



APPENDIX F

Biodiversity Offset Baseline Fauna Report

CRISTAL MINING PTY LTD

MALLARA FAUNA SURVEY



PREPARED BY
BIODIVERSITY MONITORING
SERVICES

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EXECUTIVE SUMMARY

Cristal Mining Australia Limited (Cristal Mining) commissioned Biodiversity Monitoring Services to undertake a fauna survey on part of the 'Mallara' property, a Western Lands Lease held by Cristal Mining, located approximately 87 kilometres (km) north of Wentworth and 28 km west of Pooncarie, New South Wales (NSW) (the Study area).

A series of 15 survey sites were established to sample each major habitat type located within the Study area. Different techniques were used at each site to ensure a complete coverage of fauna use was obtained. The survey methods used during the fauna survey consisted of observational surveys, spotlighting, pit traps, Elliott traps (ground and tree traps), cage traps, hair and reptile funnels, call playback, remote cameras, tree hollow counts, bird surveys and sand plots. Surveys for bats were undertaken using an Anabat recording device and harp traps. Targeted threatened species surveys were also conducted to locate conservation significant species potentially occurring within the Study area.

Fauna habitat assessments were undertaken within the five broad habitat types occurring within the Study area, along with an assessment of the number of tree hollows present.

The results from the fauna survey show biodiversity values that are similar to that found within surrounding areas that have been surveyed in recent years. A total of 63 bird, 12 native mammal, nine introduced mammal and 20 reptile species were located within the Study area. The species richness values for the Study area are similar to that found elsewhere in the wider locality.

Five species listed as 'Vulnerable' under the NSW *Threatened Species Conservation Act, 1995* were located within the Study area. These species are the Hooded Robin (south-eastern form) (*Melanodryas cucullata cucullata*), Inland Forest Bat (*Vespadelus baverstocki*), Little Eagle (*Hieraaetus morphnoides*), Little Pied Bat (*Chalinolobus picatus*) and Major Mitchell's Cockatoo (*Lophochroa leadbeateri*). Only one species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) was located within the Study area. This was the Rainbow Bee-eater (*Merops ornatus*), listed as Migratory under the EPBC Act. A total of nine introduced species were also located within the Study area, with sheep and goats being the most dominant.

The survey of the Study area showed that a number of species usually located in this environment were missing or were in low numbers. This includes small ground mammals (only one House Mouse was located) and some of the rarer reptiles (e.g. Jewelled Gecko) as well as smaller birds such as finches and chats.

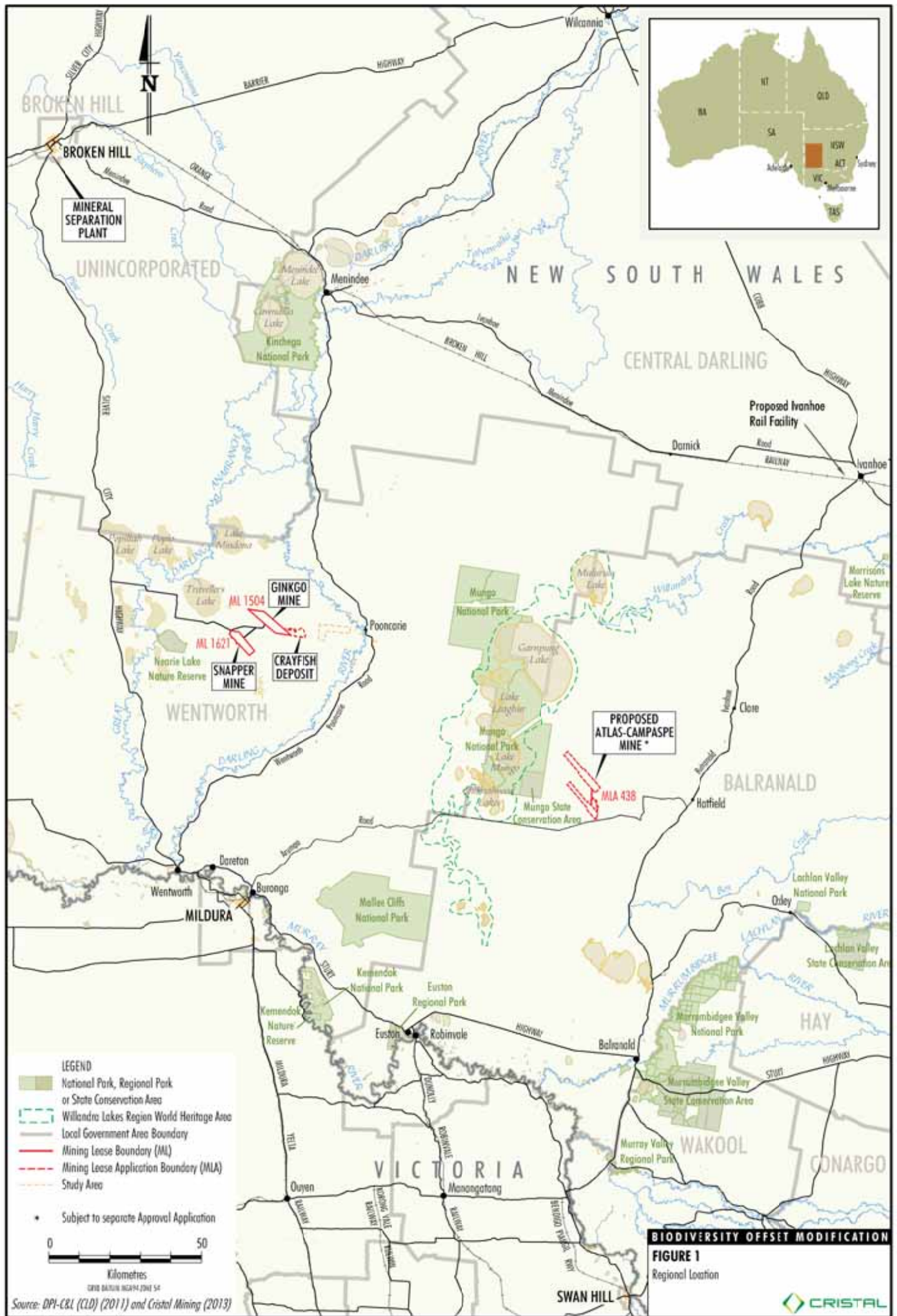
1 INTRODUCTION

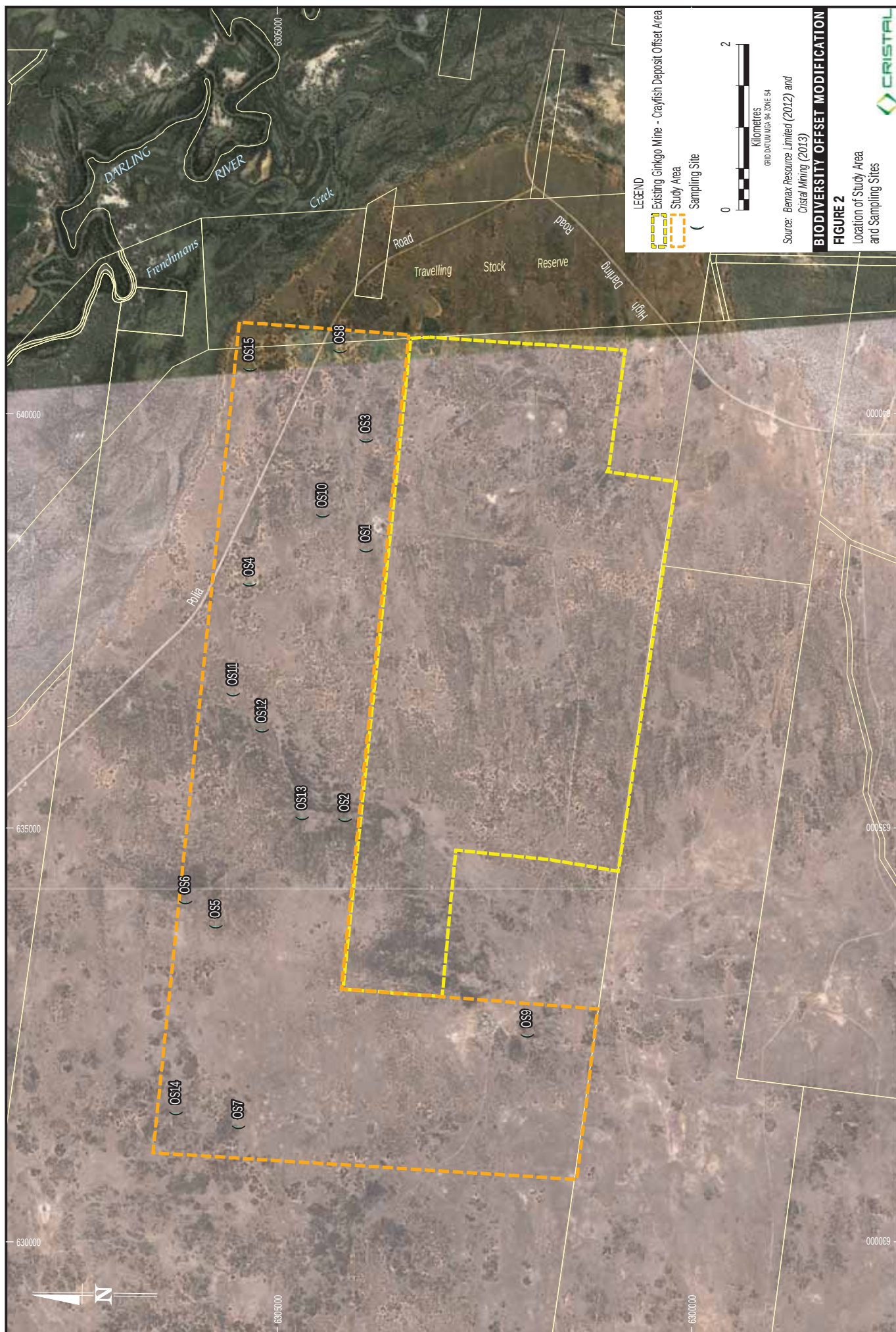
Cristal Mining Australia Limited (Cristal Mining) commissioned Biodiversity Monitoring Services to undertake a fauna survey on part of the 'Mallara' property, a Western Lands Lease held by Cristal Mining, located approximately 87 kilometres (km) north of Wentworth and 28 km west of Pooncarie, New South Wales (NSW) (the Study area).

The Study area is located beside the existing Ginkgo Mine Crayfish Deposit Offset area previously assessed by Biodiversity Monitoring Services (2012) and is shown in Figures 1 and 2. The Study area is dominated by grassland and woodland, mainly comprised Black Oak and Rosewood. Some patches of chenopod mallee and Black Box woodland are also found in the Study area. The area is currently grazed by domestic stock (mainly sheep) and contains a number of dams, as well as troughs fed by piped water.

The objectives of the survey were to:

- sample the vertebrate fauna (amphibian, reptiles, birds and mammals) in the Study area using standard survey techniques;
- determine and map the broad habitat types present within the Study area, including their condition;
- determine and map habitat and habitat condition likely to be utilised for each threatened species located in the Study area and those that could potentially use habitat in the Study area;
- compile a comprehensive vertebrate species list for the Study area and evaluate the status and relative abundance of each species; and
- conduct targeted surveys for potentially occurring threatened fauna species, populations, communities and critical habitat, listed in the schedules of the NSW *Threatened Species Conservation Act, 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) and map any occurrences within the Study area.





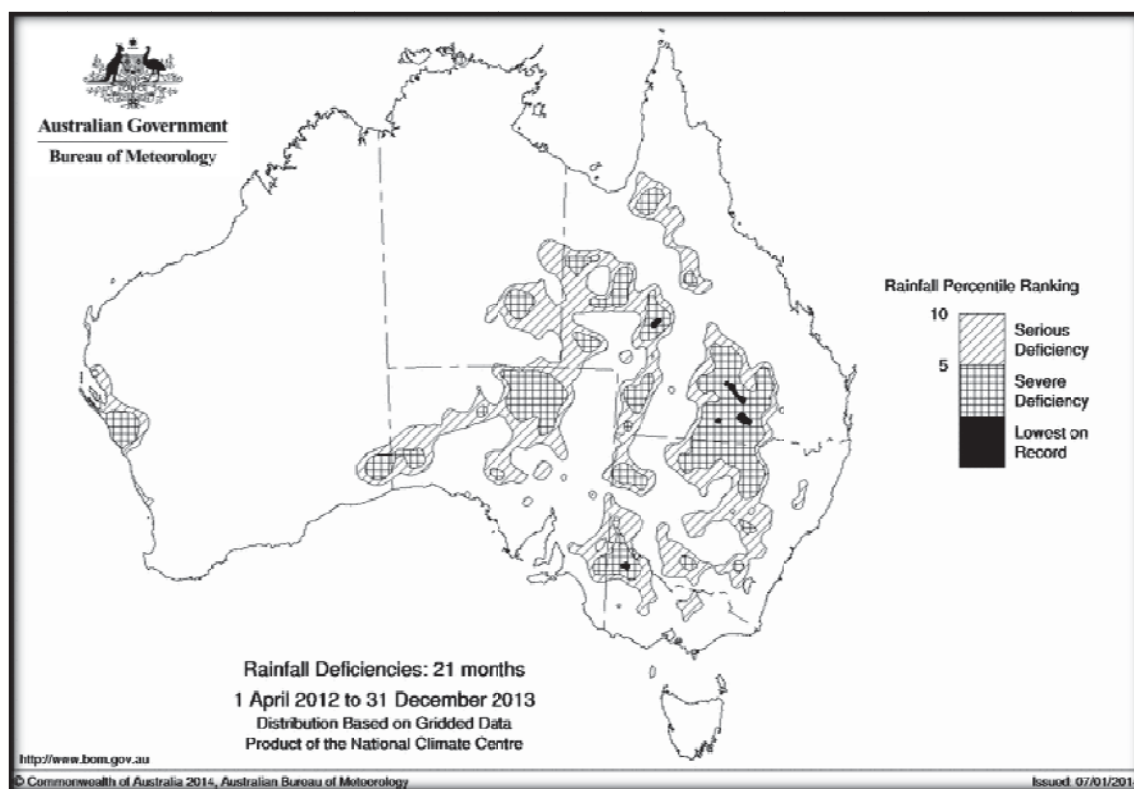
2 LOCAL ENVIRONMENT

2.1 REGIONAL LOCATION

The Study area is located in the Murray Darling Depression Interim Biogeographic Regionalisation for Australia Bioregion (Commonwealth Department of Sustainability, Environment, Water, Population and Communities [SEWPaC], 2013) and the Murray Catchment Management Authority (CMA) Region (Cristal Mining Limited, 2013).

2.2 CLIMATE

The closest Bureau of Meteorology (BOM) weather stations to the Study area are located approximately 90 km south-southwest at Wentworth Post Office and approximately 110 km north-northeast at Menindee. The mean annual rainfall near the Study area is between 245 millimetres (mm) (Menindee) and 285 mm (Wentworth) (BOM, 2013). However, Plate 1 shows the rainfall deficiencies for Australia between 1 April 2012 and 31 December 2013 and the region where the Study area is located is suffering a serious rainfall deficiency.



Extracted from BOM, 2013.

Plate 1: Rainfall Deficiency Map for Australia

2.3 HYDROLOGY

The Darling River is a major hydrological feature of the local environment intersecting the Murray River at Wentworth. The Darling River Anabranch runs parallel to the Darling River and only flows under flood conditions. Numerous ephemeral lakes are associated with the Anabranch, which occasionally hold water (primarily during flood conditions). The Study area does not contain any watercourses.

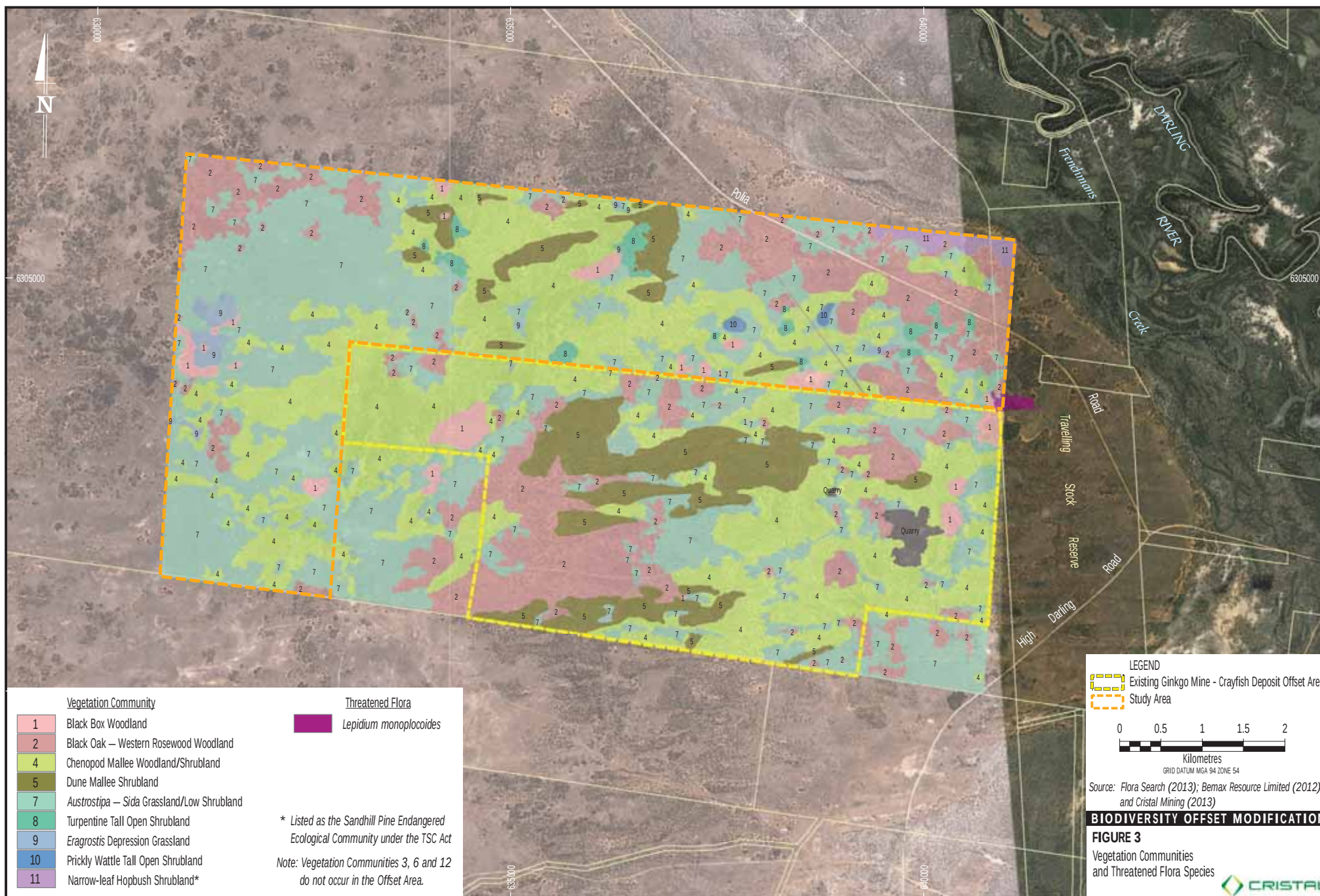
2.4 TOPOGRAPHY AND LAND USE

Topography of the surrounding region shows limited relief and comprises generally flat to undulating sandplains covered by a combination of grasslands, low woodland and shrublands. The elevations within the Study area range from 50 to 70 metres (m) Australian Height Datum.

Surrounding land uses comprise of pastoral leasehold lands that are used predominantly for livestock grazing of native pastures by sheep, cattle and goats on Perpetual Western Land Leases.

2.5 VEGETATION

The Study area is part of Mallara property and supports a variety of vegetation types and habitats that are similar to that found within the Ginkgo Mine. Within the vicinity of the Study area a wide range of vegetation types occur. These include grassy and shrubby woodlands, shrublands and grasslands. Black Box (*Eucalyptus largiflorens*) and Black Oak (*Casuarina pauper*) dominated woodland communities also occur within the Study area surrounds along with two broad kinds of shrublands (eucalyptus or mallee shrublands and chenopod or saltbush/bluebush shrublands). Cleared areas dominated by annual grasses are also present within the locality of the Study area. Figure 3 shows the vegetation communities within the Study Area.



3 METHODOLOGY

3.1 DATABASE SEARCHES

The following databases were searched to identify threatened species that have the potential to occur within the Study area:

- Atlas of NSW Wildlife search (NSW Office of Environment and Heritage [OEH], 2013);
- the EPBC Act Protected Matters Search Tool (Department of the Environment, 2013);
- BirdLife Australia (BirdLife Australia, 2013);
- Australian Museum Business Services (AMBS, 2013);
- Atlas of Living Australia Search Tool ([Atlas of Living Australia, 2013](#)); and
- Threatened Species found in South Olary Plain, Murray Basin Sands (Part D) CMA sub-region (OEH, 2014).

A list of potentially occurring threatened species was developed from the results of the database searches (Section 3.4) and targeted searches were used to identify whether these species are present within the Study area.

3.2 SURVEY SITES

The surveys were undertaken by Dr Martin Denny and Andrew Lothian between 19 and 30 November 2013. The weather conditions recorded at Ivanhoe Post Office (station number 0449019) during the survey period are given in Table 1.

Table 1
Rainfall and Temperatures at Ivanhoe Post Office

Date	Minimum temperature (°C)	Maximum temperature (°C)	Rainfall (mm)
19/11/2013	15.5	35.1	0
20/11/2013	19.8	38.2	0
21/11/2013	16	29.5	0
22/11/2013	15.6	28	0
23/11/2013	11.8	26	0
24/11/2013	12.8	26.9	0
25/11/2013	12	29.2	0
26/11/2013	15.1	33.3	0
27/11/2013	15.9	37.1	0
28/11/2013	22.7	41.3	0
29/11/2013	12.9	26.9	4.6
30/11/2013	9.1	30.1	0

Source: BoM (2013).

Although the entire Study area was surveyed by observation, a series of sites were established that sampled the major habitat types. A total of 15 survey sites were established that sampled nine of the vegetation communities mapped by FloraSearch (2014). A description of each site is given in Table 2 and their locations are shown on Figure 2.

Table 2
Survey Sites within the Study Area

Site Name	Easting	Northing	Vegetation Community Number	Vegetation Community (FloraSearch, 2014)	Broad Fauna Habitat Type
OS1	638348	6303940	5	Dune Mallee Shrubland	5. Dune Mallee
OS2	635091	6304197	5	Dune Mallee Shrubland	5. Dune Mallee
OS3	639667	6303940	2	Black Oak – Western Rosewood Woodland (Poor Condition)	2. Black Oak Woodland
OS4	637938	6305348	2	Black Oak – Western Rosewood Woodland (Poor Condition)	2. Black Oak Woodland
OS5	633810	6305756	5	Dune Mallee Shrubland	5. Dune Mallee
OS6	634103	6306121	1	Black Box Woodland (Good Condition)	1. Black Box Woodland
OS7	631388	6305479	2	Black Oak – Western Rosewood Woodland (Good Condition)	2. Black Oak Woodland
OS8	640748	6304255	2	Black Oak – Western Rosewood Woodland (Good Condition)	2. Black Oak Woodland
OS9	632486	6301997	4	Chenopod Mallee Woodland/ Shrubland (Good Condition)	3. Chenopod Mallee
OS10	638763	6304467	10	Prickly Wattle Tall Open Shrubland	4. Grassland/Low Shrubland
OS11	636612	6305545	8	Turpentine Tall Open Shrubland	4. Grassland/Low Shrubland
OS12	636167	6305196	1	Black Box Woodland (Poor Condition)	1. Black Box Woodland
OS13	635112	6304715	4	Chenopod Mallee Woodland/ Shrubland (Good Condition)	3. Chenopod Mallee
OS14	631553	6306238	2	Black Oak – Western Rosewood Woodland (Poor Condition)	2. Black Oak Woodland
OS15	640529	6305346	11	Narrow-leaf Hopbush Shrubland	4. Grassland/Low Shrubland

Only three survey sites were established within the grassland vegetation communities as this habitat was substantiated by observational methods. Constant traversing of the grassland vegetation communities during the 10 days survey provided an adequate picture of fauna use in this part of the Study area.

Different techniques were used at each site to ensure a complete coverage of fauna use was obtained. In addition, habitat values, in terms of tree hollow presence, were determined at a number of sites and this required a specialised technique that is described in the following section.

The size of each survey site was determined by the techniques used. In general, each site had a diameter of at least 500 m to accommodate the trap lines used. Sites where tree hollows were counted could be larger as walking transects covered a bigger area. Transect lengths ranged from 200 m to over 800 m.

3.3 SURVEY TECHNIQUES

A variety of survey techniques were utilised within the Study area and Table 3 provides relevant information about each site.

Sites OS1, OS2, OS4 and OS5 were established to capture a range of fauna and utilised techniques targeting small mammals and reptiles. At each of these sites a line of pit traps were dug into the ground, the pits being either 20 litre buckets or 1 m long tubes. Five Elliott traps were placed at each end of the pit trap line, resulting in 10 Elliott traps per site. Two sites (OS3 and OS6) sampled land that was difficult to dig pits (heavy clay) and reptile funnels were used instead. Each site was sampled with a remote camera and a sand plot was established at four of the sites. Surveys for bats were undertaken at five of the sites, either by use of an Anabat recording device or by a harp trap.

Sites OS7 onwards focused on observational surveys, where each site was walked and any fauna sighted was noted. The observational sessions took half to one hour and were undertaken by two observers. Tree hollows were also recorded at Sites OS7, 8 and 9. A separate call playback site was established close to Site OS1.

Ground Elliott Trapping

Five small (8 x 10 x 33 centimetre [cm]) Elliott traps were laid in straight lines at the ends of pit trap and reptile trap lines. The traps were set for five days, giving a trap effort of 25 trap days at each site. The traps were baited with a mixture of rolled oats, peanut butter and bacon fat, and a small piece of dacron was placed within each trap (as protection against the cold). A freezer bag was placed over the end of each trap to prevent the contents becoming wet from the rain.

Tree Elliott Trapping

To sample any small arboreal mammals, five small Elliott traps were mounted on trees at Sites OS4 and OS5 for five nights. There were a number of trees with obvious hollows at these sites. Aluminium tree mounts were attached to trees and a baited Elliott trap attached to the mount. The tree trunk and trap were sprayed with a honey-water mixture to assist in attracting any nectar or sap feeding arboreal mammals. Again, dacron and freezer bags were used to combat the cold and wet conditions. A total of 50 trap days were expended in the Study area. Plate 2 shows a tree-mounted Elliott trap on a Black Oak tree with hollow.



Plate 2: Tree-mounted Elliott and Hair Funnel on Black Oak Tree

Table 3
Survey Techniques Used at Each Site

Site	Ground Elliott	Tree Elliott	Tree Cage	Hair Funnels	Remote Camera	Bird Surveys	Call Broadcasting	Pit Trap	Reptile Funnel	Sand Plot	Anabat Recorder	Harp Trap	Tree Hollow Count	Observation Sessions	Spotlighting
OS1	Yes	-	-	-	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes	Yes	Yes	Yes
OS2	Yes	-	-	-	Yes	Yes	Yes	Yes	-	Yes	Yes	-	Yes	Yes	Yes
OS3	Yes	-	-	-	Yes	Yes		-	Yes	Yes	-	Yes	Yes	Yes	Yes
OS4	Yes	Yes	-	Yes	Yes	Yes	Yes	Yes	-	-	Yes	-	Yes	Yes	Yes
OS5	Yes	Yes	-	Yes	Yes	Yes		Yes	-	Yes	-	-	Yes	Yes	Yes
OS6	Yes	-	Yes	-	Yes	Yes		-	Yes	-	-	Yes	Yes	Yes	Yes
OS7	-	-	-	-	-	Yes		-	-	-	-	-	Yes	Yes	-
OS8	-	-	-	-	-	Yes		-	-	-	-	-	Yes	Yes	-
OS9	-	-	-	-	-	Yes		-	-	-	-	-	Yes	Yes	Yes
OS10	-	-	-	-	-	Yes		-	-	-	-	-	-	Yes	Yes
OS11	-	-	-	-	-	Yes		-	-	-	-	-	-	Yes	-
OS12	-	-	-	-	-	Yes		-	-	-	-	-	-	Yes	Yes
OS13	-	-	-	-	-	Yes		-	-	-	-	-	-	Yes	-
OS14	-	-	-	-	-	Yes		-	-	-	-	-	-	Yes	Yes
OS15	-	-	-	-	-	Yes		-	-	-	-	-	-	Yes	Yes

Cage Traps

Six Tomahawk cage traps were mounted on mature Black Box trees that contained obvious hollows at Site OS6 for five nights.

Spotlighting

Two forms of spotlighting transect were undertaken. Tracks within the survey area were spotlighted from a moving vehicle. In addition, spotlighting on foot was undertaken where targeted searching was important e.g. wetland areas.

Hair Funnels

Hair funnels (from Faunatech) were used at the two sites where tree hollows were obvious (OS4 and OS5). Five hair funnels were set out at each site for four nights and baited with a mixture of rolled oats, peanut butter and bacon fat (Plate 2).

Remote Cameras

Remote cameras (Digital Scouting Camera 5.0 MP) were used at Sites OS1 to OS6 to capture images of any animal using the area, particularly near the traps. At Sites OS1, OS3 and OS6 a small container of bait was placed in front of a camera to attract animals. Remote Cameras were left for five days per site (30 trap days total).

Bird Surveys

In addition to the results obtained from general observations and spotlighting, listening and observing periods were undertaken at all sites. Taking into consideration the discussion in the working draft on methods to survey diurnal birds (Department of Environment and Climate Change, 2006) an area search method was used at each site. A 30 minute search was used where the observer walked around each site, as well as observing and listening for calls from a single point. At each site up to four periods of observation were undertaken (two in the morning and two in the late afternoon) (a total of least 30 hours of bird surveys).

Call Broadcasting

Calls of several species of nocturnal bird were broadcast during the night in the general area. Calls were broadcast through a megaphone for approximately five minutes, with a 10 minute listening time. Calls from the Tawny Frogmouth (*Podargus strigoides*), Barking Owl (*Ninox connivens*), Barn Owl (*Tyto alba*), Masked Owl (*Tyto novaehollandiae*), Grass Owl (*Tyto capensis*), Southern Boobook (*Ninox boobook*), White-throated Nightjar (*Eurostopodus mystacalis*), Australian Owlet-Nightjar (*Aegotheles cristatus*) and Bush Stone-curlew (*Burhinus grallarius*) were broadcast.

Pit Fall Traps

Pit fall traps were established at four of the survey sites (OS1, 2, 4 and 5). Either 20 litre buckets or 1 m long tubes were used, together with drift fencing made from wire gauze. At all sites buckets and tubes were dug into the ground at 5 m intervals and a 20 cm high wire mesh fence run between each hole. Because of the threat from ants in this environment, a small quantity of diatomaceous earth was spread around the edge of each bucket and tube (Plate 3). This material is known to be able to discourage insects (e.g. bed bugs, beetles) due to its sharp-edged composition. 5 traps were placed for five nights at sites OS1, OS2 and OS5 for a total of 25 trap days at each site. Five pit fall traps were placed at Site OS4 for four nights and five days for a total of 20 trap nights.



Plate 3: Diatomaceous Earth Surrounding Pit Trap

Reptile Funnel Traps

Reptile funnel traps are basically an enlarged rectangular fish trap (about 75 cm long and 18 cm wide) made from plastic netting over a wire frame with a funnel at each end. Each trap uses a screen of sunshade cloth to protect any captures.

The traps were laid out in association with a drift fence and can be either placed with the fence joining the funnel at each end, or the funnels can be placed alongside the drift fence. It is usual to place a funnel on each side of the fence, thus ensuring a greater catch (not necessarily a more diverse catch) than if having a funnel placed within the drift fence. Reptile funnel traps were used at the OS3 and OS6 Sites, where the ground was too hard for digging pits (heavy clay). A total of 10 reptile funnels were used at each site for five days (Plate 4).



Plate 4: Reptile Funnels in Black Oak Habitat

Herpetological Searches

Systematic searches for reptiles and amphibians were undertaken within each habitat type at each survey site. Litter was raked and logs and loose tin turned over. Loose bark was prised from the trunks of dead trees. Some spinifex was removed and the exposed ground raked. A similar approach was taken with dead mallee roots. Each search took approximately 30 minutes and was repeated at each site. Searches for amphibians took place at night using spotlights and recognition of characteristic calls. There was little water to search for amphibians (either dams or spill from troughs). Spotlighting searches were also attempted for reptiles.

Sand Plots

Areas of sand on tracks were smoothed over and inspected for evidence of animal movement. Paw prints and other animal signs were identified and recorded. Sandplots were conducted at OS1, 2, 3 and 5 for five days (five trap days each)

Anabat Recorder

An Anabat II Bat Detector with a Compact Flash Storage ZCAIM was placed at Sites OS1, 2 and 4 for one night each and recorded any bat calls. The results from these detectors together with that from the harp traps and the bat call detection results from the adjoining Crayfish Deposit Offset Area were considered adequate to provide a picture of use of the Study area by bats. Bat calls were analysed by Glenn Hoyer, FBN Bat Surveys PL.

Harp Traps

Harp traps usually consist of a 1.8 m square frame made of aluminium mounted on adjustable legs. Monofilament fishing line is strung vertically in the frame in two banks, with the lines c. 2.5 cm apart and the banks separated by c. 10 cm, and with the lines of each bank offset. Below the bottom of the frame is a canvas catch bag lined with plastic (Plate 5). Traps are usually placed in vegetation corridors, over water tanks, and at cave or mine entrances. Bats fly into the fishing lines and slide down into the catch bag from which they cannot escape. Five harp traps were placed close to Sites OS1, 3 and 6 for one night (two nights at OS6).



Plate 5: Harp Trap in Mallee Habitat

Observation Sessions

At all sites time was set aside to record the presence of any fauna. The period of time for the observation sessions was one hour. During the session, traverses through each site occurred and any bird, mammal and reptile species observed was documented. In addition, logs and rocks were turned over and the underneath of any loose bark inspected. Signs of any species (e.g. scats, diggings, nests, scratching and burrows) were also recorded. Table 4 provides the survey effort undertaken at each site within the Study area excluding observational techniques which were conducted throughout the Study area.

Table 4
Survey Effort within the Study Area

Site	Ground Elliott	Tree Elliott	Tree Cage	Hair Funnel	Remote Camera	Pit Trap	Reptile Funnel	Sand Plot	Anabat Recorder	Harp Trap
OS1	50 trap days	-	-	-	5 trap days	25 trap days	-	5 trap days	1 trap days	5 trap days
OS2	50 trap days	-	-	-	5 trap days	25 trap days	-	5 trap days	1 trap days	-
OS3	50 trap days	-	-	-	5 trap days	-	50 trap days	5 trap days	-	5 trap days
OS4	50 trap days	25 trap days	-	25 trap days	5 trap days	20 trap days	-	-	1 trap days	-
OS5	50 trap days	25 trap days	-	25 trap days	5 trap days	25 trap days	-	5 trap days	-	-
OS6	50 trap days	-	30 trap days	-	5 trap days	-	50 trap days	-	-	10 trap days
TOTAL	300 trap days	50 trap days	30 trap days	50 trap days	30 trap days	95 trap days	100 trap days	20 trap days	13 trap days	20 trap days

3.4 THREATENED SPECIES SURVEYS

A total of 41 species listed under the TSC Act are known from database search results from the general region containing the Study area. These species are listed in Table 5, together with the survey techniques to target each species. The techniques used are in accordance with the guidelines produced by the OEH (Department of Environment and Conservation, 2004) and SEWPaC (Department of the Environment, Water, Heritage and the Arts, 2010; SEWPaC, 2011).

Table 5
Threatened Species Known from the Locality Containing the Study Area

Scientific Name	Common Name	TSC Act	EPBC Act	Survey Methods
<i>Neobatrachus pictus</i>	Painted Burrowing Frog	E		Call identification, Pit Trapping
<i>Diplodactylus stenodactylus</i>	Crowned Gecko	V		Searching, Pit Trapping, Reptile Funnels
<i>Strophurus elderi</i>	Jewelled Gecko	V		Searching, Pit Trapping, Reptile Funnels
<i>Aprasia inaurita</i>	Mallee Worm-Lizard	E		Searching, Pit Trapping, Reptile Funnels
<i>Delma australis</i>	Marbled-headed Delma	E		Searching, Pit Trapping, Reptile Funnels
<i>Ctenotus brooksi</i>	Wedge-headed Ctenotus	V		Searching, Pit Trapping, Reptile Funnels
<i>Cyclodomorphus melanops elongatus</i>	Mallee Slender Blue-tongue Lizard	V		Searching, Pit Trapping, Reptile Funnels
<i>Lerista xanthura</i>	Yellow-tailed Plain Slider	V		Searching, Pit Trapping, Reptile Funnels
<i>Tiliqua occipitalis</i>	Western Blue-tongue Lizard	V		Searching, Pit Trapping, Reptile Funnels
<i>Pseudonaja modesta</i>	Ringed Brown Snake	E		Searching, Pit Trapping, Reptile Funnels
<i>Leipoa ocellata</i>	Malleefowl	E	V	Bird Surveys, Observational Sessions, Call Identification

Table 5 (Continued)
Threatened Species Known from the Locality Containing the Study Area

Scientific Name	Common Name	TSC Act	EPBC Act	Survey Methods
<i>Stictonetta naevosa</i>	Freckled Duck	V		Bird Surveys, Observational Sessions, Call Identification
<i>Oxyura australis</i>	Blue-billed Duck	V		Bird Surveys, Observational Sessions, Call Identification
<i>Falco hypoleucos</i>	Grey Falcon	E		Bird Surveys, Observational Sessions, Call Identification
<i>Lophoictinia isura</i>	Square-tailed Kite	V		Bird Surveys, Observational Sessions, Call Identification
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V		Bird Surveys, Observational Sessions, Call Identification
<i>Circus assimilis</i>	Spotted Harrier	V		Bird Surveys, Observational Sessions, Call Identification
<i>Hieraaetus morphnoides</i>	Little Eagle	V		Bird Surveys, Observational Sessions, Call Identification
<i>Falco hypoleucos</i>	Grey Falcon	E		Bird Surveys, Observational Sessions, Call Identification
<i>Falco subniger</i>	Black Falcon	V		Bird Surveys, Observational Sessions, Call Identification
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V		Bird Surveys, Observational Sessions, Call Identification
<i>Calyptorhynchus banksii samueli</i>	Red-tailed Black-Cockatoo	V		Bird Surveys, Observational Sessions, Call Identification
<i>Lathamus discolor</i>	Swift Parrot	E	E	Bird Surveys, Observational Sessions, Call Identification
<i>Polytelis anthopeplus monarchoides</i>	Regent Parrot (eastern sub-species)	E	V	Bird Surveys, Observational Sessions, Call Identification
<i>Ninox connivens</i>	Barking Owl	V		Bird Surveys, Observational Sessions, Call Identification, Spotlighting, Call Broadcasting
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern sub-species)	V		Bird Surveys, Observational Sessions, Call Identification
<i>Pyrrholaemus brunneus</i>	Redthroat	V		Bird Surveys, Observational Sessions, Call Identification
<i>Epthianura albifrons</i>	White-fronted Chat	V		Bird Surveys, Observational Sessions, Call Identification
<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater	V		Bird Surveys, Observational Sessions, Call Identification
<i>Hylacola cautus</i>	Shy Heathwren	V		Bird Surveys, Observational Sessions, Call Identification
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	V		Bird Surveys, Observational Sessions, Call Identification
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (south-eastern sub-species)	V		Bird Surveys, Observational Sessions, Call Identification
<i>Cinclosoma castaneothorax</i>	Chestnut-backed Quail-thrush	V		Bird Surveys, Observational Sessions, Call Identification
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V		Bird Surveys, Observational Sessions, Call Identification
<i>Pachycephala inornata</i>	Gilbert's Whistler	V		Bird Surveys, Observational Sessions, Call Identification
<i>Ningau i yvonneae</i>	Southern Ningau i	V		Elliott Trapping, Pit Trapping
<i>Pseudomys bolami</i>	Bolam's Mouse	E		Elliott Trapping, Pit Trapping
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V		Harp Trapping, Anabat Recording
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	V	Harp Trapping, Anabat Recording
<i>Chalinolobus picatus</i>	Little Pied Bat	V		Harp Trapping, Anabat Recording
<i>Vespadelus baverstocki</i>	Inland Forest Bat	V		Harp Trapping, Anabat Recording

3.5 HABITAT ASSESSMENT

For convenience, the Study area has been divided into five main habitat types:

1. Black Box Woodland.
2. Black Oak Woodland.
3. Chenopod Mallee.
4. Grassland/Low Shrubland.
5. Dune Mallee.

The classification of these habitats is based upon the vegetation communities described by FloraSearch (2014) (Figure 2). These five habitat types are listed in Table 5, together with the extent of each habitat and the vegetation communities within each habitat (FloraSearch, 2014). Figure 4 shows the distribution of the habitat types within the Study area.

Nine sites were selected to sample tree hollows in a range of habitats within the Study area (OS1-OS9). Transects were walked through each site, and a number of trees were inspected and the following information was documented:

- tree species;
- tree height;
- diameter at breast height (DBH);
- presence of cracks and/or shedding bark;
- number of small (<10 cm), medium (10 to 20 cm) and large (>20 cm) hollows;
- if the hollow classed as a stag;
- GPS co-ordinates;
- presence of wildlife; and
- if the hollow classed as a habitat tree.

An inspection camera was used (DeWalt DCT410 Inspection Camera (Plate 6) with a three foot cable. A total of 50 trees were inspected at eight of the sites, and 100 trees at one site, making a total survey effort of 500 trees.

Biometric data was collected by FloraSearch (2014) and has been considered in this report in terms of fauna habitat.



CWA-13-03 BA_FSR_20BC

- | | |
|---|--|
| LEGEND | |
| Mining Lease Boundary | Ginkgo Mine General Arrangement (2010) |
| Ore Pipeline (Processing Option 2) (Not Constructed) | Subject Area |
| Mineral Concentrate Transport Route and MSP Process Waste Transport Route | Modified Approximate Extent of Surface Development |
| Ginkgo Mine Potable Water Pipeline (Not Constructed) | Study Area |
| Electricity Transmission Line | ▲ Flora Survey Site |
| ● Water Bore | |

Source: Bemax Resources Limited (2010) and Cristal Mining (2013)
 Orthophoto: Cristal Mining (2012)



G I N K G O M I N E
 Flora Survey Sites

Figure 3



Plate 6: Using the Inspection Camera in a Hollow in a Black Oak Tree

4 RESULTS

4.1 HABITAT TYPES

1. Black Box Woodland

Black Box Woodland (also the same vegetation community [Table 2] [FloraSearch, 2014]) is confined to isolated playa depressions in the west, north and east of the Study area (Figure 4) and forms open woodlands in seasonally waterlogged depressions with clay loam soils. There are large areas with a Speargrass/Lovegrass understorey interspersed with deeper claypans dominated by Nardoo and ephemeral herbs and tall shrubs are rare and low chenopod shrubs scattered, except in the wetter areas where all shrubs are absent.

2. Black Oak Woodland

This habitat type comprises the Black Oak – Western Rosewood Woodland vegetation community (Table 2; FloraSearch, 2014). The area of this habitat in the Study area has been considerably reduced by past clearing and thinning to encourage the growth of grasses, herbs and shrubs for grazing by domestic stock. Most remnants of this habitat are fragmented and highly disturbed, and much of the cleared area of this community is now derived grassland or shrubland. Remnants of this habitat are concentrated mainly in the north-west corner and the east of the Study area with small isolated patches elsewhere (Figure 4).

3. Chenopod Mallee

This habitat comprises the Chenopod Mallee Woodland/Shrubland vegetation community (FloraSearch, 2014) and dominates the naturally vegetated parts of the Study area (Figure 4). It mainly occurs on gently sloping sand plains, on the lower slopes of linear sand dunes and on shallow east-west oriented and irregular sand dunes. The dominant tree species in this community are mallee eucalypts and there is usually a more or less sparse layer of low shrubs, mainly Bluebushes. The ground cover is dominated by the chenopods.

4. Grassland/Low Shrubland

This habitat comprises the most widespread vegetation type on the Study area (Figure 4). It occurs mainly on sand plains and in cleared dune swales. The habitat comprises Prickly Wattle Tall Open Shrublands, Turpentine Tall Open Shrubland and Narrow-leaf Hopbush Shrubland vegetation communities (Table 2; FloraSearch, 2014) and appears to have been derived mainly from clearing Chenopod Sandplain Mallee Woodland and to a lesser extent Black Oak – Rosewood Woodland. This habitat can be considered as a derived grassland formation that may also have a significant representation of low shrubs. Trees are lacking, but there may be occasional scattered tall shrubs.

5. Dune Mallee

This habitat mainly occurs on the crests and upper slopes of high irregular and east-west oriented sand dunes with deep loose sand. This habitat is comprised of Dune Mallee Shrubland vegetation community (Table 2; FloraSearch, 2014) and the dominant tree species are mallee eucalypts and the understorey generally lacks tall shrubs. Low shrubs are generally uncommon, comprising mainly bluebush and saltbush. This habitat is distinguished principally by the dominance of Porcupine Grass (*Spinifex*) in the understorey.

4.2 FAUNA COMPOSITION

A total of 102 species were located within the Study area including 62 bird, 12 native mammal, eight introduced mammal and 20 reptile species. The species richness (the value of different species) values for the Study area are similar to that found elsewhere in the Ginkgo area. The results from the fauna surveys for the original Ginkgo Mineral Sands Project give species richness values for birds and reptiles of 54 and 19, respectively. Surveys for the Crayfish Modification area (Biodiversity Monitoring Services, 2012) give various bird species richness values ranging from 30 to 77 and reptile values from 4 to 19. Table 6 and Figure 5 show the species richness values for various areas surveyed for Ginkgo Mineral Sands Mine and fauna listings from the present survey of the Study area are provided in Appendix A.

Table 6
Bird and Reptile Species Richness Values in the Ginkgo Area

Fauna Group	Source	Birds	Reptiles
Crayfish Modification Area	Biodiversity Monitoring Services (2012)	77	19
Crayfish Deposit Area	Biodiversity Monitoring Services (2012)	46	15
Crayfish Deposit Offset area	Biodiversity Monitoring Services (2012)	55	4
Haul Road Area	Biodiversity Monitoring Services (2012)	30	Na
Modification Area Overall	Biodiversity Monitoring Services (2012)	89	26
Ginkgo Mine Area	BEMAX Resources (2001)	54	19
Ginkgo Overall	BEMAX Resources (2001)	136	27
Study Area	This report	63	20

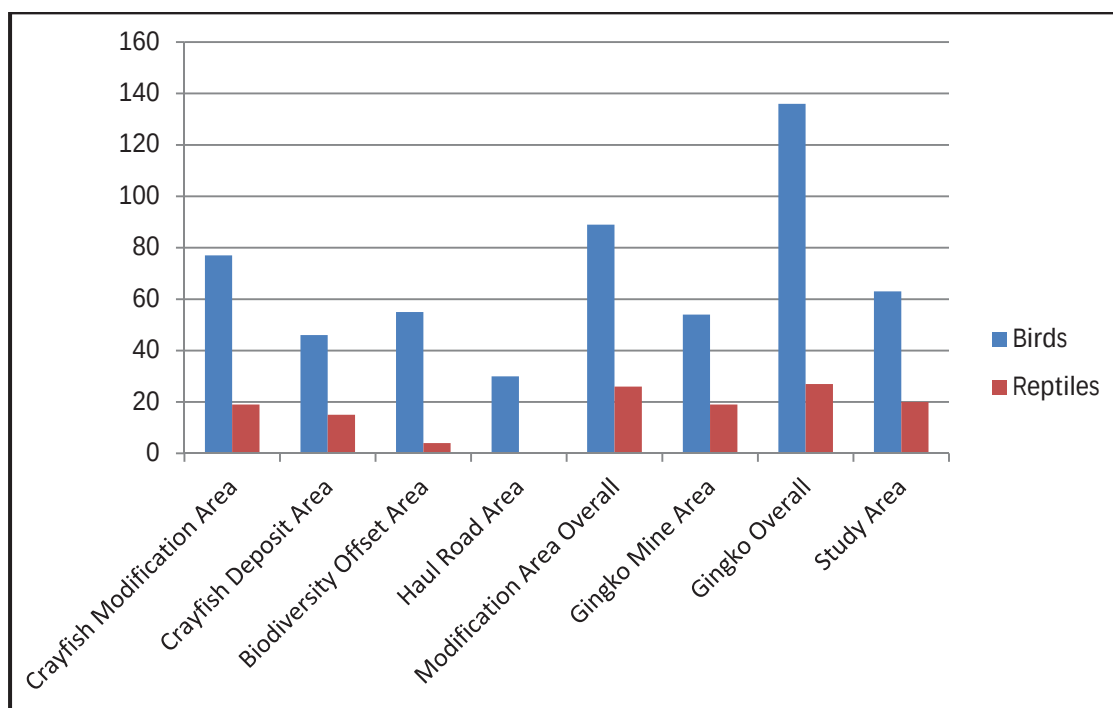


Figure 5: Bird and Reptile Species Richness Values for in the Ginkgo Area

There is sufficient data obtained under formal survey conditions (consistent survey effort and techniques) to calculate some comparisons and relationships from the results of the survey.

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

An Evenness score was also calculated. Evenness is a measure of the relative abundance of different species making up the richness of an area. A low value for Evenness means that the sample is dominated by a large number of one or two species. A high Evenness value means that most species in the sample have a similar abundance. It was possible to calculate Simpson's Index of Diversity and Evenness score for bird and reptile populations from the Study area and compare these with that obtained from the Crayfish Deposit Offset area and the Crayfish Project area. The results from the calculations are given in Table 7 and Figures 6a and 6b.

Table 7
Biodiversity Indices for Three Areas

Location	Evenness	Simpson's Index (D)	Number	Species Richness
Birds				
Study Area	0.808	0.943	2,246	63
Crayfish Deposit Offset Area	0.687	0.866	2,034	55
Crayfish Deposit	0.796	0.911	869	46
Reptiles				
Study Area	0.893	0.912	92	20
Crayfish Deposit Offset Area	0.961	0.720	5	4
Crayfish Deposit	0.603	0.632	70	15

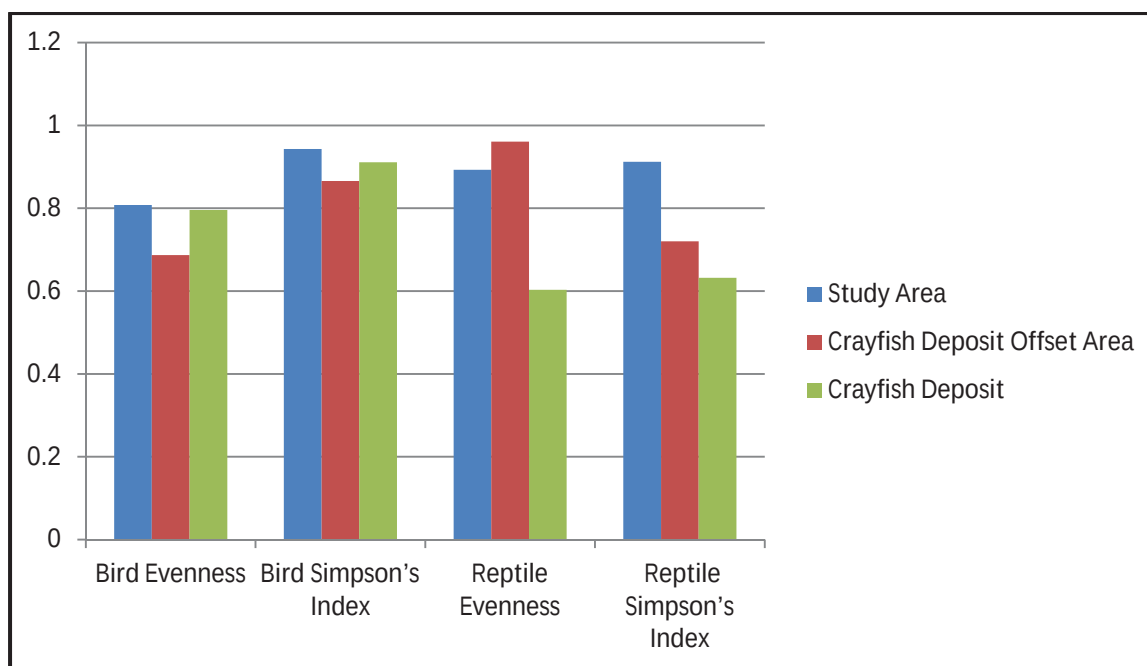


Figure 6a: Biodiversity Indices (1)

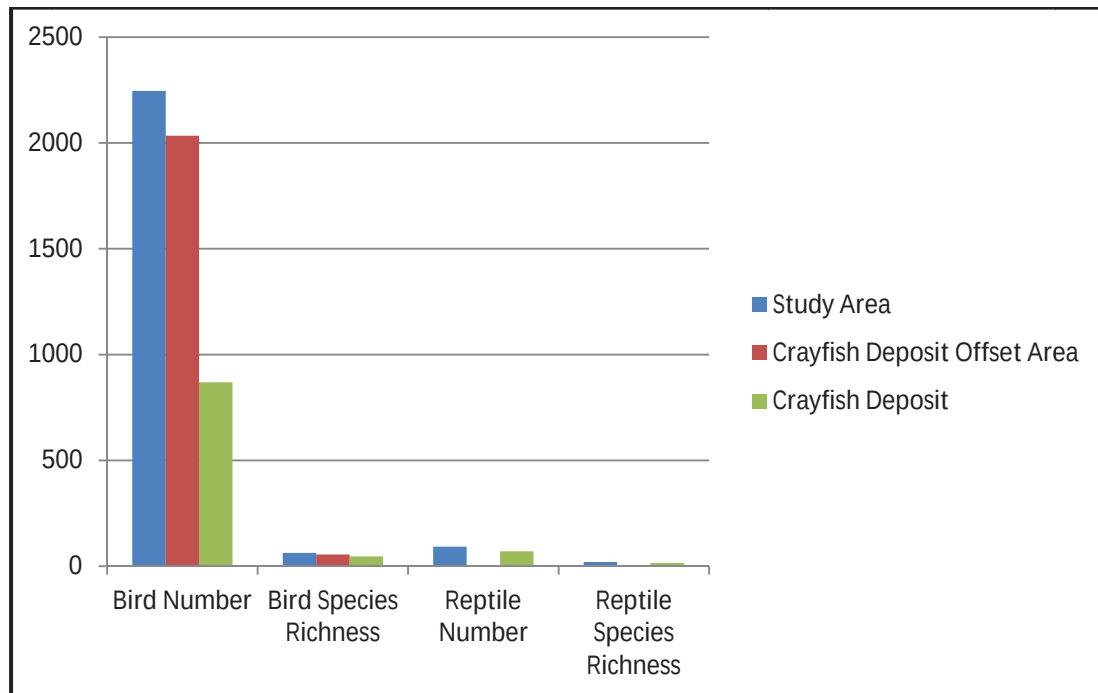


Figure 6b: Biodiversity Indices (2)

Statistically there are no significant differences between the biodiversity indices for the three areas (non-parametric Kruskal-Wallis One Way Analysis of Variance on Ranks). Most importantly, there is a significant difference between the biodiversity indices obtained from the Study area and the adjoining Crayfish Deposit Offset area previously surveyed. The combined indices for the Study area are significantly higher than that obtained from the Crayfish Deposit Offset area (non-parametric Wilcoxon Signed Rank Test, $p = 0.016$). It is possibly due to the higher biodiversity values obtained for reptiles (Plate 7) within the Study area. This difference can be explained by the timing of the surveys, with the surveys of the Crayfish Deposit Offset area occurring in winter and in summer for the Study area.



Plate 7: Thick-tailed Gecko Captured at OS3 Site

4.3 THREATENED SPECIES

Five species listed as Vulnerable under the NSW Threatened Species Conservation Act were located within the Study area. These are listed in Table 8 and their locations within the Study area are given in Figure 4. Combined with the records from the Crayfish Deposit Offset area survey there are now seven threatened species within or near the Study area.

Table 8
Threatened Species Located within the Study Area

Date	Common Name	Scientific Name	Number	Easting	Northing
23/11/2013	Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	2	638640	6303879
27/11/2013	Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	6	637938	6305348
29/11/2013	Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	2	635112	6304715
20/11/2013	Little Eagle	<i>Hieraaetus morphnoides</i>	1	638909	6303622
21/11/2013	Little Eagle	<i>Hieraaetus morphnoides</i>	1	637938	6305348
22/11/2013	Little Eagle	<i>Hieraaetus morphnoides</i>	1	632664	6301902
22/11/2013	Little Eagle	<i>Hieraaetus morphnoides</i>	1	632803	6302547
23/11/2013	Little Eagle	<i>Hieraaetus morphnoides</i>	1	633563	6305973
23/11/2013	Little Eagle	<i>Hieraaetus morphnoides</i>	1	633323	6304287
24/11/2013	Little Eagle	<i>Hieraaetus morphnoides</i>	1	639274	6303589
25/11/2013	Little Eagle	<i>Hieraaetus morphnoides</i>	1	630997	6302934
30/11/2013	Little Eagle	<i>Hieraaetus morphnoides</i>	1	631770	6304365
23/11/2013	Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>	1	633810	6305756
28/11/2013	Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>	1	638348	6303940
29/11/2013	Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>	2	638889	6305340
30/11/2013	Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>	2	623759	6305687
25/11/2013	Little Pied Bat	<i>Chalinolobus picatus</i>	3	639667	6303940
25/11/2013	Inland Forest Bat	<i>Vespadelus baverstocki</i>	2	639667	6303940

Only one species listed under the EPBC Act was located within the Study area. This was the Rainbow Bee-eater, listed as Migratory under the Act.

4.4 INTRODUCED SPECIES

The Study area has been grazed by domestic stock and feral Goats at a sufficiently high level to result in changes to the habitats, particularly the understorey and ground cover. This would have affected fauna populations in the Study area, possibly leading to gaps in the expected fauna assemblages. A total of eight introduced species were located within the Study area, with sheep and goats the most dominant (Appendix A) (2,948 sightings of sheep and 1,523 sightings of Feral Goat). There were 17 sightings of the Red Fox and 46 of Rabbits.

4.5 TREE HOLLOWES

The survey within the Study area showed that a proportion of the 500 trees inspected had some form of hollow and could be classed as 'habitat trees'. Table 9 gives a summary of the data obtained from the tree survey. Overall the proportion of different tree species sampled was Mallee (42.1 percent [%]), Black Oak (36.9%), Black Box (20%) and Mulga (1%).

Table 9
Characteristics of Trees within the Study Area

Site	Habitat Type	Mean Tree Height (m)	Mean DBH (cm)	% Trees with Cracks	% Trees with Hollows			% Stags
					Small	Medium	Large	
OS1	Dune Mallee (Poor Condition)	5.5	17.5	64	42	32	0	
OS2	Dune Mallee (Good Condition)	6.2	15.5	30	2	0	0	2
OS3	Black Oak Woodland (Poor Condition)	7.9	30.7	60	28	26	2	4
OS4	Black Oak Woodland (Poor Condition)	7.5	32.6	54	20	0	0	4
OS5	Dune Mallee (Good Condition)	6.3	21.4	50	30	14	6	2
OS6	Black Box Woodland (Good Condition)	9.0	41.7	64	71	47	16	13
OS7	Black Oak Woodland (Good Condition)	6.9	21.1	46	18	0	0	8
OS8	Black Oak Woodland (Good Condition)	7.3	35.6	72	30	0	0	4
OS9	Dune Mallee (Good Condition)	6.8	21.5	60	30	18	2	4
Mean		7.0	26.4	55.5	30.1	15.2	2.9	5.1

It can be seen that a proportion of the trees contain hollows of some size, with those trees with small hollows making up the majority. More trees showed cracks in the trunks and/or loose and cracking bark. There is some variation between the sites, with OS6 showing the highest proportion of trees with hollows and cracks. It is also the site with the largest trees suggesting a relationship between larger, older trees and the formation of hollows. Unfortunately, the inspection of many tree hollows by the use of an inspection camera did not reveal much use by fauna. In most cases all that was found were insects.

5 CONCLUSION

The results from the fauna survey show biodiversity values that are similar to that found within surrounding areas that have been surveyed in recent years. These areas include the adjacent Crayfish Deposit Offset area (Cristal Mining Limited, 2013) and the Ginkgo Mine area (BEMAX Resources, 2001). However, the survey of the Study area showed that a number of species usually located in this environment were missing or were in low numbers. This includes small ground mammals (only one House Mouse was located) and some of the rarer reptiles (e.g. the threatened Jewelled Gecko) as well as smaller birds such as finches and chats. This may be due to the lack of understory within the Study area, but the prolonged drought conditions in the region would have affected fauna populations.

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FloraSearch (2014) *Snapper and Ginkgo Mines Modification Environmental Assessment Flora Assessment*

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Data Received: 31 January 2013.

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Website: <http://www.environment.nsw.gov.au/threatenedSpeciesApp/cmaSearchResults.aspx?SubCmaId=791>

Date Accessed: January 2014.

APPENDIX A
—
SITE FAUNA LIST

Scientific Name	Common Name	Status
Birds		
Dromaiidae		
<i>Dromaius novaehollandiae</i>	Emu	P
Podicipedidae		
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	P
Accipitridae		
<i>Aquila audax</i>	Wedge-tailed Eagle	P
<i>Milvus migrans</i>	Black Kite	P
<i>Hieraaetus morphnoides</i>	Little Eagle	V
<i>Haliastur sphenurus</i>	Whistling Kite	P
Falconidae		
<i>Falco berigora</i>	Brown Falcon	P
<i>Falco cenchroides</i>	Nankeen Kestrel	P
<i>Falco longipennis</i>	Australian Hobby	P
Charadriidae		
<i>Elseyornis melanops</i>	Black-fronted Dotterel	P
Columbidae		
<i>Ocyphaps lophotes</i>	Crested Pigeon	P
<i>Phaps chalcoptera</i>	Common Bronzewing	P
Cacatuidae		
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V
<i>Eolophus roseicapillus</i>	Galah	P
Psittacidae		
<i>Barnardius zonarius</i>	Australian Ringneck	P
<i>Northiella haematogaster</i>	Bluebonnet	P
<i>Platycercus elegans flaveolus</i>	Yellow Rosella	P
<i>Psephotus varius</i>	Mulga Parrot	P
Cuculidae		
<i>Cuculus pallidus</i>	Pallid Cuckoo	P
Aegothelidae		
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	P
Halcyonidae		
<i>Todiramphus sanctus</i>	Sacred Kingfisher	P
Meropidae		
<i>Merops ornatus</i>	Rainbow Bee-eater	P
Climacteridae		
<i>Climacteris picumnus picumnus</i>	Brown Treecreeper (western subspecies)	P
Pardalotidae		
<i>Pardalotus striatus</i>	Striated Pardalote	P
Acanthizidae		
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	P
<i>Acanthiza nana</i>	Yellow Thornbill	P
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	P
<i>Aphelocephala leucopsis</i>	Southern Whiteface	P
<i>Smicrornis brevirostris</i>	Weebill	P
Meliphagidae		
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	P
<i>Lichenostomus ornatus</i>	Yellow-plumed Honeyeater	P
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater	P

Scientific Name	Common Name	Status
<i>Lichenostomus virescens</i>	Singing Honeyeater	P
<i>Manorina flavigula</i>	Yellow-throated Miner	P
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	P
<i>Plectorhyncha lanceolata</i>	Striped Honeyeater	P
Petroicidae		
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	V
<i>Microeca fascians</i>	Jacky Winter	P
<i>Petroica goodenovii</i>	Red-capped Robin	P
Pomatostomidae		
<i>Pomatostomus superciliosus</i>	White-browed Babbler	P
<i>Pomatostomus temporalis rubeculus</i>	Grey-crowned Babbler (western subspecies)	P
Pachycephalidae		
<i>Oreoica gutturalis</i>	Crested Bellbird	P
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	P
<i>Pachycephala rufiventris</i>	Rufous Whistler	P
Dicruridae		
<i>Grallina cyanoleuca</i>	Magpie-lark	P
<i>Myiagra inquieta</i>	Restless Flycatcher	P
<i>Rhipidura leucophrys</i>	Willie Wagtail	P
Artamidae		
<i>Artamus leucorhynchus</i>	White-breasted Woodswallow	P
<i>Cracticus nigrogularis</i>	Pied Butcherbird	P
<i>Cracticus torquatus</i>	Grey Butcherbird	P
<i>Gymnorhina tibicen</i>	Australian Magpie	P
Campephagidae		
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	P
<i>Coracina maxima</i>	Ground Cuckoo-shrike	P
Corvidae		
<i>Corvus coronoides</i>	Australian Raven	P
<i>Corvus bennetti</i>	Little Crow	P
<i>Corvus mellori</i>	Little Raven	P
Corcoracidae		
<i>Struthidea cinerea</i>	Apostlebird	P
<i>Corcorax melanorhamphos</i>	White-winged Chough	P
Hirundinae		
<i>Hirundo neoxena</i>	Welcome Swallow	P
<i>Petrochelidon ariel</i>	Fairy Martin	P
<i>Petrochelidon nigricans</i>	Tree Martin	P
Sylviidae		
<i>Cincloramphus mathewsi</i>	Rufous Songlark	P
Mammals		
Tachyglossidae		
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	P
Phalangeridae		
<i>Trichosurus vulpecular</i>	Common Brushtail Possum	P
Macropodidae		
<i>Macropus rufus</i>	Red Kangaroo	P
<i>Macropus fuliginosus</i>	Western Grey Kangaroo	P
<i>Macropus robustus</i>	Common Wallaroo	P

Scientific Name	Common Name	Status
Muridae		
<i>Mus musculus</i>	House Mouse	U
Molossidae		
<i>Mormopterus sp 3</i>	Inland Freetail Bat	P
Vespertilionidae		
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	P
<i>Chalinolobus picatus</i>	Little Pied Bat	V
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	P
<i>Scotorepens greyi</i>	Little Broad-nosed Bat	P
<i>Vespadelus baverstocki</i>	Inland Forest Bat	V
<i>Vespadelus vulturnus</i>	Little Forest Bat	P
Canidae		
<i>Canis lupus</i>	Dingo, domestic dog	U
<i>Vulpes vulpes</i>	Red Fox	U
Felidae		
<i>Felis catus</i>	Cat	U
Bovidae		
<i>Capra hircus</i>	Goat	U
Artiodactyla		
<i>Ovis aries</i>	Sheep	U
Suidae		
<i>Sus scrofa</i>	Feral Pig	U
Leporidae		
<i>Oryctolagus cuniculus</i>	Rabbit	U
Reptiles		
Agamidae		
<i>Amphibolurus nobbi</i>	Nobbi	P
<i>Pogona vitticeps</i>	Central Bearded Dragon	P
Gekkonidae		
<i>Gehyra variegata</i>	Tree Dtella	P
<i>Rhynchoedura ornata</i>	Beaked Gecko	P
<i>Lucasium damaeum</i>	Beaded Gecko	P
<i>Heteronotia binoea</i>	Bynoe's Gecko	P
<i>Underwoodisaurus milii</i>	Thick-tailed Gecko	P
Pygopodidae		
<i>Delma butleri</i>	Unbanded Delma	P
<i>Lialis burtonis</i>	Burton's Snake-Lizard	P
Varanidae		
<i>Varanus gouldii</i>	Gould's Goanna	P
<i>Varanus varius</i>	Lace Monitor	P
Scincidae		
<i>Cryptoblepharus carnabyi</i>	Spiny-palmed Shining-skink	P
<i>Ctenotus regius</i>	Royal Ctenotus	P
<i>Lerista punctatovittata</i>	Eastern Robust Slider	P
<i>Ctenotus brachyonyx</i>	Short-clawed Ctenotus	P
<i>Ctenotus atlas</i>	Southern Mallee Ctenotus	P
<i>Menetia greyii</i>	Common Dwarf Skink	P
<i>Morethia boulengeri</i>	South-eastern Morethia Skink	P
<i>Morethia obscura</i>	Dull Morethia	P
<i>Tiliqua rugosa</i>	Shingle-back	P

Status: P – Protected; V – Vulnerable under the NSW TSC Act; U – Introduced.