Mount Gibson Mining

EXTENSION HILL HEMATITE OPERATION

Annual Malleefowl Mound Monitoring December 2011

TABLE OF CONTENTS

1. INTRODUCTION 1
1.1 Location 1
1.2 Background 1
1.3 Malleefowl 2
1.4 Previous Surveys 3
2. METHODOLOGY 4
2.1 Survey 4
2.2 Data analysis 4
3. CONSTRAINTS AND LIMITATIONS 5
4. RESULTS 6
5. DISCUSSION 10
6. REFERENCES 11

LIST OF TABLES

Table 1 Survey Constraints and Limitations 5
Table 2 Malleefowl mound status site summary 7
Table 3 Malleefowl mound distance from disturbance and status summary 9

LIST OF FIGURES

Figure 1 Malleefowl Mound Status as at December 2011 8

Rev	Date	Revision description	By	Distribution
A	08.10.2012		J. Sackmann	

1. INTRODUCTION

1.1 Location

Extension Hill and Extension Hill North are located in the Mt Gibson Ranges, approximately 350km north-east of Perth in Western Australia. The Mt Gibson Ranges have a semi-desert Mediterranean climate, characterised by hot, dry summers with 9 to 11 months of dry weather and mild, wet winters (Payne et al. 1998). The rainfall in the area averages approximately 278.8mm per annum at Paynes Find, 70km to the north (Bureau of Meteorology 2010). There was 257.0mm of rainfall recorded at Paynes Find for the period Feb 2009 – Jan 2010. Bushfires occur naturally and frequently in this region, mostly started by lightning strikes or human activities, although no major bushfires occurred in the survey area since the last monitoring program.

The Mt Gibson Ranges occurs on the boundary of the Austin Botanical District of the Eremaean and the Avon Botanical District of the Southwest Botanical Provinces (Beard 1990). They are located in the Avon Wheatbelt bioregion (McKenzie et al. 2003), but are near the junction of the Yalgoo and Coolgardie Interim Biogeographical Regional Assessment (IBRA) bioregions. As a consequence, the floristic composition of the area is considered to be representative of all three Bioregions.

Mount Gibson has a diverse range of vegetation communities comprising of six woodlands, four mallee, 12 thicket and two heath communities (Bennett Environmental Consulting, 2000). From a fauna perspective, the habitat can be divided into four broad categories: the flat sand plains, the flat woodlands, slopes and the iron stone ridges.

Surface drainage in the Mt Gibson Ranges area is primarily characterised by ephemeral flows.

1.2 Background

Malleefowl's wariness and colouration make it difficult to reliably and accurately census their numbers. As such, the number of active mounds is used as a proxy census which directly relates to the number of breeding birds in the area and hence provides an indication of population survival likelihood and impact assessment.

Each of the major habitat types was surveyed for malleefowl mounds by ATA Environmental (2005) in 2004/05, as part of the environmental impact assessment for the Mt Gibson Iron Ore Mine and Infrastructure Project (the Project). Most of the mounds at Mt Gibson were found in thickets, typically on the sand plain and pebbly soils on the slopes or base of the ironstone range (Figure 1). However, mounds were not confined to these areas. Active mounds were spread across the tenements.

In accordance with the Malleefowl Management Plan (ATA Environmental *et al* 2008), Mount Gibson Mining Limited (MGM) and Extension Hill Pty Ltd (EHPL) are required to conduct annual monitoring of known malleefowl mounds within the Project area (see Figure 1). Following the initial survey, the first complete monitoring survey of the known mounds was conducted in October and November 2008 during the 2008/2009 breeding season. The monitoring survey for the 2009/2010 breeding season was conducted in January 2010. The 2010/2011 breeding season survey was conducted in November 2010. This report covers the 2011/2012 breeding season survey which was conducted in November/December 2011.

The Project consists of a combined hematite and magnetite open cut mining operation, with MGM managing the hematite aspect and EHPL managing the magnetite aspect. Construction activities commenced in June 2010 and the Extension Hill Hematite Operation (EHHO) was operational throughout the entire 2011/2012 breeding season. Mining activities at this site for the overall Project are anticipated to continue for approximately 40 years.

1.3 Malleefowl

1.3.1 Description

Malleefowl (*Leipoa ocellata*) is a member of the family of mound building birds (Megapodiidae). It is the only species in the genus *Leipoa* (Benshemesh 2007). Adult males (65-67.5cm) are slightly larger than females (56.5-62.0cm) and are much heavier (1.7-2.1kg versus 1.5-1.6kg).

The adult malleefowl has a greyish head and neck, with a short dark bill, brown irises, a narrow white stripe beneath each eye, chestnut colouring on the chin, a dark-brown to blackish medial stripe that extends from the forehead to the base of the head, and a broad black stripe that extends from the throat to the upper breast. The upper surfaces of the wings have a complex pattern of markings, consisting of mottled brown, white, grey and black. The upper surface of the tail is mostly greyish, with narrow brown-black barring and some small patches of white. The breast, belly and flanks are a creamy white colour, and the legs and feet range from pale grey to blackish-brown in colour, and have darker claws (Marchant & Higgins 1993).

1.3.2 Breeding and Nesting

Malleefowl tend to be a sedentary, mostly terrestrial species that nest in the same general area each year (Firth 1962a; Priddel and Wheeler 2003). Malleefowl will reuse 'old' mounds that have been inactive for a number of years. In the event of the death of a partner, males display greater nest-site fidelity than females. Malleefowl are generally monogamous, pairing for life, but quickly find a new mate, if a partner dies (Priddel and Wheeler 2003).

Construction of a malleefowl nesting mound occurs intermittently over several months and is undertaken by both partners. The mound consists of sand, gravel and vegetation and is generally 3-5m wide and over 1m high, although sizes vary as material builds up in mounds that are used regularly. Mound construction mostly occurs between autumn and spring. Upon completion, the male will continue tending the mound while the female spends most of her time feeding (Benshemesh 2007). Incubation temperature of the mound is influenced by microbial decomposition of the vegetation, particularly in the early stages, and solar radiation.

1.3.3 Habitat

Malleefowl are able to survive in semi-arid and arid habitats not normally populated by extant megapodes due to their ability to manipulate external heat sources to incubate their eggs (Benshemesh 2007).

The habitat requirements of Malleefowl are poorly understood, however a sandy substrate and abundance of leaf litter are clear requirements for the construction of the birds' nesting mounds (Frith, 1959, 1962a). Densities of the breeding birds are positively influenced by rainfall, soil fertility, shrub diversity, and density of canopy cover and are negatively influenced by grazing (Frith 1962a; Woinarski 1989; Benshemesh 1992a, 2007; Copley and Williams 1995; Priddel and Wheeler 2005).

The Malleefowl is now primarily found in semi-arid and arid shrublands and low woodlands dominated by mallee (Frith 1962a, b). The vegetation is often broombush (*Melaleuca uncinata*) (Woinarski, 1989a, b) and scrub pine (*Callitris verrucosa*). They also occur in woodlands dominated by eucalypts such as wandoo (*E. wandoo*), marri (*E. calophylla*) and mallet (*E. astringens*), and in some shrublands dominated by acacia in Western Australia (Johnstone and Storr 1998).

The malleefowl mounds at Mt Gibson were predominantly, although not exclusively, found in thickets, typically on the sand plain and pebbly soils on the slopes or base of the ironstone range (ATA Environmental 2005).

1.3.4 Distribution and Abundance

Malleefowl's geographic distribution includes much of the southern half of Australia from the Great Dividing Range to the west coast (Blakers et al. 1984), and originally as far north as the Tanami Desert (Kimber 1985). Its geographic range has contracted in recent years, particularly in arid areas and around the periphery of its distribution (Benshemesh 2007). This is mostly attributed to habitat clearing (Benshemesh 2007).

Whilst resource competition with introduced grazers such as sheep, goats and rabbits is widely accepted as having a significant impact on Malleefowl abundance, the impact of predation from foxes has historically been debated. It is believed that in some environments (areas with dense understorey, lower incidence of drought and reliable food supplies on the southern margins of the Malleefowl's range), high fecundity may reduce or buffer the impact of fox predation on Malleefowl (Short 2004). Short (2004) summarized that fox control alone is not likely to permit recovery of the species and should be conducted in conjunction with management of introduced grazers and fire management.

1.4 Previous Surveys

Previous fauna and bird surveys were conducted by Hart, Simpson and Associates (2000), Recher (surveys conducted in 2000, 2001, 2002, 2003) and Dell (2001) in the Mt Gibson area. Malleefowl were observed by Hart, Simpson and Associates, and Recher (2004) however, no details on the number of birds or mounds are available. Dell (2001) recorded old mounds present in the area of Mount Gibson Station, however the exact location of these observations is not known.

Between September 2004 and January 2005, ATA Environmental (2005) undertook an extensive grid search of the entire proposed mine site and some of the surrounding area, recording 113 Malleefowl mounds. Fifteen of these were active at the time of the survey. In addition, one freshly killed bird and four live birds were sighted during these surveys (ATA Environmental 2005). Based on this data, ATA Environmental (2005) concluded that the proposed Mt Gibson mine site and surrounds support a breeding population of Malleefowl.

The first complete monitoring survey of the mounds located by ATA Environmental (2005) was conducted in November 2008 for the 2008/2009 breeding season by Mount Gibson Mining Ltd, with training and assistance provided by the North Central Malleefowl Preservation Group (Mount Gibson Mining Ltd 2009). An additional 2 inactive mounds were discovered during the survey, resulting in a total of 96 inactive mounds and 5 active mounds. Six mounds were not found, despite extensive searching, and 8 mounds were not checked due to equipment failure (Mount Gibson Mining 2009).

The Malleefowl mound monitoring survey for the 2009/2010 breeding season was conducted in January 2010. An additional inactive mound was discovered during this survey. Ten mounds were classified as active, 96 were inactive and 9 were not found. One inactive mound located within the mine site footprint had been cleared during exploration drilling works (Mount Gibson Mining Ltd 2010). There did not appear to be an impact on the Malleefowl population due to exploration drilling works conducted on Extension Hill. Due to the heat impacts on personnel of conducting the survey in January, it was recommended that future surveys occur earlier in the breeding season.

The 2010/2011 breeding season survey was conducted in November 2010. One additional mound had been discovered prior to this survey and another was discovered during the survey. Of the 117 mounds checked, 8 could not be found, 12 were active and 97 were inactive.

2. METHODOLOGY

2.1 Survey

This survey was undertaken from the 18th November 2011 to the 2nd December 2011. Each known mound was located using a hand held Garmin GPSmap 60Cx, with an accuracy range of approximately 3-5m, and was visually inspected and photographed. An electronic mobile mapper was used to record the profile and visual observations, such as the presence of eggshell, scats and scraping, and the perimeter, rim, depth and height measurements of the mounds in accordance with the *National Manual for the Malleefowl Monitoring System* (National Heritage Trust 2006).

Mounds were classified as either 'active' (appear to be in use) or 'inactive'. Inactive mounds were further classified as extinct if they are unlikely to be used again, ie mounds that are flat and in areas that contain alternative open spaces suitable for mound building, amongst the vegetation.

Where a mound could not be found, the area was walked and inspected for approximately a 20 - 30m radius of the marked location of the mound before it was recorded as not found.

2.2 Data analysis

The known Malleefowl mounds have been grouped into 5 categories, based on their proximity to the final proposed mine footprint. This includes both the areas already impacted and the areas proposed for future impact. Roads and tracks with regular traffic (more than 2 vehicle movements/day) have also been classified as impacted areas.

This is intended to enable comparison of each year's data as the impact area spreads until the final footprint is achieved. Category A includes all mounds within the project footprint, category B includes all mounds within 500m of the impact areas, category C includes the mounds from 500m – 1km, category D includes the mounds from 1km – 1.5km and category E includes the mounds within 1.5km – 2km of the impact areas. It is acknowledged that other factors, such as rainfall and food availability will also impact on the number of Malleefowl breeding, however these impacts should influence all categories equally.

Due to the tendency of Malleefowl to re-use the same mounds, an informal comparison of the specific mounds that are active each year is also conducted. Discussion of the data collected during this survey is outlined in Section 4.

The information recorded in the mobile mapper is provided to the North Central Malleefowl Preservation Group for inclusion in the national malleefowl database.

3. CONSTRAINTS AND LIMITATIONS

Table 1 Survey Constraints and Limitations

Aspect	Constraint (yes/no) Significant/ Moderate/ Negligible	Comment
Competency and experience of staff	No	The project was managed and assessments conducted by a competent environmental engineer, previously trained in malleefowl mound assessment by the North Central Malleefowl Preservation Group president.
Scope	No	Methodology and scope as per previous surveys.
Proportion of fauna identified, recorded, collected	Negligible	No fauna identified, recorded or collected. 8 mounds were not found.
Sources of information	No	Previous survey data was available for comparison.
Proportion of the task achieved	No	Task was completed.
Timing, weather, season, cycle	No	Timing, weather, season, cycle did not impact on survey data.
Disturbances	No	No natural disturbances were experienced that influenced results.
Intensity	No	Intensity of monitoring equivalent to previous survey.
Completeness	No	All known mounds were searched for.
Resources	No	Adequate personnel with sufficient experience were available.
Remoteness and access	No	Vehicle access not available to most sites – extensive surveying on foot was required.
Efficacy of methods	No	Methods are suitable for the target species.

4. RESULTS

There are 128 mounds listed in the site database, 122 of which were checked or searched for during this survey. Six of these were newly discovered since the previous survey. Five mounds were not searched for as they had not been found in the previous three surveys and one had been cleared prior to the last survey.

The status of the mounds are summarised in Table 2. Fourteen were recorded as active in this survey, 93 were inactive and five were not found (Figure 1). Ten more mounds had been cleared since the previous survey. These were all inactive at the time of clearing.

Table 3 shows the percentage of mounds in each 'distance from disturbance' category that were active and inactive. Mounds that were not checked, not found or cleared were not included in calculating these percentages.

Table 2 Malleefowl mound status site summary

Status		Number of Mounds					
		2011/2012	2010/2011	2009/2010	2008/2009	2007/2008	2004/2005
Active		**14**	**12**	**10**	**5**	**1**	**15**
Inactive		85	65	52	65	8	98
	Extinct	8	14	17	16		
	Good Mound		12	21	14		
	Worked/Disturbed		6	6	1		
	Total Inactive	**93**	**97**	**96**	**95**	**8**	**98**
Not Found		**5**	**8**	**9**	**6**		**0**
Not Checked		**5**	**0**	**0**	**8**		**0**
Cleared		**11**	**0**	**1**	**0**	**0**	**0**

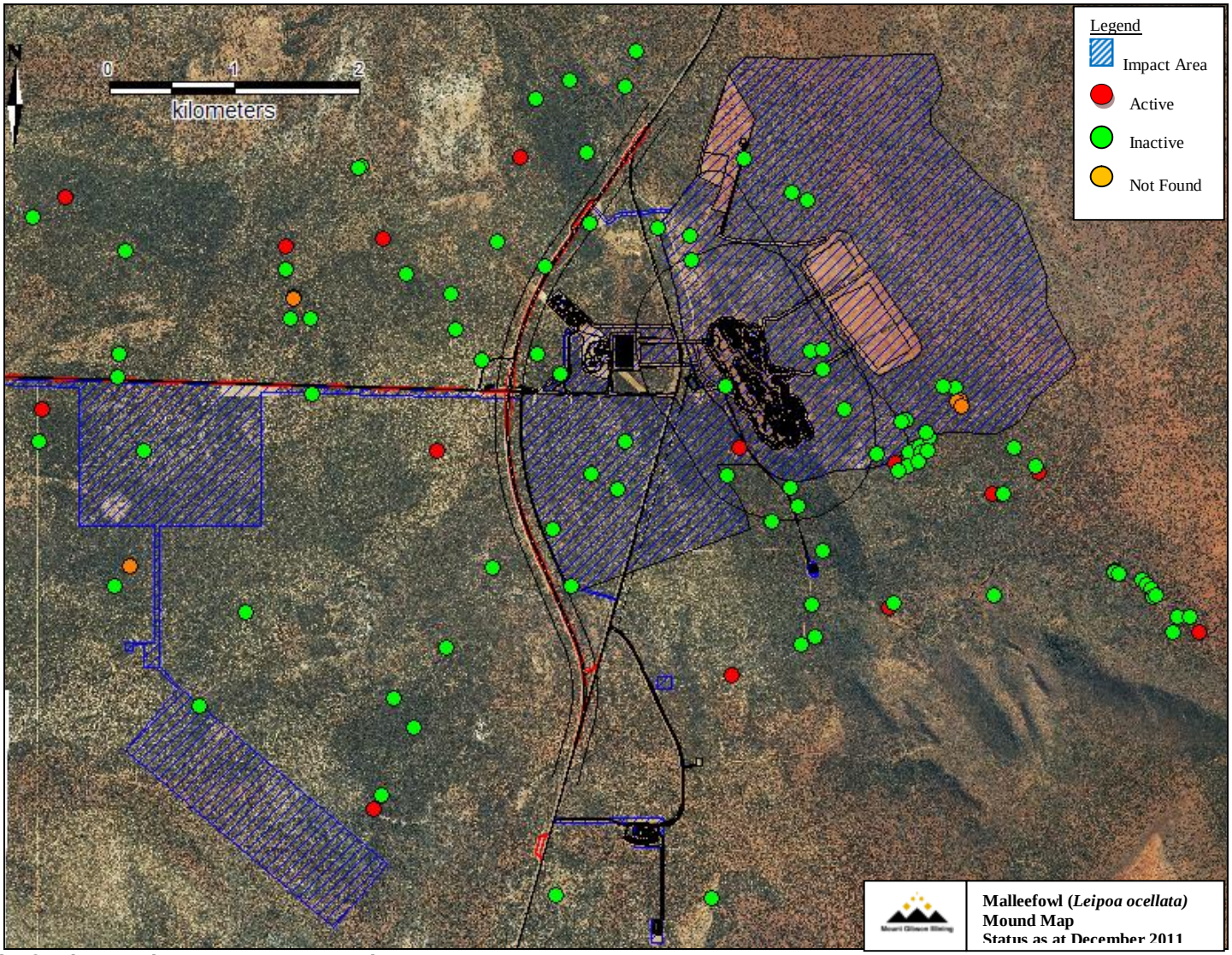

Figure 1 Malleefowl Mound Status as at December 2011

Table 3 Malleefowl mound distance from disturbance and status summary

Status		Number of Mounds											
		2011/2012		2010/2011		2009/2010		2008/2009		2007/2008		2004/2005	
	Category*	Number of Mounds	% of checked mounds	Number of Mounds	% of checked mounds	Number of Mounds	% of checked mounds	Number of Mounds	% of checked mounds	Number of Mounds	% of checked mounds	Number of Mounds	% of checked mounds
Active	A	1	1%	1	1%	2	2%	1	1%	1	11%	3	3%
	B	8[#]	7%	5	5%	4	4%	2	2%	0	0%	9	8%
	C	1	1%	1	1%	1	1%	1	1%	0	0%	1	1%
	D	3	3%	3	3%	3	3%	1	1%	0	0%	2	2%
	E	1	1%	2	2%	0	0%	0	0%	0	0%	0	0%
	Total	**14**	**13%**	**12**	**11%**	**10**	**9%**	**5**	**5%**	**1**	**11%**	**15**	**13%**
Inactive	A	26	24%	33	30%	32	30%	33	33%	5	56%	34	30%
	B	38	36%	38	35%	38	36%	38	38%	3	33%	34	30%
	C	15	14%	14	13%	13	12%	12	12%	0	0%	16	14%
	D	11	10%	10	9%	10	9%	11	11%	0	0%	11	10%
	E	3	3%	2	2%	3	3%	2	2%	0	0%	3	3%
	Total	**93**	**87%**	**97**	**89%**	**96**	**91%**	**96**	**95%**	**8**	**89%**	**98**	**87%**

* Categories are defined according to distance from impact areas (both current and future), as per Section 2.2.

One of these mounds was newly discovered during the survey.

5. DISCUSSION

Due to the difficulties and impracticality of accurately assessing the malleefowl population through census of individuals of this species, the number of active nesting mounds in an area is widely used and recognised as a suitable proxy. It provides data regarding the number of reproductively active birds in the area, which can impact on the survival of the local population.

Of the 14 active mounds, ten were recorded as active in the previous survey, one was inactive in the last survey but was active in the 2009/2010 survey, one was newly discovered and two had not been recorded as active in any of the previous surveys.

There were two mounds which were recorded as active in the previous survey but were not in this survey. One of these is located greater than 1.5km from mining impact areas.

The second previously inactive mound is located within 500m of a mound that was previously active but is now inactive. This suggests that the birds using the now inactive mound may have moved mounds (although there is no definitive evidence of this) as malleefowl are known to reuse old mounds and these mounds are in close proximity to one another.

Thirteen percent of the mounds found and checked in this survey were active. This is comparable to the 13% which were active in the initial survey, however it is noted that the number of mounds fluctuates slightly each year due to new discoveries and clearing activities, so percentages are to be used with caution. Note also that the 2008/2009 survey, which recorded only 5% of mounds as active, was essentially a baseline survey as no mining activities had been conducted in the area prior to this breeding season. Thus the average number of active mounds in a season from baseline data is 10 mounds (or 9% of the checked mounds).

With 11 of the 14 active mounds having been recorded as active in previous surveys, there is no evidence to suggest that malleefowl are moving away from impact areas. Furthermore, there are a number of mounds within 500m of impact areas which are consistently active.

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