surveys, spotlight surveys, and along roads and tracks throughout the survey area. Bird species were recorded incidentally throughout each survey. Observations of wildlife recorded outside the main sampling sites were noted according to the habitat in which they were observed.

2.3 Nomenclature

Taxonomic nomenclature used for describing fauna species follows Stanger *et al.* (1998), with the exception of recently published taxonomic revisions. Feral species are denoted by an asterisk (*). Field references used for the identification and description of fauna species include Churchill (1998), Cogger (2000), Menkhorst and Knight (2001), Morecombe (2004), Pizzey and Knight (2007), Robinson (1998), Simpson and Day (2004), Strahan (2008), Triggs (2004) and Wilson (2005).

Results and Discussion

3.1 Description of Environmental Values

3.1.1 Site Characteristics

The majority of the EIS study area is located on relatively flat or slightly undulating lands at elevations between 200 m and 300 m above sea level. Woodlands dominated by *Eucalyptus* or *Acacia* species cover part of the area with the remainder vegetated by non-remnant grasslands (as pasture) and shrubby regrowth. Small areas of native grassland are present. In the drier areas *Eucalyptus populnea* (poplar box), *E. cambageana* (Dawson gum), *Corymbia tessellaris* (Moreton Bay ash) and *Acacia harpophylla* (brigalow) generally dominate the canopy, with a sparse mid layer and ground cover of tussocky introduced grasses. Black soil grassland areas with *Lysiphyllum* species occur, while other areas are dominated by sandy, clayey or stony soils. Isolated low laterite hills vegetated with *Acacia* species occur throughout the site.

Natural waterways on the site include the Isaac River and its tributaries, including 12 Mile Gully and Goonyella, Eureka, Fisher and Platypus Creeks. All streams on the site are ephemeral with flow only evident following significant rain events. The Isaac River is a significant watercourse in the region and flows south to enter the Fitzroy River system.

The primary existing land use around the EIS study area is cattle grazing and, as a result, the general ecology of the area has been significantly modified. Such modifications include the proliferation of the exotic *Pennisetum ciliare* (buffel grass) (to the general exclusion of native groundcover species) and impacts from cattle such as the trampling of ground cover vegetation, loss of diversity in the shrubby mid-story vegetation layer, soil erosion, compaction, and disturbance and fouling of natural water bodies. The presence of artificial water supplies, such as dams, provide habitat for fauna groups such as waterbirds and frogs and enhances the conditions for exotic animals such as cane toads and feral pigs.

3.2 Literature Review Results

A desktop review of ecological data and literature was undertaken to characterise the ecological values and identify the potential presence of conservation significant fauna species across the EIS study area. **Appendix C** of this report details the results of the review and presents the likelihood of presence for each identified fauna species of conservation significance.

3.2.1 Target Species

Conservation significant fauna species listed under both state and commonwealth legislation were identified from the database searches and subsequently targeted during the field surveys. Twenty-four conservation significant fauna species were identified as potentially occurring within the EIS study area as determined from the desktop survey. Conservation significant fauna species identified include any critically endangered, endangered, vulnerable or near threatened taxa listed as per:

- The Queensland *Nature Conservation (Wildlife) Regulation 2006* under the provisions of the NC Act; and
- The EPBC Act.

Target species also include migratory bird species listed under:

- Convention of Migratory Species of Wild Animals (Bonn Convention); and

3 Results and Discussion

- Bilateral agreements between Australia and Japan (Japan-Australia Migratory Bird Agreement (JAMBA)), Australia and China (China-Australia Migratory Bird Agreement (CAMBA)) and Australia and Republic of Korea (Republic of Korea – Australia Migratory Bird Agreement (ROKAMBA)).

3.2.2 EPBC MNES Protected Matters

A search of the MNES Protected Matters Database (DSEWPaC 2012) identified 13 fauna species of conservation significance listed under the EPBC Act as potentially occurring within the EIS study area. These include five bird species, two mammals and six reptiles. Ten migratory and/or marine bird species were also identified as potentially occurring within the EIS study area (including Australian painted snipe (*Rostratula australis*) which is also listed as vulnerable). The results of the search are detailed below in **Table 3-1**.

Table 3-1: Conservation Significant Species Listed under the EPBC Act Identified to Potentially Occur within the EIS Study Area

Name	Status ¹	Type of Presence
Birds		
red goshawk <i>Erythrotriorchis radiatus</i>	V	Species or species habitat likely to occur within area
squatter pigeon (southern) <i>Geophaps scripta scripta</i>	V	Species or species habitat likely to occur within area
star finch (eastern & southern) <i>Neochmia ruficauda ruficauda</i>	E	Species or species habitat likely to occur within area
black-throated finch (southern) <i>Poephila cincta cincta</i>	E	Species or species habitat likely to occur within area
Australian painted snipe <i>Rostratula australis</i>	E, Mi, M	Species or species habitat may occur within area
fork-tailed swift <i>Apus pacificus</i>	Mi, M	Species or species habitat may occur within area
great egret <i>Ardea alba</i>	Mi, M	Species or species habitat may occur within area
cattle egret <i>Ardea ibis</i>	Mi, M	Species or species habitat may occur within area
white-bellied sea-eagle <i>Haliaeetus leucogaster</i>	Mi, M	Species or species habitat likely to occur within area
rainbow bee-eater <i>Merops ornatus</i>	Mi, M	Species or species habitat may occur within area
black-faced monarch <i>Monarcha melanopsis</i>	Mi, M	Species or species habitat may occur within area
Latham's snipe, Japanese snipe <i>Gallinago hardwickii</i>	Mi, M	Species or species habitat may occur within area
Mammals		
northern quoll <i>Dasyurus hallucatus</i>	E	Species or species habitat likely to occur within area
south-eastern long-eared bat <i>Nyctophilus corbeni</i>	V	Species or species habitat may occur within area

3 Results and Discussion

Name	Status ¹	Type of Presence
koala <i>Phascolarctos cinereus</i> (combined populations of Qld, NSW and the ACT)	V	Species or species habitat likely to occur within area
Reptiles		
yakka skink <i>Egernia rugosa</i>	V	Species or species habitat likely to occur within area
Fitzroy River turtle <i>Rheodytes leukops</i>	V	Species or species habitat may occur within area
ornamental snake <i>Denisonia maculata</i>	V	Species or species habitat may occur within area
Dunmall's snake <i>Furina dunmali</i>	V	Species or species habitat may occur within area
Allan's lerista <i>Lerista allanae</i>	E	Species or species habitat may occur within area

1 E – Endangered V – Vulnerable Mi – Migratory M – Marine

3.2.3 Wildlife Online

A search of the EHP Wildlife Online database generated records of 79 fauna species that potentially occur within the EIS study area. Of these, two are considered to be of conservation significance. These are listed in **Table 3-2** below.

Table 3-2: Conservation Significant Species Listed under the NC Act that Potentially Occurs within the EIS Study Area.

Class	Common Name	Scientific Name	NCA Status ¹
Reptiles	ornamental snake	<i>Denisonia maculata</i>	V
Reptiles	brigalow scaly-foot	<i>Paradelma orientalis</i>	V

1 V – Vulnerable

3.2.4 Queensland Museum

A search of the Queensland Museum database for the EIS study area generated 34 fauna records representing 19 species. The search identified one conservation significant species as potentially occurring within the EIS study area; ornamental snake (*Denisonia maculata*), listed as vulnerable under the EPBC Act and the NC Act.

3.2.5 Birds Australia

A search of the Birds Australia database for the EIS study area generated a total of 72 bird species. Of these, three species listed under the EPBC Act and the NC Act were identified. These are detailed in below **Table 3-3**.

3 Results and Discussion

Table 3-3: Conservation Significant Species Listed under the EPBC Act and NC Act that Potentially Occur within the EIS Study Area

Common Name	Scientific Name	EPBC Status ¹	NCA Status ¹
black-necked stork	<i>Ephippiorhynchus asiaticus</i>	-	NT
great egret	<i>Ardea modesta</i>	Mi, M	-
rainbow bee-eater	<i>Merops ornatus</i>	Mi	-

1 E – Endangered V – Vulnerable Mi – Migratory M – Marine NT – Near Threatened

3.2.6 Existing Ecological Reports

Five previous ecological reports discuss the results of various flora and fauna surveys conducted within the GRM and surrounding area. The main findings of each document are highlighted below. Fauna records from all surveys including those listed below are presented in **Appendix C** of this report.

WBM (1998/2000) Terrestrial and Aquatic Fauna Survey: Dry Season; Terrestrial and Aquatic Fauna Survey: Wet Season, Prepared by WBM Pty Ltd for BHP Coal's GRM.

- Location: GRM.
- These reports outline the terrestrial and aquatic fauna survey results during the dry and wet seasons.
- Both reports contain database searches and literature reviews conducted prior to the field survey. A field survey was undertaken by two experienced ecologists between 20 to 26 August 1998 (dry season) and 9 to 15 February 2000 (wet season).
- The combined results of both surveys:
 - The survey area was located within heavily disturbed *Acacia* or *Eucalyptus* remnant vegetation surrounding the GRM; and
 - Field surveys identified 201 terrestrial vertebrate fauna species. Conservation significant fauna species identified include the brigalow scaly-foot (*Paradelma orientalis*), squatter pigeon (*Geophaps scripta scripta*), cotton pygmy-goose (*Nettapus coromandelianus*), Latham's snipe (*Gallinago hardwickii*) and little pied bat (*Chalinolobus picatus*).

WBM (2002) Fauna & flora surveys of unmined lands associated with the proposed ramp four underground mining - Goonyella Riverside Mine, Prepared by WBM Oceanics Australia for BMA's Goonyella Riverside Mine.

- Location: GRM.
- The purpose of this report was to investigate the flora and fauna and habitat values of unmined land associated with the proposed Ramp 4 Project.
- The report utilises database searches and literature reviews regarding the terrestrial flora and fauna known or likely to occur within the survey area. Field surveys were carried out during the period between 4 and 10 February 2002. Species of conservation significance were targeted during the field surveys.
- The results of the survey:
 - The field survey program provided records for 127 vertebrate fauna species;

3 Results and Discussion

- Three species listed under the NC Act were confirmed to occur within the EIS study area: short-beaked echidna (*Tachyglossus aculeatus*), little pied bat (*Chalinolobus picatus*) and the squatter pigeon (*Geophaps scripta scripta*); and
- Four migratory species listed under the EPBC Act were also recorded during the field survey. These were the oriental cuckoo (*Cuculus saturatus*), dollarbird (*Eurystomus orientalis*), white-throated needletail (*Hirundapus caudacutus*), and fork-tailed swift (*Apus pacificus*).

Ecoserve and LAMR (2005). *A review of habitat values for biodiversity and conservation significance*, Prepared by Ecoserve and LAMR for BMA's Goonyella Riverside Mine.

- Location: GRM.
- The purpose of this report was to determine the nature, extent, condition and values of habitats and ecosystems, and the known or likely occurrence of flora and fauna species and vegetation communities, with particular focus on those of conservation concern at the local, State and Commonwealth levels.
- The report integrates database searches and existing ecological reports to identify the species and/or habitat types known or likely to occur within the survey area and vicinity.
- The results of the survey:
 - Review of existing information provides records for 223 terrestrial vertebrate fauna species. This represents 63 per cent of the database fauna records for the general area of the Bowen Basin; and
 - Fifteen species of conservation significance identified from previous fauna surveys are known to occur on the surveyed area. As a result of habitat assessments undertaken in this report, a further 11 species of conservation significance are considered likely to occur within the survey area.

Ecoserve (2006). *Targeted vertebrate fauna surveys of elected remnant regional ecosystems on BMA Goonyella Riverside Mine*, Prepared by Ecoserve for BMA's Goonyella Riverside Mine.

- Location: GRM.
- The purpose of this report was to assess several previously unsurveyed areas which are considered to support potentially high value habitats for both vertebrate fauna biodiversity and species of conservation significance.
- Prior to a field assessment, literature and database searches were undertaken to identify species known or potentially likely to occur within the survey area.
- Field surveys were carried out between 9 and 15 March 2006.
- The results of the survey include:
 - The field investigation provided records of 174 vertebrate fauna species. Eight fauna species recorded during this investigation are considered conservation significant under the provision of the NC Act and/or EPBC Act. These include the ornamental snake (*Denisonia maculata*), little pied bat (*Chalinolobus picatus*), short-beaked echidna (*Tachyglossus aculeatus*) and koala (*Phascolarctos cinereus*); and
 - Four migratory bird species listed under the EPBC Act including white-bellied sea-eagle (*Haliaeetus leucogaster*), rainbow bee-eater (*Merops ornatus*), dollarbird (*Eurystomus orientalis*) and rufous fantail (*Rhipidura rufifrons*).

3 Results and Discussion

3.3 Field Survey Results

3.3.1 Survey Timing and Climatic Conditions

Field surveys were conducted over three periods, across a range of seasonal conditions. Climatic conditions during these periods are summarised below.

Summer 2005:

The 2005 fauna survey was conducted over one period:

- April 7 to 17 (11 days).

This period experienced hot days and mild nights as expected for the season. Bureau of Meteorology (BoM) daily weather observations at the Moranbah Water Treatment Plant (WTP) (Station 034038) show that the minimum and maximum temperatures for the survey period were 20.4°C and 37.2°C respectively. Relative humidity (recorded daily at 9 am) for the survey period averaged 60.7 per cent. Wind direction was predominantly from the east with occasions of westerly influence. Rainfall over this period was 4 mm (BoM 2009a).

Autumn/Winter 2009:

The 2009 fauna survey was conducted over two periods:

- March 18 to 26 (9 days) surveying east of the survey; and
- June 16 to 27 (12 days) surveying west of the survey area.

Weather conditions for the March survey period were warm and dry as expected for the season, and featured warm days and mild nights. BoM daily weather observations at the Moranbah WTP show that the minimum and maximum temperatures for the survey period were 17°C and 32.9°C respectively. Relative humidity (recorded daily at 9 am) for the survey period averaged 70.3 per cent. Wind direction was predominantly south-easterly. The only precipitation recorded was 1.4 mm of rainfall on Friday 20 March (BoM 2009b). Rainfall for the two months preceding the survey was 413.4 mm (BoM 2011).

Weather conditions for the June survey period were typical for the season in the region; warm days and cool nights with occasional gusty winds. BoM daily weather observations at the Moranbah WTP show that the minimum and maximum temperatures for the survey period were 8.1°C and 28.3°C respectively. Relative humidity (recorded daily at 9 am) for the survey period averaged 75.2 per cent. Wind direction was predominantly south-easterly and south-westerly. Rainfall of 4.4 mm was recorded on the final day of the survey (BoM 2009b). Rainfall for the two months preceding the survey was 35.9 mm (BoM 2011).

Autumn 2011:

The 2011 fauna survey was conducted over one period:

- May 16 to 23 (8 days).

Weather conditions for the May survey period were warm and dry as expected for the season, and featured warm days and cool nights. BoM daily weather observations at the Moranbah WTP show that the minimum and maximum temperatures for the survey period were 9.5°C and 27.7°C

3 Results and Discussion

respectively. Relative humidity (recorded daily at 9 am) for the survey period averaged 84.3 per cent. Wind direction was predominantly easterly with influences from the north and south. The only precipitation was recorded on Friday 20 May and Saturday 21 May with 0.4 mm and 0.2 mm respectively. Rainfall for the two months preceding the survey was 145.6 mm (BoM 2011).

3.3.2 Fauna Diversity

A total of 210 native and nine introduced terrestrial vertebrate species were recorded from the three URS field surveys (**Appendix D** of this report). Native species included 133 bird, 32 mammal, 10 amphibian and 35 reptile species. One additional microbat species was provisionally identified on-site but positive identification to species level could not be confirmed due to overlap of ultrasonic call patterns between species.

A species list for all fauna identified within the survey during the URS studies in 2005, 2009 and 2011 has been compiled in **Appendix A** of this report. This list also includes all fauna species recorded by WBM (1998, 2000 and 2002) and Ecoserve (2006). This list details a cumulative total (including exotic fauna) of 168 bird, 49 mammal, 17 amphibian and 54 reptile species recorded for the site for all survey periods.

Amphibians

The general lack of rain across both the 2005 and 2009 URS survey periods was not conducive to amphibian activity. There was, however, a single storm event on 26 June 2009 which elicited a number of frog captures in pitfall traps at various trapping sites, resulting in the capture of representative amphibian diversity. During the months prior to the 2011 URS survey, the area received high levels of rain, and in some areas inundation from flood water occurred. As a result, a total of 10 species (including the exotic cane toad (*Rhinella marina**) were identified for the three URS surveys. Given that 17 species of amphibians were identified throughout the 13 year survey period, this is believed to be indicative of high amphibian diversity throughout the survey area.

Native frog species from the genera *Cyclorana*, *Litoria*, *Limnodynastes* and *Opisthodon* were recorded during all URS surveys. The survey results show that despite significant historical habitat alteration, amphibians are resilient within this landscape.

Amphibians were generally associated with wetter microhabitats, particularly around permanent agricultural dams, natural depressions, swamps or small streams that contained water from recent rainfalls. The most common native species observed was the ornate burrowing frog (*Opisthodon ornatus*), which was caught by pitfall trapping. The green tree frog (*Litoria caerulea*) was recorded at a number of locations, both in close proximity to water, and in woodland and grassland habitats. The spotted marsh frog (*Limnodynastes tasmaniensis*) was abundant at some swampy locations and in cracking clay-gilgai earths, while the eastern snapping-frog (*Cyclorana novaehollandiae*) was common at one site in an exposed depression. Multiple specimens of the barking marsh frog (*Limnodynastes fletcheri*) were recorded along the Isaac River and in close proximity to a dam near the power line easement in the east. All other species were recorded incidentally in low numbers.

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Reptiles

During the URS surveys, 35 reptiles were encountered, featuring representatives of eight families. These included six gecko (Gekkonidae), one legless lizard (Pygopodidae), four dragon (Agamidae), one goanna (Varanidae), 16 skink (Scincidae), two python (Pythonidae), two elapid snake (Elapidae) and three colubrid snake (Colubridae) species.

The warm conditions experienced during the 2005 summer survey resulted in a large diversity of reptiles being recorded, as would be expected. However, reptile activity was still obvious on warmer days during the 2009 autumn and winter surveys. During the 2011 autumn survey, cool conditions were experienced and subsequently reptile activity generally was low. However, with the unusually wet conditions during the previous months leading up to the survey, reptiles were identified during spotlighting surveys to be actively foraging despite the cool nights. This was the case on the 22 May 2011, when four records of snake and multiple specimens of frog were recorded near a constructed dam in the east of the EIS study area.

The Bynoe's gecko (*Heteronotia binoei*) was the most commonly recorded reptile species. Two Gehyra gecko species were commonly recorded; *G. dubia* was generally confined to riverine habitat, especially on the trunks of large, smooth-barked *Eucalyptus tereticornis* trees, while *G. catenata* was almost in all instances strictly confined to microhabitats such as under the exfoliated bark of standing or fallen *Acacia harpophylla* trees.

One Pygopodidae species, Burton's legless lizard (*Lialis burtonis*), was recorded during the URS 2005 survey. It was active at night amongst elevated rocks adjacent to the east of the mine site. This species has been recorded in the area only once previously (WBM 2002).

Bearded dragons (*Pogona barbata*) are a common large dragon in the survey area. Whilst traversing the site during the 2005 and 2009 surveys, URS frequently recorded sightings of the dragons on roadsides, or on tree stumps. The frilled lizard (*Chlamydosaurus kingii*) was observed on one occasion following rain in 2005. The freckled monitor (*Varanus tristis*) is a woodland species found in brigalow and lancewood vegetation. In 2005, one small specimen was recorded in a tree in a brigalow community to the west of the mine, and in 2009 another caught in an Elliott trap in a lancewood community in the Red Hill area.

Small skinks are the most obvious lizards seen in the area. Skinks of the genus *Carlia* were common in areas of leaf litter and grass cover across the survey site, but especially in the brigalow habitat and the riverine grasses along the Isaac River. The fire-tailed skink (*Morethia taeniopleura*) and striped skinks (*Ctenotus* spp.) were observed chiefly in *Eucalyptus populnea* woodland, especially in areas of sandy soils. Specimens of an Eastern mulch-slider skink (*Lerista fragilis*) were caught by digging through organic matter at the base of large trees in the western area in 2009 and 2011.

Seven snake species were recorded during the surveys. These were the common tree snake (*Dendrelaphis punctulatus*), yellow-faced whip snake (*Demansia psammophis*), eastern brown snake (*Pseudonaja textilis*), spotted python (*Antaresia maculosa*), black-headed python (*Aspidites melanocephalus*), keelback or freshwater snake (*Tropidonophis mairii*) and the ornamental snake (*Denisonia maculata*). The ornamental snake (*Denisonia maculata*) is considered vulnerable under the EPBC Act and NC Act.

Rocky areas and riverine sites along the Isaac River recorded the highest species richness and abundance of reptile species.

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Previous surveys of the GRM lease area have recorded an additional 19 reptile species in the area. No turtles have been recorded within the survey area.

Birds

During the URS survey periods, a total of 133 bird species were recorded within the survey area during targeted searches and as incidental observations. Species from all habitat and feeding groups were observed with woodland generalists, raptors and waterbirds being particularly prominent. The highest avian diversities were encountered within the riparian and alluvial woodlands where flowering forest red gums (*Eucalyptus tereticornis*) and narrow-leaved ironbarks (*E. crebra*) attracted honeyeaters, canopy gleaners and insectivores. The grasslands also showed high diversity, especially following rain, when waterholes and small wetlands attracted wading birds. Brigalow communities displayed the least avian diversity within the site, most likely due to a lack of flowering plants and low floristic and structural diversity. The most commonly observed bird species include the crested pigeon (*Ocyphaps lophotes*), rainbow lorikeet (*Trichoglossus haemotodus*), noisy friarbird, (*Philemon corniculatus*), blue-faced honeyeater (*Entomyzon cyanotis*), Torresian crow (*Corvus orru*) and white-winged chough (*Corcorax melanorhamphos*), all of which are common throughout the Bowen Basin.

A diversity of waterbird species were observed on or near the artificial dams in the survey area. Other than these dams, there are no natural permanent waterholes in the survey area, although due to some recent rain prior to, and during the surveys, some depressions and river beds did contain water. A total of 27 species of waterbirds and waders were observed on water bodies in the survey area during URS surveys. Commonly observed water bird species were: black swan (*Cygnus atratus*), Australian wood duck (*Chenonetta jubata*), cotton pygmy-goose (*Nettapus coromandelianus*), pacific black duck (*Anas superciliosa*), grey teal (*Anas gracilis*), Eurasian coot (*Fulica atra*) and great egret (*Ardea alba*).

Raptors were abundant at the survey area, especially during the 2009 surveys. Species such as whistling kite (*Haliastur sphenurus*), wedge-tailed eagle (*Aquila audax*), brown falcon (*Falco berigora*) and nankeen kestrel (*Falco cenchroides*) were regularly observed. During the 2011 surveys, high abundances of raptors were also recorded, often seen near waterbodies. Three large terrestrial birds were recorded: brolga (*Grus rubicunda*), emu (*Dromaius novaehollandiae*) and Australian bustard (*Ardeotis australis*).

Four nocturnal bird species; tawny frogmouth (*Podargus strigoides*), Australian owl-nightjar (*Aegotheles cristatus*), barn owl (*Tyto alba*) and southern boobook owl (*Ninox boobook*) were recorded during spotlighting within the survey area. The latter two species were also recorded responding to call playback.

Summer migrants observed include: channel-billed cuckoo (*Scythrops novaehollandiae*), common koel (*Eudynamys scolopacea*) and dollarbird (*Eurystomus orientalis*). The June 2009 and the 2011 surveys both recorded the presence of winter migrants, including the grey fantail (*Rhipidura fuliginosa*), golden whistler (*Pachycephala pectoralis*) and rufous whistler (*P. rufiventris*). Several species were recorded breeding in the area at the time of the 2005 survey. These included scaly-breasted lorikeet (*Trichoglossus chlorolepidotus*), Australian owl-nightjar, dollarbird, Australian magpie-lark (*Grallina cyanoleuca*) and white-faced heron (*Egretta novaehollandiae*).

Previous surveys recorded an additional 35 bird species (**Appendix A** of this report).

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Mammals

Thirty-two native and eight introduced mammal species were identified during the URS surveys. Results from the small mammal live trapping program were poor, with only eight specimens from four species (*Rattus fuscipes*, *Mus musculus**, *Pseudomys gracilicaudatus* and *Pseudomys delicatulus*) captured during all URS surveys involving an overall effort of 2179 Elliott trap-nights and 245 pitfall-trap-nights. This low result reflects that of the WBM 2002 survey, which recorded no small mammals. However, previous surveys of the GRB mine complex area in 1998 and 2000 recorded seven rodent and three dasyurid (WBM 1998 and 2000) species (**Appendix A** of this report). These results may reflect a combination of poor rainfall years in recent times, and the continuing disturbance of ground habitats from cattle grazing and other activities.

Signs of short-beaked echidnas (*Tachyglossus aculeatus*) were commonly found in parts of the survey area. Evidence of scats, burrows, tracks and diggings were common in the stonier habitats of the western sector, especially the laterite ridges, as well as within poplar box woodlands.

Arboreal mammals were represented by four species; common brushtail possum (*Trichosurus vulpecula*), koala (*Phascolarctos cinereus*), sugar glider (*Petaurus breviceps*) and greater glider (*Petauroides volans*). During the 2011 autumn survey, brushtail possums were observed in relatively high density in the riparian zone east of the site, adjacent to the Isaac River. In spite of the numbers observed along the Isaac River, brushtail possums are considered to occur in very low densities across the site despite a high density of arboreal hollows, which particularly occur in the *E. populnea* woodlands. Greater gliders were observed at two locations associated with alluvial woodland; adjacent to the Isaac River in the east and along Fisher Creek in the west of the survey area. Sugar gliders (*Petaurus breviceps*) were observed in fringing riparian woodland at 12 Mile Gully in the Red Hill area and adjoining the Isaac River in the east.

The eastern grey kangaroo (*Macropus giganteus*) is a common large macropod in the survey area. Individuals and groups of up to five animals were seen in all woodland habitats. The rufous bettong (*Aepyprymnus rufescens*) was recorded in two locations; south of the mine complex in tussock grass microhabitat adjacent to an ephemeral swamp, and south-east of the mine complex in *Megathyrsus maximus* (guinea grass) microhabitat adjacent to the Isaac River. A population of common wallaroos (*Macropus robustus*) was located in the north-western sector of the survey area, associated with the lateritic ridge habitat. A single red-necked wallaby (*Macropus rufogriseus*) was observed in *Eucalyptus cambageana* (Dawson Gum) woodland in the western extent of the site in 2011. Ecoserve (2006) recorded the presence of swamp wallaby (*Wallabia bicolor*), indicating that this macropod is present in small numbers within restricted habitat in the area, despite not being recorded by URS.

Nineteen species of microchiropteran bats were positively recorded by Anabat ultrasonic sampling at 11 sites. **Figure 2-1** shows the locations of the sampling sites. In some cases, calls cannot be differentiated to species level in the Anabat system, so four of the identifications cannot be assigned specific names. Based on frequency of calls, the most common call types within the survey area have been assigned to Gould's wattle bat (*Chalinolobus gouldii*), chocolate wattled bat (*Chalinolobus morio*), little pied bat (*Chalinolobus picatus*), eastern cave bat (*Vespadelus troughtoni*) and yellow-bellied sheath-tail bat (*Saccolaimus flaviventris*). During the 2011 survey, 669 records from the eastern cave bat were identified underneath the railway bridge that crosses the Isaac River. The eastern cave bat is known to roost under bridges and culverts in abandoned fairy martin nests and future works on the rail crossing may potentially have an impact on this species. One deceased megachiropteran

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species, little red flying fox (*Pteropus scapulatus*) was found entangled in a wire fence. This species had not been previously reported within the survey area.

Previous surveys of the GRM lease have recorded an additional nine mammal species, most of which are small ground dwelling rodents or dasyurids.

3.3.3 Conservation Significant Fauna Species

The majority of the species recorded within the survey area are widespread in northern or eastern Australia, while a small number of species are restricted to the region.

Fauna species are assigned threatened status according to Queensland or Commonwealth legislation as described in the:

- NC Act and the subordinate *Nature Conservation (Wildlife) Regulation 1994*; and
- EPBC Act.

Under these listings, extant threatened species may be classified as critically endangered, endangered, vulnerable or near-threatened. A lesser classification of special least concern applies to iconic marsupials such as the koala and echidna under the NC Act.

In addition to the threatened species, the EPBC Act includes a list of migratory species. These species are those which are listed under the following international agreements to which Australia is a signatory nation:

- JAMBA;
- CAMBA;
- ROKAMBA; and
- Convention on the Conservation of Migratory Species of Wild Animals - (Bonn Convention).

Under the EPBC Act, Australia has an international obligation to protect significant populations and sites for these species.

Conservation significant fauna species recorded from all surveys (URS and other) within the survey area are detailed in **Table 3-4** below. The location in which they were recorded (only URS surveys) is shown in **Figure 3-1**. No endangered or critically endangered species are known or expected to occur in the area. Habitat and distribution descriptions of all identified and potentially occurring significant fauna species are provided in **Appendix C** of this report.

Table 3-4: Status of Conservation Significant Fauna Species Recorded from the Survey Area (all surveys)

Common Name	Scientific Name	EPBC Act ¹	Qld NC Act ¹
squatter pigeon	<i>Geophaps scripta scripta</i>	V	V
cotton pygmy-goose	<i>Nettapus coromandelianus</i>	M	NT
rainbow bee-eater	<i>Merops ornatus</i>	M, Mi	-
great egret	<i>Ardea alba</i>	M, Mi	-
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>	M, Mi	-
black-necked stork	<i>Ephippiorhynchus asiaticus</i>	-	NT
Latham's snipe ²	<i>Gallinago hardwickii</i>	M, Mi	-
white-throated needletail ²	<i>Hirundapus caudacutus</i>	M, Mi	-

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Common Name	Scientific Name	EPBC Act ¹	Qld NC Act ¹
fork-tailed swift ²	<i>Apus pacificus</i>	M, Mi	-
rufous fantail ²	<i>Rhipidura rufifrons</i>	M, Mi	
marsh sand-piper ²	<i>Tringa stagnatilis</i>	M, Mi	-
oriental cuckoo ²	<i>Cuculus saturatus</i>	M, Mi	-
brigalow scaly-foot ²	<i>Paradelma orientalis</i>		V
ornamental snake	<i>Denisonia maculata</i>	V	V
little pied bat	<i>Chalinolobus picatus</i>	V	NT
koala	<i>Phascolarctos cinereus</i>	V	SLC
short-beaked echidna	<i>Tachyglossus aculeatus</i>	-	SLC

¹ V-Vulnerable; NT-near threatened; SLC-species of special least concern; Mi-migratory; M-marine.

²= not recorded from URS surveys.

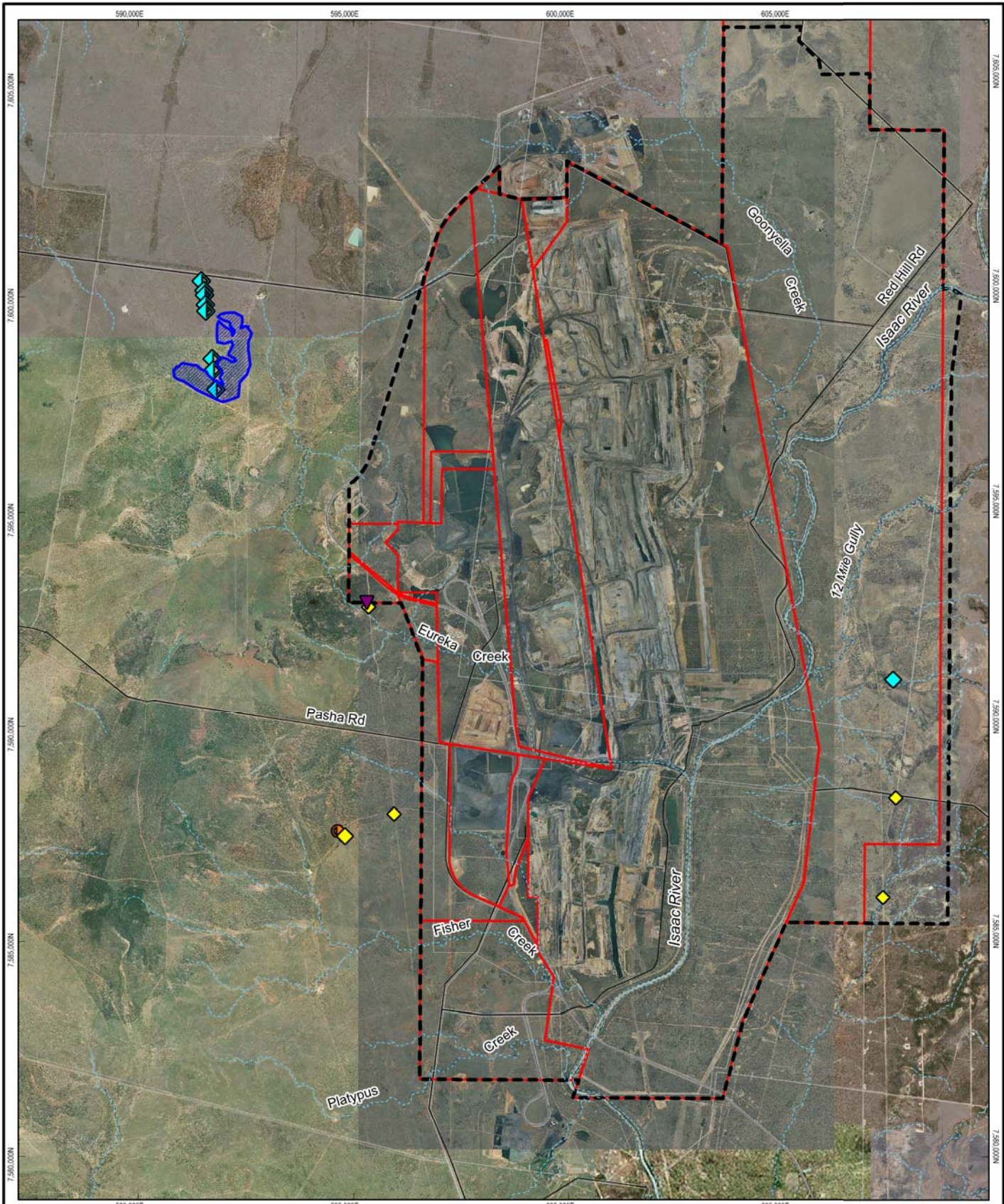
3.3.4 Introduced Species

Nine introduced vertebrate fauna species were recorded within the survey area, of which eight are mammals and one an amphibian. The survey area is used for grazing domesticated horses (*Equus caballus**) and cattle (*Bos taurus**). All other introduced species noted are present as true feral animals. Rabbits (*Oryctolagus cuniculus**) are abundant throughout the site, as are cane toads (*Rhinella marina**). Feral cats (*Felis catus**) were observed, whilst wild dogs (*Canis lupus dingo/familiaris**) were occasionally seen in the east of the site. Signs of feral pigs (*Sus scrofa**) were common in the western portions, especially as wallows in creek beds and dam verges, while one sighting was recorded near a dam in the east during the May 2011 survey. House mice (*Mus musculus**) were trapped in grassland in the north-west of the survey area and are likely to be widespread over the EIS study area. Foxes (*Vulpes vulpes**) were observed during nocturnal surveys. Introduced species detected from URS surveys are supported by the results of WBM (1998, 2000 and 2002) and Ecoserve (2006) surveys.

3.3.5 Habitat Values

The majority of the land within the EIS study area is considered to be generally of low conservation value for fauna. As the majority of the surveyed area is an operational cattle property, most habitats have been highly modified through tree clearing, cattle grazing, cattle trampling of ground cover and waterway substrates, disturbance to and pollution of water bodies, proliferation of feral animals, and the widespread occurrence of introduced plants, especially pastoral grasses such as *Pennisetum ciliare** (buffel grass).

These modifications have affected the majority of habitats and fauna assemblages to some degree, but appear to have particularly impacted on small ground-dwelling mammal populations. Despite this, some sites or habitats in the EIS study area possess conservation values and require special management as detailed below. Corresponding REs for each habitat type (where applicable) are provided. Detailed descriptions of REs can be found in Appendix K1.1 of the Red Hill Mining Lease EIS.



This drawing is subject to COPYRIGHT.



0 1.25 2.5km
Scale 1:125 000 (A4)
Projection: MGA94 Zone 55, (GDA94)

EIS Study Boundary
 BMA Tenure/Tenement

Squatter Pigeon
 Ornamental Snake
 Koala
 Echidna
 Ornamental Snake (DERM)
 Essential Habitat

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BHP Billiton Mitsubishi Alliance

RED HILL MINING LEASE
FAUNA STUDY REPORT

LOCATION OF CONSERVATION
SIGNIFICANT SPECIES



ECOLOGICAL ASSESSMENT - FAUNA

Figure: 3-1



File No: 42627136-g-2020.wor Drawn: VH Approved: CT Date: 08-07-2013

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3 Results and Discussion

Brigalow Woodlands

Brigalow communities (endangered REs 11.3.1, 11.4.7, 11.4.8, 11.4.9, 11.5.16 and 11.9.1 and least concern RE 11.7.1) in the survey area were generally small, fragmented and heavily degraded by cattle grazing. They were also found to be generally low in fauna diversity. However, these areas traditionally offer refuge for a number of species that are typically associated with this community, including specialists such as the gecko *Gehyra catenata*. They may also provide habitat for conservation significant species including the brigalow scaly-foot (*Paradelma orientalis*), ornamental snake (*Denisonia maculata*), and the skink *Anomolopus brevicollis*.

Riparian and Alluvial Woodlands

The riparian and adjacent alluvial woodlands (endangered RE 11.3.1, of concern REs 11.3.2, 11.3.3, 11.3.4, 11.3.36 and least concern REs 11.3.5, 11.3.7 and 11.3.25) along the Isaac River and other waterways provide important local habitat for a number of species, especially arboreal mammals such as possums and gliders. Large, mature forest red gums (*Eucalyptus tereticornis*) present in riparian habitats frequently contain hollow limbs which provide denning sites for arboreal mammals and microbats and nesting sites for many bird species such as parrots, owls and dollarbirds (*Eurystomus orientalis*). These trees also act as a food source for insectivorous and nectivorous birds and mammals. Where this habitat forms a continuous corridor, it constitutes a route for migratory and dispersing fauna of all types.

Seasonal inundation and flow along the Isaac River also provides habitat and breeding sites for aquatic or semi-aquatic species such as frogs and their predators such as snakes.

The three small waterways to the west of the survey area (Eureka, Fisher and Platypus Creeks) and two in the east (12 Mile Gully and Goonyella Creek) are ephemeral streams. Of these, Eureka Creek is the most significant in terms of fauna habitat, as it contains a narrow but well developed riverine forest dominated by Eucalyptus and Acacia species, a dense grassy understorey, and a deep shaded stream channel with small, ephemeral refuge pools.

In the south of the survey area, the Isaac River channel was diverted in 1983 for approximately 8 km (replacing approximately 11 km of pre-existing river) to accommodate the existing GRB mine complex operations. This river diversion is significantly different to the natural river habitat in this area in the following ways:

- The diverted river bed is much wider than the natural river, and banks are deeper and more eroded;
- There is a lack of alluvial plain development due to insufficient time for it to develop, different substrate type, and because the channel is now contained and no longer overtops and floods;
- There is a lack of mature trees with nesting/denning hollows; and
- There is an absence of the central sand/habitat accretions.

The regenerating communities along the diversion therefore do not provide the same habitat opportunities as riparian woodlands upstream and downstream of the diversion.

Poplar Box Woodlands

Poplar Box (*E. populnea*) woodland (endangered RE 11.4.7, and of concern REs 11.3.2 and 11.4.2 and least concern RE 11.5.3) has been largely cleared throughout the survey area. However,

3 Results and Discussion

significant tracts are still present within the region, especially in the west of the survey area. Poplar box readily forms hollows and as a result many trees within these communities possessed one or more such habitat features. Despite this, arboreal mammal diversity was found to be relatively low in poplar box woodland.

Laterite Ridges

The laterite ridge country in the west and north-west of the survey area (least concern RE 11.7.2) provides rocky habitats not present elsewhere on the site. Due to the vegetation density and ruggedness, these habitats are less disturbed by cattle than the adjacent woodland plains. They also provide habitat for bird species not found elsewhere in the survey area due to the less disturbed shrub layer. These habitats tend to be populated by species that were found to be primarily restricted to these areas (e.g. common wallaroo *Macropus robustus*), but were also the favoured habitat of some widespread species, such as echidna (*Tachyglossus aculeatus*). Occasionally the laterite is heavily weathered and less rocky, yet still influences the vegetation present. In all cases, lancewood (*Acacia shirleyi*) was found to be dominant on these substrates.

Dawson Gum Woodland

Dawson gum (*Eucalyptus cambageana*) woodlands (endangered RE 11.4.8) are located primarily to the west of the survey area, with small occurrences in the east including within the RHM footprint and the north-east of EIS study area. These communities typically feature a mid-dense shrub layer that is attractive to woodland bird species. Arboreal hollows and ground timber also act as valuable habitat resources. Like the majority of habitat found within the survey area, these communities are heavily impacted by cattle. The presence of cattle and buffel grass may deter some ground fauna from utilising these areas.

Modified Grassland

The grasslands found in the EIS study area mostly exist as a relic from clearing practices, and form the largest type of community (approximately 58 per cent of the EIS study area). The introduced pasture species *Pennisetum ciliare** (buffel grass) dominates much of this community, although patches of native grasses still exist in places. Buffel grass does not provide preferred habitat for native ground fauna. However, the modified grasslands support a range of larger mammal species such as the grey kangaroo (*Macropus giganteus*) and specialist grassland bird species such as the nankeen kestrel (*Falco cenchroides*), tawny grassbird (*Megalurus timoriensis*) and the Australasian pipit (*Anthus novaeseelandiae*). The presence of native grasses found in isolated patches in the northern area of the study area would typically offer better habitat values for native dasyurids, murids and herpetofauna.

Water Bodies

Water bodies in the area, both natural and artificial, are attractive as watering points for woodland bird species and provide habitat for a number of waterbird and frog species. They are also important in promoting the survival and proliferation of feral animals such as pigs and cane toads. All watercourses (including the Isaac River) are ephemeral and natural waterholes are uncommon and short-lived. Therefore, farm dams (and mine dams) act as reliable water sources and refugia for fauna throughout the year.

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3.3.6 Habitat Connectivity

The functional habitat connectivity in an east to west direction across the entire survey area is interrupted by the GRB mine complex in the centre of the site. However, to the east and west of the GRB mine complex, there are opportunities for fauna movement despite the historical clearing of woodland for grazing. Whilst large swathes of woodland have been historically cleared, connectivity exists in bands of remnant woodland or along the ephemeral creeks in the area. In addition, the Isaac River, including the sections diverted for mine operations, acts as a functioning north-south fauna corridor linking Burton Gorge dam to the north with habitat to the south. The Isaac River is mapped as being of State significance on Biodiversity Planning Assessment (BPA) mapping. Therefore, while terrestrial and arboreal fauna movement is generally limited and compromised across the EIS study area, there remain opportunities for fauna movement within the eastern and western sectors, in a north to south direction and to areas beyond the EIS study area boundary.

3.3.7 Environmentally Sensitive Areas

ESAs include World Heritage Areas, national parks, reserves and other areas declared to protect fauna, flora or other significant values. There are no ESAs on or directly adjacent to the survey site.

Essential Habitat mapping (EHP 2012) shows habitat for the ornamental snake (*Denisonia maculata*) in the north-west of the survey site (**Figure 3-1**). ESAs within the greater Moranbah region are described in the Red Hill Mining Lease EIS **Section 9.5.3**.

3.3.8 Summary of Significant Values

As highlighted above, the habitat found within the survey area is highly impacted by grazing practices and is, for the majority, of low conservation value. However, the riparian forest and alluvial woodland adjacent to the Isaac River is primary habitat for arboreal mammals and other native wildlife. Arboreal mammals were observed in low densities across the site and recorded at a relatively high density during surveys along the Isaac River. The Isaac River also provides the only north-south corridor for wildlife dispersing through the survey area.

As detailed in **Section 3.3.3**, eight conservation significant species (not including migratory species) are known to occur within the study area, including:

- squatter pigeon (*Geophaps scripta scripta*);
- cotton pygmy-goose (*Nettapus coromandelianus*);
- black-necked stork (*Ephippiorhynchus asiaticus*);
- koala (*Phascolarctos cinereus*);
- short-beaked echidna (*Tachyglossus aculeatus*);
- little pied bat (*Chalinolobus picatus*);
- ornamental snake (*Denisonia maculata*); and
- brigalow scaly-foot (*Paradelma orientalis*).

Nine EPBC-listed migratory species are also known to occur within the survey area (**Section 3.3.3**).

Conclusions and Recommendations

The desktop and field surveys conducted for the project ecological assessment have determined that a range of habitat values exist. While the majority of the habitat within the site is generally of low conservation value, some habitats, such as the Isaac River riparian and alluvial woodland which act as a wildlife corridor, possess greater potential for supporting significant fauna.

The studies identified a total (including exotic fauna) of 288 fauna species as occurring within the survey area. This includes 168 bird, 49 mammal, 17 amphibian and 54 reptile species. Of the fauna species recorded within the EIS study area, 17 are listed under the NC Act or the EPBC Act. It was also determined that a further five conservation significant species may potentially occur within the EIS study area due to the availability of suitable habitat. Further ground truthing is required to confirm the presence of these species.

The ornamental snake (*Denisonia maculata*) was first recorded in 2006 (Ecoserve 2006) in the north-west of EIS study area. An additional sighting of the ornamental snake during the 2011 URS survey in excavated dam spoil to the east of the GRB mine complex, suggests that the EIS study area may support a small population. It is recommended that further targeted surveys be undertaken in order to provide a greater understanding of this species' presence across the EIS study area.

Six conservation significant fauna, including the brigalow scaly-foot (*Paradelma orientalis*), were identified within the EIS study area from existing ecological fauna reports. This species was last recorded in 1998 (WBM) and is assumed locally extinct due to the lack of additional records and continued disturbance of the area.

A detailed discussion of potential project impacts to fauna values and recommended mitigation strategies is provided within the Red Hill Mining Lease EIS **Section 9**.

References

- Birds Australia (2011) *Birds Australia Database*. Data Retrieved 1 April 2011
- BoM (2009a) *Daily Weather Observations, November 2005*: Moranbah Water Treatment Plant, Queensland. Bureau of Meteorology. Prepared 4 July 2009.
<http://www.bom.gov.au/climate/dwo/IDCJDW4102.latest.shtml>.
- BoM (2009b) *Daily Weather Observations, March and June 2009*: Moranbah Water Treatment Plant, Queensland. Bureau of Meteorology. Prepared 20 July 2009.
<http://www.bom.gov.au/climate/dwo/IDCJDW4102.latest.shtml>.
- BoM (2011) *Daily Weather Observations, May 2011*: Moranbah Water Treatment Plant, Queensland. Bureau of Meteorology. Prepared 2 June 2011
<http://www.bom.gov.au/climate/dwo/201105/html/IDCJDW4087.201105.shtml>
- Churchill, S. (1998) *Australian Bats*. National Library of Australia.
- Cogger, H (2000) *Reptiles & Amphibians of Australia*. Reed Books, Melbourne.
- DSEWPac (2011a). *About the EPBC Act*, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from
<http://www.environment.gov.au/epbc/about/index.html>. Accessed 21 June 2011
- DSEWPac (2011b). *Neochmia ruficauda ruficauda* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: <http://www.environment.gov.au/sprat>. Accessed Thu, 16 Jun 2011
- DSEWPac (2011c). *Nyctophilus corbeni* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: <http://www.environment.gov.au/sprat>. Accessed Thu, 16 Jun 2011.
- DSEWPac (2011d). *Dasyurus hallucatus* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: <http://www.environment.gov.au/sprat>. Accessed Thu, 16 Jun 2011
- DSEWPac (2011e). *Denisonia maculata* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: <http://www.environment.gov.au/sprat>. Accessed Thu, 16 Jun 2011
- DSEWPac (2012) *Department of Sustainability, Environment, Water, Population and Communities Protected Matters of National Environmental Significance online database*. Data generated 16 January 2012 <http://www.environment.gov.au/arcgis-framework/apps/pmst/pmst-coordinate.jsf>
- Ecoserve and LAMR (2005) *A Review of Habitat Values for Biodiversity and Species of Conservation Significance*. Report prepared for Goonyella Riverside Mine.
- Ecoserve (2006) *Targeted Vertebrate Fauna Surveys of Selected Remnant Regional Ecosystems on BMA Goonyella Riverside Mine*. Report prepared for Goonyella Riverside Mine.
- EHP (2009) *Maps of Environmentally Sensitive Areas*. Queensland Department of Environment and Resource Management. http://www.ehp.qld.gov.au/licences-permits/maps_of_environmentally_sensitive_areas.php

5 References

EHP (2012) *Regional Ecosystem Maps / Regrowth Vegetation Maps and PMAVS*. Queensland Department of Environment and Heritage Protection.

<http://www.ehp.qld.gov.au/ecosystems/biodiversity/regional-ecosystems/maps/index.php>

EHP (2013) *Wildlife Online*. Queensland Government. Department of Environment and Heritage Protection. Prepared 21 January 2011 <http://www.ehp.qld.gov.au/wildlife/wildlife-online/index.html>

Environmental Protection and Biodiversity Conservation Act 1999.

EPA (1999) *Guidelines for Flora and Fauna Surveys*. Queensland Environmental Protection Agency, Southern Region.

Eyre, T, Kreiger, G., Venz, M., Hines, B., Hannah, D. and Schultz, M. (1997). *Systematic Vertebrate Fauna Survey in the South-east Queensland Bioregion*. Queensland Department of Environment.

Land Protection (Pest and Stock Route Management) Act 2002.

Menkhorst, P. and F. Knight. (2001). *A Field Guide to the Mammals of Australia*. Oxford University Press.

Morcombe (2004) *Field Guide to Australian Birds*. Steve Parish Publishing, Brisbane.

Nature Conservation Act 1992.

Nature Conservation (Wildlife) Regulation, 2006.

Pizzey, G. M. and F. Knight (2007). *The Field Guide to Australian Birds*. Harper Collins, Sydney Australia.

Queensland Museum (2011). *Queensland Museum Zoology Data Search*. Queensland Government, Data Generated 1st April 2011

[<http://www.qm.qld.gov.au/Research/Biodiversity/Studying+biodiversity/Zoology+Data+Search>]

Robinson, M. (1998). *A field Guide to Frogs of Australia*, Australian Museum, Reed New Holland.

Simpson, K. and Day, N. (2004). *Field Guide to the Birds of Australia*, Fifth Ed, Penguin books.

Stanger, M., Clayton, M., Schodde, R., Wombey, J., Mason, I. (1998) *CSIRO List of Australian Vertebrates: with Reference to Conservation Status*. CSIRO Australia, Collingwood, Victoria.

Strahan (Ed) (2008) *The Mammals of Australia*, Australian Museum, Reed Books.

Triggs, B (2004) *Tracks, Scats and Other Traces - A Field Guide to Australian Mammals*. Oxford University Press, Oxford, United Kingdom.

Vegetation Management Act 1999.

WBM (1998) *Dry Season Terrestrial and Aquatic Fauna Surveys of Goonyella Riverside Mine*. Report prepared for BHP Coal, Goonyella Riverside Mine

WBM (2000) *Wet Season Terrestrial and Aquatic Fauna Surveys of Goonyella Riverside Mine*. Report prepared for BHP Coal, Goonyella Riverside Mine.

WBM (2002) *Fauna & Flora Surveys of Unmined Lands Associated with the Proposed Ramp Four Underground Mining - Goonyella Riverside Mine*. Report prepared for BMA Goonyella Riverside Mine

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Appendix A Combined Species List

Common Name	Scientific name	WBM, 1998	WBM 2000	WBM 2002	URS 2005	Ecoserve 2006	URS Red Hill 2009	URS West 2009	URS 2011
Amphibians									
greenstripe frog	<i>Litoria alboguttata</i>		x	x		x	x		
green tree frog	<i>Litoria caerulea</i>	x	x	x	x	x	x		x
eastern sedgefrog	<i>Litoria fallax</i>		x						
graceful treefrog	<i>Litoria gracilentata</i>		x						
bumpy rocketfrog	<i>Litoria inermis</i>	x	x	x		x			
broad-palmed rocketfrog	<i>Litoria latopalmata</i>	x	x				x	x	x
rocket frog	<i>Litoria nasuta</i>				x	x			
red tree frog	<i>Litoria rubella</i>	x	x	x	x		x		
red-eyed tree frog	<i>Litoria rothi</i>	x	x		x				
barking frog	<i>Limnodynastes fletcheri</i>	x	x						x
ornate burrowing frog	<i>Opisthodon ornatus</i>		x	x	x	x	x	x	
scarlet-sided pobblebonk	<i>Limnodynastes terraereginae</i>	x							
spotted marsh frog	<i>Limnodynastes tasmaniensis</i>		x	x	x	x	x	x	
eastern snapping frog	<i>Cyclorana novaehollandiae</i>		x		x	x			
superb collared frog	<i>Cyclorana brevipes</i>		x	x					
holy cross toad	<i>Notaden bennetti</i>			x					
cane toad*	<i>Rhinella marina</i>	x	x	x	x	x	x	x	x
	Total (17)	8	14	9	8	8	7	4	4
Reptiles									
fat-tailed gecko	<i>Diplodactylus conspicillatus</i>	x	x	x		x			
gecko	<i>Diplodactylus steindachneri</i>	x		x	x	x			
wood gecko	<i>Diplodactylus vittatus</i>	x	x			x			

Common Name	Scientific name	WBM, 1998	WBM 2000	WBM 2002	URS 2005	Ecoserve 2006	URS Red Hill 2009	URS West 2009	URS 2011
gecko	<i>Diplodactylus williamsi</i>	x							
gecko	<i>Gehyra dubia</i>	x	x	x	x	x			x
gecko	<i>Gehyra catenata</i>	x	x	x	x	x			
Bynoe's gecko	<i>Heteronotia binoei</i>	x	x	x	x	x	x	x	x
knob-tailed gecko	<i>Nephurus asper</i>	x				x			x
ocellated velvet gecko	<i>Oedura monilis</i>	x	x			x			
robust velvet gecko	<i>Oedura robusta</i>							x	
eastern spiny-tailed gecko	<i>Strophurus williamsi</i>					x			
brigalow scalyfoot	<i>Paradelma orientalis</i>	x							
Burton's legless lizard	<i>Lialis burtonis</i>			x	x				
jacky lizard	<i>Amphibolurus muricatus</i>	x							
burn's dragon	<i>Amphibolurus burnsi</i>					x			
nobbi dragon	<i>Amphibolurus nobbi</i>					x			
dragon	<i>Diporiphora australis</i>			x		x	x		
frilled lizard	<i>Chlamydosaurus kingii</i>				x				
bearded dragon	<i>Pogona barbata</i>	x		x	x	x	x	x	
freckled monitor	<i>Varanus tristis</i>			x	x		x		
rainbow-skink	<i>Carlia foliorum</i>						x		
rainbow-skink	<i>Carlia pectoralis</i>			x	x	x			
rainbow-skink	<i>Carlia munda</i>		x		x				
rainbow-skink	<i>Carlia schmeltzii</i>					x			
rainbow-skink	<i>Carlia vivax</i>	x	x	x	x				
skink	<i>Cryptoblepharus carnabyi</i>		x			x			
wall skink	<i>Cryptoblepharus virgatus</i>	x	x		x	x	x	x	x
wall skink	<i>Cryptoblepharus plagiocephalus</i>	x	x	x	x				
brown-blazed wedgesnout ctenotus	<i>Ctenotus allotropis</i>						x		

Common Name	Scientific name	WBM, 1998	WBM 2000	WBM 2002	URS 2005	Ecoserve 2006	URS Red Hill 2009	URS West 2009	URS 2011
striped skink	<i>Ctenotus robustus</i>	x	x	x	x	x	X		
skink	<i>Ctenotus strauchii</i>	x	x	x	x	x			
coppertail skink	<i>Ctenotus taeniolatus</i>			x					
narrow-banded sand swimmer	<i>Eremiascincus fasciolatus</i>					x			
skink	<i>Lampropholus delicata</i>		x	x			x	x	
skink	<i>Lygisaurus foliorum</i>	x	x	x					
skink	<i>Lerista muelleri</i>						x		
skink	<i>Lerista fragilis</i>		x	x		x			x
skink	<i>Lerista punctatovittata</i>					x			
skink	<i>Menetia greyii</i>	x	x		x		x		x
skink	<i>Menetia timlowi</i>			x	x				
skink	<i>Morethia boulengeri</i>	x	x	x					
fire-tailed skink	<i>Morethia taeniopleura</i>	x	x		x	x			
skink	<i>Proablepharus tenuis</i>				x				
blind snake	<i>Ramphotyphlops proximus</i>		x						
spotted python	<i>Antaresia maculosa</i>	x	x		x	x			x
carpet python	<i>Morelia spilota</i>			x					
black-headed python	<i>Aspidites melanocephalus</i>							x	
common tree snake	<i>Dendrelaphus punctulatus</i>				x				
keelback	<i>Tropidonophis mairii</i>								x
eastern brown snake	<i>Pseudonaja textilis</i>		x	x	x			x	
curl snake	<i>Suta suta</i>	x		x					
Carpentaria snake	<i>Cryptophis boschmai</i>			x					
yellow-faced whip snake	<i>Demansia psammophis</i>		x	x	x				
ornamental snake	<i>Denisonia maculata</i>					x			x
	Total (54)	23	23	25	24	25	11	8	9

Common Name	Scientific name	WBM, 1998	WBM 2000	WBM 2002	URS 2005	Ecoserve 2006	URS Red Hill 2009	URS West 2009	URS 2011
Birds									
Emu	<i>Dromaius novaehollandiae</i>		x		x		x	x	x
brown quail	<i>Coturnix ypsilophora</i>		x		x		x	x	x
stubble quail	<i>Coturnix pectoralis</i>								x
plumed whistling-duck	<i>Dendrocygna eytoni</i>		x	x	x				
wandering whistling-duck	<i>Dendrocygna arcuata</i>		x						
black swan	<i>Cygnus atratus</i>	x	x		x	x		x	
Australian wood duck	<i>Chenonetta jubata</i>	x	x	x	x	x	x	x	x
cotton pygmy-goose	<i>Nettapus coromandelianus</i>	x	x		x				
pacific black duck	<i>Anas superciliosa</i>	x	x	x	x	x	x	x	x
Australasian shoveler	<i>Anas rhynchos</i>		x		x				
grey teal	<i>Anas gracilis</i>	x	x	x	x	x			
hardhead	<i>Aythya australis</i>	x	x		x	x			x
Australasian grebe	<i>Tachybaptus novaehollandiae</i>	x	x		x	x		x	
great crested grebe	<i>Podiceps cristatus</i>		x		x	x			
darner	<i>Anhinga melanogaster</i>	x	x			x		x	
little pied cormorant	<i>Phalacrocorax melanoleucas</i>	x	x	x	x	x			x
pied cormorant	<i>Phalacrocorax varius</i>	x	x			x		x	
little black cormorant	<i>Phalacrocorax sulcirostris</i>	x	x			x			
great cormorant	<i>Phalacrocorax carbo</i>	x	x			x			
black-necked stork	<i>Ephippiorhynchus asiaticus</i>								x
Australian pelican	<i>Pelicanus conspicillatus</i>	x	x		x	x			
white-faced heron	<i>Egretta novaehollandiae</i>	x	x	x	x	x	x	x	x
little egret	<i>Egretta garzetta</i>	x	x						
white-necked heron	<i>Ardea pacifica</i>	x	x		x			x	x
great egret	<i>Ardea alba</i>		x	x	x				
intermediate egret	<i>Ardea intermedia</i>				x	x			

Common Name	Scientific name	WBM, 1998	WBM 2000	WBM 2002	URS 2005	Ecoserve 2006	URS Red Hill 2009	URS West 2009	URS 2011
nankeen night heron	<i>Nycticorax caledonicus</i>		x		x	x			
black bittern	<i>Ixobrychus flavicollis</i>		x						
Australian white ibis	<i>Threskiornis molucca</i>		x						
straw-necked ibis	<i>Threskiornis spinicollis</i>		x					x	x
royal spoonbill	<i>Platalea regia</i>	x	x		x				
yellow-billed spoonbill	<i>Platalea flavipes</i>		x						
black kite	<i>Milvus migrans</i>	x	x	x	x	x	x	x	x
whistling kite	<i>Haliastur sphenurus</i>	x	x	x	x	x	x	x	x
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>		x			x		x	
swamp harrier	<i>Circus approximans</i>	x							
spotted harrier	<i>Circus assimilis</i>						x		
collared sparrowhawk	<i>Accipiter cirrhocephalus</i>			x	x	x			
brown goshawk	<i>Accipiter fasciatus</i>								x
wedge-tailed eagle	<i>Aquila audax</i>	x	x		x		x	x	x
little eagle	<i>Hieraaetus morphnoides</i>	x							
brown falcon	<i>Falco berigora</i>	x	x	x	x			x	x
Australian hobby	<i>Falco longipennis</i>		x				x		
nankeen kestrel	<i>Falco cenchroides</i>	x	x		x	x	x	x	x
brolga	<i>Grus rubicunda</i>		x	x	x			x	
buff-banded rail	<i>Gallirallus philippensis</i>	x				x			
purple swamphen	<i>Porphyrio porphyrio</i>		x		x				
dusky moorhen	<i>Gallinula tenebrosa</i>		x		x				
Eurasian coot	<i>Fulica atra</i>	x	x		x	x			
Australian bustard	<i>Ardeotis australis</i>	x	x		x		x	x	x
little button-quail	<i>Turnix velox</i>			x					
painted button-quail	<i>Turnix varia</i>		x						
Latham's Snipe	<i>Gallinago hardwickii</i>	x	x						

Common Name	Scientific name	WBM, 1998	WBM 2000	WBM 2002	URS 2005	Ecoserve 2006	URS Red Hill 2009	URS West 2009	URS 2011
marsh sandpiper	<i>Tringa stagnatilis</i>		x						
comb-crested jacana	<i>Irediparra galliacea</i>		x						
black-winged stilt	<i>Himantopus himantopus</i>	x	x	x	x	x			
black-fronted dotterel	<i>Elseya melanops</i>	x	x	x	x	x			
masked lapwing	<i>Vanellus miles</i>	x	x	x	x	x	x		x
banded lapwing	<i>Vanellus tricolor</i>					x			
common bronzewing	<i>Phaps chalcoptera</i>		x	x					
crested pigeon	<i>Ocyphaps lophotes</i>	x	x	x	x	x	x	x	x
squatter pigeon	<i>Geophaps scripta</i>	x	x	x	x		x	x	x
diamond dove	<i>Geopelia cuneata</i>								x
peaceful dove	<i>Geopelia striata</i>	x	x	x	x		x	x	x
bar-shouldered dove	<i>Geopelia humeralis</i>	x	x		x		x		
yellow-tailed black cockatoo	<i>Calyptorhynchus funereus</i>		x						
galah	<i>Cacatua roseicapilla</i>	x	x	x	x	x	x	x	x
sulphur-crested cockatoo	<i>Cacatua galerita</i>	x	x	x	x	x	x	x	x
cockatiel	<i>Nymphicus hollandicus</i>	x	x	x	x	x	x		
rainbow lorikeet	<i>Trichoglossus haematodus</i>	x	x		x	x	x	x	x
scaly-breasted lorikeet	<i>Trichoglossus chlorolepidotus</i>	x			x				
little lorikeet	<i>Glossopsitta pusilla</i>						x		
Australian king-parrot	<i>Alisterus scapularis</i>						x		
red-winged parrot	<i>Aprosmictus erythropterus</i>	x	x	x	x	x			x
pale-headed rosella	<i>Platycercus adscitus</i>	x	x	x	x	x	x	x	x
oriental cuckoo	<i>Cuculus saturatus</i>			x					
pallid cuckoo	<i>Cuculus pallidus</i>	x							
brush cuckoo	<i>Cacomantis variolosus</i>		x	x					
Horsfield's bronze-cuckoo	<i>Chrysococcyx basalis</i>		x	x					

Common Name	Scientific name	WBM, 1998	WBM 2000	WBM 2002	URS 2005	Ecoserve 2006	URS Red Hill 2009	URS West 2009	URS 2011
common koel	<i>Eudynamys scolopacea</i>			x	x				
channel-billed cuckoo	<i>Scythrops novaehollandiae</i>			x	x	x			
pheasant coucal	<i>Centropus phasianinus</i>	x	x	x	x		x	x	x
barking owl	<i>Ninox connivens</i>	x							
southern boobook owl	<i>Ninox novaeseelandiae</i>	x	x	x	x	x	x	x	x
barn owl	<i>Tyto alba</i>	x	x			x		x	x
grass owl	<i>Tyto capensis</i>		x						
tawny frogmouth	<i>Podargus strigoides</i>	x		x	x	x	x	x	x
Australian owl-nightjar	<i>Aegotheles cristatus</i>	x	x	x	x	x			
white-throated needletail	<i>Hirundapus caudacutus</i>			x		x			
fork-tailed swift	<i>Apus pacificus</i>			x					
laughing kookaburra	<i>Dacelo novaeguinea</i>	x	x	x	x	x	x	x	x
blue-winged kookaburra	<i>Dacelo leachii</i>	x	x		x	x			x
red-backed kingfisher	<i>Todiramphus pyrrhopygia</i>		x	x	x			x	x
sacred kingfisher	<i>Todiramphus sanctus</i>	x	x						
forest kingfisher	<i>Todiramphus macleayii</i>					x	x		x
rainbow bee-eater	<i>Merops ornatus</i>	x	x	x	x	x		x	x
dollarbird	<i>Eurystomus orientalis</i>		x	x	x	x	x		
brown treecreeper	<i>Climacteris picumnus</i>	x						x	
variegated fairy-wren	<i>Malurus lamberti</i>					x			x
red-backed fairy-wren	<i>Malurus melanocephalus</i>	x	x	x	x	x	x	x	x
red-browed pardalote	<i>Pardalotus rubricatus</i>			x					
spotted pardalote	<i>Pardalotus punctatus</i>					x	x		
striated pardalote	<i>Pardalotus striatus</i>	x	x	x	x		x	x	x
speckled warbler	<i>Chthonicola sagittata</i>	x			x	x			
weebill	<i>Smicrornis brevirostris</i>		x	x	x	x	x	x	
western gerygone	<i>Gerygone fusca</i>							x	

Common Name	Scientific name	WBM, 1998	WBM 2000	WBM 2002	URS 2005	Ecoserve 2006	URS Red Hill 2009	URS West 2009	URS 2011
white-throated gerygone	<i>Gerygone olivacea</i>	x		x		x	x	x	x
inland thornbill	<i>Acanthiza apicalis</i>					x			
buff-rumped thornbill	<i>Acanthiza reguloides</i>	x	x		x	x			
yellow-rumped thornbill	<i>Acanthiza chrysorrhoa</i>								x
yellow thornbill	<i>Acanthiza nana</i>	x		x					x
striped honeyeater	<i>Plectorhyncha lanceolata</i>		x	x	x	x	x		
noisy friarbird	<i>Philemon corniculatus</i>	x	x	x	x	x	x	x	x
little friarbird	<i>Philemon citreogularis</i>		x	x	x	x	x		
blue-faced honeyeater	<i>Entomyzon cyanotis</i>	x	x	x	x	x	x	x	x
noisy miner	<i>Manorina melanocephala</i>		x	x	x	x	x	x	x
yellow-throated miner	<i>Manorina flavigula</i>	x		x	x	x	x		
yellow-faced honeyeater	<i>Lichenostomus chrysops</i>							x	
singing honeyeater	<i>Lichenostomus virescens</i>	x	x	x	x	x		x	x
white-throated honeyeater	<i>Melithreptus albogularis</i>	x	x		x	x		x	x
black-chinned honeyeater	<i>Melithreptus gularis</i>						x		
white-naped honeyeater	<i>Melithreptus lunatus</i>		x						
brown honeyeater	<i>Lichmera indistincta</i>	x	x		x			x	x
jacky winter	<i>Microeca fascinans</i>							x	
grey-crowned babbler	<i>Pomatostomus temporalis</i>	x	x	x	x	x	x	x	x
rufous whistler	<i>Pachycephala rufiventris</i>	x		x	x	x	x	x	x
golden whistler	<i>Pachycephala pectoralis</i>						x	x	
grey shrike-thrush	<i>Colluricincla harmonica</i>	x	x		x	x			x
leaden flycatcher	<i>Myiagra rubecula</i>	x	x	x		x			
restless flycatcher	<i>Myiagra inquieta</i>								x
Australian magpie-lark	<i>Grallina cyanoleuca</i>	x	x	x	x	x	x	x	x
grey fantail	<i>Rhipidura fuliginosa</i>	x						x	x
rufous fantail	<i>Rhipidura rufifrons</i>					x			

Common Name	Scientific name	WBM, 1998	WBM 2000	WBM 2002	URS 2005	Ecoserve 2006	URS Red Hill 2009	URS West 2009	URS 2011
willie wagtail	<i>Rhipidura leucophrys</i>	x	x	x	x	x	x	x	x
spangled drongo	<i>Dicrurus bracteatus</i>		x	x	x				x
black-faced cuckoo-shrike	<i>Coracina novaehollandiae</i>	x	x	x	x	x	x		x
white-bellied cuckoo-shrike	<i>Coracina papuensis</i>				x				
ground cuckoo-shrike	<i>Coracina maxima</i>						x		
cicadabird	<i>Coracina tenuirostris</i>				x				
white-winged triller	<i>Lalage sueurii</i>			x	x				x
olive-backed oriole	<i>Oriolus sagittatus</i>	x	x	x	x			x	x
white-breasted woodswallow	<i>Artamus leucorhynchus</i>		x						x
white-browed woodswallow	<i>Artamus superciliosus</i>			x	x	x			
black-faced woodswallow	<i>Artamus cinereus</i>				x	x			x
masked woodswallow	<i>Artamus personatus</i>								x
grey butcherbird	<i>Cracticus torquatus</i>	x	x		x		x	x	x
pied butcherbird	<i>Cracticus nigrogularis</i>	x	x	x	x	x	x	x	x
Australian magpie	<i>Gymnorhina tibicen</i>	x	x	x	x	x	x	x	x
pied currawong	<i>Strepera graculina</i>	x	x		x		x	x	
Australian raven	<i>Corvus coronoides</i>	x	x		x				
Torresian crow	<i>Corvus orru</i>	x	x	x	x	x	x	x	x
white-winged chough	<i>Corcorax melanorhamphos</i>	x			x	x	x	x	
apostlebird	<i>Struthidea cinerea</i>	x	x	x	x		x	x	x
spotted bowerbird	<i>Chlamydera maculata</i>	x	x		x			x	x
singing bushlark	<i>Mirafra javanica</i>	x	x				x		
Australasian pipit	<i>Anthus novaeseelandiae</i>	x	x	x	x		x	x	x
zebra finch	<i>Taeniopygia guttata</i>	x	x					x	x
double-barred finch	<i>Taeniopygia bichenovii</i>	x	x	x	x	x	x	x	x
chestnut-breasted mannikin	<i>Lonchura castaneothorax</i>	x	x						

Common Name	Scientific name	WBM, 1998	WBM 2000	WBM 2002	URS 2005	Ecoserve 2006	URS Red Hill 2009	URS West 2009	URS 2011
mistletoebird	<i>Dicaeum hirundinaceum</i>	x	x	x		x		x	x
welcome swallow	<i>Hirundo neoxena</i>	x	x		x			x	x
tree martin	<i>Hirundo nigricans</i>	x	x	x				x	x
fairy martin	<i>Hirundo ariel</i>	x	x	x	x				
clamorous reed-warbler	<i>Acrocephalus stentoreus</i>	x	x		x	x			
little grassbird	<i>Megalurus gramineus</i>		x						x
tawny grassbird	<i>Megalurus timoriensis</i>						x	x	x
brown songlark	<i>Cincloramphus cruralis</i>			x					
golden-headed cisticola	<i>Cisticola exilis</i>		x	x				x	
	Total (167)	94	115	74	97	78	59	70	76
Mammals									
koala	<i>Phascolarctos cinereus</i>					x		x	
short-beaked echidna	<i>Tachyglossus aculeatus</i>	x		x	x	x		x	x
common planigale	<i>Planigale maculata</i>	x							
narrow-nosed planigale	<i>Planigale tenuirostris</i>	x	x						
stripe-faced dunnart	<i>Sminthopsis macroura</i>	x							
northern brown bandicoot	<i>Isodon macrourus</i>	x	x				x		x
sugar glider	<i>Petaurus breviceps</i>	x	x	x		x	x		x
common brushtail possum	<i>Trichosurus vulpecula</i>	x	x		x	x		x	x
greater glider	<i>Petauroides volans</i>	x	x	x	x			x	x
rufous bettong	<i>Aepyprymnus rufescens</i>				x				x
eastern grey kangaroo	<i>Macropus giganteus</i>	x	x	x	x	x	x	x	x
common wallaroo	<i>Macropus robustus</i>				x				
swamp wallaby	<i>Wallabia bicolor</i>					x			
red-necked wallaby	<i>Wallabia rufogriseus</i>								x
white-striped freetail bat	<i>Auromotus australis</i>								x
little red flying-fox	<i>Pteropus scapulatus</i>				x			x	

Common Name	Scientific name	WBM, 1998	WBM 2000	WBM 2002	URS 2005	Ecoserve 2006	URS Red Hill 2009	URS West 2009	URS 2011
Gould's wattled bat	<i>Chalinolobus gouldii</i>	x	x	x	x		x	x	x
northern freetail bat	<i>Chaerephon jobensis</i>	x	x	x	x		x	x	x
hoary wattled bat	<i>Chalinolobus nigrogriseus</i>	x	x	x	x		(x)		(x)
chocolate wattled bat	<i>Chalinolobus morio</i>	x	x		x		x	x	x
little pied bat	<i>Chalinolobus picatus</i>		x	x	x		(x)	(x)	(x)
	<i>Miniopterus oriana oceanensis</i>						(x)		x
Beccari's freetail bat	<i>Mormopterus beccarii</i>			x	x		x	x	x
freetail bat	<i>Mormopterus sp.2</i>			x	x		(x)	x	
eastern free-tailed bat	<i>Mormopterus ridei</i>								x
longeared bat	<i>Nyctophilus sp.</i>				x		(x)	(x)	
yellow-bellied sheathtail bat	<i>Saccolaimus flaviventris</i>	x	x	x	x	x	x		x
sheathtail bat	<i>Taphozous spp.</i>	x	x	x	x				
Troughton's sheathtail bat	<i>Taphozous troughtoni</i>						x	x	
inland broadnosed bat	<i>Scotorepens balstoni</i>						x	(x)	x
broadnosed bat	<i>Scotorepens greyii/ sanborni</i>						x	(x)	x
broadnosed bat	<i>Scotorepens sp.</i>			x	x				
inland forest bat	<i>Vespadelus baverstocki</i>						(x)	(x)	
eastern cave bat	<i>Vespadelus troughtoni</i>		x		x				x
delicate mouse	<i>Pseudomys delicatulus</i>		x				x	x	
eastern chestnut mouse	<i>Pseudomys gracilicaudatus</i>		x		x				
water rat	<i>Hydromys chrysogaster</i>	x	x						
house mouse*	<i>Mus musculus</i>	x	x					x	
bush rat	<i>Rattus fuscipes</i>								x
swamp rat	<i>Rattus lutreolus</i>	x							
canefield rat	<i>Rattus sordidus</i>	x	x						
pale field rat	<i>Rattus tunneyi</i>	x	x						

Common Name	Scientific name	WBM, 1998	WBM 2000	WBM 2002	URS 2005	Ecoserve 2006	URS Red Hill 2009	URS West 2009	URS 2011
dingo/dog*	<i>Canis lupus dingo/familiaris</i>		x	x	x	x	x	x	x
fox*	<i>Vulpes vulpes</i>	x					x		
house cat*	<i>Felis catus</i>	x	x		x	x	x	x	x
horse*	<i>Equus caballus</i>				x			x	x
domestic cattle*	<i>Bos taurus</i>	x	x	x	x	x	x	x	x
feral pig*	<i>Sus scrofa</i>		x	x	x	x	x	x	x
European rabbit*	<i>Oryctolagus cuniculus</i>	x	x	x	x	x	x	x	x
	Total (49(1))	24	25	17	26	12	18 (6)	24 (5)	26(2)

* Indicates feral animal

(x) Refers to microbats that could not be reliably identified due to poor data quality and/or call similarities between species (notation only applies to URS surveys)

Appendix B Survey Effort and Habitat Description

Trapline Number	Name Area Survey Period	Location AGD84	Number of Elliott A traps	Number of Elliott B traps	Number of Cage Traps	Number of Pitfall Traps	Elliott Trap-nights	Pitfall Trap-nights	Cage Trap-nights	Habitat Notes
F1	Brigalow Ridge Red Hill 2005	0597782 7602071	20	-	1	2	80	8	4	Stony hillside strewn with larger rocks, and dominated by brigalow thickets forming a low closed forest. Numerous fallen trees provide ground cover. Fallen and standing trees with exfoliated bark present. A small dry stream bed. Rocky ridge top with sparse vine thickets, acacias and brachychiton. Introduced grasses. Some shrubs.
F2	Isaac River Crossing Red Hill 2005	0606150 7596695	20	-	1	2	80	8	4	Flat sandy river bed and sloping banks dominated by <i>Eucalyptus tereticornis</i> and / or <i>E. camaldulensis</i> at 25 to 30 m in height with <i>Casuarina cunninghamiana</i> and <i>Lysiphyllum</i> species dominating the midlayer and <i>Melaleuca bracteata</i> in the shrub layer along the lower banks. Taller <i>Eucalyptus</i> species provide hollow bearing habitat for arboreal nesting fauna. Some larger fallen limbs provide microhabitat instream and on the banks. Ground cover dominated by exotic grass species.
F3	Poplar Box East Red Hill 2005	0606490 7595261	20	-	1	2	80	8	4	Open woodland dominated by <i>E. populnea</i> to 15 m height, with grass understorey. About 60 -70% grass cover. A sparse shrubby mid story. Ground cover includes fallen logs. Sandy soil and flat ground. <i>Eucalyptus</i> trees had many hollows provide hiding areas or nesting sites for fauna.

Appendix B

Trapline Number	Name Area Survey Period	Location AGD84	Number of Elliott A traps	Number of Elliott B traps	Number of Cage Traps	Number of Pitfall Traps	Elliott Trap-nights	Pitfall Trap-nights	Cage Trap-nights	Habitat Notes
F4	Goonyella Creek Red Hill 2005	0605524 7599393	20	-	1	2	80	8	4	<i>Acacia harpophylla</i> with occasional <i>Eucalyptus populnea</i> dominates canopy to 10-15 m. A high percentage of dieback of brigalow observed in the canopy. Very sparse mid-storey. Buffel grass dominating ground cover with some Parthenium present. Dark cracking clay soils with 80% ground cover and 20% bare soil.
F5	Railway Swamp Red Hill 2005	0601095 7582333	20	-	1	2	80	8	4	Mid-tall woodland to open woodland with <i>E. populnea</i> , <i>Bauhinia</i> and <i>Acacias</i> , with a sandy substrate with some introduced tussock grasses. Some taller trees to 20 m. A small depression containing some water. A few small fallen logs but otherwise about 60% ground cover of introduced grasses and 40% bare earth.
F6	Low woodland south Red Hill West 2005	0597959 7583069	20	-	1	2	80	8	4	Near main road to Goonyella. Gently sloping area of low open woodland tending to shrubland. Sandy exposed soil, 30% ground cover. Sparse brigalow and shrubs, mostly regrowth. A few larger eucalypts. Low woodland tending to tall shrubland. Some <i>bauhinia</i> forming a mid storey. The understory is extremely sparse with 30% cover of introduced grasses. Reddish clay soil. Few logs or other ground cover. Area highly disturbed by cattle, and clearing of vegetation.

Appendix B

Trapline Number	Name Area Survey Period	Location AGD84	Number of Elliott A traps	Number of Elliott B traps	Number of Cage Traps	Number of Pitfall Traps	Elliott Trap-nights	Pitfall Trap-nights	Cage Trap-nights	Habitat Notes
F7	Brigalow west Red Hill West 2005	0597537 7590665	20	-	1	2	80	8	4	500 m south of Eureka Creek crossing. Small area of Brigalow and mid-high open forest with tussocky grass understory, clay substrate covered in buffel grass with 70% ground cover and a few fallen logs. Low (to 5-6m) shrubland of mostly regenerated brigalow with taller eucalypts and a few smaller acacias. Few large mature trees.
F8	Laterite Ridge Red Hill West 2005	0596771 7599712	20	-	1	2	80	8	4	Lateritic ridge with mostly brigalow and lancewood low woodland or shrubland. Small shrubs, 60-70% bare soil or rock with introduced grasses. Large tree hollows. Some fallen trees, some rocky crevice habitat. Evidence of recent fire.
T1	Dead Calf Red Hill New 2009	0608140 7591852	20	2	-	4	110	20	-	Open <i>Eucalyptus populnea</i> / <i>E. crebra</i> woodland with a mixture of mature and young trees. Sparse mid-story of <i>Geijera parvifolia</i> , <i>Petalostigma pubescens</i> and <i>Cassia brewsteri</i> . Groundlayer 60-70% FPC comprising of buffel grass with areas dominated by native grasses of the genera <i>Themeda</i> , <i>Heteropogon</i> , <i>Aristida</i> , <i>Sporobolus</i> and <i>Panicum</i> . Abundant ground timber and clumps of <i>Carissa ovata</i> and <i>Capparis lasiantha</i> . Tree hollows and stags abundant. Reasonable connectivity to N, S and W.

Appendix B

Trapline Number	Name Area Survey Period	Location AGD84	Number of Elliott A traps	Number of Elliott B traps	Number of Cage Traps	Number of Pitfall Traps	Elliott Trap-nights	Pitfall Trap-nights	Cage Trap-nights	Habitat Notes
T2	North Creek Red Hill New 2009	0608419 7594807	20	-	-	4	100	20	-	Narrow riparian woodland strip along 12 Mile Gully in the north of the site. Canopy dominated by <i>Acacia harpophylla</i> and <i>E. populnea</i> to 15 m. Midstory comprises <i>Terminalia oblongata</i> , <i>Petalostigma pubescens</i> and <i>Lysiphyllum carronii</i> . Dense buffel grass and green panic forms the ground layer. Creek substrate is sand with clay beneath. Small pools of water were present at the time of trapping. Moderate connectivity along creek and to woodland to the west. Abundant fallen timber and occasional arboreal hollows. Cleared pasture lies beyond the riparian woodland.
T3	Lancewood Red Hill New 2009	0607603 7587430	20	1	-	3	105	15	-	Low forest of <i>Acacia shirleyi</i> with emergent <i>Corymbia clarksoniana</i> and <i>E. crebra</i> . Very sparse shrub layer of <i>Erythroxylon australe</i> . Mid-dense to sparse ground layer of <i>Sporobolus</i> , <i>Aristida</i> , <i>Eragrostis</i> and <i>Oplismenus</i> . Reddish sandy soil with scattered surface lateritic nodules. Tree hollows scarce. Ground timber and leaf litter abundant. No recent fire.

Appendix B

Trapline Number	Name Area Survey Period	Location AGD84	Number of Elliott A traps	Number of Elliott B traps	Number of Cage Traps	Number of Pitfall Traps	Elliott Trap-nights	Pitfall Trap-nights	Cage Trap-nights	Habitat Notes
T4	Thozet's Red Hill New 2009	0607929 7586098	20	-	-	2	80	8	-	<i>Eucalyptus thozetiana</i> open woodland to 18 m. Shrub layer of <i>Eremophila mitchellii</i> , <i>Cassia brewsteri</i> and <i>E. thozetiana</i> saplings. Sparse to mid-dense groundlayer of <i>Aristida</i> , <i>Chloris</i> and <i>Eragrostis</i> with buffel grass sparse or locally dominant. Stag trees, arboreal hollows and fallen timber abundant. High connectivity to surrounding bushland.
T5	Paddock Red Hill New 2009	0607003 7587752	20	2	-	-	88	-	-	Cleared pasture of buffel grass. Occasional shrubs to less than 1m including <i>Atalaya hemiglauca</i> , <i>Carissa ovata</i> , <i>Capparis lasiantha</i> and <i>E. populnea</i> seedlings.
T6	South Poplar Red Hill New 2009	0606749 7587743	20	-	-	-	80	-	-	Open woodland of <i>E. populnea</i> and <i>E. crebra</i> to 14m. Sparse to mid-dense shrub layer of <i>Petalostigma pubescens</i> , <i>Erythroxylon australe</i> , <i>Eremophila mitchellii</i> and <i>Carissa ovata</i> . Sparse to mid-dense groundlayer of buffel grass and patches of <i>Eragrostis</i> , <i>Panicum</i> , <i>Heteropogon</i> , <i>Enneapogon</i> , <i>Aristida</i> and <i>Chrysopogon</i> . Abundant hollows, stag trees and fallen timber.

Appendix B

Trapline Number	Name Area Survey Period	Location AGD84	Number of Elliott A traps	Number of Elliott B traps	Number of Cage Traps	Number of Pitfall Traps	Elliott Trap-nights	Pitfall Trap-nights	Cage Trap-nights	Habitat Notes
T7	Crebra woodland Red Hill West New 2009	0594906 7597760	20	1	-	3	84	12	-	Open woodland of <i>E. crebra</i> to 18 m in association with <i>C. tessellaris</i> , <i>C. clarksoniana</i> and <i>E. populnea</i> . A sparse shrub layer of <i>Eremophila mitchellii</i> , <i>Erythroxylon australe</i> , <i>Cassia brewsteri</i> , <i>Terminalia oblongata</i> and <i>Petalostigma pubescens</i> is present. Groundcovers dominated by buffel grass with occasional clumps of <i>Aristida</i> spp., <i>Themeda triandra</i> and <i>Heteropogon contortus</i> . Numerous stags present, some fallen timber. No recent fire.
T8	Eureka Creek North Red Hill West New 2009	0593822 7596315	20	-	-	4	80	16	-	Narrow riparian fringe of <i>E. tereticornis</i> in association with <i>E. populnea</i> . Midlayer of <i>E. tereticornis</i> , <i>E. populnea</i> , <i>A. harpophylla</i> , <i>T. oblongata</i> and <i>Cassia brewsteri</i> . Groundlayer dominated by buffel grass with shrubby stylo, <i>Heteropogon contortus</i> and other native species. Occasional hollows, stags and fallen timber. No recent fire. Cattle impacts obvious.

Appendix B

Trapline Number	Name Area Survey Period	Location AGD84	Number of Elliott A traps	Number of Elliott B traps	Number of Cage Traps	Number of Pitfall Traps	Elliott Trap-nights	Pitfall Trap-nights	Cage Trap-nights	Habitat Notes
T9	Dawson woodland Red Hill West New 2009	0591913 7597720	20	1	-	3	84	12	-	<i>E. cambageana</i> woodland with <i>E. populnea</i> , <i>A. harpophylla</i> , <i>Cassia brewsteri</i> , <i>Eremophila mitchellii</i> , <i>Flindersia dissosperma</i> and <i>Owenia acidula</i> in the midstory. Groundlayer dominated by buffel grass with <i>Aristida</i> spp., <i>Heteropogon contortus</i> , <i>Capparis lasiantha</i> , <i>Enchylaena tomentosus</i> and <i>Eriocereus martinii</i> . No evidence of recent fire. Abundant ground timber and occasional stags present.
T10	Poplar woodland Red Hill West New 2009	0590769 7595491	14	-	-	3	56	12	-	Open <i>E. populnea</i> woodland to 18 m with occasional <i>E. cambageana</i> . Midstory of <i>E. populnea</i> , <i>Cassia brewsteri</i> , <i>Eremophila mitchellii</i> , <i>A. harpophylla</i> and <i>T. oblongata</i> . Groundcover comprises <i>Carissa ovata</i> , <i>Pennisetum ciliare</i> , <i>Enchylaena tomentosa</i> , <i>Aristida</i> spp. and <i>Sporobolus</i> spp. Occasional stags and hollows present. Abundant ground timber and <i>Carissa</i> thickets. No evidence of recent fire.
T11	Grassland Red Hill West New 2009	0589815 7597764	20	1	-	-	84	-	-	Dense grassland with scattered low <i>A. harpophylla</i> and <i>Atalaya hemiglauca</i> regrowth. Species present include <i>Sporobolus</i> spp., <i>Aristida</i> spp., <i>Astrebla squarrosa</i> , <i>Bothriochloa</i> spp., <i>Panicum</i> spp. and buffel grass. Dark cracking clays. Very little habitat timber present.

Appendix B

Trapline Number	Name Area Survey Period	Location AGD84	Number of Elliott A traps	Number of Elliott B traps	Number of Cage Traps	Number of Pitfall Traps	Elliott Trap-nights	Pitfall Trap-nights	Cage Trap-nights	Habitat Notes
T12	Fisher Creek Red Hill West New 2009	0596108 7584642	20	1	-	4	84	16	-	Ephemeral creek fringed by <i>E. tereticornis</i> woodland. Also present are <i>C. tessellaris</i> , <i>C. clarksoniana</i> and <i>E. populnea</i> . A sparse midlayer of <i>A. harpophylla</i> , <i>Lysiphyllum</i> spp., <i>Petalostigma pubescens</i> , <i>Flindersia dissosperma</i> and <i>Archidendropsis basaltica</i> is present. The ground layer is dominated by buffel grass with occasional patches of <i>Heteropogon contortus</i> , <i>Themeda triandra</i> , <i>Aristida</i> spp. and <i>Carissa ovata</i> present. Sandy alluvium. Abundant tree hollows present.
T13	Brigalow woodland Red Hill West New 2009	0595440 7587829	20	1	-	3	84	12	-	<i>Acacia harpophylla</i> open woodland to 15 m. Community surrounded by <i>E. populnea</i> woodland. Mid layer comprises <i>Terminalia oblongata</i> and juvenile <i>A. harpophylla</i> . Ground layer is sparse to dense and consists of buffel grass, <i>Carissa ovata</i> , <i>Enchylaena tomentosa</i> , <i>Eragrostis brownii</i> , <i>Parthenium hysterophorus</i> , <i>Salsola kali</i> , <i>Paspalidium caespitosum</i> and <i>Capparis lasiantha</i> . No recent fire; occasional stags; few arboreal hollows, abundant ground timber, gilgai formations. Light brown cracking clays intermittently inundated. Freshwater snail shells and crab holes obvious.

Appendix B

Trapline Number	Name Area Survey Period	Location AGD84	Number of Elliott A traps	Number of Elliott B traps	Number of Cage Traps	Number of Pitfall Traps	Elliott Trap-nights	Pitfall Trap-nights	Cage Trap-nights	Habitat Notes
T14	Poplar woodland west New Red Hill West New 2009	0592835 7589802	20	1	-	4	84	16	-	<i>E. populnea</i> woodland to 20 m. Midlayer consists of <i>E. populnea</i> , <i>Melaleuca nervosa</i> , <i>Grewia latifolia</i> , <i>Alphitonia excelsa</i> , <i>Atalaya hemiglauca</i> , <i>Grevillea striata</i> , <i>Ventilago viminalis</i> , <i>Owenia acidula</i> and <i>Geijera parviflora</i> . The groundlayer is dominated by buffel grass but native species such as <i>Heteropogon contortus</i> , <i>Eragrostis brownii</i> , <i>Aristida</i> spp., <i>Themeda triandra</i> and <i>Sporobolus</i> spp. are common.
T15	Laterite Lancewood Red Hill West New 2009	0595230 7592877	20	1	-	-	84	-	-	<i>Acacia shirleyi</i> closed woodland to 10 m with occasional <i>C. clarksoniana</i> and <i>C. tessellaris</i> emergents. Midstory of <i>Erythroxylon australe</i> and immature <i>A. shirleyi</i> . A dense ground cover of <i>Calyptochloa gracillima</i> is present.
W1	Dawson Gum woodland Red Hill Exploration West 2011	0590776 7594592	20	1	-	3	84	12	-	Remnant <i>E. cambageana</i> woodland to 20 m with <i>E. populnea</i> and <i>A. harpophylla</i> to 15 m in the secondary tree layer. The ground layer was dominated by buffel grass. <i>Carissa ovata</i> is common throughout the site. Abundant arboreal hollows and ground timber present.

Appendix B

Trapline Number	Name Area Survey Period	Location AGD84	Number of Elliott A traps	Number of Elliott B traps	Number of Cage Traps	Number of Pitfall Traps	Elliott Trap-nights	Pitfall Trap-nights	Cage Trap-nights	Habitat Notes
W2	Laterite Jump-up – Lancewood Red Hill Exploration West 2011	0592754 7592140	20	1	-	-	84	-	-	<i>A. shirleyi</i> woodland to 12 m on laterite rise. <i>E. cambageana</i> emergent layer. <i>E. thozetiana</i> present on steep slopes. Plateau consists of buffel grass however native grass such as <i>Melinis repens</i> and <i>Aristida</i> spp. occur. Other flora present include <i>Cassia brewsteri</i> , <i>Erythroxylum australe</i> and <i>Flindersia maculosa</i>
W3	Poplar Box woodland Red Hill Exploration West – Pasha Rd 2011	0592657 7590144	20	1	-	-	84	-	-	<i>E. populnea</i> woodland to 18 m with occasional <i>Acacia pendula</i> and <i>C. tessellaris</i> . Ground layer is dominated by buffel grass. High abundance of logs and timber on ground providing microhabitat for ground mammals and reptiles.
Totals			514	15	8	56	2179	245	32	

Notes: NC Act Status: Indicates the conservation status of each taxon under the NC Act. The codes are; endangered (E), vulnerable (V), near threatened (NT).

EPBC Act Status: Indicates the conservation status of each taxon under the EPBC Act. The codes are: endangered (E), vulnerable (V), migratory (Mi), marine (M)

Information based on a number of sources including: Cogger (2000), DSEWPac (2011a), Menkhorst and Knight (2001), Morcombe (2004)

Appendix C Conservation Significant Species and Likelihood of Presence

Scientific Name common name	NC Act Status ¹	EPBC Act Status ²	Distribution/Habitat	Likelihood of presence	Source of record
Birds					
<i>Erythrotriorchis radiatus</i> red goshawk	E	V	The red goshawk has a home range covering between 50 and 220 square km. It prefers a mix of vegetation types with its habitat including tall open forest, woodland, lightly treed savannah and the edge of rainforest. Habitats required by red goshawks for breeding are very specific. They will only nest in trees taller than 20 m, and these must be within 1 km of water.	Potentially present	The Department of the Environment
<i>Geophaps scripta scripta</i> squatter pigeon, (southern subspecies)	V	V	The distribution of the squatter pigeon (southern) occurs on the inland slopes of the Great Dividing Range, extending from the Burdekin-Lynd divide in central Queensland, west to Charleville and Longreach, east to the coast and south to scattered sights within south-east Queensland. It is found mainly in grassy woodlands and open forests dominated by eucalypts and commonly observed close to bodies of water.	Present in small numbers throughout the EIS study area	The Department of the Environment, BA
<i>Neochmia ruficauda ruficauda</i> star finch (eastern and southern)	-	E	The star finch is known to utilise tall grass and reed beds associated with swamps and watercourses as well as grassy woodlands, open forests and mangroves (DSEWPaC 2011b). Bodies of nearby fresh water are thought to be important (DSEWPaC 2011b), and that woodlands of <i>Eucalyptus coolabah</i> , <i>E. tereticornis</i> , <i>E. tessellaris</i> , <i>Melaleuca leucadendra</i> , <i>E. camaldulensis</i> and <i>Casuarina cunninghamiana</i> were part of the historic range (DSEWPaC 2011c).	Unlikely	The Department of the Environment
<i>Poephila cincta cincta</i> black-throated finch (southern)	-	E	Forages on ground for seed in small flocks. Inhabits open woodlands and grasslands with scattered tree cover never far from water (Morcombe, 2004).	Unlikely	The Department of the Environment

Appendix C

Scientific Name common name	NC Act Status ¹	EPBC Act Status ²	Distribution/Habitat	Likelihood of presence	Source of record
<i>Haliaeetus leucogaster</i> white-bellied sea-eagle	-	Mi, M	The White-bellied Sea-Eagle is distributed along the coastline of mainland Australia and Tasmania and also extends inland along some of the larger waterways, especially in eastern Australia. It feeds opportunistically on a variety of fish, birds, reptiles, mammals and crustaceans, and on carrion and offal	Present. Observed at dam in western area	The Department of the Environment
<i>Hirundapus caudacutus</i> white-throated needletail	-	Mi, M	The White-throated Needletail is a large swift that is generally gregarious when in Australia, sometimes occurring in large flocks. In Australia, the White-throated Needletail is almost exclusively aerial but are most often recorded above wooded areas, including open forest and rainforest.	Present. Recorded	The Department of the Environment
<i>Merops ornatus</i> rainbow bee-eater	-	Mi, M	The rainbow bee-eater is a medium-sized bird, and the only species of bee-eater in Australia. It is distributed across much of mainland Australia and favours open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats.	Present. Observed at several sites throughout the western area	The Department of the Environment, BA
<i>Monarcha melanopsis</i> black-faced monarch	-	Mi	A slow-moving monarch that favours rainforest, mangroves and eucalypt woodlands. Takes insects from foliage singly or in pairs.	Possibly present in suitable habitat	The Department of the Environment
<i>Ardea ibis</i> cattle egret	-	Mi, M	Small egret often accompanying livestock in large flocks.	Probable	The Department of the Environment, BA
<i>Myiagra cyanoleuca</i> satin flycatcher	-	Mi, M	Active flycatcher in upper levels of forest where it chases insects. Favours mangroves, forests and woodlands and coastal heathland.	Possibly present in suitable habitat	The Department of the Environment
<i>Apus pacificus</i> fork-tailed swift	-	Mi, M	Medium sized swift that stays on the wing day and nights. Hawks for insects, often in company with the white-throated needletail.	Present, May overfly the site	The Department of the Environment, BA

Appendix C

Scientific Name common name	NC Act Status ¹	EPBC Act Status ²	Distribution/Habitat	Likelihood of presence	Source of record
<i>Ardea alba</i> = <i>Ardea modesta</i> great egret, white egret, eastern great egret	-	Mi, M	The Eastern Great Egret is a moderately large bird that occurs solitarily, or in small groups when feeding. It has been reported in a wide range of wetland habitats, including fresh, brackish, saline, natural and constructed systems.	Present. Observed feeding in grassland and at dams.	The Department of the Environment
<i>Gallinago hardwickii</i> Latham's snipe, Japanese snipe	-	Mi, M	Latham's snipe is a medium sized wader, and the largest snipe in Australia. It is a non-breeding visitor to south-eastern Australia, and is a passage migrant through northern Australia. It occurs in permanent and ephemeral wetlands including fresh, saline, brackish, natural and constructed systems.	Unlikely to utilise wetlands on the site as core habitat.	The Department of the Environment
<i>Falco cenchroides</i> nankeen kestrel		M	A small falcon that can often be seen in grassland and open woodland habitats.	Present. Observed throughout site across all grassland or open woodland habitats	BA
<i>Ephippiorhynchus asiaticus</i> black-necked stork	NT	-	Tall stork that seeks fish, frogs, reptiles, and invertebrates in natural or artificial wetlands and on adjacent floodplains.	Present. Observed flying over the Isaac River in the east.	BA
<i>Rostratula australis</i> Australian painted snipe	-	V, Mi, M	The Australian Painted Snipe is usually found in shallow inland wetlands, either freshwater or brackish, that are either permanently or temporarily filled. It is a cryptic bird that is hard to see and+ often overlooked. Usually only single birds are seen, though larger groups of up to 30 have been recorded. It nests on the ground amongst tall reed-like vegetation near water, and feeds near the water's edge and on mudflats, taking invertebrates, such as insects and worms, and seeds.	Unlikely as the requisite habitat type is not present	The Department of the Environment

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Scientific Name common name	NC Act Status ¹	EPBC Act Status ²	Distribution/Habitat	Likelihood of presence	Source of record
<i>Cuculus saturatus</i> oriental cuckoo	-	M	The oriental cuckoo is a migratory bird species that can be found from southern NSW to northern QLD. The oriental cuckoo prefers dense eucalypt forest, riverine thickets and mangroves (Morcombe 2004). This species is considered uncommon and was last recorded on the EIS study area during 2002 (WBM 2002)	Present - last recorded in 2002	WBM 2002
<i>Coturnix pectoralis</i> stubble quail	-	M	The stubble quail is a listed marine species under the EPBC Act. This species is currently distributed throughout central QLD and occurs across the majority of Australia. The stubble quail can often be found in both short and tall grasses (Morcombe 2004).	Present – recorded in 2011	URS 2011
<i>Accipiter fasciatus</i> brown goshawk	-	M	The brown goshawk is a marine listed species and was recorded within the EIS study area during 2011 URS surveys. The brown goshawk occurs across Australia and is often found in forests, woodlands and dry scrublands.	Present – recorded in 2011	URS 2011
<i>Scythrops novaehollandiae</i> channel-billed cuckoo	-	M	The channel-billed cuckoo is a marine listed species that was last recorded on the EIS study area in 2006. This species occurs across all of QLD prefers eucalypt forest and woodlands, riverine thickets and swampy woodlands.	Present – last recorded in 2006	Ecoserve 2006, URS 2005, WBM 2002
<i>Eurystomus orientalis</i> dollarbird	-	M	The dollarbird is marine listed species that is distributed across QLD and eastern Australia. The dollarbird prefers open country including eucalypt woodland, farmland and riparian woodland.	Present – Last recorded in 2009	URS 2009, 2005; Ecoserve 2006; WBM 2000, 2002
<i>Rhipidura rufifrons</i> rufous fantail	-	M, Mi	The rufous fantail is a marine and migratory listed bird species under the EPBC Act. The rufous fantail is distributed across eastern and northern Australia. The rufous fantail occurs in multiple habitat types including dense eucalypt forest, rainforest and riparian thicket.	Present – last recorded in 2006	Ecoserve 2006
<i>Tringa stagnatilis</i> marsh sandpiper	-	M, Mi	The marsh sandpiper is an EPBC-listed marine/ migratory species. It can be found across all of QLD during Australian summers. The marsh sandpiper occurs in estuarine and mangrove mudflats, coastal and inland wetlands and billabongs.	Present – last recorded in 2000	WBM 2000

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Scientific Name common name	NC Act Status ¹	EPBC Act Status ²	Distribution/Habitat	Likelihood of presence	Source of record
<i>Anseranas semipalmata</i> magpie goose	-	M	The magpie goose is large water bird that is mainly found in shallow wetlands with dense growth of rushes or sedges. Its distribution extends from SE QLD to the Australian northern tropics.	Unlikely due to EIS study area occurring on the extreme western limit of its range.	The Department of the Environment
Mammals					
<i>Nyctophilus timoriensis</i> eastern long-eared bat (south-eastern form)	-	V	The eastern long-eared bat forages in Callitris/ironbark/box open forest and buloke woodland in southern Queensland (DSEWPac 2011c). Its extent is poorly understood, and although government databases list it for the area, it has not been recorded in earlier surveys on the site. It is known to roost in tree hollows and under bark (Churchill 1998), habitat features present in various communities at the EIS study area. Its potential presence on the site cannot be dismissed. An unidentified species of <i>Nyctophilus</i> has been recorded during surveys.	Potentially present as suitable habitat is available	The Department of the Environment
<i>Dasyurus hallucatus</i> northern quoll	-	E	The northern quoll is found in the savannas of northern Australia. Populations of this quoll have declined across much of its former range, with cane toads thought to be a major factor. They utilise a range of habitats, with rocky areas and eucalypt forests preferred (DSEWPac 2011d).	Unlikely to be present due to habitat disturbance	The Department of the Environment
Reptiles					
<i>Rheodytes leukops</i> Fitzroy River turtle	-	V	Cogger (2000) notes that the Fitzroy River turtle is known only from the Fitzroy River and its tributaries in Queensland. It is recorded as preferring fast-flowing water. Although the EIS study area is within the Fitzroy River catchment, the waterways are ephemeral and the dams are still water containments. Therefore it is highly unlikely that this species would be present on the site	Unlikely as the requisite habitat type is not present	The Department of the Environment

Appendix C

Scientific Name common name	NC Act Status ¹	EPBC Act Status ²	Distribution/Habitat	Likelihood of presence	Source of record
<i>Denisonia maculata</i> ornamental snake	V	V	Occurs in <i>Acacia harpophylla</i> woodland growing on clay and sandy soils, riverine woodland, and open forest growing on natural levees. Shows a preference for moist areas. Known only from the Brigalow Belt (DSEWPaC 2011e).	Present. Recorded from cracking clay habitat in the north-west of the site and amongst excavated dam spoil in the east	EHP, EH, QM
<i>Egernia rugosa</i> yakka skink	V	V	Usually found in open dry sclerophyll forest or woodland, often taking refuge among dense ground vegetation, hollow logs, and cavities in soil-bound root systems of fallen trees and beneath rocks. Alternatively, skinks may also excavate burrow systems among low vegetation.	Possibly present in suitable habitat	The Department of the Environment
<i>Paradelma orientalis</i> brigalow scaly-foot	V	V	Occurs on sandstone ridges in woodlands and vine thickets, and in open forests.	Recorded by WBM in 1998. May still be present.	EHP
<i>Lerista allanae</i> Allan's lerista	E	E	Known only from undulating black soil plains at Clermont and nearby stations (Wilson 2005).	Unlikely to be present due to distance from known range.	The Department of the Environment
<i>Furina dunmalli</i> Dunmall's snake	V	V	Utilises brigalow, belah and cypress pine communities usually on heavy soil.	Moderate likelihood of presence in suitable habitat	The Department of the Environment

Appendix D Species List and Habitat Type

Common Name	Scientific name	Poplar Box Woodland	Brigalow Woodland	Riparian Woodland	Alluvial Woodland	Grassland	Laterite	Dawson Gum woodland	Water bodies
Amphibians									
greenstripe frog	<i>Litoria alboguttata</i>								x
green tree frog	<i>Litoria caerulea</i>		x	x		x			x
broad-palmed rocketfrog	<i>Litoria latopalmata</i>		x	x					x
rocket frog	<i>Litoria nasuta</i>								x
red tree frog	<i>Litoria rubella</i>								x
red-eyed tree frog	<i>Litoria rothi</i>			x					
barking frog	<i>Limnodynastes fletcheri</i>			x					
ornate burrowing frog	<i>Opisthodon ornatus</i>	x	x	x	x			x	x
spotted marsh frog	<i>Limnodynastes tasmaniensis</i>				x				x
eastern snapping frog	<i>Cyclorana novaehollandiae</i>		x						x
cane toad*	<i>Rhinella marina</i>	x	x	x	x	x	x	x	x
Reptiles									
gecko	<i>Diplodactylus steindachneri</i>	x			x				
gecko	<i>Gehyra dubia</i>	x		x					
gecko	<i>Gehyra catenata</i>		x						x
bynoe's gecko	<i>Heteronotia binoei</i>	x	x	x	x		x	x	x
knob-tailed gecko	<i>Nephrurus asper</i>						x		
robust velvet gecko	<i>Oedura robusta</i>							x	
Burton's legless lizard	<i>Lialis burtonis</i>		x				x		
burn's dragon	<i>Amphibolurus burnsi</i>	x		x		x			
dragon	<i>Diporiphora australis</i>	x							

Appendix D

Common Name	Scientific name	Poplar Box Woodland	Brigalow Woodland	Riparian Woodland	Alluvial Woodland	Grassland	Laterite	Dawson Gum woodland	Water bodies
frilled lizard	<i>Chlamydosaurus kingii</i>				x				
bearded dragon	<i>Pogona barbata</i>	x		x			x		
freckled monitor	<i>Varanus tristis</i>		x				x		
rainbow-skink	<i>Carlia foliorum</i>	x							
rainbow-skink	<i>Carlia pectoralis</i>	x		x			x		
rainbow-skink	<i>Carlia munda</i>	x							
rainbow-skink	<i>Carlia vivax</i>		x	x					x
wall skink	<i>Cryptoblepharus virgatus</i>	x	x	x					
wall skink	<i>Cryptoblepharus plagiocephalus</i>	x	x						
brown-blazed wedgesnout ctenotus	<i>Ctenotus allotropis</i>	x							
striped skink	<i>Ctenotus robustus</i>	x	x	x		x			x
skink	<i>Ctenotus strauchii</i>	x							
skink	<i>Lampropholus delicata</i>	x		x	x			x	
skink	<i>Lerista muelleri</i>							x	
skink	<i>Lerista fragilis</i>							x	
skink	<i>Menetia greyii</i>	x		x					
skink	<i>Menetia timlowi</i>			x					
fire-tailed skink	<i>Morethia taeniopleura</i>	x	x						x
skink	<i>Proablepharus tenuis</i>			x					
spotted python	<i>Antaresia maculosa</i>		x			x			x
black-headed python	<i>Aspidites melanocephalus</i>						x		
common tree snake	<i>Dendrelaphus punctulatus</i>			x			x		

Appendix D

Common Name	Scientific name	Poplar Box Woodland	Brigalow Woodland	Riparian Woodland	Alluvial Woodland	Grassland	Laterite	Dawson Gum woodland	Water bodies
keelback	<i>Tropidonophis mairii</i>					x			
eastern brown snake	<i>Pseudonaja textilis</i>	x					x		
yellow-faced whip snake	<i>Demansia psammophis</i>						x		
ornamental snake	<i>Denisonia maculata</i>					x			
Birds									
emu	<i>Dromaius novaehollandiae</i>	x		x		x			
brown quail	<i>Coturnix ypsilophora</i>	x			x				x
stubble quail	<i>Coturnix pectoralis</i>					x			
plumed whistling-duck	<i>Dendrocygna eytoni</i>								x
black swan	<i>Cygnus atratus</i>								x
Australian wood duck	<i>Chenonetta jubata</i>								x
cotton pygmy-goose	<i>Nettapus coromandelianus</i>								x
pacific black duck	<i>Anas superciliosa</i>								x
australasian shoveler	<i>anas rhynchotis</i>								x
grey teal	<i>Anas gracilis</i>								x
hardhead	<i>Aythya australis</i>								x
Australasian grebe	<i>Tachybaptus novaehollandiae</i>								x
great crested grebe	<i>Podiceps cristatus</i>								x
darter	<i>Anhinga melanogaster</i>								x
little pied cormorant	<i>Phalacrocorax melanoleucas</i>								x
pied cormorant	<i>Phalacrocorax varius</i>								x
black-necked stork	<i>Ephippiorhynchus asiaticus</i>								x
australian pelican	<i>Pelicanus conspicillatus</i>								x

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Common Name	Scientific name	Poplar Box Woodland	Brigalow Woodland	Riparian Woodland	Alluvial Woodland	Grassland	Laterite	Dawson Gum woodland	Water bodies
white-faced heron	<i>Egretta novaehollandiae</i>					x			x
white-necked heron	<i>Ardea pacifica</i>					x			x
great egret	<i>Ardea alba</i>					x			x
intermediate egret	<i>Ardea intermedia</i>					x			x
nankeen night heron	<i>Nycticorax caledonicus</i>								x
straw-necked ibis	<i>Threskiornis spinicollis</i>					x			
royal spoonbill	<i>Platalea regia</i>								x
black kite	<i>Milvus migrans</i>	x			x	x	x		
whistling kite	<i>Haliastur sphenurus</i>	x	x	x	x	x	x		x
white-bellied sea-eagle	<i>Haliaeetus leucogaster</i>								x
spotted harrier	<i>Circus assimilis</i>						x		
collared sparrowhawk	<i>Accipiter cirrhocephalus</i>		x						
brown goshawk	<i>Accipiter fasciatus</i>						x		
wedge-tailed eagle	<i>Aquila audax</i>	x	x			x	x		
brown falcon	<i>Falco berigora</i>	x				x			
Australian hobby	<i>Falco longipennis</i>					x	x		
nankeen kestrel	<i>Falco cenchroides</i>			x		x	x		
brolga	<i>Grus rubicunda</i>			x			x		
purple swamphen	<i>Porphyrio porphyrio</i>								x
dusky moorhen	<i>Gallinula tenebrosa</i>								x
eurasian coot	<i>Fulica atra</i>								x
Australian bustard	<i>Ardeotis australis</i>					x	x		
black-winged stilt	<i>Himantopus himantopus</i>								x

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Common Name	Scientific name	Poplar Box Woodland	Brigalow Woodland	Riparian Woodland	Alluvial Woodland	Grassland	Laterite	Dawson Gum woodland	Water bodies
black-fronted dotterel	<i>Euseyornis melanops</i>								x
masked lapwing	<i>Vanellus miles</i>								x
crested pigeon	<i>Ochophaps lophotes</i>	x	x	x	x	x	x		
squatter pigeon	<i>Geophaps scripta</i>		x	x		x	x		
diamond dove	<i>Geopelia cuneata</i>						x		
peaceful dove	<i>Geopelia striata</i>	x	x	x			x		
bar-shouldered dove	<i>Geopelia humeralis</i>	x	x	x					
galah	<i>Eolophus roseicapilla</i>	x	x	x	x		x		
sulphur-crested cockatoo	<i>Cacatua galerita</i>	x		x				x	
cockatiel	<i>Nymphicus hollandicus</i>	x		x					
rainbow lorikeet	<i>Trichoglossus haematodus</i>	x		x					
scaly-breasted lorikeet	<i>Trichoglossus chlorolepidotus</i>	x		x					
little lorikeet	<i>Glossopsitta pusilla</i>	x						x	
Australian king parrot	<i>Alisterus scapularis</i>	x	x						
red-winged parrot	<i>Aprosmictus erythropterus</i>		x	x	x				
pale-headed rosella	<i>Platycercus adscitus</i>	x		x	x		x		
common koel	<i>Eudynamys scolopacea</i>	x	x	x					x
channel-billed cuckoo	<i>Scythrops novaehollandiae</i>	x		x	x				x
pheasant coucal	<i>Centropus phasianinus</i>	x	x			x	x		
southern boobook owl	<i>Ninox novaeseelandiae</i>	x		x			x		
barn owl	<i>Tyto alba</i>	x		x			x		x
tawny frogmouth	<i>Podargus strigoides</i>	x			x		x		
Australian owlet-nightjar	<i>Aegotheles cristatus</i>						x		

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Common Name	Scientific name	Poplar Box Woodland	Brigalow Woodland	Riparian Woodland	Alluvial Woodland	Grassland	Laterite	Dawson Gum woodland	Water bodies
laughing kookaburra	<i>Dacelo novaeguinea</i>	x		x	x		x		x
blue-winged kookaburra	<i>Dacelo leachii</i>	x		x					
red-backed kingfisher	<i>Todiramphus pyrrhopygia</i>					x			
forest kingfisher	<i>Todiramphus macleayii</i>	x							
rainbow bee-eater	<i>Merops ornatus</i>	x		x					
dollarbird	<i>Eurystomus orientalis</i>		x	x	x				
brown treecreeper	<i>Climacteris picumnus</i>	x							
variegated fairy-wren	<i>Malurus lamberti</i>	x							
red-backed fairy-wren	<i>Malurus melanocephalus</i>		x	x			x		x
striated pardalote	<i>Pardalotus striatus</i>	x	x	x	x		x	x	x
speckled warbler	<i>Chthonicola sagittata</i>						x		
weebill	<i>Smicromis brevirostris</i>	x	x	x			x		
western gerygone	<i>Gerygone fusca</i>	x						x	
white-throated gerygone	<i>Gerygone olivacea</i>	x	x		x			x	
buff-rumped thornbill	<i>Acanthiza reguloides</i>	x			x				
yellow-rumped thornbill	<i>Acanthiza chrysorrhoa</i>							x	
yellow thornbill	<i>Acanthiza nana</i>						x		
striped honeyeater	<i>Plectorhyncha lanceolata</i>						x		
noisy friarbird	<i>Philemon corniculatus</i>	x	x	x			x	x	x
little friarbird	<i>Philemon citreogularis</i>	x	x	x	x		x	x	x
blue-faced honeyeater	<i>Entomyzon cyanotis</i>	x	x	x	x		x		x
noisy miner	<i>Manorina melanocephala</i>	x		x	x			x	x
yellow-throated miner	<i>Manorina flavigula</i>	x			x				

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Common Name	Scientific name	Poplar Box Woodland	Brigalow Woodland	Riparian Woodland	Alluvial Woodland	Grassland	Laterite	Dawson Gum woodland	Water bodies
yellow-faced honeyeater	<i>Lichenostomus chrysops</i>				x				
singing honeyeater	<i>Lichenostomus virescens</i>		x		x				
white-throated honeyeater	<i>Melithreptus albogularis</i>			x	x				
black-chinned honeyeater	<i>Melithreptus gularis</i>	x		x				x	
brown honeyeater	<i>Lichmera indistincta</i>	x	x	x	x		x		
jacky winter	<i>Microeca fascinans</i>								x
grey-crowned babbler	<i>Pomatostomus temporalis</i>	x	x	x			x		x
rufous whistler	<i>Pachycephala rufiventris</i>	x					x	x	x
golden whistler	<i>Pachycephala pectoralis</i>	x							
grey shrike-thrush	<i>Colluricincla harmonica</i>				x	x			x
restless flycatcher	<i>Myiagra inquieta</i>					x			
Australian magpie-lark	<i>Grallina cyanoleuca</i>	x	x	x	x	x	x	x	x
grey fantail	<i>Rhipidura fuliginosa</i>	x	x	x	x		x	x	
willie wagtail	<i>Rhipidura leucophrys</i>	x	x	x	x	x	x		x
spangled drongo	<i>Dicrurus bracteatus</i>	x	x	x	x			x	
black-faced cuckoo-shrike	<i>Coracina novaehollandiae</i>	x	x	x	x	x	x	x	x
white-bellied cuckoo-shrike	<i>Coracina papuensis</i>								x
ground cuckoo-shrike	<i>Coracina maxima</i>	x					x		
cicadabird	<i>Coracina tenuirostris</i>	x							
white-winged triller	<i>Lalage sueurii</i>	x	x	x		x	x		
olive-backed oriole	<i>Oriolus sagittatus</i>		x	x			x	x	
white-breasted woodswallow	<i>Artamus leucorhynchus</i>	x				x			
white-browed woodswallow	<i>Artamus superciliosus</i>		x						

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Common Name	Scientific name	Poplar Box Woodland	Brigalow Woodland	Riparian Woodland	Alluvial Woodland	Grassland	Laterite	Dawson Gum woodland	Water bodies
black-faced woodswallow	<i>Artamus cinereus</i>	x	x						
masked woodswallow	<i>Artamus personatus</i>	x							
grey butcherbird	<i>Cracticus torquatus</i>	x	x	x	x		x	x	
pied butcherbird	<i>Cracticus nigrogularis</i>	x	x	x			x		
Australian magpie	<i>Gymnorhina tibicen</i>	x	x	x	x	x	x	x	x
pied currawong	<i>Strepera graculina</i>	x		x	x		x		x
Australian raven	<i>Corvus coronoides</i>	x	x	x	x				x
torresian crow	<i>Corvus orru</i>	x	x	x	x	x	x	x	x
white-winged chough	<i>Corcorax melanorhamphos</i>	x		x			x		x
apostlebird	<i>Struthidea cinerea</i>	x	x	x	x	x	x	x	x
spotted bowerbird	<i>Chlamydera maculata</i>	x	x	x	x		x		
singing bushlark	<i>Mirafrja javanica</i>					x			
Australasian pipit	<i>Anthus novaeseelandiae</i>	x	x	x	x	x			x
zebra finch	<i>Taeniopygia guttata</i>	x	x	x	x	x	x		x
double-barred finch	<i>Taeniopygia bichenovii</i>	x	x	x	x	x	x		x
mistletoebird	<i>Dicaeum hirundinaceum</i>			x					
welcome swallow	<i>Hirundo neoxena</i>	x		x	x	x			x
tree martin	<i>Hirundo nigricans</i>	x		x		x			
fairy martin	<i>Hirundo ariel</i>						x		x
clamorous reed-warbler	<i>Acrocephalus stentoreus</i>								x
little grassbird	<i>Megalurus gramineus</i>					x			
tawny grassbird	<i>Megalurus timoriensis</i>					x			
golden-headed cisticola	<i>Cisticola exilis</i>								x

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Common Name	Scientific name	Poplar Box Woodland	Brigalow Woodland	Riparian Woodland	Alluvial Woodland	Grassland	Laterite	Dawson Gum woodland	Water bodies
Mammals									
koala	<i>Phascolarctos cinereus</i>	x							
short-beaked echidna	<i>Tachyglossus aculeatus</i>	x	x				x		
northern brown bandicoot	<i>Isoodon macrourus</i>			x					
sugar glider	<i>Petaurus breviceps</i>			x					
common brushtail possum	<i>Trichosurus vulpecula</i>	x		x			x		
greater glider	<i>Petauroides volans</i>			x					
rufous bettong	<i>Aepyprymnus rufescens</i>			x	x				
eastern grey kangaroo	<i>Macropus giganteus</i>	x	x	x	x	x	x	x	x
common wallaroo	<i>Macropus robustus</i>						x		x
red-necked wallaby	<i>Wallabia rufogriseus</i>							x	
white-striped freetail bat	<i>Austronomus australis</i>			x					
little red flying-fox	<i>Pteropus scapulatus</i>					x			
Gould's wattled bat	<i>Chalinolobus gouldii</i>	x		X				x	
northern freetail bat	<i>Chaerephon jobensis</i>			X				x	x
hoary wattled bat	<i>Chalinolobus nigrogriseus</i>			X				(x)	x
chocolate wattled bat	<i>Chalinolobus morio</i>		x	x			x	(x)	x
little pied bat	<i>Chalinolobus picatus</i>		x	x			x	(x)	x
	<i>Miniopterus orianae oceanensis</i>			x					
Beccari's freetail bat	<i>Mormopterus beccarii</i>			x					
freetail bat	<i>Mormopterus sp.2</i>	x		x					
eastern free-tailed bat	<i>Mormopterus ridei</i>			x					

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Common Name	Scientific name	Poplar Box Woodland	Brigalow Woodland	Riparian Woodland	Alluvial Woodland	Grassland	Laterite	Dawson Gum woodland	Water bodies
longeared bat	<i>Nyctophilus sp.</i>			x					x
yellow-bellied sheathtail bat	<i>Saccolaimus flaviventris</i>	x		x			x		x
sheathtail bat	<i>Taphozous spp.</i>			x					x
Troughton's sheathtail bat	<i>Taphozous troughtoni</i>			x					
inland broadnosed bat	<i>Scotorepens balstoni</i>	x		x					
broadnosed bat	<i>Scotorepens greyii/ sanborni</i>	x		x				(x)	
broadnosed bat	<i>Scotorepens sp.</i>								x
inland forest bat	<i>Vespadelus baverstocki</i>	(x)							
eastern cave bat	<i>Vespadelus troughtoni</i>		x	x			x	(x)	
delicate mouse	<i>Pseudomys delicatulus</i>		x	x					
eastern chestnut mouse	<i>Pseudomys gracilicaudatus</i>	x							
house mouse*	<i>Mus musculus</i>					x			x
bush rat	<i>Rattus fuscipes</i>						x		
dingo/dog*	<i>Canis lupus dingo/familiaris</i>	x		x		x			x
fox*	<i>Vulpes vulpes</i>	x							
house cat*	<i>Felis catus</i>	x		x	x	x			
horse*	<i>Equus caballus</i>	x				x			
domestic cattle*	<i>Bos taurus</i>	x	x	x	x	x	x	x	x
feral pig*	<i>Sus scrofa</i>			x					x
european rabbit*	<i>Oryctolagus cuniculus</i>	x	x	x	x	x	x	x	x

* Indicates feral animal

(X) Refers to microbats that could not be reliably identified due to poor data quality and/or call similarities between species



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