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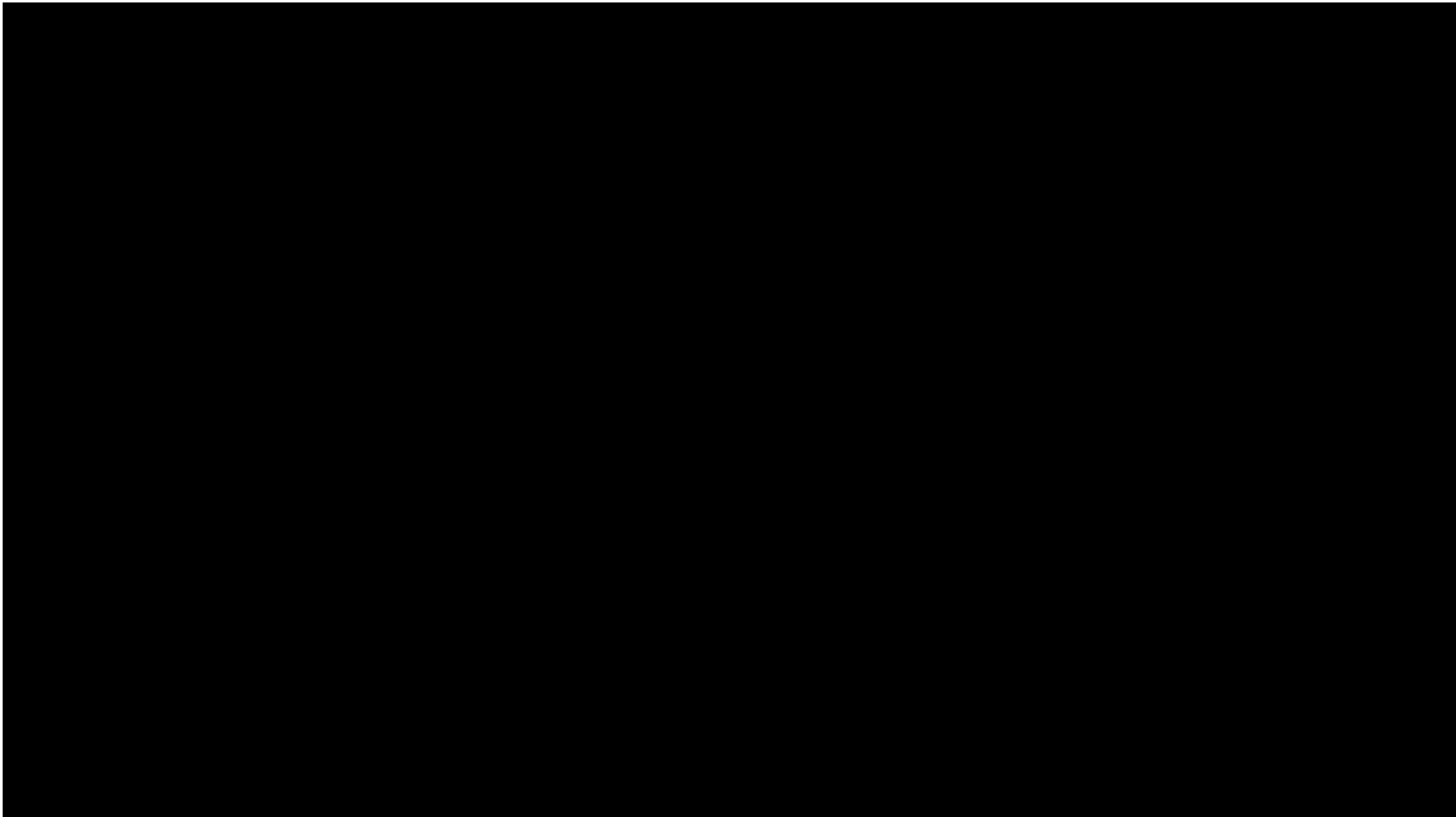
Biota
Environmental
Sciences

Cosmos Nickel Mine Extension Fauna Survey

Sir Samuel Mines NL | URS

Fauna and Faunal Assemblage Report

May 2004



Cosmos Nickel Mine Extensions Fauna and Faunal Assemblage

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1.0 Introduction

1.1 Project Background

In order to further develop the nickel resource at Cosmos mine, Sir Samuel Mines NL is proposing to extend its current mine area. This extension will involve an enlargement of the open cut pit and the relocation of existing waste dump and associated infrastructure (e.g. roads) (see Figure 1.1).

In order to provide an assessment of any potential fauna issues associated with the extension, a seven-day site survey was conducted by Biota Environmental Sciences in April 2004. This report summarises the findings of that survey and makes recommendations for any further work.

1.2 Existing Environment

The Cosmos study area is situated entirely within the Murchison Bioregion (Thackway and Cresswell 1995, Environment Australia 2000) of central Western Australia. This is described as: "*Mulga low woodlands, often rich in ephemerals, on outcrop and fine-textured Quaternary alluvial and eluvial surfaces mantling granitic and greenstone strata of the northern part of the Yilgarn Craton. Surfaces associated with the occluded drainage occur throughout with hummock grasslands on Quaternary sandplains, saltbush shrublands on calcareous soils and Halosarcia low shrublands on saline alluvia. Areas of red sandplains with mallee-mulga parkland over hummock grasslands occur in the east.*" (Thackway and Cresswell 1995).

The mining lease is a part of Yakabindie station and most of the study area had been fairly heavily grazed in the past.

1.2.1 Previous surveys

The terrestrial fauna of the Cosmos area is not known in great detail. The Western Australian Museum (WAM) conducted surveys in the general area between 1979 and 1981 but these surveys were completed primarily in Wanjarri Nature Reserve to the north of Cosmos and concentrated solely on vertebrate fauna. There are also some data on the birds for the general area from the Birds Australia Atlas database but little specific systematic survey work has been completed on the vertebrate fauna in the Cosmos mine area, nor on the invertebrate fauna of the region.

A preliminary fauna assessment of the central Cosmos mine area was completed by Ninox Wildlife Consulting (1998). No systematic survey work was completed as part of this initial assessment, which comprised a three-day site inspection. The inspection identified three fauna habitats; woodlands on loamy flats and drainage lines, shrublands on loamy soils and shrublands on stony slopes. They also recorded 35 species of vertebrates from the lease area although no evidence of any Threatened and Priority fauna species was recorded during this initial appraisal.

1.3 Aims

This report documents the results of the seven-day survey of the Cosmos extension area. The aims of the work were to:

1. collect information on the presence and abundance of vertebrate fauna;
2. collect information on the presence and abundance of selected invertebrate taxa (short-range endemics); and
3. document the presence and condition of faunal habitats within the study area.

2.0 Methodology

2.1 Site Survey Timing and Weather

The site survey was conducted between 19th and 26th April 2004. Weather during the survey was clear and dry with warm days and cool nights that became slightly warmer as the survey progressed. Although there was no rain during the survey there had been a rain event of about 20 mm two weeks prior to the survey. The average maximum and minimum temperatures for April at Yeelirrie (c.30 km to the WSW) were 13.9° and 8.6°C respectively.

2.2 Fauna Survey Team

The fauna survey was undertaken by Mr Greg Harold and Mr Phil Runham of Biota Environmental Sciences. The fauna survey was conducted under "Licence To Take Fauna For Scientific Purposes" No. SF004524 issued to Mr Garth Humphreys which also covered the activities of Mr Greg Harold and Mr Phil Runham. Ms. Norah Cooper and Mr Brad Maryan (WAM) assisted with confirmation of herpetofauna and mammal identifications. Dr Volker Fromenau, Dr Mark Harvey, Ms Julianne Waldock, Ms Karen Edward and Ms Shirley Slack-Smith provided assistance with invertebrate identification and information.

2.3 Fauna Sampling Techniques

2.3.1 Trapping grids

Terrestrial fauna was largely sampled on the basis of systematic grids installed in habitats considered to be representative of the range of units within the project area. Five trapping grids were installed throughout the project area (see Table 2.1).

Table 2.1: Trapping grid location and trap effort (WGS84 datum Zone 51).

Site #	Location (AMG)	Trap Type	Date Opened	Date Closed	Nights Open	# of traps	Total effort (trap nights)
CM001	260718mE	Elliott	21/4/2004	25/4/2004	4	20	80
	6943060mN	Pit	19/4/2004	25/4/2004	6	6	36
CM002	260703mE	Elliott	21/4/2004	25/4/2004	4	20	80
	6943854mN	Pit	20/4/2004	25/4/2004	5	6	30
CM003	259637mE	Elliott	21/4/2004	25/4/2004	4	20	80
	6943667mN	Pit	20/4/2004	25/4/2004	5	5	25
CM004	258027mE	Elliott	21/4/2004	25/4/2004	4	20	80
	6945151mN	Pit	19/4/2004	25/4/2004	6	6	36
CM005	259477mE	Funnel	21/4/2004	25/4/2004	4	8	32
	6943405mN						
Total						Elliott Pit Funnel	320 127 32

Three of the five trapping grids (CM001, CM002, CM004) consisted of one row of six pitfall traps (alternating 20 L buckets and 20 cm PVC tubing) approximately 10 m apart. All traps were connected with a single length of 30 cm high flywire fence (Figure 2.2). At CM003 only five pit traps were installed (three 20 L buckets and two 20 cm PVC) due to the hardness of the substrate. These pit traps were also connected with a single length of 30 cm high flywire fence. Twenty medium-sized Elliott traps were also installed (at 5 to 10 m spacing) at all four of these trapping grids in a semicircle of approximately 100 m radius so that the semicircle started at one end of the pit-line and finished at the other. At CM005 eight paired funnel traps were installed at 12.5 m

intervals along a 30 m long length of 30 cm high flywire as the substrate was too hard to install pit-traps.

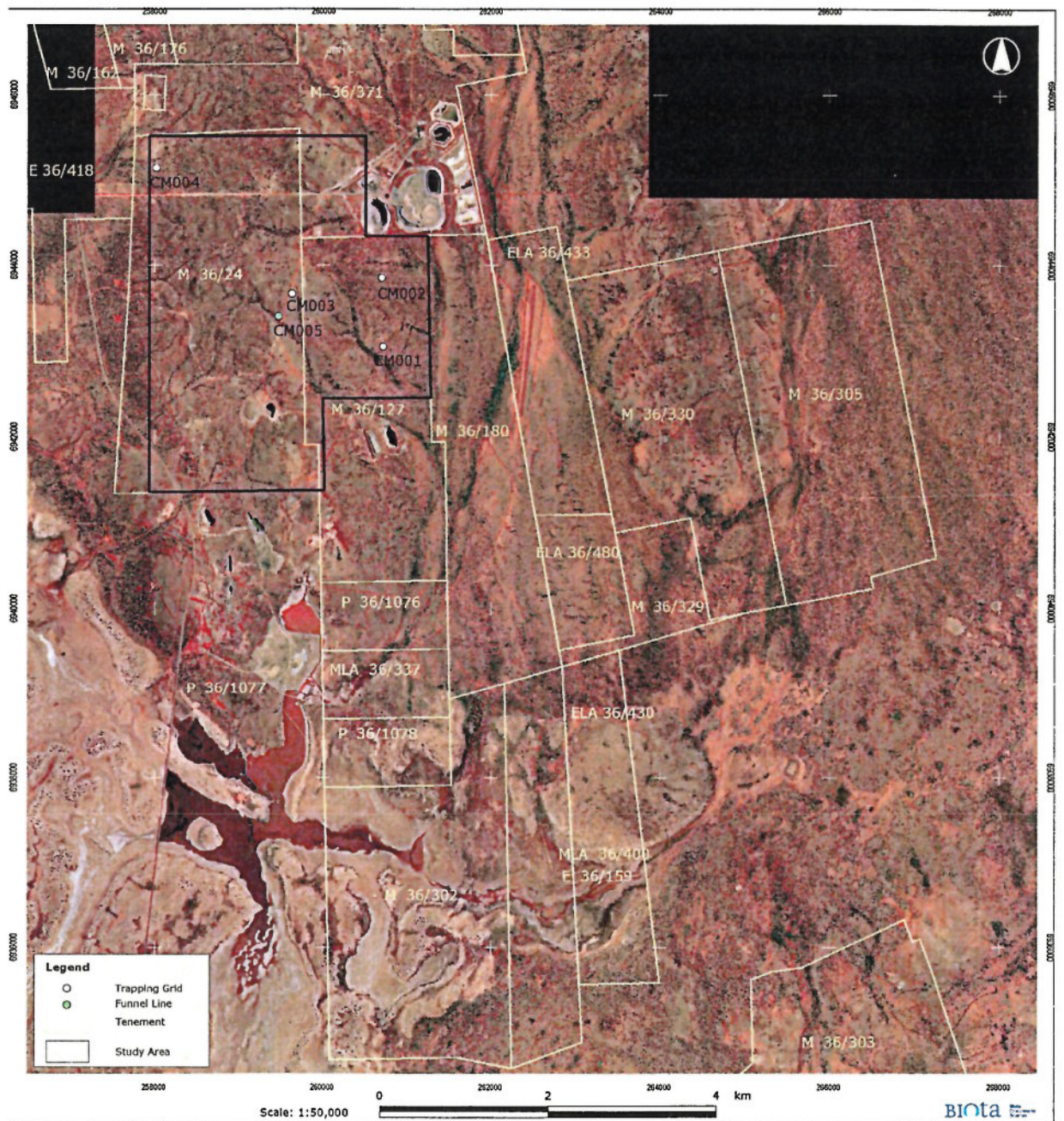


Figure 1.1: Aerial photograph of the Cosmos Nickel Mine Extension project area showing the location of trapping grids and funnel line in relation to tenement boundaries and existing mine infrastructure.

2.3.2 Avifauna Sampling

Avifauna were sampled using an unbounded area search. Three 40-min area searches were conducted at CM002, CM003 and CM004 (see Table 2.2). Censuses were conducted between 0700 and 0830 each morning over two days. In addition, records were kept of all bird species sighted while driving between sites and during transects through sites not sampled by the trapping grids.

Table 2.2: Systematic avifauna censuses undertaken at each of the fauna sites.

Date	CM001	CM002	CM003	CM004	CM005
21/4/04	-	0700-0740	-	-	-
22/4/04	-	-	0750-0830	0700-0740	-

2.3.3 Nocturnal Sampling

In order to assess the presence of nocturnal animals, from two to four person-hours of spotlighting were completed at four of the trapping grids (CM002, CM003, CM004, CM005) using head torches (see Table 2.3). Microhabitats were examined during these searches that were most likely to contain animals and searches were confined to the habitat unit sampled by each trapping grid. Spotlighting was also conducted along tracks in the project area and a record kept of any species sighted opportunistically while spotlighting.

Table 2.3: Systematic nocturnal censuses undertaken at each of the fauna sites.

Date	CM001	CM002	CM003	CM004	CM005
21/4/04			1845-1945		
22/4/04		1845-2045			
23/4/04					1850-2050
24/4/04				1845-1945	

2.3.4 Invertebrate Sampling

Targeted invertebrate groups were sampled through systematic collections from pit-traps during the survey. Invertebrate groups targeted during the survey included:

- Mygalomorphae (Trapdoor spiders); and
- Lycosidae (Wolf spiders).

In addition, collections were made of some Scorpionida (scorpions) from pit-traps. Representative samples of all invertebrates were collected, placed in 70% ethanol and lodged with the WA Museum.

2.3.5 Non-systematic Sampling

In addition to systematic sampling, all other opportunistic observations of fauna throughout the project area were noted. Most non-systematic observations consisted of records from searches in suitable microhabitats during the day for reptiles. Six person hours of this searching was conducted during the site survey.

2.4 Database Searches

In addition to the field fauna survey, searches were also made of the Department of Conservation and Land Management (DCLM) Threatened Fauna Database, the Western Australian Museum (WAM) FaunaBase and the Department of Environment and Heritage (DEH) database. The corners of all searches were 26° 30'S 120° 30'E, 27° 40'S 120° 30'E, 26° 30'S 121° 40'E and 27° 40'S 121° 40'E. These searches were supplemented by a search of the Birds Australia Atlas database with search coordinates of 27°S 120°E, 28°S 120°E, 27°S 121°E and 28°S 121°E.

3.0 Results

3.1 Terrestrial Fauna Habitats

The study area was dominated by mulga habitats, which were subdivided into five faunal habitats.

1. Creekline mulga

Fairly dense stands of mulga *Acacia aneura* along a narrow (c.20 m wide), poorly-defined drainage line. The mulga was tall (to about 4 m) and the understorey was low (up to 10 cm) and sparse with many weed species. The soil was a red clayey loam. Trapping grid CM001 was situated within this habitat.

2. Open mulga

Open stands of mulga *A. aneura* to about 3.5 m in a low-lying part of the landscape. The understorey was very sparse and consisted primarily of *Eremophila* species. The soil was a red loamy sand. Trapping grid CM002 was placed in this habitat in an area that was fairly degraded with several small patches of rehabilitated vegetation.

3. Rocky slope mulga

Open mulga *A. aneura*, to c.3 m, growing on a mid-slope, with some *Senna* species in the overstorey. Essentially no understorey. The substrate comprised a hard clayey loam and there were numerous small to medium-sized rocks on the soil surface. Trapping grid CM003 was placed in this habitat in an area that was quite degraded with a lot of sawn-off or broken tree stumps.

4. Sandplain mulga

Overstorey was open and again dominated by mulga *A. aneura* (to c.5 m), with several other *Acacia* species present. There was essentially no understorey and the soil was a red sand. Trapping grid CM004 was installed in this habitat.

5. Rocky ridge mulga

Open mulga *A. aneura* and other *Acacia* species growing along a rocky ridge. The overstorey was very open and there was essentially no understorey. The soil was a clayey loam and there were numerous small to medium-sized rocks on the soil surface. Trapping grid CM005 was situated within this habitat.

3.2 Terrestrial Fauna

The survey recorded a combined total of 51 vertebrate species from the area of the proposed extension. Table 3.1 provides a summary of the number of species recorded from each major vertebrate group during the survey.

Table 3.1: Number of species recorded during the survey of the Cosmos study area.

Fauna Group	Total
Amphibians	1
Reptiles	18
Avifauna	28
Native Mammals	3
Introduced Mammals	1
Total	51

3.2.1 Amphibians

Only a single species of frog was recorded during the survey.

MYOBATRACHIDAE

Neobatrachus wilsmorei

A total of three individuals were trapped from the sandplain habitat (CM004).

Discussion

The number of frog species in the study area is likely to be larger than the number recorded during the survey, as no rainfall events occurred during the survey. However, none of the species known from the general region are currently listed as threatened or priority species so no frog species of conservation significance would be expected to occur in the study area.

3.2.2 Reptiles

A total of 18 species of reptiles was recorded during the survey, which included 17 species of lizard and a single species of snake (see Table 3.2). The most species rich families were the Gekkonidae (ten species) and Scincidae (four species).

Table 3.2: Reptile records from the Cosmos Nickel mine extension survey sites (the number before the '+' represents the number that were trapped and the number after represents the number that were captured opportunistically).

Family and Species	CM001	CM002	CM003	CM004	CM005	Total
Scincidae (Skinks)						
<i>Eremiascincus richardsonii</i>			0+1	0+1		0+2
<i>Lerista desertorum</i>				0+5		0+5
<i>Lerista muelleri</i>		0+1		0+2		0+3
<i>Menetia greyii</i>				0+2		0+2
Agamidae (Dragons)						
<i>Tympanocryptis cephalo</i>				0+1		0+1
Gekkonidae (Geckos)						
<i>Diplodactylus granariensis rex</i>		3+4				3+4
<i>Diplodactylus pulcher</i>		1+1	1+0		1+0	3+1
<i>Diplodactylus squarrosus</i>		3+3	1+2		0+2	4+7
<i>Gehyra variegata</i>	0+1		0+5	0+2		0+8
<i>Heteronotia binoei</i>				0+1	0+1	0+2
<i>Nephurus vertebralis</i>				2+0		2+0
<i>Rhynchoedura ornata</i>				0+1		0+1
<i>Strophurus assimilis</i>		0+1			0+1	0+2
<i>Strophurus strophurus</i>				0+4		0+4
<i>Strophurus wellingtonae</i>				0+1		0+1
Varanidae (Monitors)						
<i>Varanus caudolineatus</i>	0+1					0+1
<i>Varanus panoptes rubidus</i>		0+1	1+3	0+2		1+6
Elapidae (Front-fanged Snakes)						
<i>Parasuta monachus</i>		1+0		0+1		1+1
No. of species:	2	7	5	14	4	19
No. of individuals:	0+2	8+11	3+11	5+23	1+4	17+51

More detail on the reptile species recorded during the survey is provided in the following annotated list.

Annotated List**SCINCIDAE***Eremiascincus richardsonii*

Singles were hand-captured on rocky slope mulga (CM003) and sandplain mulga (CM004).

Lerista desertorum

Five individuals were hand-captured on the sandplain (CM004) on 24th April.

Lerista muelleri

One individual was trapped in open mulga (CM002) and two individuals were hand-captured on the sandplain (CM004).

Menetia greyii

Two individuals were hand-captured on the sandplain (CM004) on 24th April.

AGAMIDAE*Tympanocryptis cephalo*

One individual was hand-captured on rocky mulga slopes (CM003) on 19th April.

GEKKONIDAE*Diplodactylus granariensis rex*

Only recorded in open mulga (CM002) but apparently very common, with three individuals trapped and four individuals collected whilst head-torching.

Diplodactylus pulcher

Recorded in a variety of habitats with singles trapped in open mulga (CM002), rocky slope mulga (CM003) and rocky ridge mulga (CM005) with a further individual collected whilst head-torching in open mulga (CM002). Tends to occur in habitats on clayey or loamy soils.

Diplodactylus squarrosus

Recorded in a variety of habitats including open mulga (CM002, three trapped and three head-torched), rocky slope mulga (CM003, one trapped and two head-torched) and rocky ridge mulga (CM005, two head-torched). Tends to occur in habitats on clayey or loamy soils.

Gehyra variegata

Recorded in a variety of habitats with one individual hand-captured in creekline mulga (CM001), five individuals head-torched in rocky slope mulga (CM003) and two individuals hand-captured in sandplain mulga (CM004). The most abundant reptile collected during the survey. Likely to be present in all habitats in the study area.

Heteronotia binoei

Single individuals were hand-captured in sandplain mulga (CM004) and head-torched in rocky ridge mulga (CM005).

Nephrurus vertebralis

Only recorded from sandplain mulga (CM004) where two individuals were trapped on 20th and 23rd April.

Rhynchoedura ornata

One individual was head-torched in sandplain mulga (CM004) on 24th April.

Strophurus assimilis

Single individuals were head-torched in open mulga (CM002) and rocky ridge mulga (CM005).

Strophurus strophurus

Only recorded in sandplain mulga (CM004) where four individuals were head-torched on 24th April.

Strophurus wellingtonae

One individual collected during head-torching in sandplain mulga (CM004).

VARANIDAE*Varanus caudolineatus*

One individual was hand-captured in creekline mulga (CM001) on 21st April.

Varanus panoptes

Recorded in a variety of habitats. A juvenile was trapped in rocky slope mulga (CM003) and further individuals were observed in open mulga (CM002; one individual), sandplain mulga (CM004; two individuals) and rocky slope mulga (CM003; three individuals). Presumably present in all habitats in the study area.

ELAPIDAE*Parasuta monachus*

One individual was trapped in open mulga (CM002) and another was hand-captured on the sandplain (CM004).

Discussion

Although a relatively large number of reptile species were recorded during the site survey, the potential list for the study area would be relatively small due to the absence of *Triodia* hummock grassland from the site. Only one species of conservation significance, *Egernia kintorei*, could potentially occur on the site (see Section 4.1).

3.2.3 Birds

A total of 28 bird species was recorded from the study area during the survey (see Table 3.3). The most speciose families were the Psittacidae (Parrots), Meliphagidae (Honeyeaters) and Cracticidae (Magpies and Butcherbirds), each with three species. The avifauna recorded is described in more detail in the following annotated list.

Annotated List**DROMAIIDAE**Emu - *Dromaius novaehollandiae*

Scats of this species were seen in rocky slope mulga (site CM003).

ACCIPITRIDAEWedge-tailed Eagle - *Aquila audax*

Two individuals were seen over open mulga (CM002) on 21st April.

FALCONIDAEBrown Falcon - *Falco berigora berigora*

Two individuals were seen in rocky slope mulga (CM003) on 22nd April.

Australian Kestrel - *Falco cenchroides cenchroides*

A single bird was seen over rocky slope mulga (CM003) on 22nd April.

COLUMBIDAECrested Pigeon - *Ocyphaps lophotes*

Two birds were seen in open mulga (CM002) and a single bird in rocky slope mulga (CM003).

Table 3.3: Avifauna records from the Cosmos survey sites during the April 2004 survey.

Common and Species Name	CM001	CM002	CM003	CM004	CM005	Opportunistic	Total
<i>Emu Dromaius novaehollandiae</i>			1				1
Wedge-tailed Eagle <i>Aquila audax</i>		2					2
Brown Falcon <i>Falco berigora berigora</i>			2				3
Australian Kestrel <i>Falco cenchroides cenchroides</i>			1				2
Crested Pigeon <i>Ocyphaps lophotes</i>		2		1			3
Galah <i>Cathartea roseicapilla assimilis</i>			3				3
Cockatiel <i>Nymphicus hollandicus</i>					10		10
Budgerigar <i>Melopsittacus undulatus</i>				6			6
Pallid Cuckoo <i>Cuculus pallidus</i>			1				1
Singing Honeyeater <i>Lichenostomus virescens</i>		7	6	2			15
Yellow-throated Miner <i>Manorina flavigula</i>			1	12		6	19
Spiny-cheeked Honeyeater <i>Acanthagenys rufogularis</i>			1	2			3
Red-capped Robin <i>Petroica goodenovii</i>					1		1
Hooded Robin <i>Petroica cucullata</i>		2					2
Grey-crowned Babbler <i>Pomatostomus temporalis rubeculus</i>				12			12
Chestnut-breasted Quail-thrush <i>Cinclosoma castaneothorax marginatum</i>			1				1
Crested Bellbird <i>Oreocitta gutturalis</i>		4					4
Willie Wagtail <i>Rhipidura leucophrys</i>		1				1	2
Black-faced Cuckoo-shrike <i>Coracina novaehollandiae</i>		1					1
Black-faced Woodswallow <i>Artamus cinereus melanops</i>		9	2			6	17
Grey Butcherbird <i>Cracticus torquatus torquatus</i>		1	1	3			5
Pied Butcherbird <i>Cracticus nigrogularis</i>			2	2			4
Australian Magpie <i>Cracticus tibicen</i>		1	5		2		9
Western Crow <i>Corvus orru ceciliae</i>				2			2
Little Crow <i>Corvus bennettii</i>			7	4			13
Fairy Martin <i>Hirundo ariel</i>		6					6
Zebra Finch <i>Taeniopygia guttata castanotis</i>		6					6
Australian Pipit <i>Anthus australis australis</i>		4	1				5
	0	12	15	10	3	3	28
No. of species:	0	46	35	46	13	13	152
No. of individuals:							

PSITTACIDAE

Galah – *Cacatua roseicapilla assimilis*

A pair and a single bird were seen in rocky slope mulga (CM003).

Cockatiel – *Nymphicus hollandicus*

A flock of ten birds was seen flying over rocky ridge mulga (CM005) on 21st April.

Budgerigar – *Melopsittacus undulatus*

A flock of six was seen flying through sandplain mulga (CM004) on 22nd April.

CUCULIDAE

Pallid Cuckoo – *Cuculus pallidus*

A single bird was seen in rocky slope mulga (CM003) on 23rd April.

MELIPHAGIDAE

Singing Honeyeater – *Lichenostomus virescens*

The most commonly recorded bird species and present in open mulga (CM002), rocky slope mulga (CM003) and sandplain mulga (CM004). Recorded singly (n=3), in pairs (n=4) and a group of four (n=1).

Yellow-throated Miner – *Manorina flavigula*

A single bird was seen in rocky slope mulga (CM003) and a group of six was recorded twice in sandplain mulga (CM004).

Spiny-cheeked Honeyeater – *Acanthagenys rufogularis*

Two birds were seen in sandplain mulga (CM004) and a single bird was heard in rocky slope mulga (CM003).

PETROICIDAE

Red-capped Robin – *Petroica goodenovii*

One individual was seen in rocky ridge mulga (CM005) on 23rd April.

Hooded Robin – *Petroica cucullata*

The only record was a pair of birds seen in open mulga (CM002) on 23rd April.

POMATOSTOMIDAE

Grey-crowned Babbler – *Pomatostomus temporalis rubeculus*

A group of six birds was seen twice in sandplain mulga (CM004).

CINCLOSOMATIDAE

Chestnut-breasted Quail-thrush – *Cinclosoma castaneothorax marginatum*

A single bird was seen in rocky slope mulga (CM003) on 22nd April.

PACHYCEPHALIDAE

Crested Bellbird – *Oreoica gutturalis*

Single birds were recorded on several occasions in open mulga (CM002).

DICRURIDAE

Willie Wagtail – *Rhipidura leucophrys leucophrys*

A single bird was sighted in open mulga (CM002) on 23rd April.

CAMPEPHAGIDAE

Black-faced Cuckoo-shrike – *Coracina novaehollandiae*

A single bird was sighted in open mulga (CM002) on 23rd April.

ARTAMIDAE

Black-faced Woodswallow – *Artamus cinereus melanops*

Recorded in open mulga (CM002) and rocky slope mulga (CM003). Recorded singly (n=1), in pairs (n=2) and in groups of six (n=2).

CRACTICIDAE

Grey Butcherbird – *Cracticus torquatus torquatus*

Recorded in open mulga (CM002), rocky slope (CM003) and sandplain mulga (CM004). Recorded singly (n=1) or in pairs (n=3).

Pied Butcherbird – *Cracticus nigrogularis*

Single birds were seen twice in rocky slope mulga (CM003) and a pair of birds was heard in sandplain mulga (CM004).

Australian Magpie – *Cracticus tibicen tibicen*

Recorded in open mulga (CM002), rocky slope mulga (CM003) and sandplain mulga (CM004). Recorded singly (n=5) and a group of three (n=1).

CORVIDAE

Western Crow – *Corvus orru cecilae*

A pair of birds was seen in sandplain mulga (CM004) on 22nd April.

Little Crow – *Corvus bennettii*

Recorded in rocky slope mulga (CM003) and sandplain mulga (CM004). Recorded singly, in pairs, a group of four and a group of six (n=1 each).

HIRUNDINIDAE

Fairy Martin – *Hirundo ariel*

A flock of six was seen over open mulga (CM002) on 23rd April.

PASSERIDAE

Zebra Finch – *Taeniopygia guttata castanotis*

A flock of six birds was seen in open mulga (CM002) on 22nd April.

MOTACILLIDAE

Australian Pipit – *Anthus australis australis*

A pair of birds was seen twice in open mulga (CM002) and a single bird was seen in rocky slope mulga (CM003).

Discussion

The study area supported a relatively low diversity of birds during the site survey, which was surprising considering the amount of rain the area had received in the months prior to the survey. This could either reflect the degraded nature of the site or the fact that most birds had moved to other regions that had received better rainfall. No bird species of conservation significance were recorded during the site survey although several threatened avifauna species could potentially occur there. However, due to the mobile nature and large home range of many of these species, they are both unlikely to be recorded during a short survey and are unlikely to be significantly affected by the proposed mine extension.

3.2.4 Mammals

Three native mammal species and one introduced mammal were recorded during the survey. The four families recorded were represented by a single species each (see Table 3.4).

Table 3.4: Mammal records from the Cosmos survey sites during the April 2004 survey (the number before the '+' represents the number that were trapped and the number after represents the number that were sighted opportunistically or where presence was inferred from secondary signs).

Common and Species Name	CM001	CM002	CM003	CM004	CM005	Opp	Total
Echidna <i>Tachyglossus aculeatus</i>		0+1	0+3	0+1			0+5
Stripe-faced Dunnart <i>Sminthopsis macroura</i>		2+0		2+0			4+0
Euro <i>Macropus robustus erubescens</i>			0+1			0+3	0+4
Rabbit <i>Oryctolagus cuniculus</i>			0+1				0+1
No. of species:	0	2	3	2	0	1	4
No. of individuals:	0	2+1	0+5	2+1	0	0+3	4+10

The mammal species recorded are discussed in more detail in the following annotated list.

Annotated List

TACHYGLOSSIDAE

Echidna - *Tachyglossus aculeatus*

Recorded from open mulga (CM002), rocky slope mulga (CM003) and sandplain mulga (CM004). Also several records of diggings from around the study area (n=5).

DASYURIDAE

Stripe-faced Dunnart - *Sminthopsis macroura*

Two individuals were trapped in each of open mulga (CM002) and sandplain mulga (CM004).

MACROPODIDAE

Euro - *Macropus robustus erubescens*

One individual was sighted in rocky slope mulga (CM003) and three individuals were sighted in a habitat similar to CM004.

LEPORIDAE

Rabbit- *Oryctolagus cuniculus*

Diggings of this species were observed in rocky slope mulga (CM003).

Discussion

The number of mammal species recorded during the site survey was relatively low. This is probably a reflection of the lack of *Triodia* hummock grassland habitats and the generally degraded nature of the site. Although there are some mammal species of conservation concern recorded from the general region, current data suggest that it is unlikely that any of them occur in the proposed expansion area.

4.0 Conservation Significance

4.1 Threatened Fauna

Native fauna species which are rare, threatened with extinction or have high conservation value are specially protected by law under the *Western Australian Wildlife Conservation Act 1950-1979*. In addition, some species of fauna are covered under the 1991 ANZECC convention, while certain birds are listed under the Japan & Australia Migratory Bird Agreement (JAMBA) and the China & Australia Migratory Bird Agreement (CAMBA).

Classification of rare and endangered fauna by the Department of Conservation and Land Management under the *Wildlife Conservation (Specially Protected Fauna) Notice 2003* recognises four distinct schedules of taxa:

1. Schedule 1 taxa are fauna which are rare or likely to become extinct and are declared to be fauna in need of special protection;
2. Schedule 2 taxa are fauna which are presumed to be extinct and are declared to be fauna in need of special protection;
3. Schedule 3 taxa are birds which are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, which are declared to be fauna in need of special protection; and
4. Schedule 4 taxa are fauna that are in need of special protection, otherwise than for the reasons mentioned in paragraphs (1), (2) and (3).

Schedule 1 fauna are further classified by the Department of Conservation and Land Management under four different codes relating to the risk of extinction: Extinct in the Wild, Critically Endangered, Endangered and Vulnerable. These are defined as:

Extinct in the Wild: A native species is eligible to be included in the *extinct in the wild* category at a particular time if, at that time:

- (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
- (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.

Critically Endangered: A native species is eligible to be included in the *critically endangered* category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

Endangered: A native species is eligible to be included in the *endangered* category at a particular time if, at that time:

- (a) it is not critically endangered; and
- (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

Vulnerable: A native species is eligible to be included in the *vulnerable* category at a particular time if, at that time:

- (a) it is not critically endangered or endangered; and
- (b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

Schedule 2 fauna are included as such if, at that time, there is no reasonable doubt that the last member of the species has died.

Schedule 4 taxa are fauna that are in need of special protection, otherwise than for the reasons mentioned in paragraphs (1), (2) and (3) and are also called Specially Protected Fauna.

In addition to the above classification, fauna are also classified by the Department of Conservation and Land Management under four different Priority codes:

Priority One Taxa with few, poorly known populations on threatened lands.

Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Priority Two Taxa with few, poorly known populations on conservation lands, or taxa with several, poorly known populations not on conservation lands.

Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Priority Three Taxa with several, poorly known populations, some on conservation lands.

Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Priority Four Taxa in need of monitoring.

Taxa which are considered to have been adequately surveyed or for which sufficient knowledge is available and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. Taxa which are declining significantly but are not yet threatened.

Conservation Dependent Species

This list includes species previously listed as Specially Protected Fauna (Schedule 4) but that have benefited from fox baiting such that populations have increased substantially. However, it is felt that without continued baiting and monitoring, populations may again be at risk.

The Department of Environment and Heritage classified fauna of national environmental significance as either threatened fauna or migratory fauna. Threatened fauna are classified under the EPBC Act 1999 and the classifications used are the same as the classifications the Department of Conservation and Land Management use for their Schedule 1 fauna. Migratory fauna are those species that are afforded special protection by international agreements such as the Japan & Australia Migratory Bird Agreement (JAMBA) and the China & Australia Migratory Bird Agreement (CAMBA). These species can be classified as

Migratory Wetland Species or Migratory Terrestrial Species depending on whether they primarily inhabit wetland or terrestrial habitats.

Based on known distributions, a total of five Schedule 1 fauna, two Schedule 4 fauna and seven Priority fauna could potentially occur in the study area. Some of these species are likely to occur in the study area but these are unlikely to be affected by the proposed extension.

A search of the DCLM Threatened Fauna database for species potentially occurring in the area yielded four Schedule 1 species *Egernia kintorei*, *Leipoa ocellata*, *Dasycercus cristicauda*, *Macrotis lagotis*, two Schedule 4 species *Falco peregrinus* and *Cactua leadbeateri* and four Priority species *Kwonkan moriartii*, *Ardeotis australis*, *Amytornis striatus* and *Macroderma gigas*.

Schedule 1 Fauna

Giant Desert Skink *Egernia kintorei* - Vulnerable under EPBC Act 1999

There is one nearby record from 1964 in the DCLM Threatened Fauna database and the species is recorded from the general area on the West Australian Museum FaunaBase and the Department of Environment and Heritage database. The species occurs in a variety of desert habitats on sandy, clay and loamy soils (Storr et al. 1999) and could potentially occur in the area. No evidence of the species was found during the site inspection, and its presence would not be expected given the degraded nature of the site, but the species is highly cryptic and could be easily missed.

Malleefowl *Leipoa ocellata* - Vulnerable under EPBC Act 1999

This species is likely to occur in areas affected by the development and there are several recent records from the area on the DCLM Threatened Fauna database. It was also recorded from the general region on the West Australian Museum FaunaBase and the Department of Environment and Heritage database. However, the impact of extending the mine area is only likely to be significant only if a nesting mound is to be disturbed. Home ranges are typically large in this species, so foraging habitat would be negligibly affected by the proposed extension. Our survey failed to detect any nesting mounds, and we consider it unlikely that any occur there due to the degraded nature of the site. The species is therefore unlikely to be significantly affected by the proposed development.

Night Parrot *Pezoporus occidentalis* - Critically Endangered under EPBC Act 1999

The species is widespread throughout the arid zone but there are no records from the general region of the study area on either the DCLM Threatened Fauna database or the West Australian Museum FaunaBase. It is unlikely that it occurs in the study area as there are no *Triodia* of samphire habitats present. Given the low probability of occurrence we would conclude that the species is unlikely to be affected by the proposed development.

Slender-billed Thornbill *Acanthiza iredalei iredalei* - Vulnerable under EPBC Act 1999

This species is recorded from the general region on the Department of Environment and Heritage database. However, is not currently listed as threatened by the Department of Conservation and Land Management being locally common in several parts of Western Australia. In any case, in the central Goldfields the species is confined to samphire around the margins of salt lakes. As this habitat is absent from the study area, it is extremely unlikely that the species occurs there and, therefore, it is unlikely to be affected by the proposed development.

Mulgara *Dasycercus cristicauda* - Vulnerable under EPBC Act 1999

There are numerous recent records of this species from the general area on the DCLM Threatened Fauna database and the species is also listed for the area on the West Australian Museum FaunaBase and the Department of Environment and Heritage database. However, it is extremely unlikely that the species occurs in the study area due

to the absence of *Triodia* sandplain habitats. Given the low probability of occurrence we would conclude that the species is unlikely to be affected by the proposed development.

Bilby (*Macrotis lagotis*) – Vulnerable under EPBC Act 1999

The species was recorded from the general area on the WAM FaunaBase and from a 1981 record on the DCLM Threatened Fauna database. However, it is now generally considered to now be extinct in the area. The species occurs in a wide range of habitats on a wide range of substrates in the arid zone (Strahan 1995) but mostly in areas to the north and east of the project area. No evidence of this species was found during the survey and its diggings and burrows are typically fairly obvious. As no burrows or diggings were found during the survey it is considered extremely unlikely that the Bilby occurs in the study area.

Schedule 3 Fauna

Oriental Plover *Charadrius veredus* – Migratory Wetland Species

This species was listed for the general region on the Department of Environment and Heritage database. It typically inhabits sparsely vegetated plains, beaches and tidal flats, none of which are present in the study. In addition, the species is considered a vagrant south of the Pilbara so this record almost certainly pertained to a vagrant individual. The species is, therefore, extremely unlikely to be significantly affected by the proposed development.

Schedule 4 Fauna

Peregrine Falcon *Falco peregrinus macropus* - Specially Protected Fauna

This species almost certainly occurs in the study area as it present virtually throughout Western Australia in a wide range of habitats. In addition, it is listed as potentially occurring on the DCLM Threatened Fauna database and it is listed for the general region on the Birds Australia Atlas database. However, home ranges are typically very large (20 to 1500 km²) (Marchant and Higgins 1999) and, given the small area of the proposed mine, the species would be negligibly affected.

Major Mitchell's Cockatoo *Cacatua leadbeateri* - Specially Protected Fauna

It is unlikely that this species occurs in the study area as the site is outside its currently recognised range and there are no records from the general region on the DCLM Threatened Fauna database, the West Australian Museum FaunaBase or the Birds Australia Atlas database. However, the species does occur to the south-west and north-east of Cosmos (Johnstone and Storr 1999) and, given the current knowledge gaps in this species' distribution, it is possible that it could occur in the study area. The species would however be negligibly affected by the proposed extension if present. It may be worth avoiding removing any hollow-bearing trees where possible as they could potentially contain nest sites for this species.

Priority Taxa

Mygalomorph spider *Kwonkan moriartii* - Priority Two

This species is almost unknown as the only recorded specimens were collected from Kathleen Valley Station near Wiluna in 1962. Given that little is known about its ecology it is not possible to predict whether the species occurs in the study area. With the distance of the study area from Kathleen Valley it is probable that it does not, and no specimens were recorded during the fauna survey (although searches were not exhaustive). The degraded nature of the site suggests that the species is unlikely to occur in the study area.

Grey Falcon *Falco hypoleucos* - Priority Four

It is unlikely that this species occurs in the study area and it is not recorded from the general area on the DCLM Threatened Fauna database, the West Australian Museum FaunaBase. Based on current knowledge of its distribution, the species is an irregular visitor to the Goldfields (Johnstone and Storr 1999) and it would be negligibly affected by the proposed extension, even if present.

Australian Bustard *Ardeotis australis* - Priority Four

This species is likely to occur in the study area as the habitat is suitable and there are records from the region in the DCLM Threatened Fauna database and the Birds Australia Atlas database or the Birds Australia Atlas database. The species is typically nomadic and has a large home range so it would be negligibly affected by the proposed extension.

Bush Stone-curlew *Burhinus grallarius* - Priority Four

This species may occur in the study area as it is recorded from the general region in the Birds Australia Atlas database. If it is present, it would be negligibly affected by the proposed extension as the home range of individuals are typically large.

Princess Parrot *Polytelis alexandrae* - Priority Four

It is unlikely that the species occurs in the study area although there are a few old records from the general region on the West Australian Museum FaunaBase and the Department of Environment and Heritage database. Even if present, it would only occur as an irregular and very infrequent visitor. Avoiding the destruction of hollow-bearing trees would be the most appropriate method to minimise any potential impact on the species.

Striated Grasswren *Amytornis striatus striatus* - Priority Four

The species is recorded from the general area on the DCLM Threatened Fauna database and the Birds Australia Atlas database. However, the species is extremely unlikely to occur in the study area as there are no *Triodia* dominated habitats. Given the very low probability of occurrence the species is considered unlikely to be affected by the proposed development.

Ghost Bat *Macroderma gigas* - Priority Four

The species was recorded from the general area from a 1961 record on the DCLM Threatened Fauna database but is generally considered to now be extinct in the area. The study area contained no caves so, if the species occurred there, it would be used only as foraging habitat. This, combined with the generally low probability of occurrence, suggests that the species is unlikely to be affected by the proposed development.

4.2 Conclusions and Recommendations

The survey of the proposed extension area to the Cosmos nickel mine recorded 51 species of vertebrate fauna from five mulga-dominated habitat types. The fauna recorded comprised 28 bird species, 19 herpetofauna species (18 reptiles and one frog species), and four mammals (3 native and one introduced) (see Section 3.2).

Database searches suggested that up to ten Threatened fauna species could potentially occurring in the study area (six Schedule listed species and four Priority; Section 4.1). Site-specific habitat appraisal and survey data suggested that only five of these species have any significant probability of occurring in the project area (see Section 4.1). These were *Egernia kintorei* (Schedule 1; Vulnerable under EPBC Act 1999), Malleefowl *Leipoa ocellata* (Schedule 1; Vulnerable under EPBC Act 1999), *Falco peregrinus* (Schedule 4), Major Mitchell's Cockatoo *Cacatua leadbeateri* (Schedule 4), and Australian Bustard *Ardeotis australis* (Priority 4). None of these species were recorded from the proposed extension area during the survey.

To minimise impacts on fauna present in the project area we recommend that the following fauna management measures be developed and implemented during the mine extension:

1. Existing cleared and disturbed habitats should be utilised, where possible, for proposed new mining disturbances. The use of these disturbed areas should be maximised as part of project design.

2. Any large, hollow-bearing trees be identified and retained on-site as far as possible. This will minimise impacts on fauna utilising these habitats, including the Threatened Fauna species *Cactua leadbeateri*, if present.
3. All personnel should be prohibited from bringing pets, traps or firearms into the project area.
4. The rehabilitation programme for the site should give consideration to fauna habitat reconstruction, including measures such as the replacement of fallen timber, rock pile microhabitat re-creation, litter bed establishment and other measures.

