

## **Appendix D**

### **Final fauna report**



## ***Indicus Biological Consultants***

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## **Indicus Biological Consultants Pty. Ltd.**



# **Fauna Surveys of the Andranangoo Creek West and Lethbridge Bay West Prospects and their corresponding haul roads on Melville Island (Matilda Minerals)**

**August 2005**

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## Introduction

Indicus Biological Consultants Pty. Ltd. were commissioned by URS Pty. Ltd. to undertake a fauna survey of the Andranangoo Creek West and Lethbridge Bay West prospects and their corresponding haul roads as a result of mineral lease applications on Melville Island by Matilda Minerals Limited (see figure 1). This document outlines the sampling methodology and the results of fauna surveys conducted between the 29<sup>th</sup> June and the 8<sup>th</sup> July 2005 (both prospects), 20<sup>th</sup> July and 22<sup>nd</sup> July (Andranangoo haul road) and between the 22<sup>nd</sup> August and the 24<sup>th</sup> August (Lethbridge haul road). We discuss potential impacts and mitigation measures for the proposed development, with regard to terrestrial vertebrate species.

## Methods

### Survey area

The survey was conducted on Melville Island, which is adjacent to Bathurst Island. These islands at 5788 km<sup>2</sup> and 1693 km<sup>2</sup> respectively are Australia's second and fifth largest islands; and collectively termed the Tiwi Islands.

Open forests, especially those co-dominated by *Eucalyptus miniata*, *E. tetradonta* and/ or *Corymbia nesophila*, dominate the vegetation of the Tiwi Islands. These forests comprise about 76% of the total land area (Woinarski *et al.* 2003a). Partly reflecting the high rainfall, these eucalypt forests are the tallest and have the greatest basal area of any eucalypt forests in the Northern Territory. Tall grasses, with variable shrub cover and stature depending in part on prevailing fire regimes, dominate the understorey. These regimes vary across the Islands: large areas of western Melville Island and central Bathurst Island are burnt almost every year. In contrast, the far less reachable eastern half of Melville Island is burnt noticeably less frequently (averaging about one year in five) (Woinarski *et al.* 2000).

The Tiwi Islands also include unusually large and many patches of monsoon rainforest (comprising about 2% of the land area), along with extensive tracts of mangroves (10%), and smaller areas of swamps (4%), and open shrublands (3%) (Woinarski *et al.* 2003a).

The islands support a population of around 2000 people of which most are traditional Aboriginal owners (the Tiwi). They mostly live in the small towns of Nguuiu and Wurankuwu on Bathurst Island and Milikapiti and Pirlangimpi on Melville Island, with smaller scattered settlements and outstations (Forrest 1998). The entire area is Aboriginal freehold land.



## **Methods for Andranangoo and Lethbridge prospects**

### *Vertebrate fauna survey*

Eight dedicated survey sites were established within both the Andranangoo Creek West and Lethbridge Bay West Prospects (see figures 2 & 3 respectively). The eight survey sites were chosen to ensure all major vegetation communities were represented. At each prospect survey sites were concentrated around the identified mineral deposit and planned campsite, as these areas will be most affected by the mining process.

Sampling methodologies prior to the survey were discussed with the Biodiversity Conservation group, Department of Infrastructure, Planning and Environment and amended to meet their requirements.

At each prospect seven quadrats of approximately 50 m x 50 m and one line transect of approximately 200 m in length were established. Each quadrat consisted of four cage traps (56 x 20 x 20 cm) placed in each corner, with 20 Elliot traps (33 x 10 x 9 cm) spaced evenly around the perimeter. The line transects were placed along the mangrove edge at each prospect, to avoid inundation at high tides. Each line transect consisted of the same number of traps except that they were placed along the entire length of transect instead of in a quadrat formation. Traps were baited with honey, oats and peanut butter. Within each quadrat, four pitfall traps (20 L) with 10 m drift fences were placed within different microhabitats. All traps were open for 3 nights, with cage and Elliot traps checked and closed each morning and re-baited in the late afternoon.

### *Bird counts*

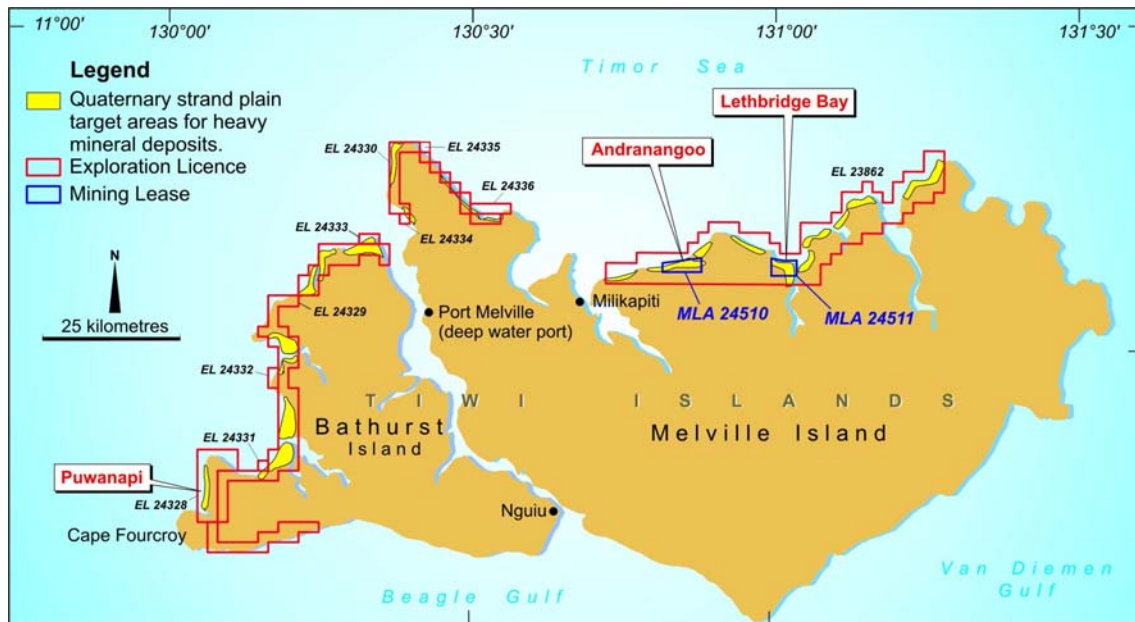
At each quadrat/ transect an area of 100 m x 100 m was censused for birds three times in the morning and three times in the afternoon with an additional two nocturnal visits. Bird counts involved walking through the quadrat/ transect and all birds heard or observed utilising the quadrat/ transect recorded. Birds flying overhead were only recorded if utilizing the habitat (e.g. hunting Raptors or Woodswallows). Note that the same search effort for transects was used however the area censused was 200 m x 50 m so that the size of each search area was maintained.



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**Tenement Locations - Tiwi Islands Mineral Sands Project**

**Figure 1.** Map of Tiwi Islands (Bathurst & Melville Island) showing both the Andranangoo and Lethbridge leases on Melville Island where the fauna surveys were undertaken.

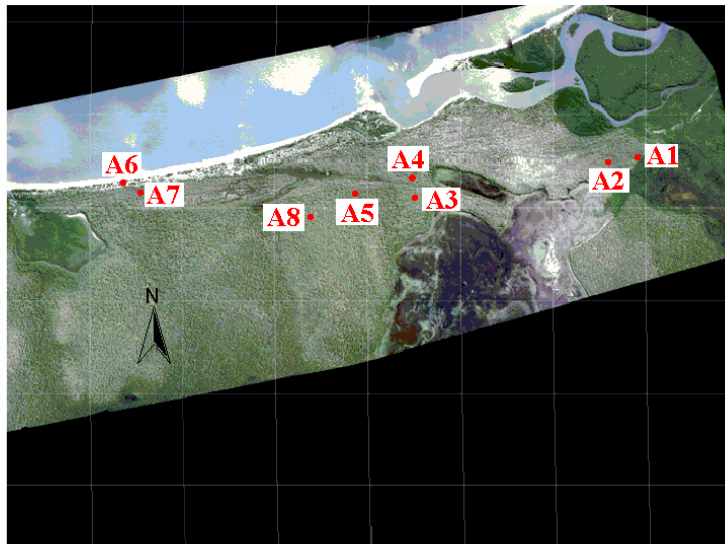


**Figure 2.** Aerial photo of the Andranangoo prospect with survey quadrats/ transect marked. See Appendix 1 for a description of each habitat type.

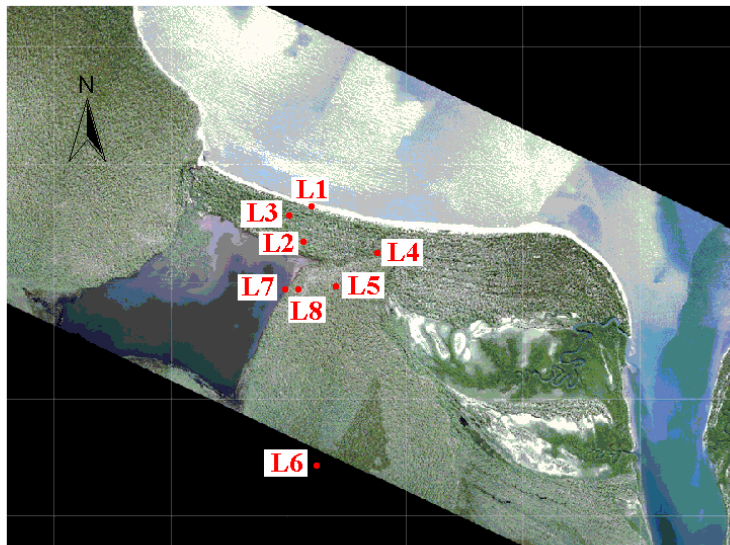


**Figure 3.** Aerial photo of the Lethbridge prospect with survey quadrats/ transect marked. See Appendix 1 for a description of each habitat type.

#### *Active searches*

Each quadrat/ transect was actively searched eight times for reptiles, mammals, scats and signs. Each active search lasted for ten minutes and involved turning rocks and logs, raking through leaf litter, looking under bark, in crevices, etc. Six searches were conducted during the day (morning, midday and late afternoon) with an additional two searches at night using spotlights.

#### *Species of particular interest*

In addition to the quadrat-based surveys, surveys specifically targeting the Red Goshawk, Masked Owl, Butler's Dunnart and False Water-rat were conducted on both the Andranangoo Creek West and Lethbridge Bay West Prospects. Active searches were made during the day for the Red Goshawks, particularly looking for roosting and nesting sites; concurrent with these searches were searches for the Tiwi Hooded Robin and Partridge Pigeon. Recorded calls of the Tiwi Hooded Robin were also broadcast in areas of open forest. Specific sampling for Masked Owls was undertaken by broadcasting their distinctive call in all quadrats, and along existing tracks at night. Additional spotlighting was carried out along existing tracks at each site in eucalypt open forest for Butler's Dunnart, Brush-tailed Rabbit-rats and the Brush-tailed Phascogale. The False Water-rat was targeted by placing Elliot traps in



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mangroves at both prospects. Active searches for the mud mound nests of this species were made in the mangrove and saline swamp areas at both prospects.

### *Incidental terrestrial records*

Other vertebrate species seen in the general area that were not attributable to a quadrat/ transect were recorded separately on an incidental list for the survey area.

### *Habitat descriptions*

A general description of the habitat was made using the methods set out in the draft guidelines by the Biodiversity Conservation group, Department of Infrastructure, Planning and Environment.

### *Taxonomy and nomenclature*

Common and scientific names used in this report follow Strahan (1998) for mammals, Christidis and Boles (1994) for birds, Cogger (2000) for reptiles and Tyler and Davies (1986) for frogs.

### *Limitations*

Cryptic and rare species may not have been recorded due to the relatively short sampling period, and further species may be detected if trapping were conducted over a longer period, or throughout different times of the year (particularly frogs, and bird species present only in the wet season). Although the survey was conducted during the dry season it was believed all vertebrate species of conservation significance likely to occur in the area could be detected at this time.

The passing of Cyclone Ingrid over the study area in mid March resulted in the falling of many trees and the loss of limbs from many standing trees. This was particularly evident in the open forest communities. This disturbance may also have influenced which species were recorded during this survey.

### *Relevant literature*

Relevant literature includes the *Territory Parks and Wildlife Conservation Act 2001* (TPWCAAct) (Parks & Wildlife Commission of the Northern Territory 2001) and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBCAct) (Commonwealth of Australia 1999) as well as the China-Australia Migratory Bird Agreement (CAMBA) 1987, the Japan-Australia Migratory Birds Agreement (JAMBA) 1974 and the Bonn Convention for the conservation of migratory species which came into effect in 1979. Species that are covered by these treaties and acts that were recorded on site were noted. Potential impacts were identified and management recommendations proposed, where necessary.



## **Methods for haul roads**

As the Andranangoo and Lethbridge haul road surveys (approximately 64 and 67 km long respectively) were specifically aimed at species of conservation significance such as Butler's Dunnart, Masked Owl, Red Goshawk and Hooded Robin. The methodologies used were different to those that are normally employed by the Biodiversity Conservation group, Department of Infrastructure, Planning and Environment. See Appendix 2 for the location of survey sites and transects for both haul roads.

### *Butler's Dunnart surveys*

As both the haul roads pass almost entirely through eucalypt open forest dominated by *Eucalyptus miniata*, *E. tetradonta* and *Corymbia nesophila*, and very little is known about the habitat preference and ecology of Butler's Dunnart sample sites were spread approximately equidistant along the proposed haul road route.

Five dedicated sites were established along each of the haul roads approximately 10 km apart beginning more or less 5 km south of both prospects. Two pitfall traps consisting of a 10 m drift fence with a bucket (20 L) in the centre were placed in different microhabitats at each site for two nights. Pitfall traps were chosen as previous captures of Butler's Dunnart on the Tiwi Islands has occurred in pitfall traps (see Woinarski *et al.* 1996).

On the first survey night the vehicle stopped at each of the dedicated sites. Two observers then walked and spotlighted along the proposed haul road for approximately 500 m in opposite directions, listening for the sounds of small mammals moving in the area while spotlighting.

### *Masked Owl surveys*

Specific sampling for Masked Owls was undertaken by broadcasting their distinctive call at all dedicated sites and transects for 10 minutes. A range of other nocturnal birdcalls was also played.

### *Red Goshawk and Hooded Robin surveys*

Trees along the proposed route were searched for nests of the Red Goshawk and calls of the Hooded Robin were broadcast at each of the five dedicated sites for 5 minutes during the day.

In addition to the five dedicated sites a further five 1 km transects were spotlighted at night on the second night of surveying (see Appendix 2). These transects were established half way between each of the dedicated sites, which meant that 10 km of



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each haul road was spotlighted on foot. Also on both nights the entire length of each haul road was spotlighted while driving slowly by car.

Although these sampling procedures were designed to target specific species such as Butler's Dunnart and the Masked Owl, all vertebrate fauna species caught in the pitfall traps or observed/ heard along the proposed haul road routes during the day and night were recorded.

### *Limitations*

It is important to note that considerable road construction had already taken place along the Andranangoo haul road prior to the survey and was still occurring while the survey was being undertaken. This may have reduced the likelihood of detecting some of the species that we were specifically targeting.

### **Study sites**

The sites chosen for these surveys represented the major habitats present on Andranangoo Creek West and Lethbridge Bay West prospects. The following descriptions together with figures 4-8 illustrate representative examples of each habitat type and Appendix 1 contains location data for each quadrat/ transect sampled.

#### *Melaleuca woodland*

Melaleuca woodland is the dominant vegetation type on the sand dunes associated with the mineral deposit. These communities are dominated by *Melaleuca leucadendra*. *Syzgium suborbiculare* f. coastal, *Acacia auriculiformis* and *Corymbia polycarpa* are also common.

#### *Eucalypt dominated open forest*

Eucalypt open forest is the dominant vegetation type across the savanna of the Top End. At both the Andranangoo and Lethbridge prospects the open forest was the dominant vegetation on the low escarpment inland of the mineral deposits. These forests were dominated by *Eucalyptus miniata*, *E. tetradonta* and *Corymbia nesophila*.

#### *Strand (beach) vegetation*

The beach side vegetation on the primary dunes was dominated by *Casuarina equisetifolia* and *Spinifex longifolius*. *Scaevola taccada* and *Hibiscus tiliaceus* were also common.



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**Figure 4.** Melaleuca woodland.

### *Coastal vine thicket*

Dry vine thicket was particularly common on the Lethbridge Bay West prospect, however many trees had fallen as a result of the passing of Cyclone Ingrid in mid March this year. A range of vine thicket tree and vine species occurred in these communities.

### *Mangroves and saltpans.*

Mangroves and saltpans occurred adjacent to the mineral deposits on both prospects. A range of mangrove species occurred with *Ceriops australis*, *Lumnitzera racemosa*, *Rhizophora stylosa* and *Avicennia marina* all being common.



**Figure 5.** Eucalypt open forest.



**Figure 6.** Strand (beach) vegetation.



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**Figure 7.** Coastal vine thicket.



**Figure 8.** Mangroves on saltpan edge.



## Results

### *Study areas*

A total of 132 species were recorded during surveys of both prospects and both haul roads and of these 12 were mammal species, 98 bird species, 19 reptile species and 3 frog species (see Table 1). The greatest number of species was recorded on the Andranangoo prospect with 94, followed by 84 on the Lethbridge prospect, 58 species along the Lethbridge haul road and 36 species the length of the Andranangoo haul road (see Table 1). At the Andranangoo prospect the site with the greatest species diversity was site 3 with 28 species, which was in open forest (see Appendix 3). At the Lethbridge prospect the site with the highest species diversity was site 8 with 26 species that was also in open forest (see Appendix 4). The beach or strand vegetation communities had the lowest species diversity on both prospects.

Of the 132 species recorded during the survey 22 are considered to have conservation significance and are therefore listed under government legislation (see Table 2). However the majority of species (110) are thought of as common and widespread both on Melville and Bathurst Islands and in the Top-End of the Northern Territory. Therefore the remainder of the report will focus on the species of conservation significance and potential impacts of the development on these species.

### *Introduced species*

The only introduced fauna species recorded during the surveys were Horses and Swamp Buffalo both of which are common on the Tiwi Islands. The traditional owners of the area hunt the Swamp Buffalo.



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**Table 1. Fauna recorded during field surveys.**

**A = Andranangoo Creek West prospect sites. L = Lethbridge Bay West prospect sites. AHR = Andranangoo haul road. LHR = Lethbridge haul road**

| Species                                                    | A | L | AHR | LHR |
|------------------------------------------------------------|---|---|-----|-----|
| <b>Mammals</b>                                             |   |   |     |     |
| Agile Wallaby, <i>Macropus agilis</i>                      | + | + | +   | +   |
| Black Flying-fox, <i>Pteropus alecto</i>                   | + | + |     |     |
| Black-footed Tree-rat, <i>Mesembriomys gouldii</i> *       | + | + | +   |     |
| Brush-tailed Phascogale, <i>Phascogale tapoatafa</i> *     | + |   |     | +   |
| Brush-tailed Possum, <i>Trichosurus vulpecula</i>          | + | + | +   | +   |
| Brush-tailed Rabbit-rat, <i>Conilurus penicillatus</i> *   | + | + |     |     |
| Butler's Dunnart, <i>Sminthopsis butleri</i> # *           |   |   |     | +   |
| Delicate Mouse, <i>Pseudomys delicatulus</i>               | + | + |     | +   |
| Dingo, <i>Canis familiaris</i>                             | + |   |     | +   |
| Grassland Melomys, <i>Melomys burtoni</i>                  | + | + |     |     |
| Horse, <i>Equus caballus</i>                               |   |   |     | +   |
| Northern Brown Bandicoot, <i>Isodon macrourus</i>          | + | + |     |     |
| Pale Field Rat, <i>Rattus tunneyi</i> *                    | + | + |     |     |
| Swamp Buffalo, <i>Bubalus bubalis</i>                      | + | + | +   | +   |
| <b>Birds</b>                                               |   |   |     |     |
| Australian Owlet-nightjar, <i>Aegotheles cristatus</i>     |   |   |     | +   |
| Australian Pelican, <i>Pelecanus conspicillatus</i>        |   | + |     |     |
| Azure Kingfisher, <i>Alcedo azurea</i>                     | + |   |     |     |
| Bar-breasted Honeyeater, <i>Ramsayornis fasciatus</i>      | + |   |     |     |
| Bar-shouldered Dove, <i>Geopelia humeralis</i>             | + | + | +   | +   |
| Bush Stone-curlew, <i>Burhinus grallarius</i>              | + | + | +   | +   |
| Beach Stone-curlew, <i>Esacus neglectus</i>                | + |   |     |     |
| Black Butcherbird, <i>Cracticus quoyi</i>                  | + |   |     |     |
| Black-faced Cuckoo-shrike, <i>Coracina novaehollandiae</i> | + | + | +   | +   |
| Black-necked Stork, <i>Ephippiorhynchus asiaticus</i>      | + | + |     |     |
| Black-tailed Godwit, <i>Limosa limosa</i> (C, J)           |   | + |     |     |
| Black-winged Stilt, <i>Himantopus himantopus</i>           |   | + |     |     |
| Blue-faced Honeyeater, <i>Entomyzon cyanotis</i>           |   |   |     | +   |
| Blue-winged Kookaburra, <i>Dacelo leachii</i>              | + | + | +   | +   |
| Black-shouldered Kite, <i>Elanus axillaris</i>             |   |   |     | +   |
| Brahminy Kite, <i>Haliastur indus</i>                      | + | + |     |     |
| Brolga, <i>Grus rubicundus</i>                             | + |   |     |     |
| Brown Falcon, <i>Falco berigora</i>                        | + |   |     | +   |
| Brown Honeyeater, <i>Lichmera indistincta</i>              | + | + |     | +   |
| Brown Quail, <i>Coturnix ypsilophora</i>                   | + |   |     |     |
| Caspian tern, <i>Sterna caspia</i> (J, C)                  |   | + |     |     |



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| Species                                                  | A | L | AHR | LHR |
|----------------------------------------------------------|---|---|-----|-----|
| Collared Kingfisher, <i>Todiramphus chloris</i>          | + |   |     |     |
| Collared Sparrowhawk, <i>Accipiter cirrhocephalus</i>    |   |   |     | +   |
| Common Bronzewing, <i>Phaps chalcoptera</i>              |   |   | +   | +   |
| Common Greenshank, <i>Tringa nebularia</i> (J, C)        |   | + |     |     |
| Darter, <i>Anhinga melanogaster</i>                      | + |   |     |     |
| Dusky Honeyeater, <i>Myzomela obscura</i>                | + | + |     |     |
| Eastern Reef Egret, <i>Egretta sacra</i> (C)             | + |   |     |     |
| Forest Kingfisher, <i>Todiramphus macleayii</i>          | + | + | +   | +   |
| Great Bowerbird, <i>Chlamydera nuchalis</i>              | + | + |     |     |
| Great Egret, <i>Ardea alba</i> (J, C)                    | + | + |     |     |
| Green-backed Gerygone, <i>Gerygone chloronotus</i>       |   | + |     |     |
| Grey Shrike-thrush, <i>Colluricincla harmonica</i>       | + |   |     | +   |
| Grey Whistler, <i>Pachycephala simplex</i>               | + | + |     |     |
| Grey-crowned Babbler, <i>Pomatostomus temporalis</i>     | + |   | +   | +   |
| Helmeted Friarbird, <i>Philemon buceroides</i>           |   | + |     |     |
| Intermediate Egret, <i>Ardea intermedia</i>              |   | + |     |     |
| Large-billed Gerygone, <i>Gerygone magnirostris</i>      | + |   |     |     |
| Large-tailed Nightjar, <i>Caprimulgus macrurus</i>       | + |   |     |     |
| Leaden Flycatcher, <i>Myiagra rubecula</i> (B)           | + | + |     | +   |
| Lemon-bellied Flycatcher, <i>Microeca flavigaster</i>    | + | + |     |     |
| Little Cormorant, <i>Phalacrocorax carbo</i>             |   | + |     |     |
| Little Friarbird, <i>Philemon citreogularis</i>          | + | + | +   | +   |
| Little Pied Cormorant, <i>Phalacrocorax malanoleucos</i> | + |   |     |     |
| Magpie Goose, <i>Anseranas semipalmata</i>               |   |   | +   | +   |
| Mangrove Gerygone, <i>Gerygone levigaster</i>            | + |   |     |     |
| Mangrove Golden Whistler, <i>Pachycephala melanura</i>   | + |   |     |     |
| Mangrove Robin, <i>Eopsaltria pulverulenta</i>           | + |   |     |     |
| Masked Lapwing, <i>Vanellus miles</i>                    |   | + |     |     |
| Masked Owl, <i>Tyto novaehollandiae</i> # *              | + | + |     | +   |
| Mistletoebird, <i>Dicaeum hirundinaceum</i>              | + | + |     | +   |
| Nankeen Kestrel, <i>Falco cenchroides</i>                |   |   |     | +   |
| Nankeen Night Heron, <i>Nycticorax caledonicus</i>       | + |   |     |     |
| Northern Fantail, <i>Rhipidura rufiventris</i>           | + | + | +   | +   |
| Northern Rosella, <i>Platycercus venustus</i>            | + |   |     | +   |
| Olive-backed Oriole, <i>Oriolus sagittatus</i>           | + | + |     |     |
| Orange-footed Scrubfowl, <i>Megapodius reinwardt</i>     | + | + |     | +   |
| Osprey, <i>Pandion haliaetus</i> (B)                     |   | + |     |     |
| Partridge Pigeon, <i>Geophaps smithii</i> #              |   |   |     | +   |
| Peaceful Dove, <i>Geopelia striata</i>                   | + | + | +   | +   |



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| Species                                                    | A | L | AHR | LHR |
|------------------------------------------------------------|---|---|-----|-----|
| Pied Butcherbird, <i>Cracticus nigrogularis</i>            | + | + | +   | +   |
| Radjah Shelduck, <i>Tadorna radjah</i>                     | + |   |     |     |
| Rainbow Bee-eater, <i>Merops ornatus</i> (J)               | + | + | +   | +   |
| Rainbow Lorikeet, <i>Trichoglossus haematodus</i>          | + | + |     | +   |
| Red-capped Plover, <i>Charadrius ruficapillus</i>          |   | + |     |     |
| Red-headed Honeyeater, <i>Myzomela erythrocephala</i>      | + |   |     |     |
| Red-necked Avocet, <i>Recurvirostra novaehollandiae</i>    |   | + |     |     |
| Red-tailed Black-cockatoo, <i>Calyptorhynchus banksii</i>  | + |   | +   | +   |
| Red-winged Parrot, <i>Aprosmictus erythropterus</i>        | + | + | +   | +   |
| Restless Flycatcher, <i>Myiagra inquieta</i> (B)           | + |   |     |     |
| Rose-crowned Fruit-dove, <i>Ptilinopus regina</i>          |   | + |     |     |
| Rufous Fantail, <i>Rhipidura rufifrons</i> (B)             | + | + |     |     |
| Rufous Whisler, <i>Pachycephala rufiventris</i>            | + | + | +   | +   |
| Rufous-banded honeyeater, <i>Conopophila albogularis</i>   |   | + |     |     |
| Sacred Kingfisher, <i>Todiramphus sanctus</i>              | + |   |     |     |
| Shining Flycatcher, <i>Myiagra alecto</i>                  | + | + |     |     |
| Silver-crowned Friarbird, <i>Philemon argenticeps</i>      | + | + |     | +   |
| Southern Boobook, <i>Ninox novaeseelandiae</i>             | + |   | +   | +   |
| Spangled Drongo, <i>Dicrurus bracteatus</i>                | + | + | +   | +   |
| Spotted Nightjar, <i>Eurostopodus argus</i>                |   |   | +   |     |
| Straw-necked Ibis, <i>Threskiornis spinicollis</i>         |   | + |     |     |
| Striated Pardalote, <i>Pardalotus striatus</i>             | + | + | +   |     |
| Sulphur-crested Cockatoo, <i>Cacatua galerita</i>          | + | + | +   | +   |
| Swamp Harrier, <i>Circus approximans</i>                   | + |   |     |     |
| Tawny Frogmouth, <i>Podargus strigoides</i>                | + | + | +   | +   |
| Torresian Crow, <i>Corvus orru</i>                         | + | + | +   | +   |
| Tree Martin, <i>Hirundo nigricans</i>                      | + | + |     |     |
| Varied Lorikeet, <i>Psitteuteles versicolor</i>            | + |   | +   | +   |
| Varied Triller, <i>Lalage leucomela</i>                    | + | + |     |     |
| Wedge-tailed Eagle, <i>Aquila audax</i>                    |   |   |     | +   |
| Weebill, <i>Smicrornis brevirostris</i>                    |   |   |     | +   |
| Whistling Kite, <i>Haliastur sphenurus</i>                 | + | + | +   | +   |
| White-bellied Cuckoo-shrike, <i>Coracina papuensis</i>     | + | + | +   | +   |
| White-bellied Sea-eagle, <i>Haliaeetus leucogaster</i> (C) |   | + |     |     |
| White-breasted Woodswallow, <i>Artamus leucorhynchus</i>   | + |   |     |     |
| White-gaped Honeyeater, <i>Lichenostomus unicolor</i>      | + | + |     |     |



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| Species                                                                                                                                                                                                                                                                                                                                                   | A         | L         | AHR       | LHR       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| White-throated Honeyeater, <i>Melithreptus albogularis</i>                                                                                                                                                                                                                                                                                                | +         | +         | +         | +         |
| Yellow White-eye, <i>Zosterops luteus</i>                                                                                                                                                                                                                                                                                                                 | +         |           |           |           |
| <b>Reptiles</b>                                                                                                                                                                                                                                                                                                                                           |           |           |           |           |
| Arboreal Snake-Eyed Skink, <i>Cryptoblepharus plagiocephalus</i>                                                                                                                                                                                                                                                                                          | +         | +         | +         | +         |
| Blind Snake, <i>Ramphotyphlops braminus</i>                                                                                                                                                                                                                                                                                                               |           | +         |           |           |
| Bynoes Gecko, <i>Heteronotia bynoei</i>                                                                                                                                                                                                                                                                                                                   | +         | +         |           | +         |
| Darwin Skink, <i>Glaphyromorphus darwiniensis</i>                                                                                                                                                                                                                                                                                                         |           | +         |           |           |
| Grey's Menetia, <i>Menetia greyii</i>                                                                                                                                                                                                                                                                                                                     | +         | +         | +         |           |
| King Brown snake, <i>Pseudechis australis</i>                                                                                                                                                                                                                                                                                                             |           |           |           | +         |
| Legless Lizzard, <i>Delma borea</i>                                                                                                                                                                                                                                                                                                                       | +         |           |           |           |
| Northern Bandy Bandy, <i>Vermicella multifasciata</i> *DD                                                                                                                                                                                                                                                                                                 | +         |           |           |           |
| Northern Two-lined Dragon, <i>Diporiphora bilineata</i>                                                                                                                                                                                                                                                                                                   |           | +         | +         |           |
| Northern Water Dragon, <i>Lophognathus temporalis</i>                                                                                                                                                                                                                                                                                                     | +         | +         |           |           |
| Olive Ridley, <i>Lepidochelys olivacea</i> # *                                                                                                                                                                                                                                                                                                            |           | +         |           |           |
| Orange-naped Snake, <i>Furina ornata</i>                                                                                                                                                                                                                                                                                                                  |           | +         |           |           |
| Port Essington Ctenotus, <i>Ctenotus essingtonii</i>                                                                                                                                                                                                                                                                                                      | +         | +         | +         | +         |
| Red-tailed Snake-eyed Skink, <i>Morethia ruficauda</i>                                                                                                                                                                                                                                                                                                    | +         |           |           |           |
| Saltwater Crocodile, <i>Crocodylus porosus</i> (B)                                                                                                                                                                                                                                                                                                        |           | +         |           |           |
| Sand Monitor, <i>Varanus gouldii</i>                                                                                                                                                                                                                                                                                                                      | +         | +         |           | +         |
| Storr's Snake-eyed Skink, <i>Morethia storri</i>                                                                                                                                                                                                                                                                                                          |           | +         | +         | +         |
| Striped Rainbow Skink, <i>Carlia munda</i>                                                                                                                                                                                                                                                                                                                | +         | +         | +         | +         |
| Three-spined Rainbow Skink, <i>Carlia triacantha</i>                                                                                                                                                                                                                                                                                                      | +         |           |           |           |
| <b>Amphibians</b>                                                                                                                                                                                                                                                                                                                                         |           |           |           |           |
| Marbled Frog, <i>Limnodynastes convexiusculus</i>                                                                                                                                                                                                                                                                                                         |           | +         |           |           |
| Northern Dwarf Tree-frog, <i>Litoria bicolor</i>                                                                                                                                                                                                                                                                                                          | +         | +         |           |           |
| Ornate Burrowing Frog, <i>Limnodynastes ornatus</i> *DD                                                                                                                                                                                                                                                                                                   |           | +         |           |           |
| <b>Total number of species</b>                                                                                                                                                                                                                                                                                                                            | <b>94</b> | <b>84</b> | <b>37</b> | <b>58</b> |
| # Species that are listed as threatened under the EPBCAct.<br>* = Species classified as threatened under the TPWCAAct.<br>J = Japan-Australia migratory bird agreement.<br>C = China-Australia migratory bird agreement<br>B = Bonn convention for the conservation of migratory species<br>DD = Species classified as Data Deficient under the TPWCAAct. |           |           |           |           |



## Species of conservation significance and recommendations

Of the species that were recorded during the survey 22 are listed under government legislation including the EPBCAct and TPWCAAct as well as the CAMBA, JAMBA and the Bonn Convention were recorded during these surveys (see Table 2). Likely impacts of the development on these species are discussed below.

**Table 2. Species of conservation significance and their assigned significance levels.**

EPBCAct = Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBCAct) (Commonwealth of Australia 1999). TPWCAAct = Territory Parks and Wildlife Conservation Act 200 (Parks & Wildlife Commission of the Northern Territory 2001). C = China-Australia Migratory Bird Agreement (CAMBA) 1987. J = Japan-Australia Migratory Birds Agreement (JAMBA) 1974. B = Bonn Convention for the conservation of migratory species 1979. E = Species classified as endangered. V = Species classified as vulnerable. NT = Species classified as near threatened. DD = Species classified as Data Deficient under the TPWCAAct.

| Species                                                | EPBCAct | TPWCAAct | CJB |
|--------------------------------------------------------|---------|----------|-----|
| Black-footed Tree-rat, <i>Mesembriomys gouldii</i>     |         | NT       |     |
| Black-tailed Godwit, <i>Limosa limosa</i>              |         |          | CJ  |
| Brush-tailed Phascogale, <i>Phascogale tapoatafa</i>   |         | V        |     |
| Brush-tailed Rabbit-rat, <i>Conilurus penicillatus</i> |         | V        |     |
| Butler's Dunnart, <i>Sminthopsis butleri</i>           | V       | V        |     |
| Caspian tern, <i>Sterna caspia</i>                     |         |          | CJ  |
| Common Greenshank, <i>Tringa nebularia</i>             |         |          | CJ  |
| Eastern Reef Egret, <i>Egretta sacra</i>               |         |          | C   |
| Great Egret, <i>Ardea alba</i>                         |         |          | CJ  |
| Leaden Flycatcher, <i>Myiagra rubecula</i>             |         |          | B   |
| Masked Owl, <i>Tyto novaehollandiae</i>                | V       | E        |     |
| Northern Bandy Bandy, <i>Vermicella multifasciata</i>  |         | DD       |     |
| Olive Ridley, <i>Lepidochelys olivacea</i>             | E       | DD       |     |
| Ornate Burrowing Frog, <i>Limnodynastes ornatus</i>    |         | DD       |     |
| Osprey, <i>Pandion haliaetus</i>                       |         |          | B   |
| Pale Field Rat, <i>Rattus tunneyi</i>                  |         | NT       |     |
| Partridge Pigeon, <i>Geophaps smithii</i>              | V       |          |     |
| Rainbow Bee-eater, <i>Merops ornatus</i>               |         |          | J   |
| Restless Flycatcher, <i>Myiagra inquieta</i>           |         |          | B   |
| Rufous Fantail, <i>Rhipidura rufifrons</i>             |         |          | B   |
| Saltwater Crocodile, <i>Crocodylus porosus</i>         |         |          | B   |
| White-bellied Sea-eagle, <i>Haliaeetus leucogaster</i> |         |          | C   |



### *Butler's Dunnart*

Butler's Dunnart is listed as vulnerable (EPBCAct & TPWCAct) and was recorded at two locations in open forest along the Lethbridge haul road. This species is known from only two localities, the Kimberley in Western Australia and from the Tiwi Islands, with only six individuals having been caught on the Tiwi Islands (three on Melville) (Woinarski *et al.* 1996; Woinarski 2002 & 2003b).

There is only sparse ecological information available for this species and the few records are associated with a variety of habitats such as eucalypt open forest (e.g. these two recent captures), melaleuca woodland and blacksoil plain and it is known to shelter under logs and other cover (Archer 1979; Woinarski *et al.* 1996; Woinarski 2000).

The impact of the proposed Lethbridge haul road on Butler's Dunnart, given its conservation status, paucity of records and lack of ecological information, could be great. Therefore we recommend that further surveys radiating out from where the two individuals were caught be undertaken before the haul road construction begins. This should be done as soon as possible due to the annual mortality of most males in the population by the end of the dry season (when they are most active and most likely to be encountered). These proposed surveys could provide information on the extent to which they occur in the local area (status). Important ecological information that may prove to be vital for further conservation work may also be gained. We will then be able to make recommendations of possible alternative routes for the haul road.



**Figure 6.** Butler's Dunnart (Lethbridge haul road).



### ***Brush-tailed Rabbit-rat***

The Brush-tailed Rabbit-rat appears to have declined significantly in the Northern Territory and is listed as vulnerable (TPWCAct). The population of Brush-tailed Rabbit-rats on the Tiwi Islands is one of three recognized subspecies (Kemper and Schmitt 1992). Although having declined in the Northern Territory the Brush-tailed Rabbit-rat currently occurs widely on the Tiwi Islands, except on the central plateau and the far east of Melville Island (Woinarski *et al.* 2000 & 2003b). This species was recorded at both prospects, and although the majority of records were from the open forest (adjacent to areas that are apparently to be less disturbed by the mining operation) it was also recorded at site 4 in melaleuca swamp/ vine thicket overlying the mineral deposit which is to be cleared at the Andranangoo prospect (see Figure 2 & Table 2).

The Brush-tailed Rabbit-rat has a small home range of around 1 ha in size in the monsoon tropics of the Northern Territory (Firth 2003; Firth *et al.* in press). Given the small home range of this species and the vegetation clearing that will be associated with the mining process and haul roads is likely to result in the loss of several individuals. Therefore there may be some value in trapping and removing the individuals in areas to be cleared at both the Andranangoo and Lethbridge prospects, and relocating them to adjacent areas and fitting radio-collars to individuals to monitor the success of the translocation.

The Brush-tailed Rabbit-rat is primarily granivorous, (Firth *et al.* 2005) and dens primarily in fallen logs and hollows of *Eucalyptus spp.* and *Corymbia spp.* (bloodwoods). Therefore to facilitate the recolonisation of this species subsequent to the mining operation, the rehabilitation program should ensure the establishment of seed producing plants, particularly native perennial grasses and sedges that currently occur in the area. The retention of hollow logs from areas to be cleared, and their subsequent placement in rehabilitation areas may also facilitate the return of this species following mining.



**Figure 7.** Brush-tailed Rabbit-rat (Andranangoo Creek West).

#### *Brush-tailed Phascogale*

The Brush-tailed Phascogale is also listed as vulnerable under the TPWCA Act. This species mainly inhabits open forest (Cole & Woinarski 2002, Soderquist 1998) and was recorded from the Andranangoo prospect (Site 3) and from the Lethbridge haul road (Site 1 and Transect 3). These records represent only the third and fourth of this species for Melville Island (Woinarski *et al.* 2003b). Given that the mineral deposit is overlain by swamp and vine thicket, and this is where the majority of clearing will occur, there should be minimal disturbance to this species habitat. Clearing in open forest areas away from the mineral deposit should not take place or should be kept to a minimum required for the mining operation.

#### *Masked Owl*

The Tiwi Island subspecies of Masked Owl is recognized as vulnerable under the EPBC Act. Recent analyses of its status has taken place and it is now listed as endangered (TPWCA Act), to reflect the possible loss of prime habitat due to forestry operations (Woinarski *et al.* 2000 & 2003b). Based on population densities recorded elsewhere in Australia and from estimated home ranges of 5–10 km<sup>2</sup> (Kavanagh and Murray 1996) the total population of the Tiwi sub-species was estimated at about 1000 mature birds (Garnett 2000).



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This species is believed to occur mainly in open forest, although it has been shown to roost and forage in a range of habitats (Kavanagh and Murray 1996; Woinarski *et al.* 2000). The Masked Owl was recorded at both mineral prospects, and was located on vegetation overlying the mineral deposit at the Andranangoo and Lethbridge prospects and the Lethbridge haul road. Given the large home range, and varied habitat use of this species the individuals recorded during this survey may well be expected to continue to reside in this area during and subsequent to the mining operation. Minimising clearing and ensuring species which will develop hollows are included in the rehabilitation program will reduce the long-term impact on this species. A monitoring program involving radio-tracking and regular surveying of the individuals in this area would determine if mining does have considerable impact on this species and would provide valuable information on a little known animal. However we would also recommend that surveys be undertaken once mining/operations have ceased as this would give a better indication of mining rehabilitation success. Matilda Minerals have made a commitment to undertake regular surveying for Masked Owls over the life of the operations.



**Figure 8.** Masked Owl (Andranangoo Creek West).

### *Partridge Pigeon*

Partridge Pigeons are also listed as vulnerable under the EPBCAct and by Garnett and Crowley (2000). They have declined noticeably in some regions, possibly due to feral predators, altered fire regimes, grazing and hunting. This species prefers to feed in habitats with an open ground layer, but roosts in areas with dense ground cover. Given the relatively small area to be affected by the widening of the Lethbridge haul road and the Partridge Pigeons preference for “patchy” habitat (a combination of open ground and vegetation cover), it is highly unlikely the proposed power-line will adversely affect this species.



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### ***Black-footed Tree-rat and Pale Field-rat***

Both the Black-footed Tree-rat and the Pale Field-rat were recorded at both prospects and are both listed as Near Threatened (TPWCAct). The Black-footed tree-rat was also recorded at site 5 on the Andranangoo haul road.

The Black-footed Tree-rat is recognised as a subspecies on the Tiwi Islands. This species is considered widespread and abundant on Melville Island (Woinarski *et al.* 2000 & 2003b). As with the Brush-tailed Phascogale the Black-footed Tree-rat occurs mainly in open forest and woodland (Griffiths *et al.* 2002). Therefore not clearing or minimising the clearing of vegetation away from the mineral deposit will minimise the impact upon this species. The clearing of vegetation for the haul roads will most probably impact upon some individuals negatively, however given there wide spread distribution on the Tiwi Islands the overall impact will be minimal.



**Figure 9.** Black-footed Tree-rat (Andranangoo Creek West).



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The Pale Field-rat is common and widespread in the Top End (Cole and Woinarski 2002). Although clearing for mining may result in the loss of some individuals, given the relatively small areas proposed for mining at this stage, there would probably be little impact on the overall population. Ensuring the re-establishment of ground vegetation, especially along the edge of creeks and swamps subsequent to mining will facilitate the recolonisation of this species.

### ***Data deficient species***

The Ornate Burrowing frog and the Northern Bandy Bandy were recorded during these surveys and are both listed as Data Deficient (TPWCAct). The Ornate Burrowing Frog was found at 3 quadrats on the Lethbridge prospect and was common at site 4 with 13 individuals recorded. This species was only recorded at one site in the extensive survey of the Tiwi Islands reported by Woinarski *et al.* (2000 & 2003). This may reflect a concentration of sample sites in open forest habitats, as this species was recorded on Melville Island by both Horner and Griffiths (1998) and Tyler *et al.* (1991). Minimising the disturbance to the water table during the mining process, particularly during the dry season will reduce the impact upon this species. By the very nature of data deficient species it is difficult to judge the conservation significance of this population on a broader scale, although Woinarski *et al.* (2003b) note that the species is more abundant on the mainland than on the Tiwi Islands.

The Northern Bandy Bandy was recorded from one site in the open forest at Andranangoo Creek West. As with other listed species found predominately in open forest, not clearing, or minimizing clearing away from the mineral deposit will reduce the impact on this species.

### ***Migratory bird species***

The majority of bird species that were recorded during this survey and are listed under the JAMBA, CAMBA and Bonn Convention and are birds of coastal habitats (beaches, mangroves, saltpans and intermittent swamps). These included the Caspian Tern, Great Egret, Black-tailed Godwit, Common Greenshank, White-bellied Sea-eagle and Osprey. As mining is not intended to take place in these areas it is unlikely that any major disturbance to these habitats will occur and therefore there should be little impact upon these species.

The Rufous Fantail, listed under the Bonn agreement was recorded in mangrove habitat during this survey, although it also occurs in the dry rainforest communities. Given the relatively small area proposed for clearing, and the large area of mangroves in the area the mining operation could be expected to have little impact on the population of this species at a local or regional scale.

The Rainbow Bee-eater and Leaden Flycatcher are birds of a range of habitats and are listed under the JAMBA and Bonn agreements respectively. Given that these species are common on the Tiwi Islands (Woinarski *et al.* 2003b) and throughout



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Australia it is extremely unlikely that mining will have a significant impact on these species in the local area or in a boarder context.

A single individual of the Restless Flycatcher, listed under the Bonn agreement, was recorded in melaleuca woodland during this survey. Given the large amount of suitable habitat on the Tiwi Islands and that this species is wide spread and common elsewhere in Australia the proposed development is unlikely to have a significant impact at a local or broader scale.

No significant roosting, nesting or breeding sites were located during this survey.

### *Tiwi subspecies of birds*

The Tiwi Islands population of the Striated Pardalote and the Brown Honeyeater are both recognised as subspecies. They are however common and widespread on the Tiwi Islands (Woinarski *et al.* 2000) and the mining operation would not be expected to have any detrimental impact on these species.

### *Reptiles*

A large saltwater crocodiles was sighted on the waters edge at the Lethbridge prospect (Bonn convention). This species is unlikely to be impacted upon by the terrestrial mining operation, although their presence should be considered in workplace health and safety plans at the proposed mine site.

There were signs of sea turtles at both sites however these are the subjects of a separate report (see Guinea 2005).

### *New records for the Tiwi Islands*

The Red-necked Avocet (Lethbridge) and the Swamp Harrier (Andranangoo) recorded during this survey were not recorded during the surveys, or the assessment of historical records, of the Tiwi Islands reported by Woinarski *et al.* (2000 & 2003a, b). Both species are however occasionally recorded on the adjacent mainland. We also recorded the Black-shouldered Kite during the recent Lethbridge haul road survey, which is a new record for Melville Island.

## **Conservation values of significant habitats**

Melaleuca communities dominated the dunes containing the mineral deposit. This community will be affected directly by clearing, and there is potential for more widespread disturbance to these communities as a result of changes to the water table associated with mining activity. This is likely to result in the loss of individual animals. However as this community type occurs widely on the Tiwi Islands and



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across the Top End it is unlikely to have a significant impact on the overall population of any vertebrate species.

Dry Vine thicket also occurs on the sand dunes overlying the mineral deposits particularly on the Lethbridge Bay West prospect. This community type has been recognized as important to conservation on the Tiwi Islands (Woinarski *et al.* 2000 & 2003a, b). The high conservation value of these communities particularly for plants has also been recognized in other areas of the Top End (e.g. Price *et al.* 2000; Russell-Smith & Bowman 1992). As with Melaleuca communities the loss of this habitat is likely to result in the loss of individual animals at a local scale, however given the relatively small area proposed for mining at this stage, it is unlikely to have a significant affect upon the populations of species using this habitat type on the Tiwi Islands or across the Top End.

A Rainforest patch was observed approximately 200 m from Site 3 on the Lethbridge haul road. These communities have high conservation value and so it is therefore important that this patch is not disturbed during the widening phase of the current track.

Open forest is a very widespread vegetation community on the Tiwi Islands and across the Top End (Woinarski *et al.* 2000 & 2003a, b). As the mineral deposits occur on the sand dunes that support primarily swamp and vine thicket communities, little open forest should be directly affected by mining activity. The construction of both haul roads to each of the mineral leases and subsequent increased human access to the area may have implications for the open forest by increasing the extent, distribution and timing of fires and hunting. As the majority of vertebrate species of conservation significance recorded during this survey are found predominately in this habitat, clearing and disturbance to this habitat should be minimised.

Mangrove and salt-flats occur adjacent to the mineral deposits at both prospects. Given that there is no intention to mine these communities they should be little affected by the proposed development. However a buffer zone adjacent to these habitats would further reduce the likelihood of disturbance to these communities.

The strand (beach) community is typical of that which occurs along much of the coast of the Tiwi Islands and the Top End. A buffer zone of 200 m between mining operations and the high tide mark has already been suggested by Guinea (2005) for Sea turtles, which nest on the beaches. This should also minimise the potential for disturbance to this community.

A large open swamp, which is connected to mangroves, occurs adjacent to the mineral deposit on the Andranangoo prospect. The fauna of this area was not part of



this survey, so we are unable to comment directly on the conservation significance of this habitat. The relatively large size of this swamp is not common and as a result this area may have some conservation significance on the Tiwi Islands, although such swamps do occur across the Top End. There is no plan to mine this area, however we still recommend that buffer zones be put in place around this swamp. There are currently hydrological studies being undertaken in the area, consequently the results of these hydrological surveys will help to determine if further surveys are required.

## **Other threats to fauna biodiversity**

Other potential threats to fauna biodiversity associated with the proposed mining activity on both the Andranangoo and Lethbridge prospects include the introduction of weeds (Gamba grass etc.) and introduced fauna such as ants (see Andersen *et al.* 2003) and cane toads. These introduced weeds and fauna will most probably be linked with an increase in traffic to the area associated with mining activity and increased local traffic brought about by better access to the area as a result of the mining haul roads. The result of impacts such as these are difficult to determine, therefore every effort should be made to monitor and manage these sites for weeds and introduced fauna throughout the life of the mine and the subsequent rehabilitation that should occur in these areas.

A rehabilitation program that aims to return vegetation communities similar to, and in comparable proportions to those existing prior to mining would result in the minimum long-term impact of mining activity on these areas.

## **Aboriginal significance of vertebrate fauna**

Appendix 1 provides Aboriginal names and uses for some of the animals recorded during this survey (Source; Tiwi Plants and Animals: Aboriginal Flora and Fauna Knowledge From Bathurst and Melville Islands, Northern Australia, by Justin Puruntatameri). There is a great deal more knowledge about animals that is of a sacred or secret nature. This knowledge relates to ceremonies, dreamtime and creation stories, healing practices and other areas (Puruntatameri 2001). Therefore discussing these issues in more detail is beyond the scope of this report.



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## Appendices

### Appendix 1. Location and habitat type of survey quadrats/ transects for both prospects.

| Sites                | Habitat                    | Easting (UTM,<br>WGS 84) | Northing (UTM,<br>WGS 84) |
|----------------------|----------------------------|--------------------------|---------------------------|
| <b>Andranangoo 1</b> | Mangrove                   | 703929                   | 8743532                   |
| <b>Andranangoo 2</b> | Melaleuca woodland         | 703614                   | 8743484                   |
| <b>Andranangoo 3</b> | Open forest                | 701524                   | 8743100                   |
| <b>Andranangoo 4</b> | Melaleuca/ Vine<br>thicket | 701555                   | 8740220                   |
| <b>Andranangoo 5</b> | Open forest                | 700883                   | 8743146                   |
| <b>Andranangoo 6</b> | Strand (beach)             | 698376                   | 8743268                   |
| <b>Andranangoo 7</b> | Melaleuca woodland         | 698564                   | 8743150                   |
| <b>Andranangoo 8</b> | Open forest                | 700401                   | 8742888                   |
| <b>Lethbridge 1</b>  | Strand (beach)             | 718203                   | 8743628                   |
| <b>Lethbridge 2</b>  | Vine thicket               | 718136                   | 8743336                   |
| <b>Lethbridge 3</b>  | Vine thicket/ Swamp        | 718018                   | 8743552                   |
| <b>Lethbridge 4</b>  | Melaleuca woodland         | 718767                   | 8743244                   |
| <b>Lethbridge 5</b>  | Open forest                | 718251                   | 8741420                   |
| <b>Lethbridge 6</b>  | Open forest                | 718415                   | 8742952                   |
| <b>Lethbridge 7</b>  | Mangrove/ Saltpan          | 717981                   | 8742928                   |
| <b>Lethbridge 8</b>  | Open forest                | 718097                   | 8742928                   |



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### **Appendix 2. Location of survey sites/ transects for both haul roads.**

| <b>SITES</b>       | <b>Easting (UTM,<br/>WGS 84)</b> | <b>Northing (UTM,<br/>WGS 84)</b> |
|--------------------|----------------------------------|-----------------------------------|
| <b>Andranangoo</b> |                                  |                                   |
| Site 1             | 703929                           | 8743532                           |
| Site 2             | 703081                           | 8729224                           |
| Site 3             | 707375                           | 8720368                           |
| Site 4             | 714354                           | 8713366                           |
| Site 5             | 717113                           | 8704300                           |
| Transect 1         | 710299                           | 8702520                           |
| Transect 2         | 713122                           | 8701256                           |
| Transect 3         | 717548                           | 8709812                           |
| Transect 4         | 710378                           | 8716456                           |
| Transect 5         | 704158                           | 8724286                           |
| <b>Lethbridge</b>  |                                  |                                   |
| Site 1             | 713413                           | 8739472                           |
| Site 2             | 715808                           | 8730472                           |
| Site 3             | 718325                           | 8721672                           |
| Site 4             | 725369                           | 8715326                           |
| Site 5             | 730014                           | 8708786                           |
| Transect 1         | 717582                           | 8705380                           |
| Transect 2         | 726703                           | 8706052                           |
| Transect 3         | 727456                           | 8712312                           |
| Transect 4         | 721637                           | 8718364                           |
| Transect 5         | 716285                           | 8725918                           |



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### Appendix 3. Fauna species recorded in quadrats/ sites at the Andranangoo Creek West prospect.

| Species                                                    | 1 | 2 | 3 | 4 | 5 | 6  | 7 | 8 | Incidental |
|------------------------------------------------------------|---|---|---|---|---|----|---|---|------------|
| <b>Mammals</b>                                             |   |   |   |   |   |    |   |   |            |
| Agile Wallaby, <i>Macropus agilis</i>                      |   |   | S |   |   |    | S |   | #          |
| Black Flying-fox, <i>Pteropus alecto</i>                   |   |   |   |   |   |    |   |   | #          |
| Black-footed Tree-rat, <i>Mesembriomys gouldii</i> *       |   |   | 2 |   | 2 |    |   | 1 |            |
| Brush-tailed Phascogale, <i>Phascogale tapoatafa</i> *     |   |   | 1 |   |   |    |   |   |            |
| Brush-tailed Possum, <i>Trichosurus vulpecula</i>          |   |   |   |   | 1 |    |   |   |            |
| Brush-tailed Rabbit-rat, <i>Conilurus penicillatus</i> *   |   |   | 1 | 1 |   |    |   | 2 | #          |
| Delicate Mouse, <i>Pseudomys delicatulus</i>               |   |   |   |   |   | 2  | 1 |   |            |
| Dingo, <i>Canis familiaris</i>                             |   |   |   |   |   |    |   |   | #          |
| Grassland Melomys, <i>Melomys burtoni</i>                  | 2 | 2 |   |   |   | 12 |   |   |            |
| Northern Brown Bandicoot, <i>Isodon macrourus</i>          | 1 | S |   |   |   |    | 1 | 1 |            |
| Pale Field Rat, <i>Rattus tunneyi</i> *                    | 3 | 6 | 1 |   |   |    |   |   |            |
| Swamp Buffalo, <i>Bubalus bubalis</i>                      | S |   |   | 1 |   |    | S |   |            |
| <b>Birds</b>                                               |   |   |   |   |   |    |   |   |            |
| Azure Kingfisher, <i>Alcedo azurea</i>                     |   |   |   |   |   |    |   |   | #          |
| Bar-breasted Honeyeater, <i>Ramsayornis fasciatus</i>      |   |   |   |   |   |    |   |   | #          |
| Bar-shouldered Dove, <i>Geopelia humeralis</i>             | 3 | 1 | 1 | 2 | 1 |    |   |   |            |
| Bush Stone-curlew, <i>Burhinus grallarius</i>              |   |   |   |   |   |    |   |   | #          |
| Beach Stone-curlew, <i>Esacus neglectus</i>                |   |   |   |   |   |    |   |   | #          |
| Black Butcherbird, <i>Cracticus quoyi</i>                  | 1 |   |   |   |   |    |   |   |            |
| Black-faced Cuckoo-shrike, <i>Coracina novaehollandiae</i> |   |   |   |   | 2 | 1  |   | 1 |            |
| Black-necked Stork, <i>Ephippiorhynchus asiaticus</i>      | 1 |   |   |   |   |    |   |   |            |



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| Species                                                  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Incidental |
|----------------------------------------------------------|---|---|---|---|---|---|---|---|------------|
| Blue-winged Kookaburra, <i>Dacelo leachii</i>            |   |   | 1 |   |   |   |   |   |            |
| Brahminy Kite, <i>Haliastur indus</i>                    | 1 |   |   | 2 |   |   |   |   |            |
| Brolga, <i>Grus rubicundus</i>                           |   |   |   |   |   |   |   |   | #          |
| Brown Falcon, <i>Falco berigora</i>                      |   |   |   |   |   |   |   | 1 |            |
| Brown Honeyeater, <i>Lichmera indistincta</i>            | 3 | 2 | 2 |   |   |   | 1 |   |            |
| Brown Quail, <i>Coturnix ypsilophora</i>                 |   |   |   |   |   |   |   | 1 | #          |
| Collared Kingfisher, <i>Todiramphus chloris</i>          |   |   |   |   |   |   |   |   | #          |
| Darter, <i>Anhinga melanogaster</i>                      | 1 |   |   |   |   |   |   |   | #          |
| Dusky Honeyeater, <i>Myzomela obscura</i>                |   |   |   |   |   |   |   |   | #          |
| Eastern Reef Egret, <i>Egretta sacra</i> (C)             |   |   |   |   |   |   |   |   | #          |
| Forest Kingfisher, <i>Todiramphus macleayii</i>          |   |   | 1 | 2 |   |   |   | 1 |            |
| Great Bowerbird, <i>Chlamydera nuchalis</i>              | 1 |   |   |   |   | 1 |   |   |            |
| Great Egret, <i>Ardea alba</i> (J, C)                    |   |   |   |   |   |   |   |   | #          |
| Grey Shrike-thrush, <i>Colluricincla harmonica</i>       |   |   |   |   |   |   |   |   | #          |
| Grey Whistler, <i>Pachycephala simplex</i>               | 1 |   |   |   |   |   |   |   |            |
| Grey-crowned Babbler, <i>Pomatostomus temporalis</i>     |   |   |   |   |   |   |   |   | #          |
| Large-billed Gerygone, <i>Gerygone magnirostris</i>      | 1 |   |   |   |   |   |   |   |            |
| Large-tailed Nightjar, <i>Caprimulgus macrurus</i>       |   |   |   |   |   |   |   |   | #          |
| Leaden Flycatcher, <i>Myiagra rubecula</i> (B)           |   |   | 1 |   | 2 |   |   |   |            |
| Lemon-bellied Flycatcher, <i>Microeca flavigaster</i>    | 1 |   |   |   |   |   | 2 |   |            |
| Little Friarbird, <i>Philemon citreogularis</i>          |   |   |   |   | 2 |   | 1 |   |            |
| Little Pied Cormorant, <i>Phalacrocorax malanoleucos</i> |   |   |   |   |   |   |   |   | #          |
| Mangrove Gerygone, <i>Gerygone levigaster</i>            |   |   |   |   |   |   |   |   | #          |
| Mangrove Golden Whistler, <i>Pachycephala</i>            |   |   |   |   |   |   |   |   | #          |



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| <i>melanura</i>                                           |   |   |   |   |   |   |   |   |            |  |
|-----------------------------------------------------------|---|---|---|---|---|---|---|---|------------|--|
| Species                                                   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Incidental |  |
| Mangrove Robin, <i>Eopsaltria pulverulenta</i>            |   |   |   |   |   |   |   |   | #          |  |
| Masked Owl, <i>Tyto novaehollandiae</i> <sup>+</sup> *    |   | 1 |   |   |   |   |   |   |            |  |
| Mistletoebird, <i>Dicaeum hirundinaceum</i>               |   |   |   |   |   |   |   |   | #          |  |
| Nankeen Night Heron, <i>Nycticorax caledonicus</i>        |   |   |   |   |   |   |   |   | #          |  |
| Northern Fantail, <i>Rhipidura rufiventris</i>            | 2 | 6 | 2 | 2 | 3 |   |   |   |            |  |
| Northern Rosella, <i>Platycercus venustus</i>             |   |   |   |   | 2 |   |   |   |            |  |
| Olive-backed Oriole, <i>Oriolus sagittatus</i>            |   |   |   |   |   |   |   |   | #          |  |
| Orange-footed Scrubfowl, <i>Megapodius reinwardt</i>      |   |   | 1 |   |   |   |   |   | #          |  |
| Peaceful Dove, <i>Geopelia striata</i>                    |   |   | 1 | 1 |   |   |   | 1 |            |  |
| Pied Butcherbird, <i>Cracticus nigrogularis</i>           |   |   |   |   |   |   |   | 1 |            |  |
| Radjah Shelduck, <i>Tadorna radjah</i>                    | 2 |   |   |   |   |   |   |   | #          |  |
| Rainbow Bee-eater, <i>Merops ornatus</i> (J)              |   |   | 1 | 1 |   | 2 | 1 |   |            |  |
| Rainbow Lorikeet, <i>Trichoglossus haematodus</i>         |   |   |   |   |   |   |   |   | #          |  |
| Red-headed Honeyeater, <i>Myzomela erythrocephala</i>     |   |   |   |   |   |   |   |   | #          |  |
| Red-tailed Black-cockatoo, <i>Calyptorhynchus banksii</i> |   |   |   |   |   |   |   |   | #          |  |
| Red-winged Parrot, <i>Aprosmictus erythropterus</i>       |   |   |   |   | 2 |   |   | 1 |            |  |
| Restless Flycatcher, <i>Myiagra inquieta</i> (B)          |   | 1 |   |   |   |   |   |   |            |  |
| Rufous Fantail, <i>Rhipidura rufifrons</i> (B)            |   |   |   |   |   |   |   |   | #          |  |
| Rufous Whisler, <i>Pachycephala rufiventris</i>           |   | 4 | 2 | 1 | 2 |   | 2 | 1 |            |  |
| Sacred Kingfisher, <i>Todiramphus sanctus</i>             |   |   |   |   |   |   |   |   | #          |  |
| Shining Flycatcher, <i>Myiagra alecto</i>                 | 1 |   |   |   |   |   |   |   |            |  |
| Silver-crowned Friarbird, <i>Philemon argenticeps</i>     |   | 2 | 2 | 2 | 4 |   |   |   |            |  |



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| Species                                                          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Incidental |
|------------------------------------------------------------------|---|---|---|---|---|---|---|---|------------|
| Southern Boobook, <i>Ninox novaeseelandiae</i>                   | 1 |   |   |   |   |   |   |   |            |
| Spangled Drongo, <i>Dicrurus bracteatus</i>                      |   |   |   |   |   |   |   |   | #          |
| Striated Pardalote, <i>Pardalotus striatus</i>                   |   | 1 | 3 | 1 | 2 | 3 |   |   |            |
| Sulphur-crested Cockatoo, <i>Cacatua galerita</i>                |   |   |   | 1 |   |   |   |   | #          |
| Swamp Harrier, <i>Circus approximans</i>                         |   |   |   |   |   |   |   |   | #          |
| Tawny Frogmouth, <i>Podargus strigoides</i>                      |   |   |   | 1 |   |   |   |   |            |
| Torresian Crow, <i>Corvus orru</i>                               |   |   |   |   |   |   |   |   | #          |
| Tree Martin, <i>Hirundo nigricans</i>                            |   |   | 3 |   |   |   |   |   |            |
| Varied Lorikeet, <i>Psitteuteles versicolor</i>                  |   |   |   |   |   |   |   |   | #          |
| Varied Triller, <i>Lalage leucomela</i>                          |   |   | 1 | 1 |   |   |   |   |            |
| Whistling Kite, <i>Haliastur sphenurus</i>                       |   |   |   | 1 |   | 1 |   |   |            |
| White-bellied Cuckoo-shrike, <i>Coracina papuensis</i>           |   |   | 2 | 1 | 1 | 1 |   |   |            |
| White-breasted Woodswallow, <i>Artamus leucorhynchus</i>         |   |   |   |   |   |   |   |   | #          |
| White-gaped Honeyeater, <i>Lichenostomus unicolor</i>            |   |   | 1 |   |   |   |   |   |            |
| White-throated Honeyeater, <i>Melithreptus albogularis</i>       | 1 | 2 | 4 | 6 | 4 |   | 1 | 2 |            |
| Yellow White-eye, <i>Zosterops luteus</i>                        |   |   |   |   |   |   |   |   | #          |
| <b>Reptiles</b>                                                  |   |   |   |   |   |   |   |   |            |
| Arboreal Snake-Eyed Skink, <i>Cryptoblepharus plagiocephalus</i> | 2 | 2 | 1 | 5 |   |   |   |   |            |
| Bynoes Gecko, <i>Heteronotia bynoei</i>                          |   |   |   |   | 2 |   |   | 1 |            |
| Grey's Menetia, <i>Menetia greyii</i>                            |   | 1 |   |   |   |   |   | 4 |            |
| Legless Lizzard, <i>Delma borea</i>                              |   |   | 1 |   |   |   |   |   |            |



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| Species                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | Incidental |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| Northern Bandy Bandy, <i>Vermicella multifasciata</i> *DD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |           | 1         |           |           |           |           |           |            |
| Northern Water Dragon, <i>Lophognathus temporalis</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |           |           |           |           |           |           |           | #          |
| Port Essington Ctenotus, <i>Ctenotus essingtonii</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |           | 2         | 3         | 2         | 1         | 3         |           | 2         |            |
| Red-tailed Snake-eyed Skink, <i>Morethia ruficauda</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |           |           |           | 1         |           |           |           |            |
| Sand Monitor, <i>Varanus gouldii</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |           |           | S         | S         | S         | S         | S         |           |            |
| Striped Rainbow Skink, <i>Carlia munda</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |           | 3         |           |           |           |           |           |            |
| Three-spined Rainbow Skink, <i>Carlia triacantha</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |           |           |           | 1         |           |           |           |           |            |
| <b>Amphibians</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |           |           |           |           |           |           |           |           |            |
| Northern Dwarf Tree-frog, <i>Litoria bicolor</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |           |           |           | 1         |           |           |           |           |            |
| <b>Total number of species</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>20</b> | <b>15</b> | <b>28</b> | <b>22</b> | <b>18</b> | <b>10</b> | <b>11</b> | <b>15</b> | <b>40</b>  |
| <sup>+</sup> Species that are listed as threatened under the EPBCAct.<br>* = Species classified as threatened under the TPWCAct.<br># = Species that were seen incidentally in the area but not recorded in the quadrats.<br>S = Signs &/ or scats.<br>J = Japan-Australia migratory bird agreement.<br>C = China-Australia migratory bird agreement<br>B = Bonn convention for the conservation of migratory species<br>Numbers in the table for each species refer to the number of animals caught or seen in each of the quadrats over three trap nights. |           |           |           |           |           |           |           |           |            |



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### Appendix 4. Fauna species recorded in quadrats/ sites at the Lethbridge Bay West prospect.

| Species                                                    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Incidental |
|------------------------------------------------------------|---|---|---|---|---|---|---|---|------------|
| <b>Mammals</b>                                             |   |   |   |   |   |   |   |   |            |
| Agile Wallaby, <i>Macropus agilis</i>                      | S |   | 1 | 2 |   |   |   |   | #          |
| Black Flying-fox, <i>Pteropus alecto</i>                   |   |   |   |   |   | 1 |   |   |            |
| Black-footed Tree-rat, <i>Mesembriomys gouldii</i> *       | 1 |   |   |   |   |   |   |   |            |
| Brush-tailed Possum, <i>Trichosurus vulpecula</i>          |   | 1 | 2 | 1 |   |   |   |   |            |
| Brush-tailed Rabbit-rat, <i>Conilurus penicillatus</i> *   |   |   |   |   |   |   |   | 1 |            |
| Delicate Mouse, <i>Pseudomys delicatulus</i>               |   |   |   |   | 2 |   |   | 2 |            |
| Grassland Melomys, <i>Melomys burtoni</i>                  | 4 | 8 | 3 | 1 |   |   | 7 | 1 |            |
| Northern Brown Bandicoot, <i>Isodon macrourus</i>          |   |   |   | S |   | S |   | S |            |
| Pale Field Rat, <i>Rattus tunneyi</i> *                    | 1 |   |   | 4 |   |   |   |   |            |
| Swamp Buffalo, <i>Bubalis bubalis</i>                      |   |   | S |   |   | S | 1 |   | #          |
| <b>Birds</b>                                               |   |   |   |   |   |   |   |   |            |
| Australian Pelican, <i>Pelecanus conspicillatus</i>        |   |   |   |   |   |   |   |   | #          |
| Bar-shouldered Dove, <i>Geopelia humeralis</i>             |   | 5 |   | 2 |   |   | 4 | 3 | #          |
| Black-faced Cuckoo-shrike, <i>Coracina novaehollandiae</i> |   |   |   |   |   |   |   | 1 | #          |
| Black-knecked Stork, <i>Ephippiorhynchus asiaticus</i>     |   |   |   |   |   |   | 1 |   |            |
| Black-tailed Godwit, <i>Limosa limosa</i> (C, J)           |   |   |   |   |   |   |   |   | #          |
| Black-winged Stilt, <i>Himantopus himantopus</i>           |   |   |   |   |   |   |   |   | #          |
| Blue-winged Kookaburra, <i>Dacelo leachii</i>              |   |   |   |   |   | 1 | 1 | 2 | #          |
| Brahminy Kite, <i>Haliastur indus</i>                      |   |   |   |   |   |   |   |   | #          |
| Brown Honeyeater, <i>Lichmera indistincta</i>              |   |   |   | 1 |   |   |   |   |            |
| Bush Stone-curlew, <i>Burhinus grallarius</i>              |   |   |   |   |   |   |   |   | #          |
| Caspian tern, <i>Sterna caspia</i> (J, C)                  |   |   |   |   |   |   |   |   | #          |



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| Species                                               | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Incidental |
|-------------------------------------------------------|---|---|---|---|---|---|---|---|------------|
| Common Greenshank, <i>Tringa nebularia</i> (J, C)     |   |   |   |   |   |   |   |   | #          |
| Dusky Honeyeater, <i>Myzomela obscura</i>             |   |   |   |   |   |   | 2 |   |            |
| Forest Kingfisher, <i>Todiramphus macleayii</i>       |   | 1 |   | 2 |   | 2 |   | 2 |            |
| Great Bowerbird, <i>Chlamydera nuchalis</i>           |   | 1 |   |   |   |   | 1 |   |            |
| Great Egret, <i>Ardea alba</i> (J, C)                 |   |   |   |   |   |   |   |   | #          |
| Green-backed Gerygone, <i>Gerygone chloronotus</i>    |   | 2 | 5 |   |   |   |   |   |            |
| Grey Whistler, <i>Pachycephala simplex</i>            |   | 1 | 1 |   |   |   | 1 |   |            |
| Helmeted Friarbird, <i>Philemon buceroides</i>        |   | 1 |   |   |   |   |   |   |            |
| Intermediate Egret, <i>Ardea intermedia</i>           |   |   |   |   |   |   |   |   | #          |
| Leaden Flycatcher, <i>Myiagra rubecula</i> (B)        |   | 2 | 2 | 3 | 3 | 2 | 3 |   |            |
| Lemon-bellied Flycatcher, <i>Microeca flavigaster</i> |   |   |   |   |   |   | 2 |   |            |
| Little Cormorant, <i>Phalacrocorax carbo</i>          |   |   |   |   |   |   |   |   | #          |
| Little Friarbird, <i>Philemon citreogularis</i>       |   |   |   | 1 |   |   |   |   | #          |
| Masked Lapwing, <i>Vanellus miles</i>                 |   |   |   |   |   |   |   |   | #          |
| Masked Owl, <i>Tyto novaehollandiae</i> + *           |   |   |   | 1 |   |   |   |   |            |
| Mistletoebird, <i>Dicaeum hirundinaceum</i>           |   | 1 | 1 |   | 1 |   |   |   |            |
| Northern Fantail, <i>Rhipidura rufiventris</i>        |   | 3 | 2 | 2 | 2 | 1 | 1 | 1 |            |
| Olive-backed Oriole, <i>Oriolus sagittatus</i>        |   | 2 |   |   |   |   |   |   |            |
| Orange-footed Scrubfowl, <i>Megapodius reinwardt</i>  |   |   | S | 1 |   |   | 1 |   | #          |
| Osprey, <i>Pandion haliaetus</i> (B)                  | 2 |   |   |   |   |   |   |   |            |
| Peaceful Dove, <i>Geopelia striata</i>                |   |   |   |   |   |   |   | 5 | #          |
| Pied Butcherbird, <i>Cracticus nigrogularis</i>       |   |   |   |   | 3 |   |   |   | #          |
| Rainbow Bee-eater, <i>Merops ornatus</i> (J)          |   |   |   |   |   |   | 4 |   | #          |
| Rainbow Lorikeet, <i>Trichoglossus haematodus</i>     |   |   |   |   |   |   |   | 1 | #          |
| Red-capped Plover, <i>Charadrius ruficapillus</i>     |   |   |   |   |   |   |   |   | #          |
| Red-necked Avocet, <i>Recurvirostra</i>               |   |   |   |   |   |   |   |   | #          |



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| <i>novaehollandiae</i>                                     |   |   |   |   |   |   |   |   |            |
|------------------------------------------------------------|---|---|---|---|---|---|---|---|------------|
| Species                                                    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Incidental |
| Red-winged Parrot, <i>Aprosmictus erythropterus</i>        |   |   |   |   | 1 |   |   | 3 | #          |
| Rose-crowned Fruit-dove, <i>Ptilinopus regina</i>          |   | 1 |   |   |   |   |   |   |            |
| Rufous Fantail, <i>Rhipidura rufifrons</i>                 |   |   | 1 |   |   |   |   |   |            |
| Rufous Whistler, <i>Pachycephala rufiventris</i>           |   | 3 | 3 | 2 | 5 | 1 | 4 | 1 |            |
| Rufous-banded honeyeater, <i>Conopophila albogularis</i>   |   |   |   |   |   |   | 1 |   |            |
| Shining Flycatcher, <i>Myiagra alecto</i>                  |   |   | 1 |   |   |   |   |   |            |
| Silver-crowned Friarbird, <i>Philemon argenticeps</i>      |   |   |   |   | 3 |   |   |   | #          |
| Spangled Drongo, <i>Dicrurus bracteatus</i>                |   |   | 2 | 1 |   |   |   |   | #          |
| Straw-necked Ibis, <i>Threskiornis spinicollis</i>         |   |   |   |   |   |   |   |   | #          |
| Striated Pardalote, <i>Pardalotus striatus</i>             |   | 1 |   |   |   | 2 | 1 | 2 |            |
| Sulphur-crested Cockatoo, <i>Cacatua galerita</i>          |   |   | 1 | 1 |   |   |   |   |            |
| Tawny Frogmouth, <i>Podargus strigoides</i>                | 1 |   |   |   |   |   | 1 |   | #          |
| Torresian Crow, <i>Corvus orru</i>                         |   |   |   |   |   |   |   | 1 | #          |
| Tree Martin, <i>Hirundo nigricans</i>                      |   |   |   |   |   |   |   |   | #          |
| Varied Triller, <i>Lalage leucomela</i>                    |   | 1 | 1 |   |   |   |   |   |            |
| Whistling Kite, <i>Haliastur sphenurus</i>                 |   |   |   |   |   |   |   |   | #          |
| White-bellied Cuckoo-shrike, <i>Coracina papuensis</i>     |   |   | 3 | 1 | 4 | 1 |   | 1 |            |
| White-bellied Sea-eagle, <i>Haliaeetus leucogaster</i> (C) | 2 |   |   |   |   |   |   |   | #          |
| White-gaped Honeyeater, <i>Lichenostomus unicolor</i>      |   | 2 | 4 | 2 |   |   |   |   |            |
| White-throated Honeyeater, <i>Melithreptus albogularis</i> |   | 2 | 1 | 1 | 5 | 2 |   | 5 |            |



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| Species                                                                                                                                                                                                                    | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8         | Incidental |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| <b>Reptiles</b>                                                                                                                                                                                                            |           |           |           |           |           |           |           |           |            |
| Arboreal Snake-Eyed Skink, <i>Cryptoblepharus plagiocephalus</i>                                                                                                                                                           |           |           | 3         |           | 1         | 2         |           | 3         |            |
| Blind Snake, <i>Ramphotyphlops braminus</i>                                                                                                                                                                                |           |           |           |           |           | 1         |           | 1         |            |
| Bynoes Gecko, <i>Heteronotia bynoei</i>                                                                                                                                                                                    |           |           |           |           | 6         |           |           |           | #          |
| Darwin Skink, <i>Glaphyromorphus darwiniensis</i>                                                                                                                                                                          |           | 1         |           | 1         |           |           |           |           |            |
| Grey's Menetia, <i>Menetia greyii</i>                                                                                                                                                                                      |           |           |           |           | 2         | 1         |           | 1         |            |
| Northern Two-lined Dragon, <i>Diporiphora bilineata</i>                                                                                                                                                                    |           |           |           |           | 2         | 1         |           | 1         |            |
| Northern Water Dragon, <i>Lophognathus temporalis</i>                                                                                                                                                                      |           |           | 3         |           |           |           |           |           | #          |
| Olive Ridley, <i>Lepidochelys olivacea</i> <sup>+</sup> *                                                                                                                                                                  | S         |           |           |           |           |           |           |           |            |
| Orange-naped Snake, <i>Furina ornata</i>                                                                                                                                                                                   |           |           |           |           |           |           |           | 1         |            |
| Port Essington Ctenotus, <i>Ctenotus essingtonii</i>                                                                                                                                                                       | 1         |           | 2         |           | 3         | 2         |           | 6         |            |
| Saltwater Crocodile, <i>Crocodylus porosus</i> (B)                                                                                                                                                                         | 1         |           |           |           |           |           |           |           |            |
| Sand Monitor, <i>Varanus gouldii</i>                                                                                                                                                                                       |           |           | S         |           |           |           |           |           |            |
| Storr's Snake-eyed Skink, <i>Morethia storri</i>                                                                                                                                                                           |           |           | 3         |           |           |           | 2         | 1         |            |
| Striped Rainbow Skink, <i>Carlia munda</i>                                                                                                                                                                                 |           |           | 2         |           | 6         | 1         | 2         | 2         |            |
| <b>Amphibians</b>                                                                                                                                                                                                          |           |           |           |           |           |           |           |           |            |
| Marbled Frog, <i>Limnodynastes convexiusculus</i>                                                                                                                                                                          |           | 2         |           | 2         |           |           |           |           |            |
| Northern Dwarf Tree-frog, <i>Litoria bicolor</i>                                                                                                                                                                           |           |           |           |           |           |           |           | 1         |            |
| Ornate Burrowing Frog, <i>Limnodynastes ornatus</i> *DD                                                                                                                                                                    |           | 2         |           | 13        |           |           | 1         |           |            |
| <b>Total number of species</b>                                                                                                                                                                                             | <b>10</b> | <b>21</b> | <b>25</b> | <b>22</b> | <b>16</b> | <b>17</b> | <b>20</b> | <b>26</b> | <b>35</b>  |
| <sup>+</sup> Species that are listed as threatened under the EPBCAct.<br>* = Species classified as threatened under the TPWCAAct.<br># = Species that were seen incidentally in the area but not recorded in the quadrats. |           |           |           |           |           |           |           |           |            |



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\*DD= Species classified as Data Deficient by the DIPE for the Northern Territory.

S = Signs &/ or scats.

J = Japan-Australia migratory bird agreement.

C = China-Australia migratory bird agreement

B = Bonn convention for the conservation of migratory species

Numbers in the table for each species refer to the number of animals caught or seen in each of the quadrats over three trap nights.



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### Appendix 5. Fauna species recorded along the Andranangoo and Lethbridge haul roads.

| Species                                                    | Andranangoo sites & transects     | Lethbridge sites & transects | Incidental |
|------------------------------------------------------------|-----------------------------------|------------------------------|------------|
| <b>Mammals</b>                                             |                                   |                              |            |
| Agile Wallaby, <i>Macropus agilis</i>                      | Site 2, 5,                        | Site 5                       | #          |
| Black-footed Tree-rat, <i>Mesembriomys gouldii</i> *       | Site 5,                           |                              | #          |
| Brush-tailed Phascogale, <i>Phascogale tapoatafa</i> *     |                                   | Site 1, Transect 3           |            |
| Brush-tailed Possum, <i>Trichosurus vulpecula</i>          | Site 2, 3, 4, Transect 2, 3, 4, 5 | Site 3, 5, Transect 1, 4     | #          |
| Butler's Dunnart, <i>Sminthopsis butleri</i> + *           |                                   |                              | #          |
| Delicate Mouse, <i>Pseudomys delicatulus</i>               |                                   | Transect 2                   |            |
| Dingo, <i>Canis familiaris</i>                             |                                   |                              | #          |
| Horse, <i>Equus caballus</i>                               |                                   |                              | #          |
| Swamp Buffalo, <i>Babalus bubalis</i>                      | Transect 5                        | Site 4, 5                    | #          |
| <b>Birds</b>                                               |                                   |                              |            |
| Australian Owlet-nightjar, <i>Aegotheles cristatus</i>     |                                   | Site 1, Transect 1, 2, 3     |            |
| Bar-shouldered Dove, <i>Geopelia humeralis</i>             |                                   | Site 2                       | #          |
| Black-faced Cuckoo-shrike, <i>Coracina novaehollandiae</i> | Site 2, 3, 5                      | Site 1, 2, 3                 | #          |
| Blue-faced Honeyeater, <i>Entomyzon cyanotis</i>           |                                   | Site 3                       | #          |
| Blue-winged Kookaburra, <i>Dacelo leachii</i>              |                                   | Site 1, 2                    | #          |
| Black-shouldered Kite, <i>Elanus axillaris</i>             |                                   |                              | #          |
| Brown Falcon, <i>Falco berigora</i>                        |                                   |                              | #          |
| Brown Goshawk, <i>Accipiter fasciatus</i>                  |                                   |                              | #          |
| Brown Honeyeater, <i>Lichmera indistincta</i>              |                                   | Site 1, 3                    | #          |
| Bush Stone-curlew, <i>Burhinus grallarius</i>              | Site 4, Transect 1, 3, 4          | Site 1, 4, Transect 1, 2     | #          |
| Collared Sparrowhawk, <i>Accipiter cirrhocephalus</i>      |                                   |                              | #          |
| Common Bronzewing, <i>Phaps chalcoptera</i>                |                                   |                              | #          |
| Forest Kingfisher, <i>Todiramphus macleayii</i>            |                                   | Site 3                       | #          |
| Grey-crowned Babbler, <i>Pomatostomus temporalis</i>       |                                   |                              | #          |
| Grey Shrike-thrush, <i>Colluricincla harmonica</i>         |                                   | Site 5                       |            |



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| Species                                                           | Andranangoo sites & transects | Lethbridge sites & transects   | Incidental |
|-------------------------------------------------------------------|-------------------------------|--------------------------------|------------|
| Leaden Flycatcher, <i>Myiagra rubecula</i>                        |                               | Site 5                         |            |
| Little Friarbird, <i>Philemon citreogularis</i>                   |                               | Site 1, 3                      | #          |
| Magpie Goose, <i>Anseranas semipalmata</i>                        | Site 2                        |                                | #          |
| Masked Owl, <i>Tyto novaehollandiae</i> <sup>+</sup> <sup>*</sup> |                               | Site 2, Transect 5             |            |
| Mistletoebird, <i>Dicaeum hirundinaceum</i>                       |                               |                                | #          |
| Nankeen Kestrel, <i>Falco cenchroides</i>                         |                               |                                | #          |
| Northern Fantail, <i>Rhipidura rufiventris</i>                    |                               | Site 1, 3                      | #          |
| Northern Rosella, <i>Platycercus venustus</i>                     |                               |                                | #          |
| Orange-footed Scrubfowl, <i>Megapodius reinwardt</i>              |                               |                                | #          |
| Partridge Pigeon, <i>Geophaps smithii</i> <sup>+</sup>            |                               |                                | #          |
| Peaceful Dove, <i>Geopelia striata</i>                            |                               |                                | #          |
| Pied Butcherbird, <i>Cracticus nigrogularis</i>                   |                               | Site 1, 5                      | #          |
| Rainbow Bee-eater, <i>Merops ornatus</i> (J)                      |                               | Site 1                         | #          |
| Rainbow Lorikeet, <i>Trichoglossus haematodus</i>                 |                               | Site 1, 3                      | #          |
| Red-tailed Black-cockatoo, <i>Calyptorhynchus banksii</i>         |                               |                                | #          |
| Red-winged Parrot, <i>Aprosmictus erythropterus</i>               |                               | Site 1, 5                      | #          |
| Rufous Whistler, <i>Pachycephala rufiventris</i>                  |                               | Site 1, 4, 5                   | #          |
| Silver-crowned Friarbird, <i>Philemon argenticeps</i>             |                               | Site 3                         | #          |
| Southern Boobook, <i>Ninox novaeseelandiae</i>                    | Site 4, Transect 1, 2, 3, 4   | Site 3, 4, 5, Transect 1, 2, 4 | #          |
| Spangled Drongo, <i>Dicrurus bracteatus</i>                       |                               | Site 1, 2                      | #          |
| Spotted Nightjar, <i>Eurostopodus argus</i>                       | Transect 4                    |                                | #          |
| Striated Pardalote, <i>Pardalotus striatus</i>                    | Site 1, 2, 3, 4, 5            |                                | #          |
| Sulphur-crested Cockatoo, <i>Cacatua galerita</i>                 | Transect 5                    |                                | #          |
| Tawny Frogmouth, <i>Podargus strigoides</i>                       | Site 3, 5, Transect 1, 2, 4   | Transect 1                     | #          |
| Torresian Crow, <i>Corvus orru</i>                                |                               | Site 2, 5                      | #          |
| Varied Lorikeet, <i>Psitteuteles versicolor</i>                   |                               |                                | #          |



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| Species                                                                                         | Andranangoo sites & transects | Lethbridge sites & transects | Incidental |
|-------------------------------------------------------------------------------------------------|-------------------------------|------------------------------|------------|
| Wedge-tailed Eagle, <i>Aquila audax</i>                                                         |                               |                              | #          |
| Weebill, <i>Smicrornis brevirostris</i>                                                         |                               | Site 2, 4                    |            |
| Whistling Kite, <i>Haliastur sphenurus</i>                                                      |                               |                              | #          |
| White-bellied Cuckoo-shrike, <i>Coracina papuensis</i>                                          |                               |                              | #          |
| White-throated Honeyeater, <i>Melithreptus albogularis</i>                                      |                               | Site 1, 2, 3, 5              | #          |
| <b>Reptiles</b>                                                                                 |                               |                              | #          |
| Arboreal Snake-Eyed Skink, <i>Cryptoblepharus plagiocephalus</i>                                | Site 3, 4                     | Site 2, 3, 5                 |            |
| Bynoes Gecko, <i>Heteronotia bynoei</i>                                                         |                               | Transect 1, 5                | #          |
| Grey's Menetia, <i>Menetia greyii</i>                                                           | Site 1, 3                     |                              | #          |
| King Brown snake, <i>Pseudechis australis</i>                                                   |                               |                              | #          |
| Northern Two-lined Dragon, <i>Diporiphora bilineata</i>                                         | Site 4                        |                              | #          |
| Port Essington Ctenotus, <i>Ctenotus essingtonii</i>                                            | Site 1, 2, 3, 5               | Site 1, 2, 3, 5              | #          |
| Sand Monitor, <i>Varanus gouldii</i>                                                            |                               |                              | #          |
| Storr's Snake-eyed Skink, <i>Morethia storri</i>                                                | Site 1, 2                     | Site 1                       | #          |
| Striped Rainbow Skink, <i>Carlia munda</i>                                                      | Site 2, 4                     | Site 1, 2, 3                 | #          |
| + Species that are listed as threatened under the EPBC Act.                                     |                               |                              |            |
| * = Species classified as threatened under the TPWC Act.                                        |                               |                              |            |
| # = Species that were seen incidentally in the area but not recorded in the sites or transects. |                               |                              |            |



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### Appendix 6. Aboriginal names and uses of some animals recorded during this survey

(Taken from Puruntatameri 2001).

| English name              | Aboriginal name                                                                                           | Uses/ significance                                                                                  |
|---------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <i>Mammals</i>            |                                                                                                           |                                                                                                     |
| Northern Brown Bandicoot  | Kipopi, Tukwatukini (male)<br>Marinyi, Tukatuka (female)                                                  | The flesh is cooked and eaten. Hunting involves searching for "nests".                              |
| Brush-tailed Possum       | Kwangapi, Marrikwalimpi (male)<br>Wuninga, Wuruwanjinga (female)                                          | Important and highly regarded food source.                                                          |
| Black Flying-fox          | Tarnikini (male)<br>Ngakuraka (female)                                                                    | Flesh is eaten. Considered good medicine for asthma and congested chest due to colds and influenza. |
| Agile Wallaby             | Anjorra and Jajurrukwa (large male), Jipwajirringa (male)<br>Arlituwi, Yirripurliwiyi (female with young) | Common and much sort after source of meat.                                                          |
| Black-footed Tree-rat     | Pwampungini (male)<br>Pwampunga, Yintumunga (female)                                                      |                                                                                                     |
| Brush-tailed Phascogale   | Pwampungini (male)<br>Pwampunga, Yintumunga (female)                                                      |                                                                                                     |
| Dingo                     | Tayamini (male)<br>Tayama (female)                                                                        | Fur used to make head-dress. Dingo pups trained as hunting companions, especially for Bandicoot.    |
| Buffalo                   | Yuwala (male)<br>Jarranga (female)                                                                        | Flesh is eaten                                                                                      |
| <i>Birds</i>              |                                                                                                           |                                                                                                     |
| Orange-footed Scrub-fowl  | Kirilima (male)<br>Kirilumunga (female)                                                                   | Subject of ceremonial dance                                                                         |
| Radjah Shelduck           | Tirrintirri                                                                                               | Traditionally hunted and eggs collected                                                             |
| Azure Kingfisher          | Pipijirringa                                                                                              |                                                                                                     |
| Black-faced Cuckoo-shrike | Arlipunyika                                                                                               |                                                                                                     |
| Blue-winged Kookaburra    | Jorrijorringa                                                                                             |                                                                                                     |



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|                                         |                                                   |                                                                                                                                                  |
|-----------------------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Collared Kingfisher                     | Payampuna                                         |                                                                                                                                                  |
| Rainbow Bee-eater                       | Wutirriwutirri                                    |                                                                                                                                                  |
| Silver-crowned Friarbird                | Juruwa                                            |                                                                                                                                                  |
| Torresian Crow                          | Kilirampani (male)<br>Wakuwakini (female)         |                                                                                                                                                  |
| Red-tailed Black Cockatoo               | Ngaringa                                          | The bright coloured feathers of these birds are used in some ceremonies. When birds are killed for feathers they are generally roasted and eaten |
| Red-collared Lorikeet                   | Mirririji                                         |                                                                                                                                                  |
| Red-winged Parrot                       | Arntirringarika                                   |                                                                                                                                                  |
| Sulphur-crested Cockatoo                | Pulpungilirri (male)<br>Yinkaka (female)          |                                                                                                                                                  |
| Bar-shouldered Dove<br>Peaceful Dove    | Mwapurawayi (male)<br>Mwapura (female)            |                                                                                                                                                  |
| Finches                                 | Wutirri                                           |                                                                                                                                                  |
| Quails                                  | Puwarriir                                         |                                                                                                                                                  |
| Honeyeaters                             | Arlipunyika                                       |                                                                                                                                                  |
| Boobook/ Barking Owl                    | Pinjoma                                           |                                                                                                                                                  |
| Tawny Frogmouth                         | Jupurtumpuni (male)<br>Kuwiyini                   |                                                                                                                                                  |
| Raptors (especially kites<br>and Hawks) | Murtati                                           |                                                                                                                                                  |
| Black Kite                              | Turtujuka                                         |                                                                                                                                                  |
| Brahminy Kite                           | Paparanyini/ Jankinaki (male),<br>Juburu (female) | This bird is imitated during the Kurlama ceremony                                                                                                |
| Osprey                                  | Purruti                                           |                                                                                                                                                  |
| White-bellied Sea-eagle                 | Ngirrikati/ Jankinanki (male),<br>Juburu (female) |                                                                                                                                                  |
| Brolga                                  | Jilarti (male)<br>Jilarringa (female)             | Flesh is eaten                                                                                                                                   |
| Darter                                  | Putini (male)                                     |                                                                                                                                                  |
| Black-necked Stork                      | Arntongi (male)                                   | Flesh is eaten                                                                                                                                   |



## ***Indicus Biological Consultants***

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|                      |                                                                 |                                                                             |
|----------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------|
|                      | Jipiyontongi (female)                                           |                                                                             |
| Masked Lapwing       | Pirrampirrama                                                   |                                                                             |
| Nankeen Night Heron  | Purtapurta, Yakingiya                                           | According to Tiwi legend Yakingiya is the mother of the Saltwater Crocodile |
| Pelican              | Alikampwarni, Arlipiwua, Kipiwura (male)<br>Jampawunga (female) | One of the main subjects of Tiwi carvings. Flesh can be eaten.              |
| White Egrets         | Pawunga (female)                                                |                                                                             |
| <i>Reptiles</i>      |                                                                 |                                                                             |
| Saltwater Crocodiles | Jikipayini (male)<br>Yirrikipayi, Jikipayinga (female)          | Crocodiles are hunted and eaten (more common in the past).                  |
| Gecko                | Wulikarani                                                      |                                                                             |
| Two-lined Dragon     | Wawungini, Pwatipwatingina                                      |                                                                             |