

Phase 1 and 2 Seasonal Fauna Surveys (Level 2)



Yoongarillup Mineral Sands Project Doral Mineral Sands Pty Ltd

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On behalf of:
Doral Mineral Sands Pty Ltd
Lot 7 Harris Road
PICTON WA 6229

Prepared by:
Greg Harewood
Zoologist
A.B.N. 95 536 627 336
PO Box 755
BUNBURY WA 6231
M: 0402 141 197
T/F: (08) 9725 0982
E: gharewood@iinet.net.au

TABLE OF CONTENTS

SUMMARY	III
1. INTRODUCTION.....	1
1.1 BACKGROUND.....	1
1.2 SURVEY SCOPE	1
1.3 BIOGEOGRAPHIC SETTING	2
1.4 PHYSICAL ENVIRONMENT.....	3
1.4.1 Climate	3
1.4.2 Topography and Soils	4
1.4.3 Surface Hydrology.....	4
2. METHODS.....	5
2.1 FAUNA HABITAT ASSESSMENT	5
2.2 FAUNA INVENTORY - DESKTOP STUDY	5
2.2.1 Database Searches.....	5
2.2.2 Previous Fauna Surveys in the Area	6
2.2.3 Existing Publications	7
2.3 FAUNA INVENTORY – DETAILED FAUNA SURVEY.....	9
2.3.1 Survey Timing and Weather	9
2.3.2 Survey Team	10
2.3.3 Site Selection	10
2.3.4 Ground Fauna Survey.....	14
2.3.5 Chuditch Trapping Program.....	15
2.3.6 Acoustic Bat Recordings.....	15
2.3.7 Bird Surveys	16
2.3.8 Western Ringtail Possum Targeted Surveys.....	16

2.3.9 Black Cockatoo Habitat Surveys	16
2.3.10 Infrared Cameras.....	17
2.3.11 Call Playback.....	17
2.3.12 Invertebrate Fauna	17
2.3.13 Opportunistic Surveys	18
3. LIMITATIONS OF THE STUDY	19
4. RESULTS	21
4.1 FAUNA HABITAT ASSESSMENT	21
4.2 FAUNA INVENTORY - DESKTOP STUDY	23
4.3 FAUNA INVENTORY – DETAILED FAUNA SURVEY.....	24
4.3.1 Ground Fauna Survey.....	24
4.3.2 Chuditch Trapping Program.....	25
4.3.3 Acoustic Bat Recordings.....	26
4.3.4 Bird Surveys.....	26
4.3.5 Western Ringtail Possum Targeted Surveys.....	26
4.3.6 Black Cockatoo Habitat Surveys	27
4.3.7 Infrared Cameras	29
4.3.8 Call Playback.....	30
4.3.9 Invertebrate Fauna.....	30
4.3.10 Opportunistic Surveys	30
5. FAUNA INVENTORY – SUMMARY	31
5.1 FISH.....	32
5.1.1 Fish Assemblage.....	32
5.1.2 Fish of Conservation Significance	32
5.1.3 Regional Endemism, Distribution Limits and Rare Assemblages.....	32

5.2	AMPHIBIANS.....	32
5.2.1	Amphibian Assemblage	32
5.2.2	Amphibians of Conservation Significance	33
5.2.3	Regional Endemism, Distribution Limits and Rare Assemblages.....	33
5.3	REPTILES	33
5.3.1	Reptile Assemblage	33
5.3.2	Reptiles of Conservation Significance	33
5.3.3	Regional Endemism, Distribution Limits and Rare Assemblages.....	34
5.4	BIRDS.....	36
5.4.1	Bird Assemblage	36
5.4.2	Birds of Conservation Significance	37
5.4.3	Regional Endemism, Distribution Limits and Rare Assemblages.....	38
5.5	NATIVE NON-VOLANT MAMMALS	38
5.5.1	Native Non-Volant Mammal Assemblage.....	38
5.5.2	Native Non-Volant Mammal of Conservation Significance	38
5.5.3	Regional Endemism, Distribution Limits and Rare Assemblages.....	39
5.6	BATS.....	39
5.6.1	Bat Assemblage	39
5.6.2	Bats of Conservation Significance	39
5.6.3	Regional Endemism, Distribution Limits and Unique Assemblages	40
5.7	INTRODUCED MAMMALS	40
5.8	INVERTEBRATE FAUNA.....	40
5.9	OTHER SPECIES OF SIGNIFICANCE	41
6.	FAUNA VALUES	43
6.1	VALUE OF THE STUDY AREA AS AN ECOLOGICAL LINKAGE/WILDLIFE CORRIDOR	43

6.2	CONSERVATION SIGNIFICANCE OF THE STUDY AREA.....	43
7.	POTENTIAL IMPACTS AND RECOMMENDATIONS	45
7.1	POTENTIAL IMPACTS	45
7.2	RECOMMENDATIONS	49
8.	CONCLUSION	51
9.	BIBLIOGRAPHY.....	52

TABLES

TABLE 1:	Daily Temperatures and Rainfall at the Busselton Airport Weather Station during Phase 1 and Phase 2 Survey Periods (BOM 2012)
TABLE 2:	Summary of Trap Nights – Phase 1 and Phase 2
TABLE 3:	Fauna Survey Limitations and Constraints
TABLE 4:	Trapping Results (number of captures at each site during each phase)
TABLE 5:	Summary of Potential Cockatoo Breeding Habitat Trees (DBH >50cm) within Main Impact Area
TABLE 6:	Black Cockatoo Foraging Habitat Species Identified at Yoongarillup during the Flora Survey (Mattiske 2012)
TABLE 7:	Summary of Potential Vertebrate Fauna Species (As listed in Appendix C)
TABLE 8:	Likelihood of Occurrence and Possible Impacts – Fauna Species of Conservation Significance

FIGURES

- FIGURE 1: Study Area and Surrounds
- FIGURE 2: Yoongarillup Project Area - Air Photo
- FIGURE 3: Mean Monthly Rainfall and Maximum and Minimum Temperatures (Busselton Airport/Busselton Shire - Bureau of Meteorology 2012)
- FIGURE 4: Trap & Recording Sites
- FIGURE 5: Fauna Habitats
- FIGURE 6: Habitat Trees (DBH >50cm)
- FIGURE 7: Black Cockatoo Roost Sites

PLATES

- PLATE 1: Trap Site 1 (SF 33) – Typical Vegetation
- PLATE 2: Trap Site 2 (SF 33) – Typical Vegetation
- PLATE 3: Trap Site 3 (Whicher NP) – Typical Vegetation
- PLATE 4: Trap Site 4 (Whicher NP) – Typical Vegetation
- PLATE 5: Trap Site 5 (SF 33) – Typical Vegetation
- PLATE 6: Sand Track (SF 33) – Typical Vegetation
- PLATE 7: Southern Brush-tailed Phascogale – Infrared Camera Site 1

APPENDICES

- APPENDIX A: Conservation Categories
- APPENDIX B: Fauna Trap and Recording Sites – Coordinates
- APPENDIX C: Vertebrate Fauna Observed or Potentially in Study Area
- APPENDIX D: DPaW & EPBC Database Search Results
- APPENDIX E: Raw Vertebrate Trapping & Recording Results
- APPENDIX F: Habitat Tree Details
- APPENDIX G: Significant Species Profiles
- APPENDIX H: Invertebrate Identification Reports

Acronyms/Abbreviations:

BA: Birdlife Australia (Formerly RAOU, Birds Australia).

CALM: Department of Conservation and Land Management (now DPaW), WA Government.

CAMBA: China Australia Migratory Bird Agreement 1998.

DEC: Department of Environment and Conservation (now DPaW), WA Government.

DEH: Department of Environment and Heritage (now DoE), Australian Government.

DEP: Department of Environment Protection (now DER), WA Government.

DEWHA: Department of the Environment, Water, Heritage and the Arts (now DoE), Australian Government

DER: Department of Environment Regulation (formerly DEC, DoE), WA Government.

DMP: Department of Mines and Petroleum (formerly DoIR), WA Government.

DoE: Department of Environment (now DER/DPaW), WA Government.

DoE: Department of the Environment (formerly SEWPaC, DWEHA, DEH), Australian Government.

DoIR: Department of Industry and Resources (now DMP), WA Government.

DPaW: Department of Parks and Wildlife (formerly DEC, CALM, DoE), WA Government.

EP Act: *Environmental Protection Act 1986*, WA Government.

EPA: Environmental Protection Authority, WA Government.

EPBC Act: *Environment Protection and Biodiversity Conservation Act 1999*, Australian Government.

ha: Hectare (10,000 square metres).

IBRA: Interim Biogeographic Regionalisation for Australia.

IUCN: International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union.

JAMBA: Japan Australia Migratory Bird Agreement 1981.

km: Kilometre (1,000 metres).

RAOU: Royal Australia Ornithologist Union.

ROKAMBA: Republic of Korea-Australia Migratory Bird Agreement 2007.

SEWPaC: Department of Sustainability, Environment, Water, Population and Communities (now DoE, formerly DEH, DEWHA), Australian Government.

SRE: Short Range Endemic

SSC: Species Survival Commission, International.

WA: Western Australia.

WAM: Western Australian Museum, WA Government.

WC Act: *Wildlife Conservation Act 1950*, WA Government.

SUMMARY

This report details the results of a two phase (seasonal) Level 2 (EPA 2004) terrestrial fauna survey of Doral Mineral Sands Pty Ltd's (Doral's) Yoongarillup Mineral Sands Project Area (Figure 1).

The study site is comprised of freehold land (Lots 1870, 1872 to 1874, Lot 101 and Lot 102) and a section of State Forest 33 (Figure 2).

The two phase seasonal trapping program was conducted in December 2011 and March 2012. To fulfil the anticipated requirements of regulatory authorities the following was carried out:

- Level 2 Fauna Survey. A two season fauna trapping program aimed at fauna species in general using cage, Elliot, pit, funnel and camera traps, bat surveys using ultrasonic detectors, bird surveys and opportunistic observations/collections of fauna including invertebrates.
- Chuditch Trapping Program. This was carried out concurrent with the proposed general fauna trapping program.
- Western Ringtail Possum Targeted Surveys. Day and night time surveys aimed at finding evidence of this species within the project area.
- Black Cockatoo Habitat Survey. This has included the recording of potential and existing breeding habitat (using DoE criteria), foraging habitat and roosting habitat.

The location of trap bat and camera recording sites are shown in Figure 4. Representative pictures of vegetation at each of the trapping sites are presented in Plates 1 to 6.

The broad scale fauna habitats within the study area are based on vegetation structure as mapped by Ecoedge (2014) and Matiske (2012) (Figure 5). Most of the project is cleared of native vegetation and is currently used for livestock grazing. Remnant native vegetation is dominated by woodlands or forests of Jarrah and/or Marri with variations occurring with respect to the numbers and types of subdominant mid and lower storey species (e.g. Mountain Marri, Banksia, Sheoak, Woody Pear and various shrubs). Wetland habitats within the study area are restricted to seasonally inundated/waterlogged paddocks, some small manmade dams and drains and a small highly degraded seasonally inundated stream line located in the western section of the study area. None of the natural or manmade surface water areas appear to be permanent, with all being controlled by the frequency and intensity of seasonal rainfall.

Vegetation within State Forest 33 (trap sites 1, 2 and 5) is rated by EcoEdge (2014) and Matiske (2012) as being in very good condition to excellent despite appearing to have regenerated after past historical disturbances (e.g. midstorey clearing and logging). Vegetation within the Whicher National Park (trap sites 3 and 4) was not

mapped but is consistent with the units found in State Forest 33, though in better condition, presumably due to lower levels of historical disturbance.

The location and extent of the identified fauna habitats (based on vegetation units) within the study area are shown in Figure 5.

A list of expected fauna species likely to occur in the study area is presented in Appendix C. With respect to native vertebrate fauna, 23 mammal (includes nine bats species), 107 bird, 36 reptile and 11 frog species have the potential to occur in or utilise at times, the study area. Of the 177 native animals that could occur, eight are considered to be threatened (vulnerable, endangered, rare or in need of special protection), with an additional four DpaW priority species being present or likely to be present. Three migratory bird species also have the potential to utilise the proposal area at times.

In total, evidence of 95 species of native vertebrate fauna was obtained during the Level 2 survey (captured, sighted, heard, recorded, signs) (54% of the predicted total). Seven introduced species have also been observed. Vertebrate fauna identified on site during the Level 2 survey is comprised of 53 bird species (one introduced), fourteen native and six introduced mammal species (including six bat species identified from calls), 25 reptile and four amphibian species. A complete listing of identified species is provided in Appendix C with raw trap results being held with Appendix E.

The conservation significant species identified in the area during the survey period were:

- *Ctenotus ora* Coastal Plains Ctenotus – P1 (DPaW Priority species)
- *Calyptorhynchus baudinii* Baudin`s Black Cockatoo - S1 (*WC Act*), Vulnerable (*EPBC Act*)
- *Calyptorhynchus latirostris* Carnaby`s Black Cockatoo - S1 (*WC Act*), Endangered (*EPBC Act*)
- *Calyptorhynchus banksii naso* Forest Red-tailed Black Cockatoo - S1 (*WC Act*), Vulnerable (*EPBC Act*)
- *Merops ornatus* Rainbow Bee-eater - Migratory (*EPBC Act*)
- *Isoodon obesulus fusciventer* Quenda - P5 (DPaW Priority species)
- *Phascogale tapoatafa ssp* Southern Brush-tailed Phascogale - S1 (*WC Act*)
- *Macropus irma* Western Brush Wallaby - P4 (DEC Priority species)

No evidence of the western ringtail possum or chuditch being present within the study area was found and given the level of survey it is concluded that these species were absent from the site during the survey period despite the presence of some apparently

suitable habitat. The results of invertebrate identifications are held with Appendix H. No invertebrates of conservation significance were identified within the study area during the survey period. Additional details on all significant species that potentially utilise the study area are given in Appendix G.

The black cockatoo habitat assessment identified the presence of substantial areas of existing foraging habitat and potential breeding habitat for all three species known to occur in the area. Several roost sites were also located.

Subsequent to approval any future mining at the site will necessarily require the clearing of some existing fauna habitat. Planning should take into account the potential presence of some species of conservation significance and fauna in general so that any impacts can be minimised or offset. Existing management plans and protocols that aim to minimise impact on fauna should be employed where relevant with specific attention being paid to those facets highlighted in Section 7.2, when considered reasonable and practical to implement.

Given the presence of black cockatoo habitat within the main impact areas it is also recommended that the project be referred to the DoE to ensure compliance with the *EPBC Act*.

1. INTRODUCTION

1.1 BACKGROUND

This report details the results of a two phase (seasonal) Level 2 (EPA 2004) terrestrial fauna survey of Doral Mineral Sands Pty Ltd's (Doral's) Yoongarillup Mineral Sands Project Area situated about 14 kms south of the Busselton townsite in south west Western Australia (Figure 1).

The study site has a total area of about 152 ha and is comprised of freehold land (Lots 1870, 1872 to 1874, Lot 101 and Lot 102) and a section of State Forest 33. Most of the freehold lots (~111 ha) are cleared farmland used primarily for livestock grazing. State Forest 33 makes up about 41 ha of the study area and was the main focus of the fauna assessment (Figure 2), though it should be noted that the currently proposed development footprint within the state forest only makes up 8.9 ha of this total area.

The surveys reported on here have been carried out to provide a baseline fauna dataset for the currently identified mine area. It is anticipated that the survey results will be taken into consideration by state and federal environmental regulatory authorities during the project approval process.

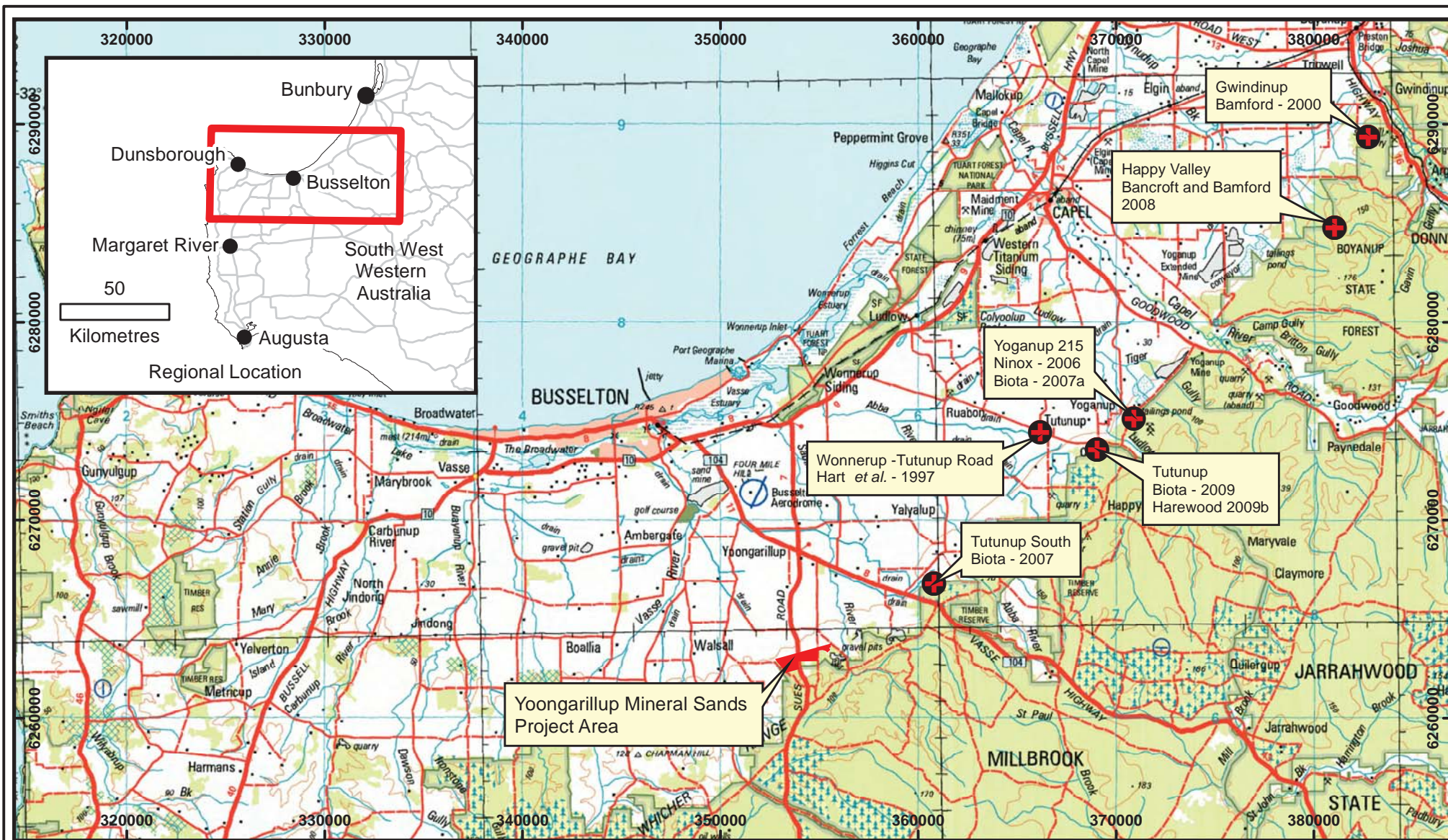
1.2 SURVEY SCOPE

The detailed fauna survey has aimed to quantify the fauna values of the site and in particular the potential presence, distribution and abundance of specific fauna species of conservation significance. Based on the findings management actions can then be formulated to minimise impacts on significant fauna or fauna values in and near the project area.

The fauna assessment has been carried out to provide information anticipated to be required by state and federal environmental regulatory authorities namely the Western Australian Environmental Protection Authority (EPA), the Department of Parks and Wildlife (DPaW), Department of Environment Regulation (DER) and the Commonwealth Department of the Environment (DoE).

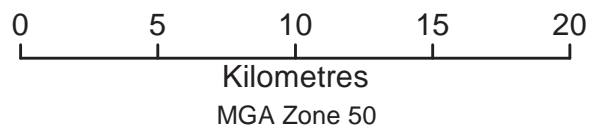
To fulfil the anticipated requirements of the abovementioned authorities the following was carried out:

- Level 2 Fauna Survey. A two season fauna trapping program aimed at fauna species in general using cage, Elliot, pit, funnel and camera traps, bat surveys using ultrasonic detectors, bird surveys and opportunistic observations/collections of fauna including invertebrates.
- Chuditch Trapping Program. This was carried out concurrent with the proposed general fauna trapping program.



Legend

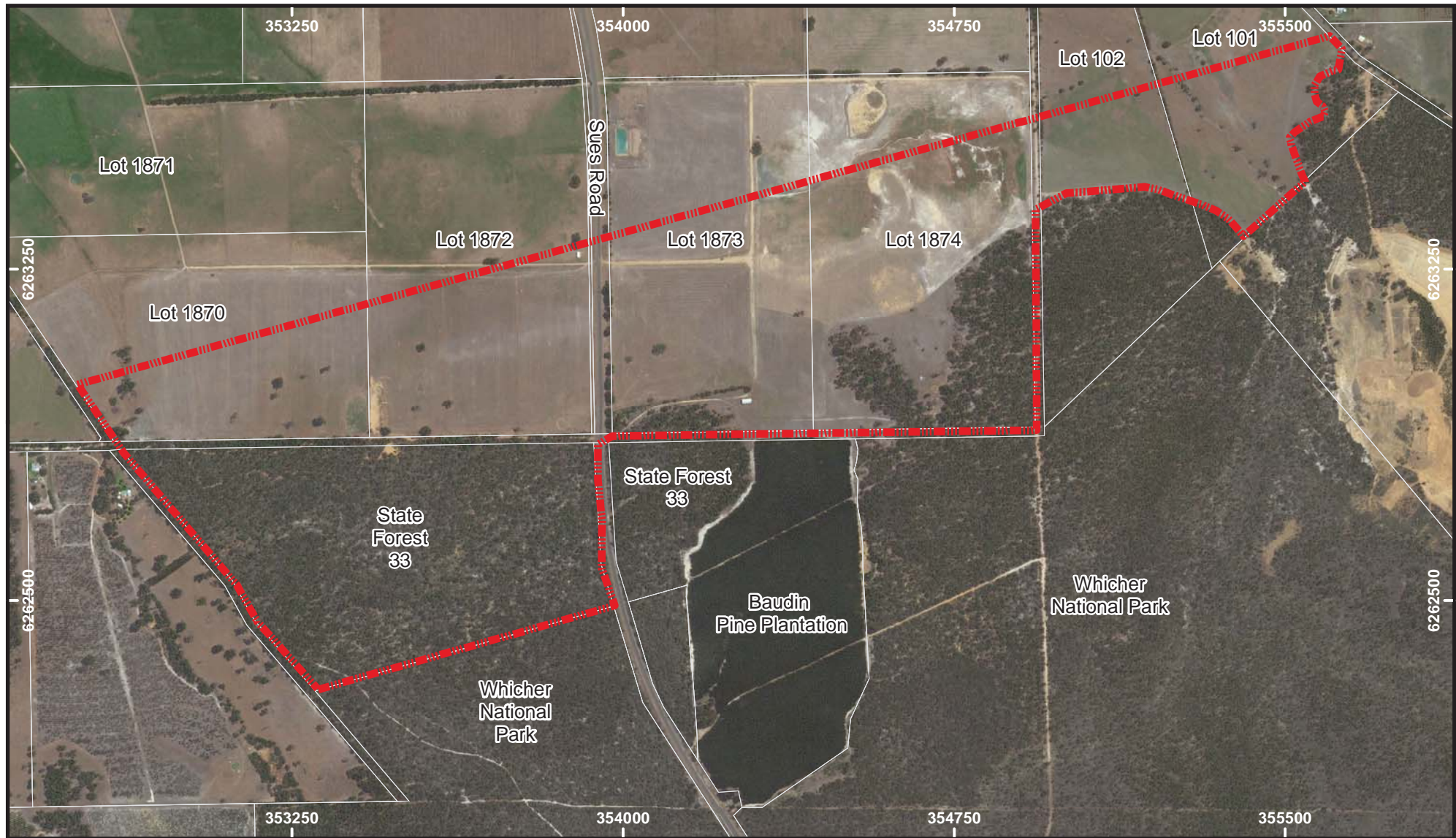
- Yoongarillup Mineral Sands Project Area
- Previous Whicher Scarp Fauna Surveys



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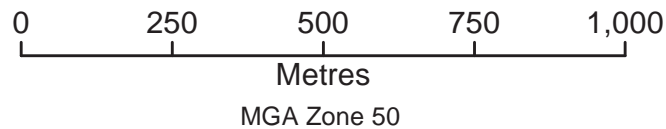
Yoongarillup Mineral Sands Project
 Doral Mineral Sands Pty Ltd

Study Area and Surrounds



Legend

 Yoongarillup Mineral Sands Project Area



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 DATE: Jan 2014
 SCALE: 1:12,500

Yoongarillup Mineral Sands Project
 Doral Mineral Sands Pty Ltd
Yoongarillup Project Area
Air Photo

- Western Ringtail Possum Targeted Surveys. Day and night time surveys aimed at finding evidence of this species within the project area.
- Black Cockatoo Habitat Survey. This has included the recording of potential and existing breeding habitat (using DoE criteria), foraging habitat and roosting habitat.

To comply with the scope of works and the likely requirements of environmental regulatory authorities the survey documented in this report was planned and implemented in accordance with:

- EPA Position Statement No. 3 “Terrestrial Biological Surveys as an Element of Biodiversity Protection” (EPA 2002);
- EPA Guidance Statement No. 56 “Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia” (EPA 2004); and
- EPA Guidance Statement No. 20 “Sampling of Short-range Endemic Fauna for Environmental Impact Assessment in Western Australia” (EPA 2009).

1.3 BIOGEOGRAPHIC SETTING

The study area is located on the lower/mid slopes of the Whicher Scarp which is an arcuate north-facing scarp formed during the late Tertiary and early Pleistocene by marine erosion of underlying sedimentary rocks and in this area marks the southern limit of the Swan Coastal Plain.

The Whicher Scarp has been mapped by the EPA (EPA 2004 – Map 1) as occurring over the boundary of the Swan Coastal Plain (Perth subregion - SWA-2) and the Southern Jarrah Forest (JF2) Biogeographic Sub-regions. Given the location of the project area on the foothills of the Whicher Scarp, for the purpose of this report, the area will be referred to as being part of the Swan Coastal Plain Biogeographical Sub-region. This conclusion is consistent with the DPaW’s assessment (Mitchell *et al.* 2002), EPA Guidance Statement 10 (EPA 2003), accepted geological interpretations (the targeted mineral sand deposits are units of the Swan Coastal Plain – Baxter 1977) and soil mapping (DAWA 2003), though it should be noted that in other reports the Whicher Scarp is referred to as being entirely within the Southern Jarrah Forest Biogeographic Sub-region (EPA 2009).

The Swan Coastal Plain (SWA) was classified as part of the Interim Biogeographical Regionalisation for Australia and is in broad terms described as a:

“Low lying coastal plain mainly covered with Woodlands. It is dominated by Banksia or Tuart on sandy soils, Allocasuarina obesa on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic

sediments dominated by Jarrah Woodland. Warm Mediterranean. Three phases of marine sand dune development provide relief. The outwash plains, once dominated by *A. obesa* – Marri Woodlands and *Melaleuca* shrublands, are extensive only in the south.” (Thackway and Cresswell, 1996; IBRA, 2000).

The study area itself is within a further defined subregion of the SWA referred to as the Swan Coastal Plan subregion or the Perth subregion (SWA2). This is defined as:

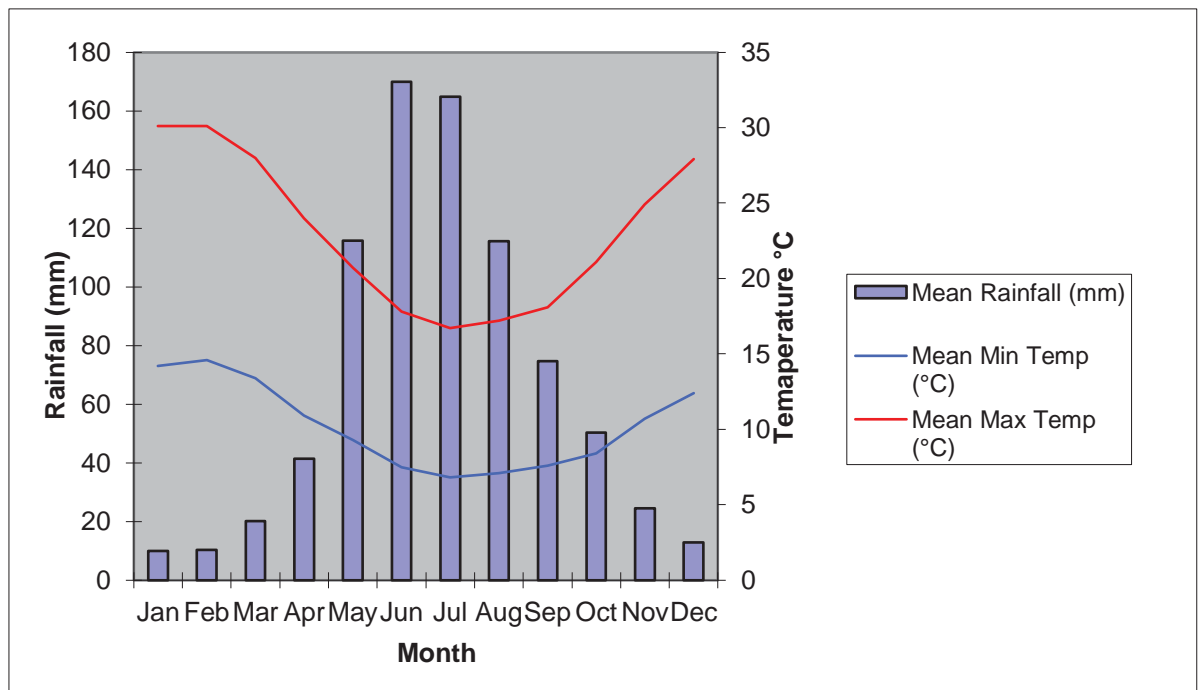
“Colluvial and aeolian sands, alluvial river flats, coastal limestone. Heath and/or Tuart woodlands on limestone, *Banksia* and Jarrah - *Banksia* woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials. Includes a complex series of seasonal wetlands and also includes Rottneest, Carnac and Garden Islands etc. Rainfall ranges between 600 and 1000 mm annually and the climate is Mediterranean”. The subregion has an area of about 1, 333,900 ha (Mitchell et al. 2002).

1.4 PHYSICAL ENVIRONMENT

1.4.1 Climate

The study area is situated in the Mediterranean climate zone of Western Australia with wet, mild winters and hot dry summers. Mean monthly maximum and minimum temperatures for the nearby Busselton Airport range from 16.8°C to 30.1°C and 6.8°C to 14.6°C respectively (Bureau of Meteorology 2012).

Figure 3: Mean Monthly Rainfall and Maximum and Minimum Temperatures (Busselton Airport/Busselton Shire - Bureau of Meteorology 2012)



The long-term mean annual rainfall for the Busselton Shire is 810 millimetres with rainfall occurring predominantly during the April to October period (Bureau of Meteorology 2012).

The summer wind pattern of the region is dominated by high pressure cells that create local onshore (sea breezes) and offshore (land breezes) winds, with light south-easterlies in the early hours of the morning and at night and stronger south-westerlies present during the day. The winter wind pattern is dominated by the eastward progression of rain-bearing low pressure systems and associated cold fronts with north-westerly storms.

1.4.2 Topography and Soils

Topography with the Yoongarillup Project area reaches a maximum height of about 70 metres AHD in the south and slopes evenly down to the north/north west to about 35m AHD at its lowest point near the north west corner of Lot 1871.

Soils and landforms of the area have been described and mapped by, Churchwood and McArthur (1980), Tille and Lantzke (1990) and more recently by the Agricultural Department (DAWA 2003). The above mapping shows the Yoongarillup Project area to consist of overlapping units of the Abba and Yelverton systems. The lower areas, occupying the northern one third of the study area are largely mapped as Abba Flats (flats and low rises with sandy grey brown duplex (Abba) and gradational (Busselton) soils) and Abba Wet Flats (winter wet flats and slight depressions with a sandy grey brown duplex soil structure). To the south the soils and landforms are mapped within the flats phase of the Yelverton subsystem and consist of raised flats with Duplex sandy gravels, semi-wet soils, yellow deep sands and sandy earths and loamy gravels (DAWA 2003).

1.4.3 Surface Hydrology

Surface water in the study area is mainly restricted to a small number of seasonally inundated/waterlogged paddocks, some small manmade dams and drains. A small highly degraded seasonally inundated stream line enters the study area near the south western corner of Lot 1870 and is then directed into a manmade drain along Yoongarillup Road. None of the natural or manmade surface water areas appear to be permanent, with all being controlled by the frequency and intensity of seasonal rainfall.

2. METHODS

2.1 FAUNA HABITAT ASSESSMENT

Vegetation units identified during flora and vegetation surveys in the area, carried out by EcoEdge (2014) and Mattiske Consulting Pty Ltd (2012) have been used to define broad fauna habitat types across the site. This information has been supplemented with observations made during the fauna survey.

The main aim of the habitat assessment was to determine if it was likely that any species of conservation significance would be utilising the areas that maybe impacted on as a consequence of the proposal proceeding. The habitat information obtained was also used to aid in finalising the overall potential fauna list.

As part of the desktop literature review, available information on the habitat requirements of the species of conservation significance listed as possibly occurring in the area was researched. During the field survey the habitats within the study area were assessed and specific elements identified, if present, to determine the likelihood of listed threatened species utilising the area and its significance to them.

2.2 FAUNA INVENTORY - DESKTOP STUDY

2.2.1 Database Searches

Searches of the following databases have been undertaken to aid in the compilation of a list of vertebrate fauna potentially occurring within the study area:

- DPaW's NatureMap Database Search (combined data from DPaW, WAM, BA and consultants reports) (DPaW 2013b): and
- Protected matters search tool (Department of the Environment – DoE 2013).

It should be noted that these lists are based on observations from a broader area than the study site and therefore may include species that would only ever occur as vagrants in the actual study area due to a lack of suitable habitat or the presence of only marginal habitat. The databases also often included very old records and in some cases the species in question have become locally or regionally extinct.

Information from these sources should therefore be taken as indicative only and local knowledge and information needs also to be taken into consideration when determining what actual species may be present within the specific area being investigated.

2.2.2 Previous Fauna Surveys in the Area

Fauna surveys, assessments and reviews have been undertaken in nearby areas in the past, though not all are publically available and could not be referenced. The most significant of those available have been used as the primary reference material for compiling the potential fauna assemblage for the general area. Those reports referred to included, but were not limited to:

- Bamford, M.J and A.R. (2000). Proposed Gwindinup Mineral Sands Mine. Fauna Surveys; August and December 1999. Unpublished report for Cable Sands WA. January 2000.
- Bancroft, W. and Bamford, M. (2008). Fauna values of Bemax's Happy Valley mineral sands deposit. Unpublished report for Bemax Resources Limited. January 2008.
- Biota (2009). Tutunup Fauna Assemblage and Fauna Habitat Seasonal Survey. Unpublished report for Iluka Resources. March 2009.
- Biota (2007a). Yoganup 215 Strand Fauna and Faunal Assemblage Survey. Unpublished report for Iluka Resources. February 2007.
- Biota (2007b). Tutunup South Fauna Habitat and Fauna Assemblage Seasonal Survey. Unpublished report for Iluka Resources. December 2007.
- Harewood, G. (2009b). Western Ringtail Possum Baseline Assessment. Tutunup. Unpublished report for Iluka Resources. August 2009.
- Hart, Simpson and Assoc. (1997). Wonnerup -Tutunup Road - Vertebrate Fauna. Unpublished report for Westralian Sands Ltd.
- Ninnox (2006). A Vertebrate Fauna Assessment of the Yoganup Mineral Sands Project Area. Unpublished report for Iluka Resources. March 2006.

(Note: The above-mentioned fauna surveys were all carried out along sections of the Whicher Scarp or in the case of Hart *et al.* (1997) very close to the scarp. The approximate location of each survey is shown in Figure 1).

As with the databases searches some reports refer to species that would not occur in the project area due to a lack of suitable habitat (extent and/or quality) and this fact was taken into consideration when compiling the potential fauna species list for the study area. It should also be noted that the NatureMap database is likely to include some records from previous fauna surveys in the area including some of those listed above.

2.2.3 Existing Publications

The following represent the main publications used to identify and refine the potential fauna species list for the study area:

- Anstis, M. (2013). Tadpoles and Frogs of Australia. New Holland Publishers, Sydney.
- Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulter, R. (2003). The New Atlas of Australian Birds. Royal Australasian Ornithologists Union, Victoria.
- Churchill, S. (2008). Australian Bats. Second Edition, Allen & Unwin.
- Cogger, H.G. (2014). Reptiles and Amphibians of Australia. 7th Edition. CSIRO Publishing.
- Johnstone, R.E. and Storr, G.M. (1998). Handbook of Western Australian Birds: Volume 1 – Non-passerines (Emu to Dollarbird). Western Australian Museum, Perth Western Australia.
- Johnstone, R.E. and Storr, G.M. (2004). Handbook of Western Australian Birds: Volume 2 – Passerines (Blue-winged Pitta to Goldfinch). Western Australian Museum, Perth Western Australia.
- Menkhorst, P. and Knight, F. (2011). A Field Guide to the Mammals of Australia. Third Edition, Oxford University Press, Melbourne.
- Morgan, D.L., Beatty, S.J., Klunzinger, M.W, Allen, M.G. and Burnham, Q.E (2011). Field Guide to the Freshwater Fishes, Crayfishes and Mussels of South Western Australia. Published by SERCUL.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1983). Lizards of Western Australia II: Dragons and Monitors. WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1990). Lizards of Western Australia III: Geckos and Pygopods. WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1999). Lizards of Western Australia I: Skinks. Revised Edition, WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (2002). Snakes of Western Australia. Revised Edition, WA Museum, Perth.
- Tyler M.J. & Doughty P. (2009). Field Guide to Frogs of Western Australia, Fourth Edition, WA Museum, Perth.
- Van Dyck, S. & Strahan, R. Eds (2008). The Mammals of Australia. Third edition. Queensland Museum.

- Wilson, S. and Swan, G. (2013) A Complete Guide to Reptiles of Australia. Third Edition, Reed, New Holland, Sydney.

2.2.4 Fauna of Conservation Significance

The conservation significance of fauna species has been assessed using data from the following sources:

- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. Administered by the Australian Government Department of the Environment (DoE);
- *Wildlife Conservation Act 1950 (WC Act)*. Administered by the Western Australian Department of Park & Wildlife (DPaW) (Govt. of WA 2013);
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List - the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and the
- DPaW Priority Fauna list. A non-legislative list maintained by the DEC for management purposes (DPaW 2013a).

The *EPBC Act* also requires the compilation of a list of migratory species that are recognised under international treaties including the:

- Japan Australia Migratory Bird Agreement 1981 (JAMBA);
- China Australia Migratory Bird Agreement 1998 (CAMBA);
- Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA); and
- Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals).

(Note - Species listed under JAMBA are also protected under Schedule 3 of the *WC Act*.)

All migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as matters of national environmental significance (NES) under the *EPBC Act*.

The conservation status of all vertebrate fauna species listed as occurring or possibly occurring in the vicinity of the study area has been assessed using the most recent lists published in accordance with the above-mentioned instruments and is indicated as such in the fauna listings of this report. A full listing of conservation codes are provided in Appendix A.

A number of other species not listed in official lists can also be considered of local or regional conservation significance. These include species that have a restricted range, those that occur in breeding colonies and those at the limit of their range.

While not classified as rare, threatened or vulnerable under any State or Commonwealth legislation, a number of bird species have been listed as of significance on the Swan Coastal portion of the Perth Metropolitan Region (Bush Forever - Government of Western Australia 1998 and 2000). The bird species are often referred to as Bush Forever Decreaser Species. The three categories used for birds within the Bush Forever documents are:

- Habitat specialists with reduced distribution on the Swan Coastal Plain (code Bh)
- Wide ranging Species with reduced population's on the Swan Coastal Plain. (code Bp)
- Extinct in the Perth region (code Be)

Other fauna species of regional significance due to declining populations on the Swan Coastal Plain, especially between Mandurah and Busselton, include the honey possum and pygmy possum (Dell 2000).

The presence of Bush Forever species should be taken into consideration when determining the fauna values. Bush Forever decreaser species are indicated as such within the species list held in Appendix B.

2.3 FAUNA INVENTORY – DETAILED FAUNA SURVEY

The fauna assessment was be carried out to comply with requirements of a detailed Level 2 terrestrial fauna survey as defined in EPA Guidance Statement 56 (EPA 2004) and use methods based on those detailed in the EPA Technical guide (EPA 2010).

2.3.1 Survey Timing and Weather

EPA guidelines (EPA 2004) indicate that fauna trapping in the south west province is best carried out in October-December (primary survey) and then again in February-March (secondary survey). To comply with these requirements the first phase seasonal survey was undertaken over a ten day period in December 2011 (01/12/2011 to 10/12/2011), with the second phase commencing in March 2012 (25/03/2012 to 02/04/2012) for a period of nine days.

Table 1 below shows the daily weather records experienced during the two fauna trapping periods.

Table 1: Daily Temperatures and Rainfall at the Busselton Airport Weather Station during Phase 1 and Phase w Survey Periods (BOM 2012).

Date	Min (°C)	Max (°C)	Rainfall (mm)
<u>Phase 1</u>			
01/12/2011	13.3	30.7	0
02/12/2011	15.0	32.3	0
03/12/2011	16.5	34.5	0
04/12/2011	19.0	33.7	0
05/12/2011	13.6	34.8	0
06/12/2011	18.4	24.2	2.2
07/12/2011	16.8	24.9	2.8
08/12/2011	15.8	26.4	0
09/12/2011	14.0	26.7	0
10/12/2011	11.6	28.0	0
<u>Phase 2</u>			
25/03/2012	12.2	27.7	0
26/03/2012	7.5	26.5	0
27/03/2012	7.6	28.3	0
28/03/2012	10.8	28.2	0
29/03/2012	9.8	26.9	0
30/03/2012	10.5	21.2	0
31/03/2012	11.3	22.4	0
01/04/2012	11.1	25.4	2.0
02/04/2012	17.9	25.2	3.0

2.3.2 Survey Team

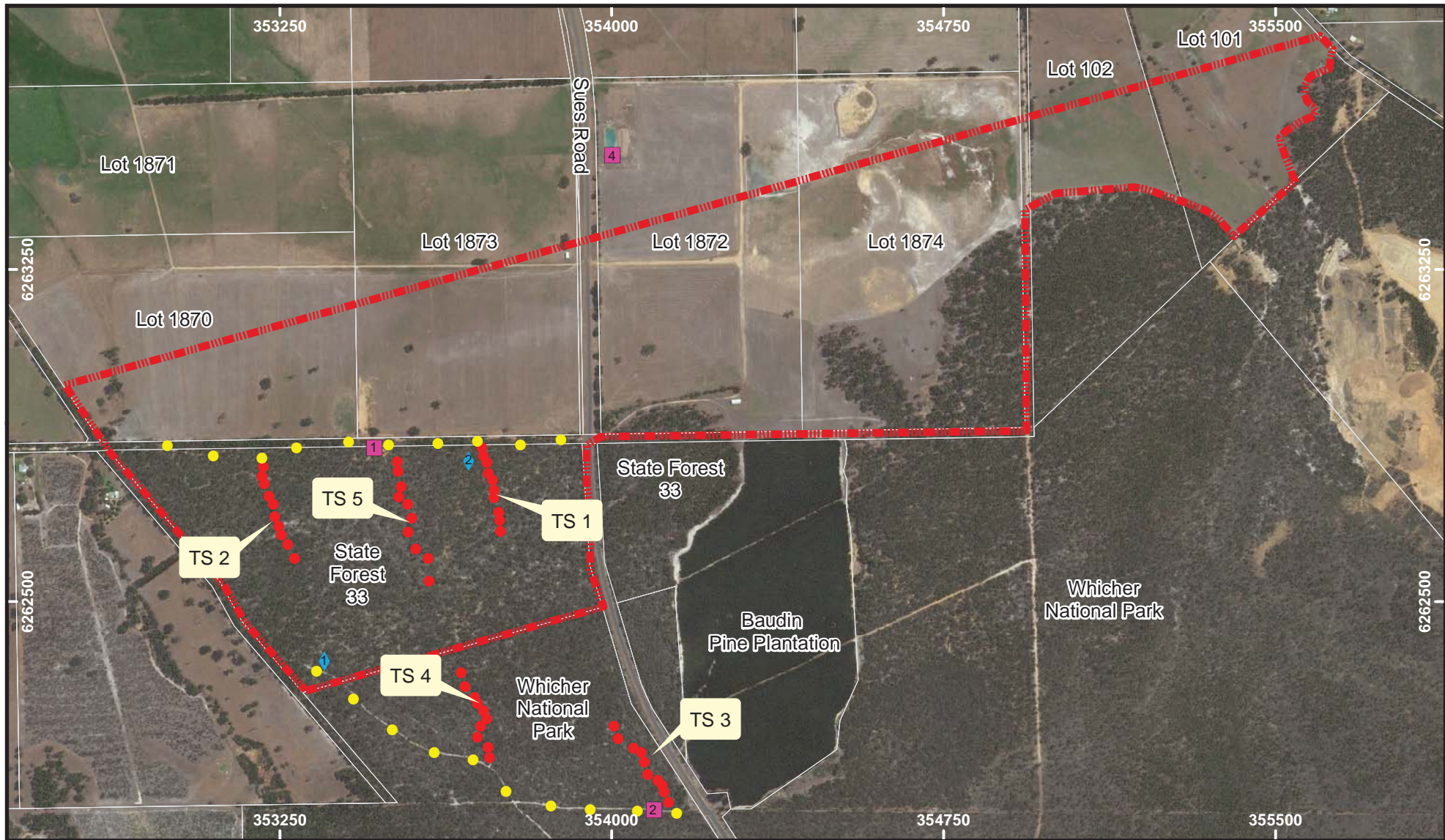
The field survey was conducted under “Licence to Take Fauna for Scientific Purposes” No. SF008335 and “Written Notice of Lawful Authority to Enter DPaW Lands and/or Waters for the Purpose of Undertaking Research” No. CE 003395, issued to Greg Harewood. The fauna survey team comprised Greg Harewood and Glen Murray.

Analysis of bat recordings was completed by Mr Bob Bullen (Bat Call WA). Invertebrate identifications were undertaken by Dr Volker Framenau (Phoenix Environmental Sciences) and Dr Eric S. Volschenk (ScorpionID).

2.3.3 Site Selection

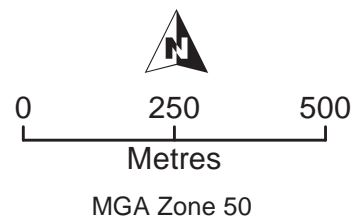
The sampling approach for this survey consisted of a combination of systematic fauna sampling and targeted/opportunistic searches within the range of habitats present within the defined study area and nearby locations.

The systematic component of the study comprised five trap sites during the phase 1 and phase 2 survey periods (three within State Forrest 33 and two within the Whicher National Park) (Figure 4). Traps (targeting Chuditch) were



Legend

-  Yoongarillup Mineral Sands Project Area
-  Trap Array
-  Large Elliot
-  Infrared Motion Sensing Camera
-  Bat Recording Locations




Fauna Survey
DRAWN: G Harewood
 DATE: Jan 2014
 SCALE: 1:12,500

Yoongarillup Mineral Sands Project
 Doral Mineral Sands Pty Ltd
Trap & Recording Sites

Figure: 4

also positioned along two tracks that run through the state forest and national park areas.

Because the vegetated sections within the main project area were relatively small in size and habitat variability was limited, trap site selection primarily aimed at evenly spacing trap lines across the areas of interest. The plates below illustrate the general characteristics of each trap site.



Plate 1: Trap Site 1 (SF 33) – Typical Vegetation



Plate 2: Trap Site 2 (SF 33) – Typical Vegetation



Plate 3: Trap Site 3 (Whicher NP) – Typical Vegetation



Plate 4: Trap Site 4 (Whicher NP) – Typical Vegetation



Plate 5: Trap Site 5 (SF 33) – Typical Vegetation



Plate 6: Sand Track (SF 33) – Typical Vegetation

2.3.4 Ground Fauna Survey

To provide information on the abundance and distribution of ground fauna present (i.e. small mammals, reptile and amphibian species), trapping, utilising a combination of cage traps and Elliott traps (to target mammal species), fly wire drift fences with associated pit fall traps (to target small mammals, reptile and amphibian species) and funnel traps (to target larger reptile species) were utilised.

Trap lines were established at the previously selected sites with each line consisting of 10 trap arrays (Figure 4). Each trap array consisted of a ~7m to 10m long, 30 cm high fly wire drift fence with a centrally located pit trap (20L bucket) dug in underneath and a single funnel trap located at each end of the drift fence. One Elliott (A) trap was also placed in the vicinity of each trap array. A single cage trap was positioned at each of the five trap sites during the phase 1 survey. This was increased to two cage traps during the second phase survey.

Elliott and cage traps were baited with “universal bait” (a mixture of peanut butter, rolled oats and sardines). Rebaiting will be carried out as required.

In total, during the phase 1 and phase 2 surveys, trapping utilised 5 cage traps (increased to 10 for phase 2), 20 Elliott (B) traps, 50 Elliott (A) traps, 50 (20L) buckets and 100 funnel traps. All traps were left open for at least seven nights during each survey phase. Pit traps were left in place after the phase 1 survey (December 2011) and sealed with a lid for re-use during the phase 2 survey (March/April 2012).

A summary of trap nights is provided in Table 2 below. The location of trap sites is shown in Figure 4. Additional details on trap locations and timing are provided in Appendix B.

Table 2: Summary of Trap Nights – Phase 1 and Phase 2

	Site Number	# Nights for Elliott Traps	# Nights for Funnel Traps	# Nights for Bucket Pit Traps	# Nights for Cages/ Elliot B's	Total # Nights
PHASE 1 DEC 2011	1	90	180	90	7	367
	2	90	180	90	7	367
	3	80	160	80	7	327
	4	70	140	70	7	287
	5	70	140	70	7	287
	Tracks	-	-	-	160	160
	Total	400	800	400	195	1,795
PHASE 2 MAR/APRIL 2012	1	70	140	70	14	294
	2	70	140	70	14	294
	3	70	140	70	14	294
	4	80	160	80	16	336
	5	70	140	70	14	294
	Tracks	-	-	-	140	140
	Total	360	720	360	212	1,652
Grand Total	760	1520	760	407	3,447	

2.3.5 Chuditch Trapping Program

Large Elliot's (size "B") and cage traps were employed in an attempt to capture chuditch if they were present in the area. The main targeted trapping program for chuditch followed closely the "standard" trapping techniques documented by DPaW (Orell and Morris 1994) with modifications to suit the project areas relatively small size and limited area of native vegetation. Forty traps (Elliot "B"s) were placed at max ~100m intervals near the edge of racks in suitable habitat throughout remnant vegetation in and adjacent to the project area (Figure 4). This was supplemented by the use of cage traps at each of the trap sites.

Traps were baited with a "smelly bait mix" formulated by DPaW staff. This mix has been found to be attractive to chuditch but less attractive to other marsupials. A spray (derived from rotting meat) will be applied adjacent to each trap site.

2.3.6 Acoustic Bat Recordings

Acoustic recordings were undertaken using an ANABAT II Bat Detector coupled with a minidisc recorder. Recordings were taken at two separate locations during the phase 1 survey and at one additional location during the phase 2

survey (Figure 4). The phase 1 recordings totalled 19 hours and 55 minutes while phase 2 recordings totalled 9 hours and 5 minutes (grand total 20 hours).

The detectors convert ultrasonic echolocation signals produced by bats into audible electronic signals that are then recorded. The recordings were later processed by Bob Bullen to determine the presence of species specific calls.

Additional details on the bat recordings carried out are contained in Appendix B.

2.3.7 Bird Surveys

Bird surveys were conducted within the project area for a minimum period of one hour each day of each phase of the survey to provide a species listing for the area. The surveys will also provide additional information on the use of the area by any significant bird species identified as potentially occurring in the area. Opportunistic observations of birds during other phases of the fauna survey were also recorded.

2.3.8 Western Ringtail Possum Targeted Surveys

The targeted assessment of the western ringtail possum included:

- Daytime surveys to locate and record dreys, obvious tree hollows, scats and individual WRPs; and
- Two night time surveys to locate and record the distribution and abundance of WRPs.

A series of diurnal inspections of the site were carried out along a series of transect (concurrent with the black cockatoo survey work) across the main impact areas of the project site. The principal aim was to identify potential WRP habitat within the site while also recording the location of scats, dreys, tree hollows or other potential day time refuge sites if observed. Opportunistic observations for evidence of WRPs were also carried out during other components of the survey work at the site.

The nocturnal counts involve systematic searching of that part of State Forest 33 that fell within the project area on two nights (7 December 2011 and 30 March 2012). Survey work was carried out on foot by two personnel equipped with high powered head torches. The survey work within State Forest 33 covered a total transect distance of about 11 km during both nights.

2.3.9 Black Cockatoo Habitat Surveys

The black cockatoo targeted assessment included:

- Potential breeding habitat survey. This involve the identification and recording of all suitable trees species within the main impact areas that have a Diameter at Breast Height (DBH) of over 50cm (DoE

criteria). The location of each tree identified was recorded with a GPS and details on tree species, number and size of hollows noted;

- Black cockatoo foraging habitat assessment. An assessment of the amount and quality of potential black cockatoo foraging habitat on site was made and included the recording of the location and nature of actual foraging evidence (e.g. chewed fruits around base of trees) observed during the field survey; and
- Roosting habitat survey. Direct and indirect evidence (e.g. branch clippings, droppings or moulted feathers) of black cockatoos roosting within trees on site was noted if observed.

2.3.10 Infrared Cameras

Two motion sensing infrared cameras were set up within the study area (Figure 4) and left to record for a period of about eight months (August 2011 to April 2012). The cameras were positioned on trees about 40cms above the ground, directed towards small clearings within bushland. Baiting of this area with fish oil and chicken fat was done periodically to attract animals to each site.

2.3.11 Call Playback

Attempts to determine the presence of the barking and masked owl were made using playback calls on three nights and three locations across the site within suitable habitat. This involved five minutes of listening, followed by five minutes of playback of pre-recorded calls of the target species using a speaker system. This will be followed by spotlighting the vicinity and a further five minutes of listening at various locations around the study area.

The call playback was undertaken within State Forest 33 on two nights (7 Dec 2011 and 30 March 2012).

2.3.12 Invertebrate Fauna

It can be difficult to identify what may be significant invertebrate species (e.g. Short Range Endemics - SREs) as there are uncertainties in determining the range-restrictions of many species due to lack of surveys, lack of taxonomic resolutions within target taxa and problems in identifying certain life stages. Where invertebrates are collected during surveys, a high percentage are likely to be unknown, or for known species there can be limited knowledge or information on their distribution (Harvey 2002).

Because of these issues recent surveys in the south west have concentrated on locating the most well-known invertebrate groups, these being snails, millipedes, scorpions, pseudoscorpions and mygalomorph spiders. These groups have been targeted because local taxonomic expertise is available and because of their tendency for short range endemism. By surveying for the better known SRE species and identifying potential impacts an assumption can

be made that unidentified SRE invertebrate species also present will be encompassed by default.

No specific invertebrate survey was carried out however time was spent searching leaf litter, under bark, excavation of burrows, and other likely areas for invertebrates. Any millipedes, scorpions, pseudoscorpions, mygalomorph spiders and snail specimens collected in pit traps or during other opportunistic surveyed work were retained and representative samples submitted to specialists for formal identification and comments.

2.3.13 Opportunistic Surveys

During the course of all the survey work non-systematic opportunistic observations of fauna species will be made and recorded. Secondary evidence of fauna such as tracks, diggings and scats will also be noted.

Some active searching will be undertaken in specific areas with the aim of locating the more elusive frog and reptile species that may inhabit the site. Searches will included but will not be limited to investigating burrows, investigating scats, tracks and other traces, turning fallen timber, opening standing timber crevices, peeling bark and raking leaf litter.

3. LIMITATIONS OF THE STUDY

The fauna assessment was designed and carried out to conform with a Level 2 survey as defined in EPA Guidance statement No. 56 (EPA 2004). The assessment has included a desktop analysis aimed at providing a list of expected species, a detailed trapping program, targeted assessments of western ringtail possums and black cockatoos, opportunistic observations, bat detector recordings and the use of camera traps.

Fauna species are indicated as potentially present within this report based on there being suitable (quality and extent) habitat within the study area. With respect to trapping and opportunistic observations, the possibility exists that certain species may not have been detected during field investigations due to:

- seasonal inactivity during field survey;
- species present within micro habitats not surveyed;
- cryptic species able to avoid detection;
- transient wide-ranging species not present during survey period.

The lack of observational data on some species should therefore not be taken as necessarily indicating that a species is absent from the site.

The habitat requirements and ecology of many of the species known to occur in the wider area are often not well understood or documented. It can therefore be difficult to include/exclude species from the potential list based on the apparent presence or absence of a specific habitats or microhabitats within the study area. As a consequence of this limitation the potential fauna list produced for this report is most likely an overestimation of those species that actually utilise the study area for some purpose. Some species may be present in the general area but may only use the study area itself on rare occasions or as vagrants.

In recognition of survey limitations, a precautionary approach has been adopted for this assessment. Any fauna species that would possibly occur within the study area (or immediately adjacent), as identified through ecological databases, publications, discussions with local experts/residents and the habitat knowledge of the Author, has been assumed to potentially occur in the study area.

Fauna survey limitations and constraints are summarised in Table 3.

Table 3: Fauna Survey Limitations and Constraints

Potential Constraint	Survey Limitation (Yes/No) Significant Moderate Negligible	Comments on Survey Outcomes
Competency/Experience of the consultant carrying out the survey;	No	Consultant Zoologists that executed the survey have both conducted many level 1 and level 2 surveys in WA and can be regarded as suitably qualified.
Scope	No	The survey carried out was a Level 2 survey, comprising of a desktop survey and two phase seasonal survey that included a habitat assessment, trapping program, and opportunistic observations. No constraints encountered.
Proportion of fauna identified, recorded and/or collected	Yes/ Negligible	The field surveys recorded about 54% of listed potential vertebrate species considered likely to be present on site. It should be noted that the potential species list is very likely an over estimation of the species that use the area investigated on a regular basis.
Sources of information	No	Various sections of the Whicher Scarp have been surveyed for fauna in the past and fauna values are reasonably well documented.
The proportion of the task achieved and further work	No	The phase 1 and 2 field surveys were completed adequately, with the trapping program and other aspects of the survey carried out to a sufficient level with respect to required scope of works. Some additional survey work may be required when mine plans are finalised.
Timing/weather/season/cycle	No	The two phase survey was carried out to comply with EPA's published guidelines for seasonal surveys in the south west.
Disturbances (e.g. fire, flood, accidental human intervention etc.) which affected results of survey	No	None observed.
Intensity (in retrospect, was the intensity adequate)	No	Based on results achieved the survey is considered adequate for two phase seasonal survey for an area of this size.
Completeness (e.g. was relevant area fully surveyed);	No	Density of trap lines and other survey work were above that generally carried out during the course of surveys of a similar type/area.
Resources (e.g. degree of expertise available in animal identification to taxon level);	No	No unresolved problems/uncertainties arose with respect to identifying observed fauna species.
Remoteness and/or access problems;	No	Majority of the study area was easily accessed.
Availability of contextual (e.g. biogeographic) information on the region.	No	WAM, and DPaW reports and databases along with specialist books/publications and previous fauna survey data for the wider area were consulted.

4. RESULTS

4.1 FAUNA HABITAT ASSESSMENT

The broad scale fauna habitats within the study area are based on vegetation structure as mapped by Ecoedge (2014) and Mattiske (2012) (Figure 5). Most of the project area is cleared of native vegetation and is used for livestock grazing. In the past areas have also been used for sand extraction. Remnant native vegetation is dominated by woodlands or forests of Jarrah and/or Marri with variations occurring with respect to the numbers and types of subdominant mid and lower storey species (e.g. Mountain Marri, *Banksia*, Sheoak, Woody Pear and various shrubs).

Most of the vegetation within State Forest 33 (trap sites 1, 2 and 5) is rated by Ecoedge (2014) and Mattiske (2012) as being in very good condition to excellent condition despite appearing to have regenerated after past historical disturbances (e.g. midstorey clearing and logging).

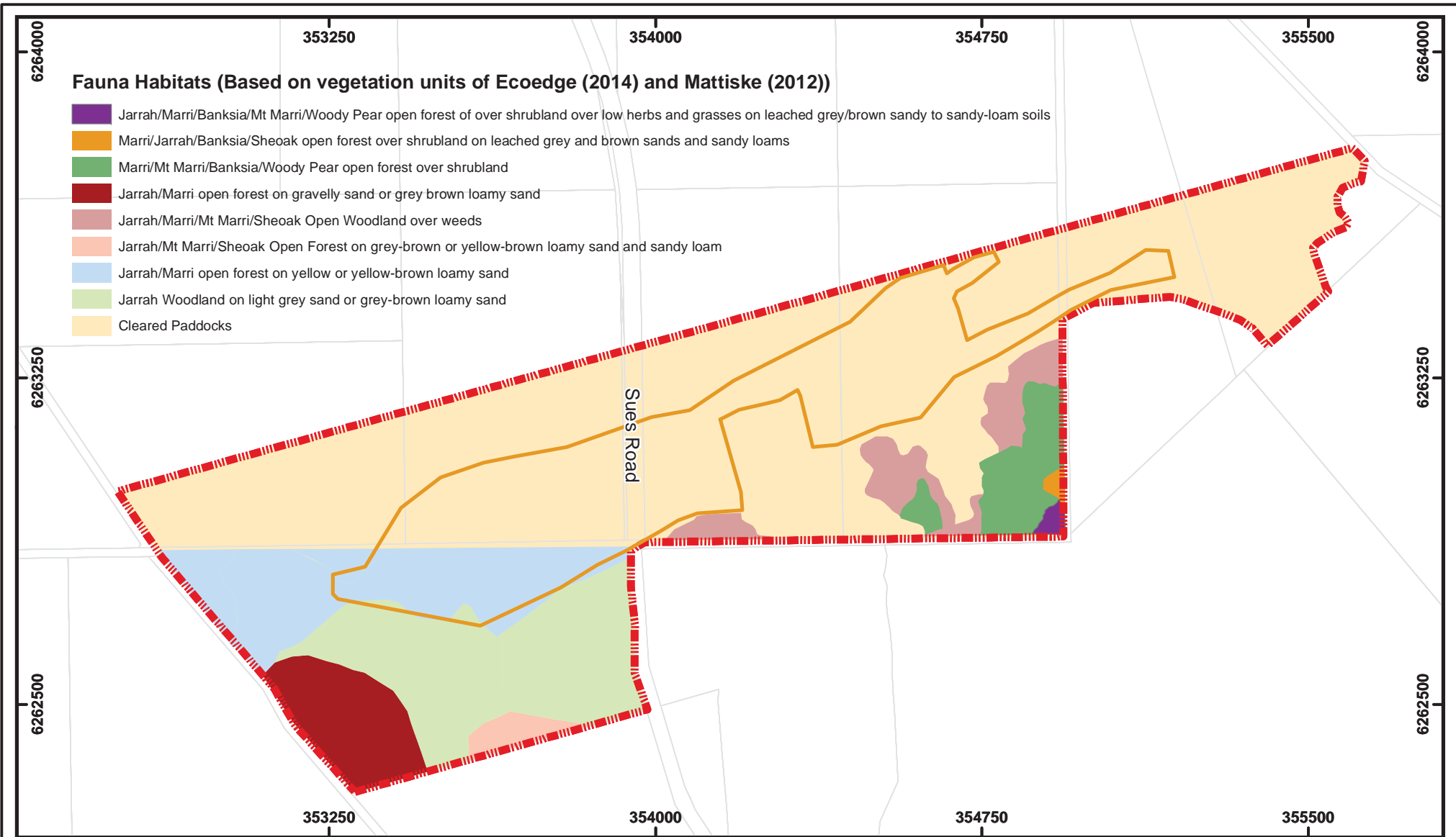
Vegetation within the Whicher National Park (trap sites 3 and 4) was not mapped as part of any botanical survey but is consistent with the units found in State Forest 33, though generally in better condition, presumably due to lower levels of historical disturbance. The density of groundcover vegetation was noticeably higher along trap line 3 and 4 compared to other sites.

Fallen logs (some hollow) and trees with hollows were relatively common. The location of trees with hollows (in the main impact area only) are shown in Figure 6.

The location and extent of the identified fauna habitats (based on vegetation units – EcoEdge 2014 and Mattiske 2012) within the study area are shown in Figure 5 and consist of:

Woodlands and Forests

- *Eucalyptus marginata*, *Corymbia calophylla* open forest/woodland over *Banksia grandis* low open woodland over *Acacia pulchella*, *Adenanthos barbiger*, *Dasypogon hookeri*, *Hakea amplexicaulis*, *H. ruscifolia*, *Hibbertia hypericoides*, *Hypocalymma robustum*, *Labichea punctata*, *Melaleuca thymoides*, *Podocarpus drouynianus*, *Synaphea whicherensis*, *Xanthorrhoea gracilis*, shrubland/low shrubland over *Anarthria prolifera*, *Loxocarya cinerea*, *Mesomelaena tetragona*, *Tetrariaoctandra* open sedgeland and *Conostylis setigera* subsp. *setigera*, *Dampiera linearis*, *Hypochoeris glabra*, *Lomandra hermaphrodita*, *Patersonia umbrosa* var. *umbrosa* and *Trachymene pilosa* open herbs on grey-brown, yellow or yellow-brown ('orange') loamy sand.

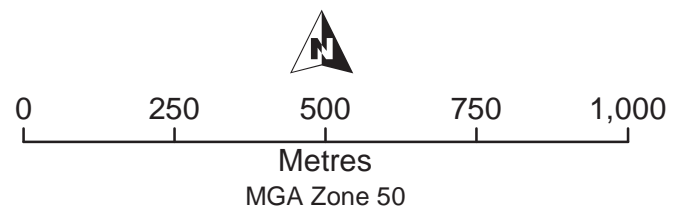


Fauna Habitats (Based on vegetation units of Ecoedge (2014) and Matisse (2012))

- Jarrah/Marri/Banksia/Mt Marri/Woody Pear open forest of over shrubland over low herbs and grasses on leached grey/brown sandy to sandy-loam soils
- Marri/Jarrah/Banksia/Sheoak open forest over shrubland on leached grey and brown sands and sandy loams
- Marri/Mt Marri/Banksia/Woody Pear open forest over shrubland
- Jarrah/Marri open forest on gravelly sand or grey brown loamy sand
- Jarrah/Marri/Mt Marri/Sheoak Open Woodland over weeds
- Jarrah/Mt Marri/Sheoak Open Forest on grey-brown or yellow-brown loamy sand and sandy loam
- Jarrah/Marri open forest on yellow or yellow-brown loamy sand
- Jarrah Woodland on light grey sand or grey-brown loamy sand
- Cleared Paddocks

Legend

- Cadastral Boundaries (Existing)
- Yoongarillup Mineral Sands Project Area
- Main Area of Impact



DRAWN: G Harewood
 DATE : Aug 2014
 SCALE: 1:12,500

Yoongarillup Mineral Sands Project
 Doral Mineral Sands Pty Ltd

Fauna Habitats

- *Eucalyptus marginata*, (*Corymbia calophylla*, *C. haematoxylon*) woodland over (*Banksia grandis*), (*Xylomelum occidentale*) open low woodland over *Acacia pulchella*, *Banksia dallanneyi* subsp. *dallanneyi*, *Conostephium pendulum*, *Dasypogon bromeliifolius*, *Hibbertia hypericoides*, *Hypocalymma robustum*, *Leucopogon pulchellus*, *Stirlingia latifolia*, *Xanthorrhoea gracilis* shrubland/low shrubland over *Desmocladius fascicularis*, *Mesomelaena tetragona* very open sedges and **Arctotheca calendula*, *Burchardia congesta*, *Caladenia flava*, *Elythranthera brunonis*, **Hypochaeris glabra*, *Quinetia urvillei*, *Rhodanthe citrina*, *Stylidium calcaratum* and *Trachymene pilosa* open herbs on grey-brown loamy sand to light grey sand.
- *Eucalyptus marginata* and *Corymbia haematoxylon*, *Allocasuarina fraseriana* open forest over *Banksia grandis*, (*Persoonia elliptica*) open low woodland over *Dasypogon hookeri*, *D. bromeliifolius*, *Hibbertia hypericoides*, *H. glomerata*, *Labichea punctata*, *Stirlingia latifolia*, *Xanthorrhoea preissii*, *X. gracilis* shrubland/low shrubland over *Patersonia umbrosa* var. *xanthina* open herbland on grey-brown or yellow-brown loamy sand and sandy loam.
- *Eucalyptus marginata* and *Corymbia calophylla* open forest over *Banksia dallanneyi*, *Hakea amplexicaulis*, *Hibbertia amplexicaulis*, *H. hypericoides*, *Hypocalymma robustum* shrubland/low shrubland over *Desmocladius fasciculatus*, *Tetraria* sp open sedgeland and *Conostylis aculeata*, *Opercularia apiciflora*, *Patersonia umbrosa* var. *xanthina* open herbland on gravelly sand or grey brown loamy sand.
- *Eucalyptus marginata*, *Corymbia calophylla*, *Corymbia haematoxylon* and *Allocasuarina fraseriana* open woodland over introduced herbs and grasses on disturbed flats and lower slopes with leached or brown sandy-loams and sandy-gravels.
- *Eucalyptus marginata*, *Corymbia calophylla*, *Banksia grandis*, *Corymbia haematoxylon* and *Xylomelum occidentale* open forest of over *Xanthorrhoea preissii*, *Podocarpus drouynianus*, *Hakea amplexicaulis*, *Hakea ruscifolia*, *Hibbertia hypericoides*, *Dasypogon hookeri*, *Dasypogon bromeliifolius* and *Kingia australis* over low herbs and grasses on lower and mid slopes with leached grey/brown sandy to sandy-loam soils.
- *Eucalyptus marginata*, *Corymbia calophylla*, *Banksia grandis*, *Corymbia haematoxylon* and *Xylomelum occidentale* open forest of over *Xanthorrhoea preissii*, *Podocarpus drouynianus*, *Hakea amplexicaulis*, *Hakea ruscifolia*, *Hibbertia hypericoides* and *Dasypogon hookeri*.
- *Corymbia calophylla*, *Eucalyptus marginata*, *Banksia grandis* and *Allocasuarina fraseriana* open forest of over *Hibbertia hypericoides*,

Xanthorrhoea preissii, *Xanthorrhoea gracilis*, *Dasypogon hookeri*, *Dasypogon bromeliifolius*, *Kunzea recurva* and *Podocarpus drouynianus* on flats with leached grey and brown sands and sandy loams.

Some of the abovementioned vegetation units fall within paddock areas and are or have been open to grazing.

Cleared Paddocks

- The majority of the study site is cleared farmland. Some of the cleared areas are low lying and subject to seasonal inundation/waterlogging in the winter months. Some sections contain various densities of scattered individual and groups of trees, principally Marri (*C. calophylla*) and Jarrah (*E. marginata*) over a mixture of introduced pasture grasses, clovers, weeds and degraded sedgeland. A variety of non-endemic trees and shrubs have been planted in some locations as windbreaks and screens.

Watercourses/Dams/Drains

- Several dams and drains are present within the study site. A small highly degraded seasonally inundated stream line enters the study area near the south western corner of Lot 1870 and is then directed into a manmade drain along Yoongarillup Road.

4.2 FAUNA INVENTORY - DESKTOP STUDY

A list of expected fauna species likely to occur in the study area was compiled from information obtained during the desktop study and is presented in Appendix C. The results of some previous fauna surveys carried out in the general area are summarised in this species listing as are the DPaW NatureMap database search results. The raw database search results from NatureMap (DPaW 2013b) and the Protected Matters Search Tool (DoE 2013) is contained within Appendix D.

The list of potential fauna takes into consideration that firstly the species in question is not known to be locally extinct and secondly that suitable habitat for each species, as identified during the habitat assessment, is present within the study area, though compiling an accurate list has limitations (see Section 3 above).

A review of the *EPBC Act* threatened fauna list, DPaW's Threatened Fauna Database and Priority List, unpublished reports and scientific publications identified 34 specially protected, priority or migratory fauna species as potentially occurring in the general vicinity of the study area.

Species that have no potential whatsoever (under normal circumstances) to utilise the study area for any purpose are not listed or discussed, despite

appearing in the DPaW or *EPBC Act* database searches (Appendix C – e.g. seabirds, sea turtles). Based on the habitats present and documented distributions it is considered possible that 17 of these species may use the study area for some purpose at times. Species have been omitted from the potential list for the site (Appendix C), principally due to lack of suitable habitat on-site (including extent or quality) or known local/regional extinction.

Additional details on significant species that potentially utilise the study area are given in Appendix G.

4.3 FAUNA INVENTORY – DETAILED FAUNA SURVEY

4.3.1 Ground Fauna Survey

The results of the trapping program are summarised in Table 4 below. In total 36 species of fauna were captured (31 species within the state forest area (SF 33) and 27 species within the national park (NP)).

The slightly lower number of species captured with the national park area can be attributed to the lower number of traps used in this area and not to lower habitat quality. The additional species caught in the state forest area are represented by a very small number of specimens of types often difficult to catch (e.g. blind snakes), the probability of capture being assisted by the use of a larger number of traps in this area.

The complete list of captures at each site is contained within Appendix E.

Table 4: Trapping Results (number of captures at each site during each phase)

Species	Common Name	Trap Line 1	Trap Line 2	Trap Line 3	Trap Line 4	Trap Line 5	Track Traps
Amphibians		SF33	SF33	NP	NP	SF33	SF33/NP
<i>Crinia insignifera</i>	Squelching Toadlet	0/0	1/0	1/0	0/0	2/0	0/0
<i>Limnodynastes dorsalis</i>	Western Banjo Frog	2/1	0/0	3/2	0/0	0/0	0/0
<i>Heleioporus eyrei</i>	Moaning Frog	0/0	2/0	7/2	0/0	2/0	0/0
<i>Metacrinia nicholli</i>	Forest Toadlet	0/0	0/0	5/2	1/0	1/0	0/0
Reptiles							
<i>Aprasia pulchella</i>	Pretty Worm Lizard	2/0	0/0	2/0	1/0	0/0	0/0
<i>Delma australis</i>	Marbled-faced Delma	0/0	0/0	1/0	0/0	0/0	0/0
<i>Diplodactylus polyophthalmus</i>	Speckled Stone Gecko	0/0	0/0	0/0	0/0	1/0	0/0
<i>Christinus marmoratus</i>	Marbled Gecko	0/0	1/0	0/1	1/0	0/0	0/0
<i>Acritoscincus trilineatum</i>	Southwestern Cool Skink	3/1	7/4	2/0	0/0	2/1	0/0
<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink	5/0	6/0	1/0	2/1	6/1	0/0
<i>Ctenotus impar</i>	Odd-striped Ctenotus	9/2	9/1	4/0	2/2	13/1	0/0
<i>Ctenotus ora</i>	Coastal Plains Ctenotus	8/0	2/0	6/0	3/0	9/0	0/0
<i>Ctenotus catenifer</i>	Chain-striped Heath Ctenotus	0/0	0/0	0/1	0/0	0/0	0/0

Species	Common Name	Trap Line 1	Trap Line 2	Trap Line 3	Trap Line 4	Trap Line 5	Track Traps
<i>Egernia napoleonis</i>	Salmon-bellied Skink	0/0	1/0	0/0	3/0	0/0	0/1
<i>Egernia kingi</i>	King's Skink	0/1	0/0	0/0	0/0	0/0	2/1
<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink	7/0	13/0	7/1	12/2	9/1	0/0
<i>Lerista elegans</i>	West Coast Four-toed Lerista	3/0	2/0	3/0	3/2	1/0	0/0
<i>Lerista distinguenda</i>	South-western Four-toed Lerista	0/0	0/0	0/2	2/0	1/0	0/0
<i>Menetia greyii</i>	Dwarf Skink	0/0	7/0	1/0	0/1	1/1	0/0
<i>Morethia lineocellata</i>	West Coast Pale-flecked Morethia	37/13	72/18	28/3	41/8	25/3	0/0
<i>Morethia obscura</i>	Dusky Morethia	1/0	18/2	3/2	7/0	3/0	0/0
<i>Tiliqua rugosa rugosa</i>	Bobtail	1/0	2/0	2/0	2/1	1/0	7/0
<i>Pogona minor minor</i>	Western Bearded Dragon	0/0	1/0	0/1	0/1	0/0	0/0
<i>Varanus rosenbergi</i>	Heath Monitor	0/0	0/0	1/0	0/0	0/0	0/0
<i>Elapognathus coronatus</i>	Crowned Snake	0/1	0/0	0/0	0/0	0/0	0/0
<i>Parasuta nigriceps</i>	Black-backed Snake	1/1	0/0	0/0	0/0	0/0	0/0
<i>Pseudonaja affinis</i>	Dugite	0/0	1/0	0/0	0/0	0/0	0/0
<i>Ramphotyphlops australis</i>	Southern Blind Snake	1/0	1/0	0/0	0/0	0/0	0/0
<i>Ramphotyphlops pinguis</i>	Stout Blind Snake	1/0	0/0	0/0	1/0	0/0	0/0
Mammals							
<i>Antechinus flavipes</i>	Yellow-footed Antechinus	3/3	0/0	0/0	4/1	1/3	2/6
<i>Cercartetus concinnus</i>	Western Pygmy-possum	0/0	0/0	0/0	1/0	0/0	0/0
<i>Isoodon obesulus</i>	Quenda	0/0	0/0	0/0	0/1	0/0	0/0
<i>Trichosurus vulpecula</i>	Common Brushtail Possum	0/0	0/4	0/0	0/0	0/2	0/0
<i>Mus musculus</i>	House Mouse	1/10	2/5	0/1	0/1	0/6	0/6
<i>Rattus fuscipes</i>	Western Bush Rat	0/0	0/0	17/9	0/0	0/0	2/0
<i>Rattus rattus</i>	Black Rat	0/3	0/0	0/0	0/0	0/0	0/0
	Total Number of Species	19	19	23	20	18	6

Two conservation significant species were captured, these being:

- *Ctenotus ora* Coastal Plains Ctenotus – P1 (DPaW Priority species)
- *Isoodon obesulus fusciventer* Quenda - P5 (DPaW Priority species)

4.3.2 Chuditch Trapping Program

No chuditch were trapped during either survey phase and no other evidence of their presence was found during any other component of the survey work. Based on this information and given the intensity of survey work it is concluded that the species was absent from the area at the time of the trapping program.

Some areas of habitat within the study area appears to be suitable for this species to utilise and therefore it may, despite the negative result of this trapping program, occur at times.

4.3.3 Acoustic Bat Recordings

Six bat species were recorded during seasonal surveys, these being:

- Gould's Wattled Bat *Chalinolobus gouldii*
- Chocolate Wattled Bat *Chalinolobus morio*
- Western Freetail Bat *Mormopterus* sp 4
- Lesser Long-eared Bat *Nyctophilus geoffroyi*
- Southern Forest Bat *Vespadelus regulus*
- White-striped Freetail Bat *Tadarida australis*

All of the bats recorded are common widespread species.

4.3.4 Bird Surveys

A total of 53 bird species were recorded during all stages of the fauna survey. The species observed are listed within Appendix C.

With respect to conservation significant species the following were observed or evidence of them utilising the study area was observed:

- *Calyptorhynchus baudinii* Baudin's Black Cockatoo - S1 (WC Act), Vulnerable (EPBC Act)
- *Calyptorhynchus latirostris* Carnaby's Black Cockatoo - S1 (WC Act), Endangered (EPBC Act)
- *Calyptorhynchus banksii naso* Forest Red-tailed Black Cockatoo - S1 (WC Act), Vulnerable (EPBC Act)
- *Merops ornatus* Rainbow Bee-eater - Migratory (EPBC Act)

4.3.5 Western Ringtail Possum Targeted Surveys

No evidence of western ringtail possums utilising the study area was found and given the intensity of survey work it is concluded that the species was absent from the area at the time of the assessment. No dreys or scats were observed during daytime survey work and the only possum species observed during nocturnal surveys was the common brushtail possum (SF 33 - eight individuals during the December 2011 survey and two in March 2012).

Some sections of the study area appear at least superficially to be suitable for WRPs to utilise based on vegetation structure (midstorey vegetation with continuous or near continuous canopy) but the reason for its absence is unknown given that along other sections of the Whicher Scarp, such as

Gwindinup/Happy Valley and Tutunup, it occurs in significant numbers (G. Harewood pers. obs.).

4.3.6 Black Cockatoo Habitat Surveys

The black cockatoo potential breeding habitat assessment identified a total of 107 trees within the main impact area that falls within State Forest 33 and within paddock areas of the freehold lots (Figure 6). Just less than half of the trees (44, ~41%) of the trees were not observed to contain hollows of any size. Fifty six (~52%) of the trees contained one or more “small” hollows (~ less than 12cm entrance size) considered by the Author not to be suitable for black cockatoos to use for nesting purposes. Ten (~9%) trees contained hollows with larger entrances (~ greater than 12cm) that appeared big enough and orientated favourably to possibly allow the entry of a black cockatoo into a suitably sized branch/trunk though none of the trees containing large hollows showed any evidence of current or past use by black cockatoos.

Details on each black cockatoo potential breeding tree observed can be found in Appendix F.

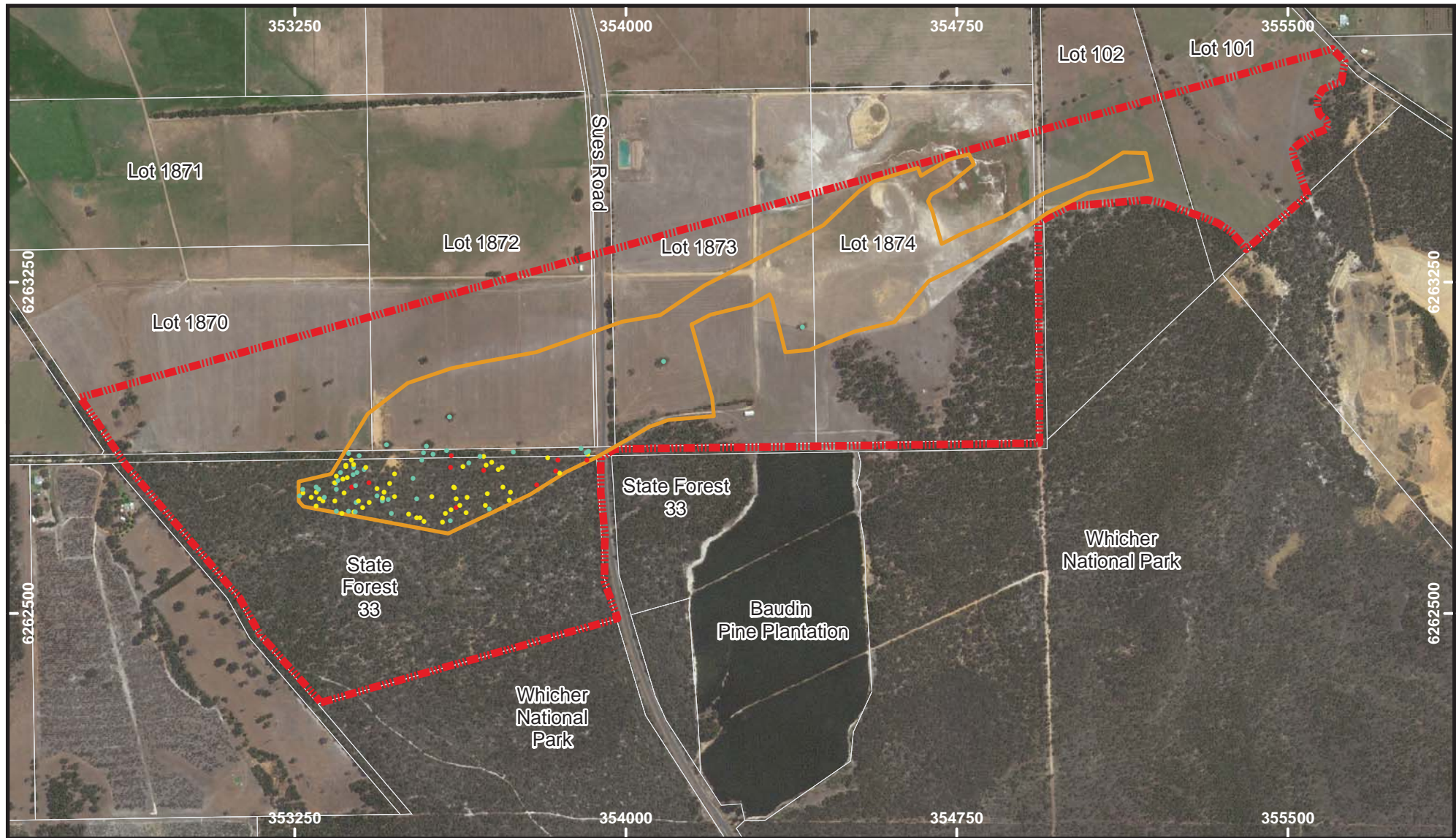
Table 5: Summary of Potential Cockatoo Breeding Habitat Trees (DBH >50cm) Within Main Impact Areas

Area	Number of Trees >50cm DBH	Number of Trees with No Hollows Observed	Number of Trees with Small (<12cm entrance Hollows	Number of Trees with Large (>12cm entrance) Hollows	Tree Species		
					Jarrah	Marri	Unknown*
SF 33	107	41	56	10	80	23	4
Freehold Lots	3	3	0	0	0	3	0






*Note: Unknown tree species were all dead individuals that could not be identified to species level.

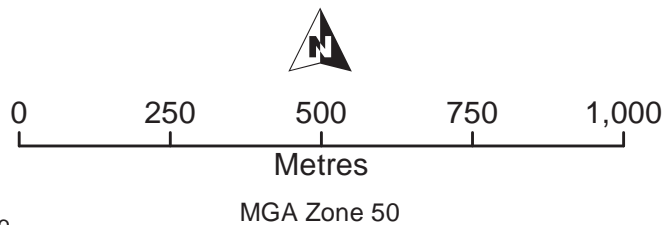
The various fauna habitats (based on vegetation) are shown in Figure 5. Almost all areas of remnant native vegetation present at Yoongarillup can be considered to represent potential black cockatoo foraging habitat as the areas contain plant species documented as foraging habitat for one or more of the three black cockatoo species known to frequenting the area, though the degree to which each specific area would be utilised for foraging purposes would vary based on species composition and density.

Table 6 below lists the flora species identified at Yoongarillup areas during the initial flora survey (Mattiske 2012) that are known to be or that are potentially utilised by black cockatoos as a food source. The degree to which each plant species represents foraging habitat varies greatly. For example while some of the shrub species are documented as a foraging species for black cockatoos, the degree of utilisation is very much lower compared to, for example, marri or



Legend

-  Yoongarillup Mineral Sands Project Area
-  Main Area of Impact
-  Tree >50cm DBH, no hollows seen
-  Tree >50cm DBH, one or more hollows seen
-  Tree >50cm DBH, one or more hollows possibly suitable for a Black Cockatoo




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 DATE: Jan 2014
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 Doral Mineral Sands Pty Ltd
**Habitat Trees
 (DBH >50cm)**

jarrah and most are probably fed upon only rarely whereas marri for example is documented as making up about 90% of the FRTBC's diet. The most common species present in the area are jarrah, marri, sheoak and *banksia*.

Table 6: Black Cockatoo Foraging Habitat Species Identified at Yoongarillup during the Flora Survey (Matiske 2012)

Species	Unit F1	Unit F2	Unit F3	Unit F4	Unit F5	Unit W1	Cockatoo Foraging Species
<i>Acacia extensa</i>	x		x	x	x		X?
<i>Acacia mooreana</i>			x				X?
<i>Acacia pulchella</i>	x	x	x	x	x		X?
<i>Acacia sp.</i>			x				X?
<i>Acacia stenoptera</i>				x			X?
<i>Acacia urophylla</i>	x						X?
<i>Allocasuarina fraseriana</i>	x	x	x	x	x	x	X
<i>Allocasuarina humilis</i>					x		X?
<i>Arctotheca calendula*</i>	x	x	x	x	x	x	X
<i>Banksia attenuata</i>	x		x	x			X
<i>Banksia dallanneyi var. dallanneyi</i>	x	x	x	x	x		X
<i>Banksia grandis</i>	x	x	x	x	x		X
<i>Banksia littoralis</i>	x						X
<i>Banksia sessilis var. sessilis</i>				x			X
<i>Corymbia calophylla</i>	x	x	x	x	x	x	X
<i>Corymbia haematoxylon</i>	x	x	x	x	x	x	X
<i>Eucalyptus marginata</i>	x	x	x	x	x	x	X
<i>Eucalyptus sp. (Planted)*</i>							X?
<i>Grevillea bipinnatifida</i>	x						X?
<i>Grevillea quercifolia</i>	x			x			X?
<i>Grevillea trifida</i>	x	x	x	x	x	x	X?
<i>Hakea amplexicaulis</i>	x	x	x	x	x	x	X
<i>Hakea lissocarpha</i>	x					x	X
<i>Hakea ruscifolia</i>	x	x	x	x	x		X
<i>Isopogon sphaerocephalus</i>	x		x	x			X?
<i>Jacksonia ?gracillima (P3)</i>				x			X?
<i>Jacksonia ?sternbergiana</i>					x		X?
<i>Jacksonia horrida</i>	x		x	x			X?
<i>Kingia australis</i>	x		x	x	x	x	X
<i>Persoonia elliptica</i>	x	x	x	x			X?
<i>Persoonia longifolia</i>	x	x	x	x	x	x	X
<i>Romulea rosea*</i>	x	x	x	x		x	X
<i>Xanthorrhoea brunonis</i>					x		X?
<i>Xanthorrhoea gracilis</i>	x	x	x	x	x	x	X?
<i>Xanthorrhoea preissii</i>	x	x	x	x	x	x	X

Species	Unit F1	Unit F2	Unit F3	Unit F4	Unit F5	Unit W1	Cockatoo Foraging Species
<i>Xylomelum occidentale</i>	X	X	X	X	X	X	X

X? = particular species listed is not specifically documented as a foraging species, only the plant genus.

All three black cockatoo species are known to also consume insects and insect larvae (including beetle, wasp and moth larvae) from under the bark and within wood of live and dead trees, and (depending on the black-cockatoo species) from the flowers, flower spikes, pith, gall, and cones of various native and introduced species, including *Banksia*, *Eucalyptus*, *Corymbia* and *Xanthorrhoea* spp.

Evidence of all three black cockatoo species foraging within the survey area was found. Evidence observed was primarily in the form of chewed jarrah/marri fruits and banksia cones and to a lesser extent mountain marri fruits. Most of the evidence observed was attributed to the forest red-tailed black-cockatoo.

Four trees were found within State Forrest 33 that showed signs of being used as roost sites by black cockatoos (numerous droppings and branch clippings). The locations of the trees are shown in Figure 7. No direct evidence (i.e. actual black cockatoos) of the trees being used was seen during either of the seasonal surveys and it seems, based on this observation alone, that the roost trees seen may only be used on a “rotational” basis with other roost trees in the general area.

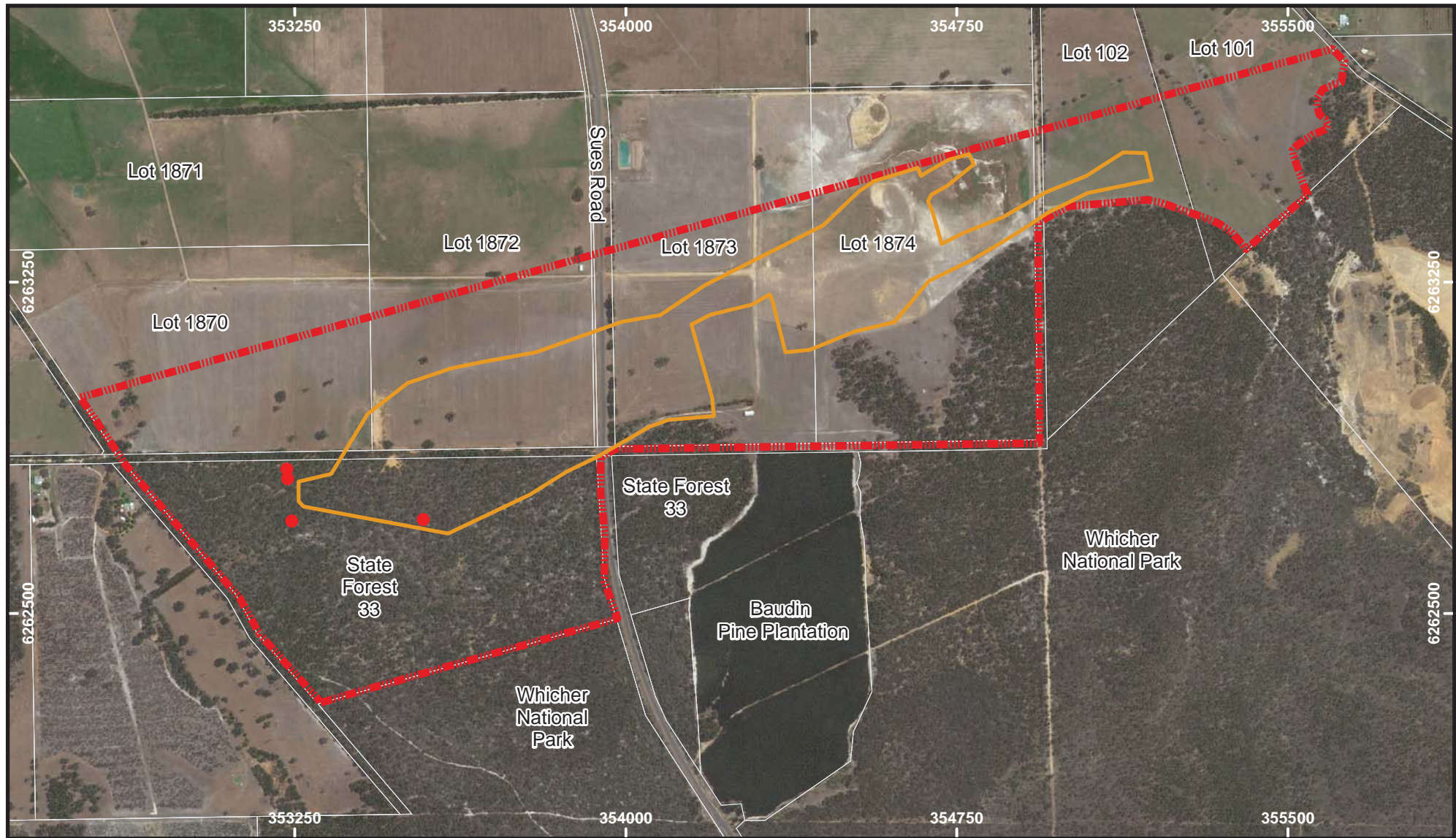
4.3.7 Infrared Cameras

A summary of the species photographed is included in the raw trap and recording results held in Appendix E (only the first record for each species is provided given the large number of actual records for many species such as western grey kangaroos). In total eleven species of fauna were recorded including one species of conservation significance, this being:




- *Phascogale tapoatafa* ssp Southern Brush-tailed Phascogale - S1 (WC Act).

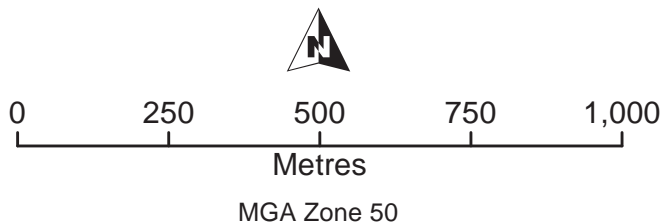


Plate 8: Southern Brush-tailed Phascogale – Infrared Camera Site 1



Legend

-  Yoongarillup Mineral Sands Project Area
-  Main Area of Impact
-  Black Cockatoo Roost Site



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 Doral Mineral Sands Pty Ltd

**Black Cockatoo
 Roost Sites**

4.3.8 Call Playback

The three separate call playback surveys targeting the barking owl and the masked owl failed to detect the presence of either species.

4.3.9 Invertebrate Fauna

A total of 13 individual invertebrate specimens (five scorpions and eight spiders) with the potential to represent short range endemic species were collected and submitted for identification to various specialists. A listing of the species collected is provided in Appendix H. Full reports on invertebrates are also held in Appendix G (Phoenix Environmental Sciences 2012 and ScorpionID 2012).

In summary, the five scorpions submitted all belonged to the same species (*Urodacus novaehollandiae*) which is widespread in south-western WA and is therefore not regarded as an SRE (ScorpionID 2012).

The spiders specimens submitted included two species of the genus *Aname* (*A. tepperi* and *Aname* 'MYG184') and a single species of *Yilgarnia* (*Yilgarnia* 'MYG248'), all of the mygalomorph spider family Nemesiidae. None of these species are considered to be SRE's (Phoenix Environmental Sciences 2012).

4.3.10 Opportunistic Surveys

Opportunistic observations (excluding birds) made of fauna species during the survey period are summarised in the trapping records (Appendix E). With respect to conservation significant species the following were observed within the study area:

- *Isoodon obesulus fusciventer* Quenda - P5 (DPaW Priority species)
- *Macropus irma* Western Brush Wallaby - P4 (DPaW Priority species)

5. FAUNA INVENTORY – SUMMARY

Table 7 summarises the numbers of potential species based on vertebrate class. A complete list of vertebrate fauna recorded or possibly inhabiting/frequenting the study area is held in Appendix C. In total, evidence of 95 species of native vertebrate fauna was obtained during the Level 2 survey (captured, sighted, heard, recorded, signs). Vertebrate fauna identified on site during the Level 2 survey is comprised of 53 bird species (one introduced), fourteen native and six introduced mammal species (including six bat species identified from calls), 25 reptile and four amphibian species.

Table 7: Summary of Potential Vertebrate Fauna Species (As listed in Appendix C)

Group	Total number of potential species	Potential number of specially protected species	Potential number of migratory species	Potential number of priority species	Number of species recorded
Fish	0	0	0	0	0
Amphibians	11	0	0	0	4
Reptiles	37	1	0	1	25
Birds	112 ²	4	3	1	53 ¹
Non Volant Mammals	21 ⁷	3	0	2	14 ⁶
Volant Mammals (Bats)	9	0	0	1	6
Total	190 ⁹	8	3	5	102 ⁷

Superscript = number of introduced species included in total.

As previously discussed not all species listed in existing databases and publications as potentially occurring within the general area are shown in the expected listing in Appendix C. Some species have been excluded from this list based largely on the lack of suitable habitat at the study site (e.g. waders) and in the general area or known local extinction.

Despite the omission of some species It should be noted that the list provided is very likely still an over estimation of the fauna species utilising the site (either on a regular or infrequent basis) as a result of the precautionary approach adopted for the assessment.

5.1 FISH

5.1.1 Fish Assemblage

No freshwater fish were recorded within the study area. A small, highly degraded, seasonally inundated stream line enters the study area near the south western corner of Lot 1870 and this may, during very wet years, represent very marginal but temporary habitat for some species if downstream habitat exists (i.e. species can move upstream).

Available information from previous surveys along the Whicher Scarp have only reported two species of native freshwater fish from within small creeklines, these being from Tutunup South (Figure 1) where the western minnow (*Galaxias occidentalis*) and the nightfish (*Bostockia porosa*) were observed. Both species are native, common, ubiquitous and widely distributed in rivers of the southwest of W.A. (WRM 2006).

Bamford recorded the introduced goldfish (*Carassius auratus*) at Gwindinup (Bamford 2000).

5.1.2 Fish of Conservation Significance

No listed threatened or priority native fish species were recorded and none of the species known from the general area are considered likely to occur in the area under any circumstances given the lack of suitable habitat.

5.1.3 Regional Endemism, Distribution Limits and Rare Assemblages

As indicated no fish species were recorded during the survey and given the lack of suitable habitat it is considered unlikely that any utilise the area.

5.2 AMPHIBIANS

5.2.1 Amphibian Assemblage

Four species of frog were captured and/or observed during the field survey. Based on the desktop study results another seven species may occur in the general area, subject to suitable habitat being present.

At Gwindinup/Happy Valley, Bancroft and Bamford recorded a total eight frog species (Bancroft and Bamford 2008), while Biota recorded seven species at Tutunup (Biota 2009), four at Yoganup (Biota 2007a) and five species at Tutunup South (Biota 2007b). Hart *et al.* (1997) recorded seven species further out on the coastal plain.

5.2.2 Amphibians of Conservation Significance

None of the identified or potential amphibian species that may occur in the area are listed as threatened or as DPaW priority species and all can be regarded as common within suitable habitat across their respective ranges.

5.2.3 Regional Endemism, Distribution Limits and Rare Assemblages

None of the amphibian species recorded during the current survey are restricted specifically to the Whicher Scarp area and the species identified onsite do not represent a unique assemblage.

The records of the forest toadlet (*Metacrina nicholls*), captured several times during the survey, are however near to the northern limits of this species documented range and of some interest though it should be noted that this species was also recorded at Tutunup (Biota 2009), approximately 20km north east of Yoongarillup along the Whicher Scarp. This suggests a northern range limit in this vicinity given that it was not recorded by Biota at Yoganup (Biota 2007a) or by Bancroft and Bamford (2008) at Gwindinup/Happy Valley and its presence at Yoongarillup is therefore not totally unexpected.

The species was captured nine times during the two phase survey period, with eight of the records being from trap sites within the national park. This can in part be attributed to the generally denser ground vegetation present in these areas which provide better microhabitat for this ground dwelling species relative to the southern sections of the state forest where ground coverage appears to be sparser.

5.3 REPTILES

5.3.1 Reptile Assemblage

A total of 25 species of reptile were captured and/or observed during the field surveys at Yoongarillup. Based on the desktop study results another 11 species may occur in the general area, subject to suitable habitat being present.

These results compare favourably with those recorded elsewhere along the Whicher Scarp. Bancroft and Bamford (2008) report finding a combined total of 25 reptile species from Gwindinup and Happy Valley. Biota recorded 18 species at Tutunup (Biota 2009) and 20 species at Yoganup and at Tutunup South (Biota 2007a, 2007b). Hart *et al.* (1997) recorded 21 species further out on the coastal plain within vegetation bordering Tutunup Road.

5.3.2 Reptiles of Conservation Significance

Only one of the reptile species recorded at Yoongarillup is of conservation significance this being the coastal plains ctenotus (*Ctenotus ora*) which is rated as Priority 1 by DPaW. *Ctenotus ora* is a recently described species of medium sized skink with a restricted range in the south-west of Western Australia, most

of which has been cleared for agriculture and urban development. It cannot reliably be distinguished from the more widespread *C. labillardieri* except by DNA sequences, but the two species appear to have disjunct distributions.

Twenty eight specimens of what is assumed to be *Ctenotus ora* were collected during the first phase of the field survey. No specimens were retained for DNA analysis as at the time they were identified as *C. labillardieri*, given the species revision had not been published at the time of the captures in December 2011.

It has also been assumed that all specimens of *C. labillardieri* captured during other surveys in the area (Bancroft and Bamford 2008, Biota 2007a, 2007b, 2009 and Hart *et al.* 1997) are also *Ctenotus ora*, which suggest the species is relatively common, where suitable habitat remains.

The only other likely species of conservation significance that may occur in the area is the southern carpet python (*Morelia spilota imbricata*) which is listed as Schedule 4 under the *WC Act*. Bancroft and Bamford (2008) report finding this species at Gwindinup during their 1999 survey (Bamford 2000) but no details are provided. The lack of other records of this species along the Whicher Scarp suggest that it at best, uncommon. It may at times occur within the study area but its actual status in the general area is difficult to determine given the lack of actual observations.

5.3.3 Regional Endemism, Distribution Limits and Rare Assemblages

None of the reptile species recorded during the current survey are restricted specifically to the Whicher Scarp though several species/assemblages could be regarded as locally/regionally significant these being:

Species of local significance

- Speckled Stone Gecko *Diplodactylus polyophthalmus*

At Yoongarillup this species was recorded once within the state forest area (though outside of the proposed works footprint). According to NatureMap (DPaW 2014) this record is at the extreme south west limit of this species range. The speckled stone gecko does however appear to be relatively widespread along the Whicher Scarp having also been recorded at Gwindinup/Happy Valley (five individuals, Bancroft and Bamford 2008) and Tutunup (two individuals, Biota 2009) and also within sections of the coastal plain in close proximity to the Whicher Scarp where adequate habitat extent and connectivity remains (two individuals, Hart *et al.* 1997).

Bush *et al.* (2010) suggests that the Swan Coastal Plain populations and the Darling Range populations (i.e. all inland populations not on the coastal plain) may represent two separate species, though this would appear to be in reference to the northern Swan Coastal Plain population

as records on the coastal plain proper, south of Perth appear to be non-existent which suggests it was not naturally found in this area except possibly at some locations in very close proximity to the Darling or Whicher Scarps (as illustrated by unique records of Hart *et al.* 1997). Its distribution in WA extends from just north of Perth, south to Manjimup but as indicated it is absent from most of the southern Swan Coastal Plain and extreme south west.

- Black-backed Hooded Snake *Parasuta nigriceps*

At Yoongarillup this species was recorded twice within the state forest area (though in both instances outside of the proposed works footprint). This species has disappeared from much of the southern Swan Coastal Plain due to clearing and habitat fragmentation. It has however been recorded along the Whicher Scarp at Yoganup (Biota 2007a) and also on a nearby section of the coastal plain where adequate habitat extent and connectivity remains (Hart *et al.* 1997). Its distribution in WA extends northwards to Moora and eastwards across the south west and south coast to the Nullarbor.

Rare assemblages

- West Coast Four-toed Lerista *Lerista elegans* and Southwestern Four-toed Lerista *Lerista distinguenda*

These two closely related species are most commonly recorded on the coastal plain and the upper Darling/Whicher Scarps respectively so their apparent overlapping distributions at Yoongarillup is of some interest though other surveys nearby have also recorded both species at the same location (Yoganup - Biota 2007a, Tutunup South – Biota 2007b and Tutunup - Biota 2009). Both species have also been recorded together on the far western section of the coastal plain (Ludlow Tuart Forest – Bamford 2001). These records would suggest the co-occurrence of these two species at Yoongarillup is not unique/rare and the presence of both species probably occurs at many locations along sand plain-scarp interzones from Busselton to Dongara where their documented distributions coincide.

- West Coast Pale-flecked Morethia *Morethia lineocellata* and Shrubland Pale-flecked Morethia *Morethia obscura*

These two closely related species do have significant overlapping distributions but typically are more common on the coastal plain and the upper Darling/Whicher Scarps respectively. Other surveys nearby have recorded both species at the same location (Yoganup - Biota 2007a, Tutunup South – Biota 2007b, Tutunup - Biota 2009 and Gwindinup/Happy Valley - Bancroft and Bamford 2008) which indicates

this assemblage is not unique/rare and probably occurs at many locations where the documented distribution of both species overlaps (Busselton to Shark Bay).

- Chain-striped Heath *Ctenotus catenifer*;
Odd-striped *Ctenotus impar*; and
Coastal Plains *Ctenotus ora*

A single *Ctenotus catenifer* specimen was captured at Yoongarillup (within the National Park area). This represents one of the most northern records for this species across its documented distribution and its significance is supported by the fact that no observations of it have been made during other surveys carried out previously along the Whicher Scarp in recent times (Biota 2007a, Biota 2007b, Biota 2009 and Bancroft and Bamford 2008).

The presence of this southern *Ctenotus* along with the other two species *C. impar* and *C. ora*, both of which have been subject to declines on the coastal plain, makes this assemblage unique and possibly rare. This is despite the fact that both *C. impar* and *C. ora* (assuming all specimens of *C. labillardieri* collected in previous surveys are in fact the recently described *C. ora*) appear to be quiet common along sections of the Whicher Scarp itself where suitable habitat remains, with several, sometimes numerous specimens of each species having been caught in previous nearby surveys (Hart *et al.* 1997, Biota 2007a, Biota 2007b, Biota 2009 and Bancroft and Bamford 2008).

It is possible that this assemblage occurs along the Whicher Scarp to the west and on the northern half of the Naturaliste ridge where the documented distributions of all three species overlap, though a lack of detailed fauna surveys in much of this area makes an accurate assessment of the likelihood of this being the case difficult.

5.4 BIRDS

5.4.1 Bird Assemblage

Fifty three bird species were observed at Yoongarillup during the field surveys. Based on the desktop study results another 55 species may occur in the general area, subject to suitable habitat being present.

At Gwindinup/Happy Valley, Bancroft and Bamford recorded a combined total of 79 bird species (Bancroft and Bamford 2008), while Biota recorded 63 species at Tutunup (Biota 2009), 35 at Yoganup (Biota 2007a) and 68 species at Tutunup South (Biota 2007b). Hart *et al.* (1997) recorded 44 species within vegetation bordering Tutunup Road.

The higher number of recorded species at some of these locations compared to Yoongarillup can in part be explained by the larger size of the respective project areas, a wider range of habitats and in the case of Gwindinup/Happy Valley a higher number of repeated surveys over several years.

5.4.2 Birds of Conservation Significance

Four species of conservation significance were observed or noted as utilising habitat within the Yoongarillup project area during the survey period, these being:

- *Calyptorhynchus baudinii* Baudin's Black Cockatoo - S1 (*WC Act*), Vulnerable (*EPBC Act*)
Foraging evidence attributed to this species found. Almost all the remnant native vegetation within the study area presents potential foraging habitat for this species. Larger trees (>50cm DBH) can be considered potential breeding habitat.
- *Calyptorhynchus latirostris* Carnaby's Black Cockatoo – S1 (*WC Act*), Endangered (*EPBC Act*)
Sighted several times within the survey area and nearby. Foraging evidence attributed to this species found. Almost all the remnant vegetation within the study area presents potential foraging habitat for this species. Larger trees (>50cm DBH) can be considered potential breeding habitat.
- *Calyptorhynchus banksii naso* Forest Red-tailed Black Cockatoo – S1 (*WC Act*), Vulnerable (*EPBC Act*)
Sighted several times within the survey area and nearby. Foraging evidence attributed to this species found. Almost all the remnant vegetation within the study area presents potential foraging habitat for this species. Larger trees (>50cm DBH) can be considered potential breeding habitat.
- *Merops ornatus* Rainbow Bee-eater - S3 (*WC Act*), Migratory (*EPBC Act*)
Heard calling during the December 2011 field survey.

All the above species were also recorded at Gwindinup/Happy Valley, Tutunup and Tutunup South (Bancroft and Bamford 2008, Biota 2007b, Biota 2009). Carnaby's black cockatoo, the red-tailed black cockatoo and the rainbow bee-eater were also recorded by Biota at Yoganup (Biota 2007a).

Other specially protected/migratory/priority species that may utilise the Yoongarillup area at times but which were not sighted are the peregrine falcon (*Falco peregrinus* - Schedule 4 (*WC Act*)), masked owl (*Tyto n. novaehollandiae* - Priority 3), great egret (*Ardea alba* – Migratory (*EPBC Act*)) and the cattle egret (*Ardea ibis* – Migratory (*EPBC Act*)). Of these species only the peregrine falcon has been recorded in the previous surveys used as a reference (Gwindinup - Bamford 2000).

5.4.3 Regional Endemism, Distribution Limits and Rare Assemblages

None of the recorded or potential bird species (excluding some listed above) can be regarded to be of conservation significance due to regional or local endemism, being at the limit of their range or comprising a unique or rare assemblage. Most of the bird species are common widespread species that could be found in similar habitats throughout the south west with assemblages also being typical of habitat of a similar type.

5.5 NATIVE NON-VOLANT MAMMALS

5.5.1 Native Non-Volant Mammal Assemblage

Eight native, non-flying mammal species were captured and/or observed during the field surveys. Based on the desktop study results another six species may occur in the general area, subject to suitable habitat being present.

At Gwindinup/Happy Valley, Bancroft and Bamford recorded a combined total of 12 native mammal species (Bancroft and Bamford 2008), while Biota recorded eight species at Tutunup (Biota 2009), 10 species at Yoganup (Biota 2007a) and seven species at Tutunup South (Biota 2007b). Hart *et al.* (1997) recorded four species within vegetation bordering Tutunup Road.

5.5.2 Native Non-Volant Mammal of Conservation Significance

Three species of conservation significance were observed or noted as utilising habitat within the Yoongarillup project area during the survey period, these being:

- *Isoodon obesulus fusciventer* Quenda - P5 (DPaW Priority species)
This species was recorded within the national park area (Trap Site 3) during the field survey. Appears to be favouring areas with the densest groundcover as it was not captured or observed in areas with relatively sparse groundcover.
- *Phascogale tapoatafa* ssp Southern Brush-tailed Phascogale - S1 (WC Act)
This species was recorded within the state forest directly adjacent to the national park boundary (outside of the proposed works footprint) during the field survey (Camera site 1).
- *Macropus irma* Western Brush Wallaby - P4 (DPaW Priority species)
A single individual of this species was seen within the national park area during the December 2011 survey period.

The quenda appears to be widespread along the scarp having been recorded by Bancroft and Bamford (2008) at Gwindinup and Happy Valley and by Biota at Yoganup, Tutunup South and Tutunup (Biota 2007a, 2007b, 2009). The western brush wallaby was also observed at Gwindinup/Happy Valley (Bancroft and Bamford 2008), Yoganup (Biota 2007a) and Tutunup (Biota 2009). The

only record of the brush-tailed phascogale from amongst these surveys is at Gwindinup and Happy Valley (Bancroft and Bamford 2008).

Other specially protected/priority species that may utilise the Yoongarillup area at times but which were not sighted are the chuditch (*Dasyurus geoffroii* - S1 (WC Act), Vulnerable (EPBC Act)) and the western ringtail possum (*Pseudocheirus occidentalis* - S1 (WC Act), Vulnerable (EPBC Act)). Some areas of habitat within the study area appears suitable for these species to utilise but based on observations made during the field survey, they were absent from the area during the assessment period.

The chuditch has previously been recorded at Gwindinup (Bamford 2000) though subsequent surveys failed to detect the species (Bancroft and Bamford 2008). The western ringtail possum is relatively common in some areas of the Whicher Scarp and adjoining coastal plain (G. Harewood pers. obs.) and has been recorded at Gwindinup/Happy Valley (Bancroft and Bamford 2008, Harewood 2005, 2006a, 2007a, 2008d, 2009a, 2011), Tutunup (Biota 2009, Harewood 2009b) and Tutunup South (G. Harewood pers. obs.).

5.5.3 Regional Endemism, Distribution Limits and Rare Assemblages

None of the recorded or potential non-volant mammal species can be regarded of conservation significance (in addition to those discussed above) due to regional or local endemism, being at the limit of their range or comprising a unique or rare assemblage.

5.6 BATS

5.6.1 Bat Assemblage

A combined total of six species of bat were recorded during the two seasonal surveys at Yoongarillup. Based on the desktop study results another three species of bat may occur in the general area, subject to suitable habitat being present.

At Gwindinup/Happy Valley, Bancroft and Bamford only confirmed the presence of one species of bat (Bancroft and Bamford 2008), while Biota recorded four species at Tutunup (Biota 2009) and at Yoganup (Biota 2007a) and three species at Tutunup South (Biota 2007b). Hart *et al.* (1997) does not appear to have surveyed for bats.

These results are not necessarily indicative of a difference in species diversity at each site but more likely reflect the effectiveness of different survey methods.

5.6.2 Bats of Conservation Significance

None of the recorded bat species are listed as threatened or as DPaW priority species, though one of the non-recorded species (western false pipistrelle - *Falsistrellus mackenziei*) is listed as Priority 4. This species was recorded by

Biota at Tutunup South (Biota 2007b) and the Author has also recorded it at Stratham (Harewood 2008b) and Kemerton (Harewood 2010b). This species moves with seasonal changes and may at times utilise the study area despite its apparent absence during the survey period.

5.6.3 Regional Endemism, Distribution Limits and Unique Assemblages

None of the bat species recorded during the current survey or considered likely to be present are restricted specifically to the Whicher Scarp area, are at the limits of their distribution and the identified assemblage cannot be considered unique or rare with all species being common and widespread across the south west.

5.7 INTRODUCED MAMMALS

Six introduced mammal species were observed during the field survey, these being:

- House Mouse – *Mus musculus*
- Black Rat – *Rattus rattus*
- Red Fox – *Vulpes vulpes*
- Rabbit - *Oryctolagus cuniculus*
- Pig – *Sus scrofa*
- European Cattle – *Bos taurus*

Based on the desktop study results one other introduced mammal species may occur in the general area this being the cat (*Felis catus*).

5.8 INVERTEBRATE FAUNA

One species of scorpion and three species mygalomorph spiders were recorded during the field survey at Yoongarillup. None of these invertebrate species are considered to represent SRE's (Phoenix Environmental Sciences 2012, ScorpionID 2012).

Bancroft and Bamford (2008) did not find any confirmed short-range endemic invertebrates at Gwindinup/Happy Valley although the taxonomy of some of the specimens collected was uncertain. Invertebrates collected that might be short-range endemics included two millipede species and an onychophoran (velvet worm or peripatus). Bancroft and Bamford concluded that “the landscape has some features that may promote short-range endemism, particularly the presence of seasonally-damp valleys” (Bancroft and Bamford 2008). This landform is not present within the Yoongarillup project area.

At Tutunup Biota (2009) also encountered uncertainties with respect to the identification of potential SRE invertebrate specimens collected and hence their actual conservation significance and therefore adopted a risk-based assessment using defined habitat units as a surrogate for inferring distributional boundaries.

At Tutunup the habitats from which potential SRE taxa (one species of scorpion and two species of mygalomorph spider) were collected was predominantly Jarrah/Marri woodland over mixed understoreys on sands (sometimes underpinned by laterite). Biota concluded that as this habitat type is characteristic of the adjacent state forest, and indeed of much of the Whicher Scarp in the local area, it seemed unlikely that any of the invertebrate taxa encountered would be restricted to the locality of the study area (Biota 2009).

Individuals representing four invertebrate families were collected from the Tutunup South site by Biota (2007b), these being: Garypidae (pseudoscorpions), the Atemnidae (pseudoscorpions), the Urodacidae (scorpions) and the Buthidae (scorpions). None of the invertebrate species were subsequently identified as representing SRE taxa by recognised experts. Again, Biota concluded that the habitat type from which the groups were recorded appeared to be widespread in the area and there were no apparent geomorphological boundaries or subdivisions that may represent species isolators that would restrict the identified taxa to the study area (Biota 2007).

Habitats at Yoongarillup are similar in general characteristic to those at Tutunup and Tutunup South (Jarrah/Marri Woodland on sand and/or laterite). The conclusions drawn by Biota regarding the absence of geomorphological boundaries or subdivisions that may represent isolating mechanisms for potential SRE invertebrate species (including species possibly not identified as being present during the assessment period) could therefore be applied to the Yoongarillup project area.

Two threatened/priority invertebrate species appeared in the DPaW and/or EPBC Act database searches (DPaW 2013b, DoE 2013) and are listed below. Neither have any potential to be present within the study area. Additional details on each species are provided in Appendix G.

- *Westralunio carteri* Carter's Freshwater Mussel – P4 (DPaW Priority Species).
No suitable habitat.
- *Cherax tenuimanus* Margaret River (Hairy) Marron – S1 (WC Act), Critically Endangered (EPBC Act).
No suitable habitat.

5.9 OTHER SPECIES OF SIGNIFICANCE

Thirty nine bird species that potentially frequent or occur in the study area are noted as Bush Forever Decreaser Species in the Perth metropolitan region (20

species were sighted during the survey). Ten of the observed species are noted as being habitat specialists. Decreaser species, in particular habitat specialists, are a significant issue in biodiversity conservation in the Perth section of the Coastal Plain as there have been marked reductions in range and population levels of many of these sedentary bird species as a consequence of disturbance and land clearing (Dell & Hyder-Griffiths 2002). While the study area is far removed from the Perth area the fauna values of a site should take into consideration the presence of decrease species as they are likely to be most susceptible to decline and possibly localised extinctions as a consequence of large scale disturbances.

6. FAUNA VALUES

6.1 VALUE OF THE STUDY AREA AS AN ECOLOGICAL LINKAGE/WILDLIFE CORRIDOR

Linkage with adjacent bushland areas has been identified as a natural attribute of high priority in the assessment of a sites regional significance (EPA 2002a).

The Whicher Scarp forms a regional ecological linkage between the Darling Plateau and the Leeuwin-Naturaliste Ridge (EPA 2009). Detailed analyses of potential ecological linkages completed for the south west (Molloy *et al.* 2009) shows the Yoongarillup study area as adjoining bushland that is identified as being part of this regional ecological linkage. In this document it is stated that vegetation making up the linkages facilitate the maintenance of ecological processes and the movement of organisms within and across a landscape (Molloy *et al.* 2009) and should, if possible be maintained in the long term.

The value of the project area as an ecological linkage between the Whicher Scarp and vegetated areas of the Swan Coastal Plain is limited. Yoongarillup directly adjoins the Whicher National Park to the south but abuts almost totally cleared farmland to the north and as such provides no direct corridor for wildlife movement.

The remnant vegetation within the study area contributes to some extent to the overall contiguous nature/value of habitats along the Whicher Scarp though its importance in facilitating the movement of fauna species is difficult to quantify. The removal of some sections of the vegetation to allow for the proposed project to proceed is however unlikely to alter the functionality or significance of any identified regional ecological linkages. This conclusion is based on the fact that the works footprint within the state forest area is relatively small (~8.9 ha of which ~0.32 ha is already cleared) and the fact that its removal will not create a gap or compromise the continuity of the vegetation currently present.

6.2 CONSERVATION SIGNIFICANCE OF THE STUDY AREA

Natural areas within the south west of Western Australia have been significantly altered since European settlement in the 1830's and a variety of environmental factors, in particular habitat fragmentation and fire, will continue to threaten many species of fauna with local extinction. As the local development of land progresses the significance of any remnant vegetation increases.

The conservation value of remnant vegetation along the Whicher Scarp has previously been recognised by the EPA and a number of conservation areas including the Whicher National Park have been gazetted as a consequence. To date most, if not all of the conservation value assessments have been based on flora studies.

The EPA state that while the Whicher Scarp has not been comprehensively surveyed for fauna, existing site based information indicates a high diversity of vertebrates. The results of the fauna assessment at Yoongarillup are consistent with this comment and with some of the EPA's other recognised significant natural values attributed to area, in particular the utilisation of the area by a number of threatened, priority and habitat specialist fauna species less common on the adjoining coastal plain (EPA 2009).

7. POTENTIAL IMPACTS AND RECOMMENDATIONS

7.1 POTENTIAL IMPACTS

The potential impact on fauna species as a consequence of future mining operations within the Yoongarillup Project area will be dependent on the each species population density and the quantity and quality of potential habitat that will be affected.

In general the most significant potential impacts to fauna of any development include:

- Loss of vegetation/fauna habitat that may be used for foraging, breeding, roosting, or dispersal (includes loss of hollow bearing trees);
- Fragmentation of vegetation/fauna habitat which may restrict the movement of some fauna species;
- Modifications to surface hydrology, siltation of creek lines;
- Changes to fire regimes;
- Pollution (e.g. oil spills);
- Noise/Light/Dust;
- Spread of plant pathogens (e.g. dieback) and weeds;
- Potential increase in the number of predatory introduced species (e.g. cats);
- Death or injury of fauna during clearing and construction; and
- An increase in fauna road kills due to increased traffic flow.

Possible impacts on specific species of conservation significance previously recorded in the general area are provided in Table 8 below.

The assessment of the degree of impact is primarily based on the extent of proposed works footprint within the state forest area and totals about 8.9 ha (of which ~0.32 ha is already cleared) compared to the extent of vegetation that will remain in adjoining and nearby areas along the scarp which are considered likely to be harbouring similar species and assemblages.

Additional information on specific fauna species of conservation significance are provided in Appendix G.

Table 8: Likelihood of Occurrence and Possible Impacts – Fauna Species of Conservation Significance (continues on following pages).

Species	Conservation Status (see Appendix A for codes)	Likelihood of Occurrence	Potential Impact on Habitat	Degree of Impact	Justification
Carter's Freshwater Mussel <i>Westralunio carteri</i>	P4	Unlikely	None	Nil	Preferred habitat absent.
Margaret River (Hairy) Marron <i>Cherax tenuimanus</i>	S1, CR	Unlikely	None	Nil	Preferred habitat absent.
Mud Minnow <i>Galaxiella munda</i>	S1	Unlikely	None	Nil	Preferred habitat absent.
Balston's Pygmy Perch <i>Nannatherina balstoni</i>	S1, VU	Unlikely	None	Nil	Preferred habitat absent.
Perth Lined Lerista <i>Lerista lineata</i>	P3	Unlikely	None	Nil	Outside of documented range.
Coastal Plains Ctenopus <i>Ctenopus ora</i>	P1	Known To Occur	Loss of areas of habitat.	Localised Moderate	Small impact area. Large areas of suitable habitat nearby.
Southern Carpet Python <i>Morelia spilota imbricata</i>	S4	Possible	Modification/loss of a very small area of habitat.	Low	Small impact area. Large areas of suitable habitat nearby.
Short-nosed Snake <i>Elapognathus minor</i>	P2	Unlikely	None	Nil	Outside of documented range.
Great Egret <i>Ardea alba</i>	S3, Mig	Possible	None	Nil	Temporary modification of manmade habitat only.
Cattle Egret <i>Ardea ibis</i>	S3, Mig	Possible	None	Nil	Temporary modification of manmade habitat only.
Malleefowl <i>Leipoa ocellata</i>	S1, VU	Unlikely	None	Nil	Locally extinct.
Australasian Bittern <i>Botaurus poiciloptilus</i>	S1, EN	Unlikely	None	Nil	Preferred habitat absent.
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i>	S3, Mig	Unlikely	None	Nil	Preferred habitat absent.
Peregrine Falcon <i>Falco peregrinus</i>	S4	Possible	None Likely.	Nil	Will continue to utilise area for foraging despite any development.
Carnaby's Black Cockatoo <i>Calyptorhynchus latirostris</i>	S1, EN	Known To Occur	Loss of areas of habitat.	Localised Moderate	Small impact area. Large areas of suitable habitat nearby.
Baudin's Black Cockatoo <i>Calyptorhynchus baudinii</i>	S1, VU	Possible	Loss of areas of habitat.	Localised Moderate	Small impact area. Large areas of suitable habitat nearby.

Species	Conservation Status (see Appendix A for codes)	Likelihood of Occurrence	Potential Impact on Habitat	Degree of Impact	Justification
Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i>	S1, VU	Known To Occur	Loss of areas of habitat.	Localised Moderate	Small impact area. Large areas of suitable habitat nearby.
Masked Owl (SW population) <i>Tyto n. novaehollandia</i>	P3	Possible	Loss of an area potential habitat.	Nil/Low	Small impact area. Large areas of suitable habitat nearby.
Fork-tailed Swift <i>Apus pacificus</i>	S3, Mig	Flyover Only	None	Nil	Aerial species.
Rainbow Bee-eater <i>Merops ornatus</i>	S3, Mig	Known To Occur	None Likely.	Nil	Utilises disturbed habitats. Species will continue to utilise the area as it does now despite proposed mining.
Chuditch <i>Dasyurus geoffroii</i>	S1, VU	Possible	Modification/loss of a small area of habitat.	Nil/Very Low	Small impact area. Large areas of suitable habitat nearby
Southern Brush-tailed Phascogale <i>Phascogale tapoatafa ssp</i>	S1	Possible	Modification/loss of a small area of habitat.	Nil/ Low	Small impact area. Large areas of suitable habitat nearby
Quenda <i>Isoodon obesulus fusciventer</i>	P5	Known To Occur	Modification/loss of small areas of habitat.	Nil/Very Low	Small impact area. Large areas of suitable habitat nearby.
Bilby <i>Macrotis lagotis</i>	S1, VU	Unlikely	None	Nil	Locally extinct.
Western Ringtail Possum <i>Pseudocheirus occidentalis</i>	S1, VU	Possible	Modification/loss of a small area of habitat.	Nil/Low	Not detected during survey period. Small impact area. Large areas of similar habitat nearby
Western Brush Wallaby <i>Macropus irma</i>	P4	Known To Occur	Modification/loss of small areas of habitat.	Nil	Small impact area. Large areas of suitable habitat nearby.
Quokka <i>Setonix brachyurus</i>	S1, VU	Unlikely	None	Nil	Preferred habitat absent.
Western False Pipistrelle <i>Falsistrellus mackenziei</i>	P4	Possible	None.	Nil/Very Low	Not detected during survey period. Small impact area. Large areas of similar habitat nearby.
Water Rat <i>Hydromys chrysogaster</i>	P4	Unlikely	None	Nil	Preferred habitat absent.

The assessment suggests that impacts on fauna, in particular those of conservation significance will be in most instances negligible or low. This conclusion is based on the fact that the site does not contain the preferred habitat of some species and therefore they are unlikely to be present. Where species have been confirmed as present in the works footprint or nearby, impacts are also likely to be low as large areas of habitat of at least similar quality are present outside of the 8.9 ha works footprint and the loss of this relatively small area of habitat is considered very unlikely to alter the

conservation status of any species or population currently utilising the general area for some purpose.

With respect to species identified as being of possible regional or local significance (i.e. local endemics, those at the limit of their range or comprising potentially unique or rare assemblages) impacts are also considered unlikely to be of significance in any instance for similar reasons as detailed above (i.e. large areas of habitat of at least similar quality are present outside of the 8.9 ha works footprint).

With respect the forest toadlet (*Metacrinia nicholsi*), while Yoongarillup is near the northern limit of this species range the assessment indicates that it is likely to be present in suitable habitat within sections of the scarp (and areas inland) at least 20km further to the north east. Also, all but one of the nine individuals of this species captured during the two phase fauna survey at Yoongarillup were within the national park, an area that will not be subject to any impacts associated with mining activities. No evidence was gathered that would suggest this species will not persist as is, within unaffected areas despite the mining proposal proceeding.

The record of the speckled stone gecko (*Diplodactylus polyophthalmus*) at Yoongarillup (within the state forest but outside of the development footprint) is also near the extreme limit of this species range but it does appear to be relatively widespread along the Whicher Scarp having also been recorded at Gwindinup/Happy Valley (Bancroft and Bamford 2008) and Tutunup (Biota 2009) and also within sections of the coastal plain in close proximity to the Whicher Scarp (Hart *et al.* 1997). Again no evidence was gathered that would suggest this species will not persist as is, within unaffected areas despite the mining proposal proceeding given the small area of required clearing and the large extent of suitable habitat adjoining.

The black-backed snake (*Parasuta nigriceps*) was also recorded during the field survey but not within the works footprint. This species has become rare in areas of the lower coastal plain but appears to persist along the Whicher Scarp given much of it remains uncleared. As with the previously mentioned species, it is not expected that development with the works footprint (where the species wasn't recorded) will result in any impact on the status of this animal in the local vicinity given the presence of substantial areas of suitable habitat in adjoining and nearby areas, much of it reserved within the Whicher National Park.

Two potentially unique/rare reptile assemblages identified on site are also unlikely to be significantly impacted upon, these being *Lerista elegans/Lerista distinguenda* and *Morethia lineocellata/Morethia obscura*. While individuals of both groups are likely to be displaced by proposed works both assemblages have significant overlapping ranges and are often recorded together. Other surveys nearby have recorded all four species at the same location (Biota 2007a, Biota 2007b, Biota 2009) which indicates neither assemblage is unique to the site or rare.

The co-occurrence of *Ctenotus catenifer*, *C. impar* and *C. ora* was recorded within the national park (but not in the works footprint). This assemblage would appear to be rare and of possible significance (given the record of *C. catenifer* is at the limit of its range and the fact that the other two species have declined on the lower coastal plain).

Ctenotus impar and *C. ora* do however appear to be relatively common on the northern section of the Whicher Scarp (Biota 2007a, Biota 2007b, Biota 2009 and Bancroft and Bamford 2008) and while this assemblage is unlikely to occur in these areas (given they are past the apparent limit of *C. catenifer*'s range) it is possible that all three could occur at other locations along the scarp to the west and on the northern half of the Naturaliste ridge where the documented distributions of all three of the skinks, though a lack of detailed fauna surveys in much of this area makes an accurate assessment of the likelihood of this being the case difficult. Nonetheless no evidence was gathered that would suggest this assemblage will not persist as is, within the national park area where it was recorded and in other unaffected areas where all three species potentially occur despite the mining proposal proceeding, given the small area of required clearing and the large extent of similar habitat adjoining.

7.2 RECOMMENDATIONS

Doral Mineral Sands Pty Ltd have a series of environmental management plans and protocols in place that aim to minimise potential environmental impacts during all facets of their operations. The implementation of these standard plans and protocols will ensure impacts of the proposed mineral sand mine, if approved, are minimised as far as reasonable and practical.

The following recommendations are considered most important and while some are likely to form part of proposed planning or existing procedures and protocols they should be made a priority during operations within vegetated sections of the Yoongarillup project site. This listing is not exhaustive environmental considerations and management plans will need to be finalised after liaison with relevant regulatory advisers/authorities (e.g. DPaW/DER/DoE). It is recommended that:

- It is understood that the project is or will be assessed under the required state environmental approvals process. The results of the fauna assessment reported on here suggest that several species listed under the federally administered *EPBC Act* potentially utilise the study site to some degree and/or that habitat of listed threatened species will be affected. In particular the proposed mine areas contain a substantial number of trees that can be regarded as potential black cockatoo breeding trees and foraging habitat using DoE criteria and their removal will be considered likely to constitute a "significant impact" under the *EPBC Act*. The project should therefore be referred to the DoE for approval to ensure the project is conducted in a manner that does not breach the *EPBC Act*.

- Planning for development should aim to minimise as much as reasonable and practical the area of remnant vegetation requiring removal. Existing cleared areas/tracks should be used in preference to clearing additional areas.
- During site works, areas requiring clearing should be clearly marked and access to other areas restricted to prevent accidental clearing of areas to be retained.
- During clearing operations a suitably experienced “fauna spotter” should be employed to inspect logs and hollow trees (where possible) before clearing to reduce likelihood of injury to fauna. If feasible any fauna encountered should be relocated to retained suitable habitat.
- Native fauna injured during clearing or normal site operations should be taken to a designated veterinary clinic or a DPaW nominated wildlife carer.
- No dead, standing or fallen timber should be removed unnecessarily. Logs (hollow or not) and other debris resulting from land clearing should be used to enhance fauna habitat in untouched and rehabilitated areas if possible.
- Disruption to surface and sub-surface hydrology should be minimised where possible and levees and drains designed to mimic natural drainage flows where disruptions will occur.
- A Construction and Operations Fire Management Plan should be prepared to reduce the risk of unplanned fires and provide contingency measures to minimise any associated impacts. The plan will include a contingency and response plan in the event of any bushfires that commence as a result of the works on site.
- All staff working on site should be made aware that native fauna is protected. Personnel working on the project should not be allowed to bring firearms, other weapons or pets onsite.
- Fuel storage facilities should be bunded.
- Any trenching required for services that runs through bushland should be kept open for only as long as necessary and suitable escape ramps (45°) and bridging provided every 50m.

8. CONCLUSION

The Level 2 fauna survey at the Yoongarillup Mineral Sands Project was undertaken for the purposes of delineating and characterising the fauna habitats and faunal assemblages present in the target area and to identify potential impacts.

With respect to native vertebrate fauna, 23 mammal (includes nine bats species), 107 bird, 36 reptile and 11 frog species have the potential to occur in or utilise at times, the study area. Of the 177 native animals that could occur, eight are considered to be threatened (vulnerable, endangered, rare or in need of special protection), with an additional five DPaW priority species being present or likely to be present. Three migratory bird species also have the potential to utilise the proposal area at times. In total, evidence of 95 species of native vertebrate fauna was obtained during the Level 2 survey (captured, sighted, heard, recorded, signs) (54% of predicted total). Seven introduced species have also been observed.

Eight of the identified fauna species are of conservation significance and are categorised as threatened, migratory or as priority species on state and/or federal listings.

Subsequent to approval any future mining at the site will necessarily require the clearing of some existing fauna habitat. Planning should take into account the potential presence of some species of conservation significance and fauna in general so that any impacts can be minimised or offset. Existing management plans and protocols that aim to minimise impact on fauna should be employed where relevant with specific attention being paid to those facets highlighted in Section 7.2, when considered reasonable and practical to implement.

Given the presence of black cockatoo habitat within the main impact areas it is also recommended that the project be referred to the DoE to ensure compliance with the *EPBC Act*.

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APPENDIX A

Conservation Categories

EPBC Act (1999) Threatened Fauna Categories

Category	Code	Description
Extinct	E	There is no reasonable doubt that the last member of the species has died.
*Extinct in the wild	EW	A species (a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) 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	CE	A species is facing an extremely high risk of extinction in the wild in the immediate future.
*Endangered	EN	A species: (a) is not critically endangered; and (b) is facing a very high risk of extinction in the wild in the near future.
*Vulnerable	VU	A species (a) is not critically endangered or endangered; and (b) is facing a high risk of extinction in the wild in the medium-term future.
Conservation dependent	CD	A species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered
*Migratory	Migratory	(a) all migratory species that are: (i) native species; and (ii) from time to time included in the appendices to the Bonn Convention; and (b) all migratory species from time to time included in annexes established under JAMBA, CAMBA and ROKAMBA; and (c) all native species from time to time identified in a list established under, or an instrument made under, an international agreement approved by the Minister.
Marine	Ma	Species in the list established under s248 of the EPBC Act

Note: Only species in those categories marked with an asterisk are matters of national environmental significance under the *EPBC Act*.

Western Australian Wildlife Conservation Act (1950) Threatened Fauna Categories

Category	Code	Description
Schedule 1	S1	<p>Fauna which is rare or likely to become extinct</p> <p>Threatened fauna (Schedule 1) are further ranked by the DEC according to their level of threat using IUCN Red List criteria:</p> <p>CR: Critically Endangered - considered to be facing an extremely high risk of extinction in the wild.</p> <p>EN: Endangered - considered to be facing a very high risk of extinction in the wild.</p> <p>VU: Vulnerable - considered to be facing a high risk of extinction in the wild.</p>
Schedule 2	S2	Fauna which is presumed extinct
Schedule 3	S3	Birds which are subject to an agreement between the governments of Australia and Japan (JAMBA) relating to the protection of migratory birds and birds in danger of extinction
Schedule 4	S4	Fauna that is otherwise in need of special protection

Western Australian DPaW Priority Fauna Categories

Category	Code	Description
Priority 1	P1	Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes..
Priority 2	P2	Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
Priority 3	P3	Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
Priority 4	P4	<p>(a) Rare. Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that 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.</p> <p>(b) Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>(c) Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>
Priority 5	P5	Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxa becoming threatened within five years.

IUCN Red List Threatened Species Categories

Category	Code	Description
Extinct	EX	Taxa for which there is no reasonable doubt that the last individual has died.
Extinct in the Wild	EW	Taxa which is known only to survive in cultivation, in captivity or and as a naturalised population well outside its past range and it has not been recorded in known or expected habitat despite exhaustive survey over a time frame appropriate to its life cycle and form.
Critically Endangered	CR	Taxa facing an extremely high risk of extinction in the wild.
Endangered	EN	Taxa facing a very high risk of extinction in the wild.
Vulnerable	VU	Taxa facing a high risk of extinction in the wild.
Near Threatened	NT	Taxa which has been evaluated but does not qualify for CR, EN or VU now but is close to qualifying or likely to qualify in the near future.
Least Concern	LC	Taxa which has been evaluated but does not qualify for CR, EN, VU, or NT but is likely to qualify for NT in the near future.
Data Deficient	DD	Taxa for which there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status.

A full list of categories and their meanings are available at:

<http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria>

APPENDIX B

Fauna Trap and Recording Sites - Coordinates

Anabat Recording Sites

Datum Australian Geocentric 1994 (GDA94)

Recording Site	Zone	MGA		Description	Commenced	Ended	Recording Minutes
		mE	mN				
Bat 1	50H	353463	6262847	Sand Pit in State Forest 33	8/12/2011	9/12/2011	615
Bat 2	50H	354095	6262029	Track through Whicher National Park	9/12/2011	10/12/2011	580
Bat 4	50H	354001	6263507	Edge of dam in paddock - Lot 1873	29/03/2012	30/03/2012	545
							1740

Infrared Camera Recording Sites

Datum Australian Geocentric 1994 (GDA94)

Recording Site	Zone	MGA		Description	Commenced	Ended	Recording Days
		mE	mN				
Camera 1	50J	353351	6262366	Near northern edge of State Forest 33	2/08/2011	1/04/2012	243
Camera 2	50J	353677	6262818	Near southern edge of State Forest 33	2/08/2011	1/04/2012	243
							486

APPENDIX C

Vertebrate Fauna Observed or Potentially in Study Area

Fauna Observed or Potentially in Study Area

Yoongarillup, W.A.

Approx. centroid = 33.760274°S 115.436642°E

Compiled by Greg Harewood - January 2013

Recorded (Captured/Sighted/Heard/Signs) = X

A = Harewood, G. (2014). Phase 1 and 2 Seasonal Fauna Surveys (Level 2) . Yoongarillup Mineral Sands Project. Unpublished report for Doral Mineral Sands Pty Ltd. V3 January 2014
 B = Bancroft, W. and Bamford, M. (2008). Fauna values of Bemax's Happy Valley mineral sands deposit. Unpublished report for Bemax Resources Limited. January 2008 (includes Gwindinup).
 C = Biota (2009). Tutunup Fauna Assemblage and Fauna Habitat Seasonal Survey. Unpublished report for Iluka Resources. March 2009.
 D = Biota (2007a). Yoganup 215 Strand Fauna and Faunal Assemblage Survey. Unpublished report for Iluka Resources. February 2007.
 E = Biota (2007b). Tutunup South Fauna Habitat and Fauna Assemblage Seasonal Survey. Unpublished report for Iluka Resources. December 2007.
 F = Ninnox (2006). A Vertebrate Fauna Assessment of the Yoganup Mineral Sands Project Area. Unpublished report for Iluka Resources. March 2006.
 G = Hart, Simpson and Assoc. (1997). Wonnerup -Tutunup Road - Vertebrate Fauna. Unpublished report for Westralian Sands Ltd.
 H = DPaW (2013). NatureMap Database search. "By Circle" 115°25' 23" E, 33°45' 43" S (plus 20km buffer). 18 September 2013.

Class Family Species	Common Name	Conservation Status								
			A	B	C	D	E	F	G	H
Amphibia										
Myobatrachidae										
Ground or Burrowing Frogs										
<i>Crinia georgiana</i>	Quacking Frog	LC		X	X	X	X		X	X
<i>Crinia glauerti</i>	Clicking Frog	LC		X	X	X		X	X	X
<i>Crinia insignifera</i>	Squelching Froglet	LC	X	X	X	X	X		X	X
<i>Geocrinia leai</i>	Ticking Frog	LC		X						
<i>Heleioporus eyrei</i>	Moaning Frog	LC	X	X	X	X	X		X	X
<i>Heleioporus psammophilus</i>	Sand Frog	LC		X						X
<i>Limnodynastes dorsalis</i>	Western Banjo Frog	LC	X	X			X		X	X
<i>Metacrinia nicholli</i>	Forest Toadlet	LC	X		X					X

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			<i>Pseudophryne guentheri</i>	Crawling Toadlet	LC			X		
Hylidae Tree or Water-Holding Frogs										
<i>Litoria adelaidensis</i>	Slender Tree Frog	LC		X	X	X				X
<i>Litoria moorei</i>	Motorbike Frog	LC								X
Reptilia										
Diplodactylidae										
<i>Diplodactylus polyophthalmus</i>	Speckled Stone Gecko		X	X	X				X	X
Gekkonidae Geckoes										
<i>Christinus marmoratus</i>	Marbled Gecko		X	X	X	X	X		X	X
Pygopodidae Legless Lizards										
<i>Aprasia pulchella</i>	Pretty Worm Lizard		X	X		X	X		X	X
<i>Aprasia repens</i>	Sandplain Worm Lizard			X			X		X	X
<i>Delma australis</i>	Marble-faced Delma		X							X
<i>Lialis burtonis</i>	Burton's Legless Lizard			X	X	X			X	
<i>Pygopus lepidopodus</i>	Common Scaly Foot									X

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Class Family <i>Species</i>	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			Agamidae Dragon Lizards							
<i>Pogona minor</i>	Western Bearded Dragon		X	X	X	X	X		X	X
Varanidae Monitor's or Goanna's										
<i>Varanus gouldii</i>	Sand Monitor			X						
<i>Varanus rosenbergi</i>	Heath Monitor		X	X	X		X	X	X	X

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			Scincidae							
Skinks										
<i>Acritoscincus trilineatum</i>	Southwestern Cool Skink		X	X	X	X	X		X	X
<i>Cryptoblepharus buchananii</i>	Fence Skink		X	X	X	X	X			X
<i>Ctenotus catenifer</i>	Chain-striped Heath Ctenotus		X							X
<i>Ctenotus impar</i>	Odd-striped Ctenotus		X	X	X	X	X		X	X
<i>Ctenotus ora</i>	Coastal Plains Ctenotus	P1	X	X	X	X	X		X	X
<i>Egernia kingii</i>	King's Skink		X		X	X			X	X
<i>Egernia napoleonis</i>	Salmon-bellied Skink		X	X			X	X		X
<i>Hemiergis gracilipes</i>	Southwestern Mulch Skink					X				X
<i>Hemiergis peronii peronii</i>	Four-toed Earless Skink						X			X
<i>Hemiergis peronii tridactyla</i>	Three-toed Earless Skink		X	X	X	X			X	X
<i>Hemiergis quadrilineata</i>	Two-toed Mulch Skink									X
<i>Lerista distinguenda</i>	SW Four-toed Lerista		X	X	X	X	X		X	X
<i>Lerista elegans</i>	West Coast Four-toed Lerista		X		X	X	X			X
<i>Menetia greyii</i>	Dwarf Skink		X	X	X	X	X		X	X
<i>Morethia lineocellata</i>	West Coast Pale-flecked Morethia		X	X	X	X	X		X	X

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			<i>Morethia obscura</i>	Shrubland Pale-flecked Morethia		X	X	X	X	X
<i>Tiliqua rugosa</i>	Bobtail		X	X	X	X	X		X	X
Typhlopidae Blind Snakes										
<i>Ramphotyphlops australis</i>	Southern Blind Snake		X	X	X	X	X		X	X
<i>Ramphotyphlops pinguis</i>	Fat Blind Snake		X	X			X			
Boidae Pythons, Boas										
<i>Morelia spilota imbricata</i>	Southern Carpet Python	S4		X						X
Elapidae Elapid Snakes										
<i>Echiopsis curta</i>	Bardick									X
<i>Elapognathus coronatus</i>	Crowned Snake		X							X
<i>Notechis scutatus</i>	Tiger Snake			X		X			X	X
<i>Parasuta gouldii</i>	Gould's Hooded Snake									
<i>Parasuta nigriceps</i>	Black-backed Snake		X			X			X	X
<i>Pseudonaja affinis</i>	Dugite		X	X					X	X
<i>Simoselaps bertholdi</i>	Jan's Banded Snake									

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			Aves							
Casuariidae Emus, Cassowaries										
<i>Dromaius novaehollandiae</i>	Emu	Bp LC	X	X	X	X	X	X		X
Phasianidae Quails, Pheasants										
<i>Coturnix pectoralis</i>	Stubble Quail	LC	X	X						X
<i>Coturnix ypsilophora</i>	Brown Quail	LC				X				
Anatidae Geese, Swans, Ducks										
<i>Anas castanea</i>	Chestnut Teal	LC								X
<i>Anas gracilis</i>	Grey Teal	LC		X		X		X	X	X
<i>Anas rhynchotis</i>	Australasian Shoveler	Bh LC								X
<i>Anas superciliosa</i>	Pacific Black Duck	LC		X	X	X		X	X	X
<i>Aythya australis</i>	Hardhead	Bh LC								X
<i>Chenonetta jubata</i>	Australian Wood Duck	LC	X	X	X	X		X	X	X
<i>Tadorna tadornoides</i>	Australian Shelduck	LC	X	X	X				X	X

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			Podicipedidae							
Grebes										
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe	LC								X
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	LC		X						X
Phalacrocoracidae										
Cormorants										
<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant	LC						X		
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	LC			X					X
<i>Phalacrocorax varius</i>	Pied Cormorant	LC				X				X
Ardeidae										
Hérons, Egrets, Bitterns										
<i>Ardea alba</i>	Great Egret	S3 Mig CA JA								X
<i>Ardea ibis</i>	Cattle Egret	S3 Mig CA JA								X
<i>Ardea novaehollandiae</i>	White-faced Heron	LC	X	X	X	X		X	X	X
<i>Ardea pacifica</i>	White-necked Heron	LC								X

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			Threskiornithidae Ibises, Spoonbills							
<i>Platalea flavipes</i>	Yellow-billed Spoonbill	LC		X						X
<i>Threskiornis molucca</i>	Australian White Ibis	LC	X	X				X	X	X
<i>Threskiornis spinicollis</i>	Straw-necked Ibis	LC	X	X	X	X			X	X
Accipitridae Kites, Goshawks, Eagles, Harriers										
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk	Bp LC	X	X						X
<i>Accipiter fasciatus</i>	Brown Goshawk	Bp LC		X			X	X		X
<i>Aquila audax</i>	Wedge-tailed Eagle	Bp LC	X	X	X	X			X	X
<i>Aquila morphnoides</i>	Little Eagle	Bp LC		X						
<i>Circus approximans</i>	Swamp Harrier	LC				X				X
<i>Elanus caeruleus</i>	Black-shouldered Kite	LC								X
<i>Haliastur sphenurus</i>	Whistling Kite	Bp LC			X					X
<i>Hamirostra isura</i>	Square-tailed Kite	Bp LC		X						

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			Falconidae Falcons							
<i>Falco berigora</i>	Brown Falcon	Bp LC		X						X
<i>Falco cenchroides</i>	Australian Kestrel	LC	X	X		X				X
<i>Falco longipennis</i>	Australian Hobby	LC				X				X
<i>Falco peregrinus</i>	Peregrine Falcon	S4 Bp LC		X						X
Rallidae Rails, Crakes, Swamphens, Coots										
<i>Porphyrio porphyrio</i>	Purple Swamphen	LC		X						X
Turnicidae Button-quails										
<i>Turnix varia</i>	Painted Button-quail	Bp LC		X						
Charadriidae Lapwings, Plovers, Dotterels										
<i>Vanellus tricolor</i>	Banded Lapwing	LC								X
Columbidae Pigeons, Doves										
<i>Ocyphaps lophotes</i>	Crested Pigeon	LC	X	X	X	X			X	X
<i>Phaps chalcoptera</i>	Common Bronzewing	Bh LC	X	X	X	X	X	X	X	X
<i>Streptopelia senegalensis</i>	Laughing Turtle-Dove	Introduced				X				X

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Class Family Species	Common Name	Conservation Status								
			A	B	C	D	E	F	G	H
Psittacidae										
Parrots										
<i>Cacatua roseicapilla</i>	Galah	LC		X						
<i>Cacatua sanguinea</i>	Little Corella	LC								X
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black-Cockatoo	S1 VU Be VU A2c+3c+4c	X	X	X	X	X	X	X	X
<i>Calyptorhynchus baudinii</i>	Baudin's Black Cockatoo	S1 VU Bp VU C2a(ii)	X	X	X	X		X	X	X
<i>Calyptorhynchus latirostris</i>	Carnaby's Black Cockatoo	S1 EN Bp EN A2bcde+3bcd	X	X	X	X	X		X	X
<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	LC	X	X			X			X
<i>Neophema elegans</i>	Elegant Parrot	LC	X	X	X	X	X			X
<i>Platycercus icterotis icterotis</i>	Western Rosella (western ssp)	Bp LC		X	X	X				X
<i>Platycercus spurius</i>	Red-capped Parrot	LC	X	X	X	X	X	X	X	X
<i>Platycercus zonarius</i>	Australian Ringneck	LC	X	X	X	X	X	X	X	X
<i>Polytelis anthopeplus</i>	Regent Parrot	LC				X			X	X

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Class Family <i>Species</i>	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			Cuculidae Parasitic Cuckoos							
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	LC		X	X				X	X
<i>Chrysococcyx basalis</i>	Horsfield's Bronze Cuckoo	LC		X	X	X				
<i>Chrysococcyx lucidus</i>	Shining Bronze Cuckoo	LC	X	X	X	X			X	X
<i>Cuculus pallidus</i>	Pallid Cuckoo	LC			X				X	
Strigidae Hawk Owls										
<i>Ninox novaeseelandiae</i>	Boobook Owl	LC	X	X	X					X
Tytonidae Barn Owls										
<i>Tyto alba</i>	Barn Owl	LC								X
<i>Tyto n. novaehollandiae</i>	Masked Owl (SW pop)	P3 Bp								X
Podargidae Frogmouths										
<i>Podargus strigoides</i>	Tawny Frogmouth	LC		X	X					X
Aegothelidae Owlet-nightjars										
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	LC		X						

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Halcyonidae										
Tree Kingfishers										
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Introduced	X	X	X	X	X	X	X	X
<i>Todiramphus sanctus</i>	Sacred Kingfisher	LC		X	X				X	X
Meropidae										
Bee-eaters										
<i>Merops ornatus</i>	Rainbow Bee-eater	S3 Mig JA LC	X	X	X	X	X		X	X
Climacteridae										
Trecreepers										
<i>Climacteris rufa</i>	Rufous Trecreeper	LC			X					
Maluridae										
Fairy Wrens, GrassWrens										
<i>Malurus elegans</i>	Red-winged Fairy-wren	Be LC	X	X	X	X	X			X
<i>Malurus splendens</i>	Splendid Fairy-wren	Bh LC	X	X	X	X	X	X	X	X
<i>Stipiturus malachurus</i>	Southern Emu-wren	Bh LC			X	X				X

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Acanthizidae										
Thornbills, Geryones, Fieldwrens & Whitefaces										
<i>Acanthiza apicalis</i>	Broad-tailed Thornbill	Bh LC	X	X	X	X	X	X	X	X
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	Bh LC	X	X	X	X		X	X	X
<i>Acanthiza inornata</i>	Western Thornbill	Bh LC		X		X	X	X		X
<i>Gerygone fusca</i>	Western Gerygone	LC	X	X	X	X	X	X	X	X
<i>Sericornis frontalis</i>	White-browed Scrubwren	Bh LC	X	X	X	X	X	X		X
<i>Smicromnis brevirostris</i>	Weebill	Bh LC	X	X	X		X	X		X
Pardalotidae										
Pardalotes										
<i>Pardalotus punctatus</i>	Spotted Pardalote	LC		X	X	X				X
<i>Pardalotus striatus</i>	Striated Pardalote	LC	X	X	X	X	X	X	X	X

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			Meliphagidae Honeyeaters, Chats							
<i>Acanthorhynchus superciliosus</i>	Western Spinebill	LC	X	X	X	X	X	X	X	X
<i>Anthochaera carunculata</i>	Red Wattlebird	LC	X	X		X	X	X	X	X
<i>Anthochaera lunulata</i>	Western Little Wattlebird	Bp LC								X
<i>Epthianura albifrons</i>	White-fronted Chat	LC				X				X
<i>Lichenostomus virescens</i>	Singing Honeyeater	LC			X		X			
<i>Lichmera indistincta</i>	Brown Honeyeater	LC	X	X	X	X	X	X	X	X
<i>Melithreptus chloropsis</i>	Western White-naped Honeyeater	Bp LC		X	X					
<i>Phylidonyris melanops</i>	Tawny-crowned Honeyeater	Bp LC			X	X				
<i>Phylidonyris nigra</i>	White-cheeked Honeyeater	Bp LC				X				
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	Bp LC	X	X	X	X	X	X	X	X
Petroicidae Australian Robins										
<i>Eopsaltria georgiana</i>	White-breasted Robin	Bh LC		X	X	X				X
<i>Eopsaltria griseogularis</i>	Western Yellow Robin	Bh LC	X	X	X	X				
<i>Petroica multicolor</i>	Scarlet Robin	Bh LC	X	X	X	X	X			X

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family <i>Species</i>	Common Name	Conservation Status								
			A	B	C	D	E	F	G	H
Neosittidae										
Sitellas										
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Bh LC	X	X	X	X				X
Pachycephalidae										
Crested Shrike-tit, Crested Bellbird, Shrike Thrushes, Whistlers										
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	Bh LC	X	X	X	X	X	X		X
<i>Pachycephala pectoralis</i>	Golden Whistler	Bh LC	X	X	X	X	X	X		X
<i>Pachycephala rufiventris</i>	Rufous Whistler	LC	X	X	X	X			X	X
Dicruridae										
Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo										
<i>Grallina cyanoleuca</i>	Magpie-lark	LC	X	X		X			X	X
<i>Rhipidura fuliginosa</i>	Grey Fantail	LC	X	X	X	X	X	X	X	X
<i>Rhipidura leucophrys</i>	Willie Wagtail	LC	X	X	X	X	X		X	X
Campephagidae										
Cuckoo-shrikes, Trillers										
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	LC	X	X	X	X	X	X	X	X
<i>Lalage tricolor</i>	White-winged Triller	LC		X						

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			Artamidae Woodswallows, Butcherbirds, Currawongs							
<i>Artamus cinereus</i>	Black-faced Woodswallow	Bp LC		X		X			X	X
<i>Artamus cyanopterus</i>	Dusky Woodswallow	Bp LC		X	X	X	X			X
Cracticidae Currawongs, Magpies & Butcherbirds										
<i>Cracticus tibicen</i>	Australian Magpie	LC	X	X	X	X	X	X	X	X
<i>Cracticus torquatus</i>	Grey Butcherbird	LC	X	X	X	X			X	X
<i>Strepera versicolor</i>	Grey Currawong	Bp LC	X	X	X					X
Corvidae Ravens, Crows										
<i>Corvus coronoides</i>	Australian Raven	LC	X	X	X	X	X	X	X	X
Motacillidae Old World Pipits, Wagtails										
<i>Anthus australis</i>	Australian Pipit	LC	X	X	X	X				X
Estrilidae Grass Finches & Mannikins										
<i>Stagonopleura oculata</i>	Red-eared Firetail	LC			X					
Dicaeidae Flowerpeckers										
<i>Dicaeum hirundinaceum</i>	Mistletoebird	LC								X

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			Hirundinidae Swallows, Martins							
<i>Hirundo ariel</i>	Fairy Martin	LC								
<i>Hirundo neoxena</i>	Welcome Swallow	LC	X	X		X	X		X	X
<i>Hirundo nigricans</i>	Tree Martin	LC	X	X	X	X		X	X	X
Sylviidae Old World Warblers										
<i>Cincloramphus cruralis</i>	Brown Songlark	LC	X							X
<i>Cincloramphus mathewsi</i>	Rufous Songlark	LC		X					X	
Zosteropidae White-eyes										
<i>Zosterops lateralis</i>	Grey-breasted White-eye	LC		X	X	X	X	X	X	X
Mammalia										
Tachyglossidae Echidnas										
<i>Tachyglossus aculeatus</i>	Echidna	LC		X	X		X	X		

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			Dasyuridae Carnivorous Marsupials							
<i>Antechinus flavipes</i>	Yellow-footed Antechinus, Mardo		X	X		X	X			X
<i>Dasyurus geoffroii</i>	Western Quoll, Chuditch	S1 VU VU C1		X						X
<i>Phascogale tapoatafa ssp</i>	Southern Brush-tailed Phascogale	S1 VU NT	X	X						X
<i>Sminthopsis gilberti</i>	Gilbert's Dunnart	LC		X		X	X			X
<i>Sminthopsis griseoventer</i>	Grey-bellied Dunnart	LC				X	X			
Peramelidae Bandicoots										
<i>Isoodon obesulus fusciventer</i>	Quenda	P5 LC	X	X	X	X	X		X	X
Phalangeridae Brushtail Possums, Cuscuses										
<i>Trichosurus vulpecula vulpecula</i>	Common Brushtail Possum	LC	X	X	X	X	X	X	X	X
Burramyidae Pygmy Possums										
<i>Cercartetus concinnus</i>	Western Pygmy-possum	LC	X	X	X		X			X
Tarsipedidae Honey Possum										
<i>Tarsipes rostratus</i>	Honey Possum, Noolbenger	LC		X			X		X	X

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family <i>Species</i>	Common Name	Conservation Status									
			A	B	C	D	E	F	G	H	
Pseudocheiridae Ringtail Possums											
<i>Pseudocheirus occidentalis</i>	Western Ringtail Possum	S1 VU VU C2a		X	X						X
Macropodidae Kangaroos, Wallabies											
<i>Macropus fuliginosus</i>	Western Grey Kangaroo	LC	X	X	X	X	X	X	X	X	X
<i>Macropus irma</i>	Western Brush Wallaby	P4 NT	X	X	X		X				X
Molossidae Freetail Bats											
<i>Mormopterus sp 4</i>	Southern Freetail-bat	LC	X								X
<i>Tadarida australis</i>	White-striped Freetail-bat	LC	X	X		X	X				X

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			Vespertilionidae Ordinary Bats							
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	LC	X		X					X
<i>Chalinolobus morio</i>	Chocolate Wattled Bat	LC	X		X		X			X
<i>Falsistrellus mackenziei</i>	Western False Pipistrelle	P4 VU A2c				X				
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	LC	X		X					X
<i>Nyctophilus gouldi</i>	Gould's Long-eared Bat	LC					X			
<i>Nyctophilus major</i>	Western Long-eared Bat	LC								
<i>Vespadelus regulus</i>	Southern Forest Bat	LC	X	X	X	X	X			X
Muridae Rats, Mice										
<i>Mus musculus</i>	House Mouse	Introduced	X	X	X	X			X	X
<i>Rattus fuscipes</i>	Western Bush Rat	LC	X		X	X				X
<i>Rattus rattus</i>	Black Rat	Introduced	X	X	X					X
Canidae Dogs, Foxes										
<i>Vulpes vulpes</i>	Red Fox	Introduced	X	X	X			X	X	X

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family <i>Species</i>	Common Name	Conservation Status	A	B	C	D	E	F	G	H
			Felidae Cats							
<i>Felis catus</i>	Cat	Introduced			X					X
Bovidae Horned Ruminants										
<i>Bos taurus</i>	European Cattle	Introduced	X							X
Suidae Pigs										
<i>Sus scrofa</i>	Pig	Introduced	X	X						
Leporidae Rabbits, Hares										
<i>Oryctolagus cuniculus</i>	Rabbit	Introduced	X	X	X	X	X	X	X	X

WC Act Status - S1 to S4, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DEC Priority Status - P1 to P5, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

APPENDIX D

DPaW & EPBC Database Search Results

NatureMap - Invertebrates - Yoongarillup

Created By Greg Harewood on 18/09/2013

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Species Group Invertebrates
Method 'By Circle'
Centre 115°25' 23" E, 33°45' 42" S
Buffer 20km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	-12132 <i>Amblyomma albolibatum</i>			
2.	-12196 <i>Aname mainae</i>			
3.	-13038 <i>Aname tepperi</i>			
4.	-13382 <i>Araneus cyphoxis</i>			
5.	-12612 <i>Araneus eburneiventris</i>			
6.	-11911 <i>Araneus recherchensis</i>			
7.	-12899 <i>Araneus senicaudatus</i>			
8.	-1751 <i>Argiope protensa</i>			
9.	-13324 <i>Argiope trifasciata</i>			
10.	-12790 <i>Arkys walckenaeri</i>			
11.	-11836 <i>Austracantha minax</i>			
12.	-12131 <i>Australotiphys barmutai</i>			
13.	-11600 <i>Backbourkia brounii</i>			
14.	-12810 <i>Cercophonius sulcatus</i>			
15.	-1758 <i>Cormocephalus aurantiipes</i>			
16.	-13332 <i>Cyclosa trilobata</i>			
17.	-11830 <i>Cyrtophora parnasia</i>			
18.	-11925 <i>Cytostethum tasmaniense</i>			Y
19.	-12821 <i>Eriophora biapicata</i>			
20.	-12115 <i>Eriophora pustulosa</i>			
21.	-12692 <i>Heurodes turritus</i>			
22.	-12192 <i>Isopeda leishmanni</i>			
23.	-1712 <i>Lampona cylindrata</i>			
24.	-12829 <i>Missulena occatoria</i>			
25.	-12540 <i>Mituliodon tarantulinus</i>			
26.	-12804 <i>Oratemnus curtus</i>			
27.	-11909 <i>Oxidus gracilis</i>			
28.	-12834 <i>Prionosternum nitidiceps</i>			
29.	-12635 <i>Synsphyronus magnus</i>			
30.	-11622 <i>Tamopsis distinguenda</i>			
31.	-11615 <i>Tamopsis perthensis</i>			
32.	-13279 <i>Tasmanicosa leuckartii</i>			
33.	-12778 <i>Urodacus novaehollandiae</i>			
34.	-11721 <i>Venator immansueta</i>			
35.	34113 <i>Westralunio carteri</i> (Carter's Freshwater Mussel)		P4	

Conservation Codes

T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap - Fish - Yoongarillup

Created By Greg Harewood on 18/09/2013

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Species Group Fish
Method 'By Circle'
Centre 115°25' 23" E, 33°45' 42" S
Buffer 20km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	-13853 ? ?			
2.	-14715 <i>Acanthaluteres spilomelanurus</i>			
3.	-15750 <i>Acanthaluteres vittiger</i>			
4.	-16604 <i>Acanthistius pardalotus</i>			
5.	-15720 <i>Apogon rueppellii</i>			
6.	-15958 <i>Aseraggodes haackeanus</i>			
7.	-17755 <i>Atherinosoma</i> sp.			
8.	-13841 <i>Austrolabrus maculatus</i>			
9.	-15786 <i>Bostockia porosa</i>			
10.	-14995 <i>Brachaluteres jacksonianus</i>			
11.	-14731 <i>Brama brama</i>			
12.	-14718 <i>Caprichthys gymnura</i>			
13.	-16773 <i>Carcharhinus brevipinna</i>			
14.	-15651 <i>Cetorhinus maximus</i>			
15.	-17010 <i>Chaetodermis penicilligera</i>			
16.	-17480 <i>Chelidonichthys kumu</i>			
17.	-15345 <i>Chelmonops curiosus</i>			
18.	-14678 <i>Cirrhimuraena calamus</i>			
19.	-14517 <i>Cleidopus gloriamaris</i>			
20.	-17704 <i>Cochleocephalus viridis</i>			
21.	-16430 <i>Coryphaena hippurus</i>			
22.	-13774 <i>Cristiceps aurantiacus</i>			
23.	-15367 <i>Cristiceps australis</i>			
24.	-16295 <i>Diodon nichthemerus</i>			
25.	-16615 <i>Dotalabrus aurantiacus</i>			
26.	-15017 <i>Echeneis naucrates</i>			
27.	-14551 <i>Edelia vittata</i>			
28.	-15388 <i>Elops hawaiiensis</i>			
29.	34028 <i>Galaxias occidentalis</i> (Western Minnow)			
30.	34026 <i>Galaxiella munda</i> (Western Mud Minnow)		T	
31.	-14513 <i>Gambusia affinis</i>			
32.	-16716 <i>Genypterus blacodes</i>			
33.	-15541 <i>Genypterus tigerinus</i>			
34.	-14751 <i>Gnathanodon speciosus</i>			
35.	-14946 <i>Gnathophip longicaudatus</i>			
36.	-15746 <i>Gonorynchus greyi</i>			
37.	-14553 <i>Gymnapistes marmoratus</i>			
38.	-15025 <i>Haletta semifasciata</i>			
39.	-17451 <i>Halichoeres brownfieldi</i>			
40.	-15772 <i>Helcogramma decurrens</i>			
41.	-15765 <i>Heteroclinus adelaidae</i>			
42.	-16493 <i>Heteroclinus</i> sp.			
43.	-16530 <i>Hypnos monopterygium</i>			
44.	-16818 <i>Ichthyoscopus barbatus</i>			
45.	-14552 <i>Lactoria cornuta</i>			
46.	-13824 <i>Lagocephalus sceleratus</i>			
47.	-16271 <i>Lepidogalaxias salamandroides</i>			
48.	-17438 <i>Lotella rhacinus</i>			
49.	-14534 <i>Meuschenia freycineti</i>			
50.	34033 <i>Nannatherina balstoni</i> (Balston's Pygmy Perch)		T	
51.	-14872 <i>Omegophora cyanopunctata</i>			

NatureMap - Frogs - Yoongarillup

Created By Greg Harewood on 18/09/2013

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Species Group Amphibians
Method 'By Circle'
Centre 115°25' 23" E,33°45' 42" S
Buffer 20km

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	25398	<i>Crinia georgiana</i> (Quacking Frog)			
2.	25399	<i>Crinia glauerti</i> (Clicking Frog)			
3.	25400	<i>Crinia insignifera</i> (Squelching Froglet)			
4.	25401	<i>Crinia pseudinsignifera</i> (Bleating Froglet)			
5.	25410	<i>Heleioporus eyrei</i> (Moaning Frog)			
6.	25412	<i>Heleioporus psammophilus</i> (Sand Frog)			
7.	25415	<i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
8.	25388	<i>Litoria moorei</i> (Motorbike Frog)			
9.	25419	<i>Metacrinia nicholisi</i> (Forest Toadlet)			
10.	25425	<i>Neobatrachus kunapalari</i> (Kunapalari Frog)			
11.	25433	<i>Pseudophryne guentheri</i> (Crawling Toadlet)			

Conservation Codes

- T - Rare or likely to become extinct
- X - Presumed extinct
- IA - Protected under international agreement
- S - Other specially protected fauna
- 1 - Priority 1
- 2 - Priority 2
- 3 - Priority 3
- 4 - Priority 4
- 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap - Reptiles - Yoongarillup

Created By Greg Harewood on 18/09/2013

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Species Group Reptiles
Method 'By Circle'
Centre 115°25' 23" E,33°45' 42" S
Buffer 20km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	42368 <i>Acritoscincus trilineatus</i>			
2.	24990 <i>Aprasia pulchella</i>			
3.	24991 <i>Aprasia repens</i>			
4.	25335 <i>Caretta caretta</i> (Loggerhead Turtle)		T	
5.	25337 <i>Chelodina oblonga</i> (Oblong Turtle)			
6.	25336 <i>Chelonia mydas</i> (Green Turtle)		T	
7.	24980 <i>Christinus marmoratus</i> (Marbled Gecko)			
8.	30893 <i>Cryptoblepharus buchananii</i>			
9.	25031 <i>Ctenotus catenifer</i>			
10.	25047 <i>Ctenotus impar</i>			
11.	25049 <i>Ctenotus labillardieri</i>			
12.	24995 <i>Delma australis</i>			
13.	25346 <i>Dermochelys coriacea</i> (Leatherback Turtle)		T	
14.	24939 <i>Diplodactylus polyophthalmus</i>			
15.	25251 <i>Echiopsis curta</i> (Bardick)			
16.	25096 <i>Egernia kingii</i> (King's Skink)			
17.	25100 <i>Egernia napoleonis</i>			
18.	25250 <i>Elapognathus coronatus</i> (Crowned Snake)			
19.	25290 <i>Elapognathus minor</i> (Short-nosed Snake)		P2	
20.	30919 <i>Hemiergis gracilipes</i>			
21.	25117 <i>Hemiergis peronii</i> subsp. <i>peronii</i>			
22.	25118 <i>Hemiergis peronii</i> subsp. <i>tridactyla</i>			
23.	25119 <i>Hemiergis quadrilineata</i>			
24.	25366 <i>Hydrophis elegans</i>			
25.	42410 <i>Hydrophis ornatus</i>			
26.	25131 <i>Lerista distinguenda</i>			
27.	25133 <i>Lerista elegans</i>			
28.	25147 <i>Lerista lineata</i> (Perth Slider, Lined Skink)		P3	
29.	25184 <i>Menetia greyii</i>			
30.	25240 <i>Morelia spilota</i> subsp. <i>imbricata</i> (Carpet Python)		S	
31.	25191 <i>Morethia lineocellata</i>			
32.	25192 <i>Morethia obscura</i>			
33.	25252 <i>Notechis scutatus</i> (Tiger Snake)			
34.	25255 <i>Parasuta nigriceps</i>			
35.	-18193 <i>Pelamis platurus</i>			
36.	25510 <i>Pogona minor</i> (Dwarf Bearded Dragon)			
37.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
38.	25511 <i>Pseudonaja affinis</i> (Dugite)			
39.	25259 <i>Pseudonaja affinis</i> subsp. <i>affinis</i> (Dugite)			
40.	25008 <i>Pygopus lepidopodus</i> (Common Scaly Foot)			
41.	25271 <i>Ramphotyphlops australis</i>			
42.	25519 <i>Tiliqua rugosa</i>			
43.	25225 <i>Varanus rosenbergi</i> (Heath Monitor)			

Conservation Codes

- T - Rare or likely to become extinct
- X - Presumed extinct
- IA - Protected under international agreement
- S - Other specially protected fauna
- 1 - Priority 1
- 2 - Priority 2
- 3 - Priority 3
- 4 - Priority 4
- 5 - Priority 5

NatureMap - Birds - Yoongarillup

Created By Greg Harewood on 18/09/2013

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Species Group Birds
Method 'By Circle'
Centre 115°25' 23" E,33°45' 42" S
Buffer 20km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
2.	24261 <i>Acanthiza chrysolorrhoea</i> (Yellow-rumped Thornbill)			
3.	24262 <i>Acanthiza inornata</i> (Western Thornbill)			
4.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
5.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
6.	24281 <i>Accipiter cirrocephalus</i> subsp. <i>cirrocephalus</i> (Collared Sparrowhawk)			
7.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
8.	25755 <i>Acrocephalus australis</i> (Australian Reed Warbler)			
9.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
10.	24310 <i>Anas castanea</i> (Chestnut Teal)			
11.	24312 <i>Anas gracilis</i> (Grey Teal)			
12.	24313 <i>Anas platyrhynchos</i> (Mallard)			
13.	24315 <i>Anas rhynchotis</i> (Australasian Shoveler)			
14.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
15.	24505 <i>Anous stolidus</i> subsp. <i>pileatus</i> (Common Noddy)		IA	
16.	24506 <i>Anous tenuirostris</i> subsp. <i>melanops</i> (Australian Lesser Noddy)		T	
17.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
18.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
19.	25670 <i>Anthus australis</i> (Australian Pipit)			
20.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
21.	25558 <i>Ardea ibis</i> (Cattle Egret)		IA	
22.	41324 <i>Ardea modesta</i> (Eastern Great Egret)		IA	
23.	24340 <i>Ardea novaehollandiae</i> (White-faced Heron)			
24.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
25.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
26.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
27.	24318 <i>Aythya australis</i> (Hardhead)			
28.	24319 <i>Biziura lobata</i> (Musk Duck)			
29.	24345 <i>Botaurus poiciloptilus</i> (Australasian Bittern)		T	
30.	25714 <i>Cacatua pastinator</i> (Western Long-billed Corella)			
31.	24724 <i>Cacatua pastinator</i> subsp. <i>pastinator</i> (Muir's Corella, Muir's Corella (Western Corella SW WA))		S	
32.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
33.	25598 <i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
34.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
35.	24779 <i>Calidris acuminata</i> (Sharp-tailed Sandpiper)		IA	
36.	24784 <i>Calidris ferruginea</i> (Curlew Sandpiper)		T	
37.	24786 <i>Calidris melanotos</i> (Pectoral Sandpiper)		IA	
38.	24788 <i>Calidris ruficollis</i> (Red-necked Stint)		IA	
39.	24789 <i>Calidris subminuta</i> (Long-toed Stint)		IA	
40.	25717 <i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
41.	24731 <i>Calyptorhynchus banksii</i> subsp. <i>naso</i> (Forest Red-tailed Black-Cockatoo)		T	
42.	24733 <i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)		T	
43.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)		T	
44.	25575 <i>Charadrius leschenaultii</i> (Greater Sand Plover)		IA	
45.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
46.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
47.	25601 <i>Chrysococcyx lucidus</i> (Shining Bronze Cuckoo)			
48.	24432 <i>Chrysococcyx lucidus</i> subsp. <i>plagosus</i> (Shining Bronze Cuckoo)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
49.	24833 <i>Cincloramphus cruralis</i> (Brown Songlark)			
50.	24288 <i>Circus approximans</i> (Swamp Harrier)			
51.	24774 <i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
52.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
53.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
54.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
55.	24416 <i>Corvus bennetti</i> (Little Crow)			
56.	25592 <i>Corvus coronoides</i> (Australian Raven)			
57.	24671 <i>Coturnix pectoralis</i> (Stubble Quail)			
58.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
59.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
60.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
61.	24322 <i>Cygnus atratus</i> (Black Swan)			
62.	30901 <i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
63.	30902 <i>Dacelo novaeguineae</i> subsp. <i>novaeguineae</i> (Laughing Kookaburra)	Y		
64.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
65.	24687 <i>Daption capense</i> (Cape Petrel)			
66.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
67.	25619 <i>Diomedea cauta</i> (Shy Albatross)		T	
68.	24468 <i>Diomedea chrysostoma</i> (Grey-headed Albatross)		T	
69.	25618 <i>Diomedea exulans</i> (Wandering Albatross)		T	
70.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
71.	24290 <i>Elanus caeruleus</i> subsp. <i>axillaris</i> (Australian Black-shouldered Kite)			
72.	24651 <i>Eopsaltria australis</i> subsp. <i>griseogularis</i> (Western Yellow Robin)			
73.	24652 <i>Eopsaltria georgiana</i> (White-breasted Robin)			
74.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
75.	24379 <i>Erythronyctis cinctus</i> (Red-kneed Dotterel)			
76.	24814 <i>Eudyptes chrysocome</i> subsp. <i>moseleyi</i> (Rockhopper Penguin)			
77.	24368 <i>Eurostopodus argus</i> (Spotted Nightjar)			
78.	25621 <i>Falco berigora</i> (Brown Falcon)			
79.	25622 <i>Falco cenchroides</i> (Australian Kestrel)			
80.	24472 <i>Falco cenchroides</i> subsp. <i>cenchrionides</i> (Australian Kestrel)			
81.	25623 <i>Falco longipennis</i> (Australian Hobby)			
82.	24474 <i>Falco longipennis</i> subsp. <i>longipennis</i> (Australian Hobby)			
83.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
84.	24475 <i>Falco peregrinus</i> subsp. <i>macropus</i> (Australian Peregrine Falcon)		S	
85.	25727 <i>Fulica atra</i> (Eurasian Coot)			
86.	25729 <i>Gallinula tenebrosa</i> (Dusky Moorhen)			
87.	24764 <i>Gallinula ventralis</i> (Black-tailed Native-hen)			
88.	25730 <i>Gallirallus philippensis</i> (Buff-banded Rail)			
89.	24765 <i>Gallirallus philippensis</i> subsp. <i>mellori</i> (Buff-banded Rail)			
90.	42314 <i>Gavicalis virescens</i> (Singing Honeyeater)			
91.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
92.	24735 <i>Glossopsitta porphyrocephala</i> (Purple-crowned Lorikeet)			
93.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
94.	24487 <i>Haematopus longirostris</i> (Pied Oystercatcher)			
95.	24293 <i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)		IA	
96.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
97.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
98.	24775 <i>Himantopus himantopus</i> subsp. <i>leucocephalus</i> (Black-winged Stilt)			
99.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
100.	25629 <i>Hirundo nigricans</i> (Tree Martin)			
101.	25638 <i>Larus pacificus</i> (Pacific Gull)			
102.	24557 <i>Leipoa ocellata</i> (Malleefowl)		T	
103.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
104.	25741 <i>Limosa limosa</i> (Black-tailed Godwit)		IA	
105.	24690 <i>Macronectes giganteus</i> (Southern Giant Petrel)		P4	
106.	24326 <i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
107.	25650 <i>Malurus elegans</i> (Red-winged Fairy-wren)			
108.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
109.	25758 <i>Megalurus gramineus</i> (Little Grassbird)			
110.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)		IA	
111.	25542 <i>Milvus migrans</i> (Black Kite)			
112.	25610 <i>Myiagra inquieta</i> (Restless Flycatcher)			
113.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
114.	24739 <i>Neophema petrophila</i> (Rock Parrot)			
115.	25748 <i>Ninox novaeseelandiae</i> (Boobook Owl)			
116.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
117.	24350 <i>Nycticorax caledonicus</i> subsp. <i>hilli</i> (Rufous Night Heron)			
118.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
119.	24328 <i>Oxyura australis</i> (Blue-billed Duck)			
120.	25679 <i>Pachycephala pectoralis</i> (Golden Whistler)			
121.	24623 <i>Pachycephala pectoralis</i> subsp. <i>fuliginosa</i> (Golden Whistler)			
122.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
123.	24624 <i>Pachycephala rufiventris</i> subsp. <i>rufiventris</i> (Rufous Whistler)			
124.	-13668 <i>Pachycephala</i> sp.			Y
125.	24692 <i>Pachyptila belcheri</i> (Slender-billed Prion)			
126.	24693 <i>Pachyptila desolata</i> (Antarctic Prion)			
127.	25707 <i>Pachyptila salvini</i> (Salvin's Prion)			
128.	24695 <i>Pachyptila salvini</i> subsp. <i>macgillivrayi</i> (Salvin's Prion)			Y
129.	24696 <i>Pachyptila turtur</i> (Fairy Prion)			
130.	24697 <i>Pachyptila vittata</i> (Broad-billed Prion)			
131.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
132.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
133.	24630 <i>Pardalotus striatus</i> subsp. <i>westraliensis</i> (Striated Pardalote)			
134.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
135.	25695 <i>Petroica multicolor</i> (Scarlet Robin)			
136.	24660 <i>Petroica multicolor</i> subsp. <i>campbelli</i> (Scarlet Robin)			
137.	24663 <i>Phaethon rubricauda</i> (Red-tailed Tropicbird)			
138.	25697 <i>Phalacrocorax carbo</i> (Great Cormorant)			
139.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
140.	25699 <i>Phalacrocorax varius</i> (Pied Cormorant)			
141.	24668 <i>Phalacrocorax varius</i> subsp. <i>hypoleucos</i> (Pied Cormorant)			
142.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
143.	24462 <i>Phoebastria fusca</i> (Sooty Albatross)		T	
144.	24463 <i>Phoebastria palpebrata</i> (Light-mantled Sooty Albatross)		P4	
145.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
146.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
147.	24842 <i>Platalea regia</i> (Royal Spoonbill)			
148.	25720 <i>Platycercus icterotis</i> (Western Rosella)			
149.	24745 <i>Platycercus icterotis</i> subsp. <i>icterotis</i> (Western Rosella)			
150.	24747 <i>Platycercus spurius</i> (Red-capped Parrot)			
151.	25721 <i>Platycercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
152.	24750 <i>Platycercus zonarius</i> subsp. <i>semitorquatus</i> (Twenty-eight Parrot)			
153.	24843 <i>Plegadis falcinellus</i> (Glossy Ibis)		IA	
154.	24382 <i>Pluvialis fulva</i> (Pacific Golden Plover)		IA	
155.	24383 <i>Pluvialis squatarola</i> (Grey Plover)		IA	
156.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
157.	24679 <i>Podargus strigoides</i> subsp. <i>brachypterus</i> (Tawny Frogmouth)			
158.	24681 <i>Poliocephalus poliocephalus</i> (Hoary-headed Grebe)			
159.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
160.	25731 <i>Porphyrio porphyrio</i> (Purple Swamphen)			
161.	24771 <i>Porzana tabuensis</i> (Spotless Crane)			
162.	24703 <i>Pterodroma lessonii</i> (White-headed Petrel)			
163.	25710 <i>Pterodroma macroptera</i> (Great-winged Petrel)			
164.	24706 <i>Pterodroma macroptera</i> subsp. <i>gouldi</i> (Great-winged Petrel)			
165.	-13702 <i>Pterodroma macroptera</i> subsp. <i>macroptera</i>			
166.	24776 <i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
167.	25613 <i>Rhipidura fuliginosa</i> (Grey Fantail)			
168.	24452 <i>Rhipidura fuliginosa</i> subsp. <i>preissi</i> (Grey Fantail)			
169.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
170.	25534 <i>Sericornis frontalis</i> (White-browed Scrubwren)			
171.	24279 <i>Sericornis frontalis</i> subsp. <i>maculatus</i> (White-browed Scrubwren)			
172.	30948 <i>Smicromis brevirostris</i> (Weebill)			
173.	24520 <i>Sterna anaethetus</i> subsp. <i>anaethetus</i> (Bridled Tern)			
174.	24329 <i>Stictonetta naevosa</i> (Freckled Duck)			
175.	24554 <i>Stipiturus malachurus</i> subsp. <i>westernensis</i> (Southern Emu-wren)			
176.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
177.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
178.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
179.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
180.	24844 <i>Threskiornis molucca</i> (Australian White Ibis)			
181.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
182.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
183.	24806 <i>Tringa glareola</i> (Wood Sandpiper)		IA	
184.	24808 <i>Tringa nebularia</i> (Common Greenshank)		IA	
185.	24809 <i>Tringa stagnatilis</i> (Marsh Sandpiper)		IA	
186.	24852 <i>Tyto alba</i> subsp. <i>delicatula</i> (Barn Owl)			
187.	24855 <i>Tyto novaehollandiae</i> subsp. <i>novaehollandiae</i> (Masked Owl (southern subsp.))		P3	
188.	25577 <i>Vanellus miles</i> (Masked Lapwing)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
189.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
190.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			
191.	24856 <i>Zosterops lateralis</i> subsp. <i>gouldi</i> (Grey-breasted White-eye)			

Conservation Codes

- T - Rare or likely to become extinct
- X - Presumed extinct
- IA - Protected under international agreement
- S - Other specially protected fauna
- 1 - Priority 1
- 2 - Priority 2
- 3 - Priority 3
- 4 - Priority 4
- 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap - Mammals - Yoongarillup

Created By Greg Harewood on 18/09/2013

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Species Group Mammals
Method 'By Circle'
Centre 115°25' 23" E,33°45' 42" S
Buffer 20km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	24088 <i>Antechinus flavipes</i> subsp. <i>leucogaster</i> (Yellow-footed Antechinus, Mardo)			
2.	24046 <i>Balaenoptera borealis</i> (Sei Whale)		T	
3.	24049 <i>Balaenoptera musculus</i> subsp. <i>intermedia</i> (Antarctic Blue Whale)		T	
4.	24162 <i>Bettongia penicillata</i> subsp. <i>ogilbyi</i> (Woylie, Brush-tailed Bettong)		T	
5.	24251 <i>Bos taurus</i> (European Cattle)	Y		
6.	24072 <i>Caperea marginata</i> (Pygmy Right Whale)			
7.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
8.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattled Bat)			
9.	24187 <i>Chalinolobus morio</i> (Chocolate Wattled Bat)			
10.	24092 <i>Dasyurus geoffroyi</i> (Chuditch, Western Quoll)		T	
11.	24052 <i>Delphinus delphis</i> (Common Dolphin)			
12.	24041 <i>Felis catus</i> (Cat)	Y		
13.	24055 <i>Globicephala melas</i> (Long-finned Pilot Whale)			
14.	24215 <i>Hydromys chrysogaster</i> (Water-rat)		P4	
15.	24153 <i>Isoodon obesulus</i> subsp. <i>fusciventer</i> (Quenda, Southern Brown Bandicoot)		P5	
16.	24132 <i>Macropus fuliginosus</i> (Western Grey Kangaroo)			
17.	24133 <i>Macropus irma</i> (Western Brush Wallaby)		P4	
18.	24168 <i>Macrotis lagotis</i> (Bilby, Dalgyte)		T	
19.	24078 <i>Mesoplodon grayi</i> (Gray's Beaked Whale)			
20.	24184 <i>Mormopterus planiceps</i> (Southern Freetail-bat)			
21.	24223 <i>Mus musculus</i> (House Mouse)	Y		
22.	24194 <i>Nyctophilus geoffroyi</i> (Lesser Long-eared Bat)			
23.	24099 <i>Phascogale tapoatafa</i> subsp. <i>tapoatafa</i> (Southern Brush-tailed Phascogale, Wambenger)		T	
24.	24166 <i>Pseudocheirus occidentalis</i> (Western Ringtail Possum)		T	
25.	24063 <i>Pseudorca crassidens</i> (False Killer Whale)			
26.	24243 <i>Rattus fuscipes</i> (Western Bush Rat)			
27.	24245 <i>Rattus rattus</i> (Black Rat)	Y		
28.	24145 <i>Setonix brachyurus</i> (Quokka)		T	
29.	24111 <i>Sminthopsis gilberti</i> (Gilbert's Dunnart)			
30.	24185 <i>Tadarida australis</i> (White-striped Freetail-bat)			
31.	24167 <i>Tarsipes rostratus</i> (Honey Possum, Noolbenger)			
32.	25521 <i>Trichosurus vulpecula</i> (Common Brushtail Possum)			
33.	24158 <i>Trichosurus vulpecula</i> subsp. <i>vulpecula</i> (Common Brushtail Possum)			
34.	24069 <i>Tursiops truncatus</i> (Bottlenose Dolphin)			
35.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
36.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		

Conservation Codes

T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
52.	-15789 <i>Ophichthus melanochir</i>			
53.	-17014 <i>Ophisurus serpens</i>			
54.	-16460 <i>Pagrus auratus</i>			
55.	-14858 <i>Parablennius postocolomaculatus</i>			
56.	-15943 <i>Parablennius sp.</i>			
57.	-15806 <i>Parapercis haackei</i>			
58.	-17436 <i>Parascyllium variolatum</i>			
59.	-15326 <i>Phyllophryne scortea</i>			
60.	-16320 <i>Phyllopteryx taeniolatus</i>			
61.	-14526 <i>Posidonichthys hutchinsi</i>			
62.	-13823 <i>Pristiophorus nudipinnis</i>			
63.	-14850 <i>Pseudogobius olorum</i>			
64.	-16501 <i>Pterygotrigla polyommata</i>			
65.	-17553 <i>Rachycentron canadus</i>			
66.	-16761 <i>Ranzania laevis</i>			
67.	-15008 <i>Regalecus glesne</i>			
68.	-17634 <i>Sarda orientalis</i>			
69.	-17424 <i>Scobinichthys granulatus</i>			
70.	-15346 <i>Sillaginodes punctata</i>			
71.	-14859 <i>Siphamia cephalotes</i>			
72.	-16492 <i>Siphonognathus argyrophanes</i>			
73.	-14878 <i>Siphonognathus radiatus</i>			
74.	-15199 <i>Squatina australis</i>			
75.	-16341 <i>Stigmatopora argus</i>			
76.	-15173 <i>Tetrapturus audax</i>			Y
77.	-17758 <i>Thunnus alalunga</i>			
78.	-17452 <i>Thunnus maccoyii</i>			
79.	-16520 <i>Trachinops noarlungae</i>			
80.	-15791 <i>Vanacampus poecilolaemus</i>			
81.	-17391 <i>Vincentia punctata</i>			

Conservation Codes

- T - Rare or likely to become extinct
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- 3 - Priority 3
- 4 - Priority 4
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¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 18/09/13 10:52:08

[Summary](#)

[Details](#)

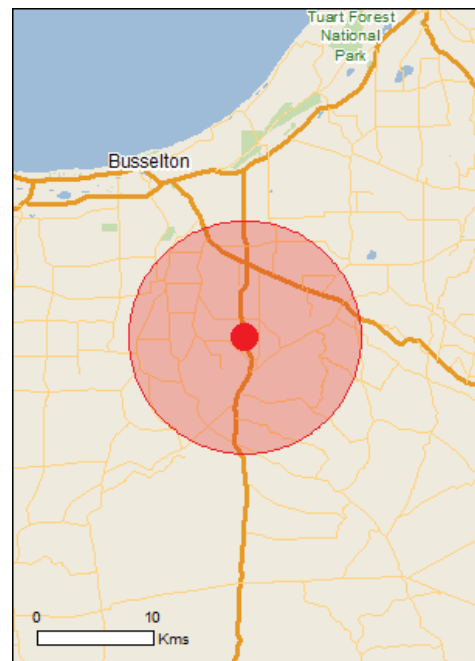
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

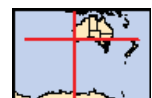
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	35
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As [heritage values](#) of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	6
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	2
State and Territory Reserves:	3
Regional Forest Agreements:	1
Invasive Species:	25
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (RAMSAR)	[Resource Information]
Name	Proximity
Vasse-wonnerup system	Within 10km of Ramsar

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Claypans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus baudinii Baudin's Black-Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Breeding known to occur within area
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Crustaceans		
Cherax tenuimanus Hairy Marron, Margaret River Hairy Marron, Margaret River Marron [78931]	Critically Endangered	Species or species habitat may occur within area
Fish		
Nannatherina balstoni Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum [25911]	Vulnerable	Species or species habitat known to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat may occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Banksia mimica Summer Honeypot [82765]	Endangered	Species or species habitat known to occur within area
Banksia nivea subsp. uliginosa Swamp Honeypot [82766]	Endangered	Species or species habitat known to occur within area
Banksia squarrosa subsp. argillacea Whicher Range Dryandra [82769]	Vulnerable	Species or species habitat known to occur within area
Brachyscias verecundus Ironstone Brachyscias [81321]	Critically Endangered	Species or species habitat may occur within area
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat likely to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Caladenia procera Carbunup King Spider Orchid [68679]	Critically Endangered	Species or species habitat may occur within area
Caladenia winfieldii Majestic Spider-orchid [64504]	Endangered	Species or species habitat may occur within area
Centrolepis caespitosa [6393]	Endangered	Species or species habitat likely to occur within area
Chamelaucium sp. C Coast Plain (R.D.Royce 4872) Royce's Waxflower [82023]	Vulnerable	Species or species habitat known to occur within area
Darwinia foetida Muche Bell [83190]	Critically Endangered	Species or species habitat likely to occur within area
Darwinia whicherensis Abba Bell [83193]	Endangered	Species or species habitat may occur within area
Daviesia elongata subsp. elongata Long-leaved Daviesia [64883]	Vulnerable	Species or species habitat known to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence
Drakaea elastica Glossy-leafed Hammer-orchid, Praying Virgin [16753]	Endangered	Species or species habitat known to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus phylacis Meelup Mallee [56422]	Endangered	Species or species habitat may occur within area
Gastrolobium papilio Butterfly-leaved Gastrolobium [78415]	Endangered	Species or species habitat may occur within area
Lambertia echinata subsp. occidentalis Western Prickly Honeysuckle [64528]	Endangered	Species or species habitat may occur within area
Petrophile latericola Laterite Petrophile [64532]	Endangered	Species or species habitat likely to occur within area
Sphenotoma drummondii [21160]	Endangered	Species or species habitat may occur within area
Synaphea stenoloba Dwellingup Synaphea [66311]	Endangered	Species or species habitat may occur within area
Tetraria australiensis Southern Tetraria [10137]	Vulnerable	Species or species habitat likely to occur within area
Verticordia plumosa var. vassensis Vasse Featherflower [55804]	Endangered	Species or species habitat known to occur within area

Listed Migratory Species [[Resource Information](#)]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name

Commonwealth Land -

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat likely to occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat likely to occur within area

Extra Information

Places on the RNE [\[Resource Information \]](#)

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Whicher Management Priority Area	WA	Indicative Place
Whicher Range Area	WA	Registered

State and Territory Reserves [\[Resource Information \]](#)

Name	State
Fish Road	WA
Unnamed WA14567	WA
Whicher	WA

Regional Forest Agreements [\[Resource Information \]](#)

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species

[[Resource Information](#)]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within

Name	Status	Type of Presence
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		area Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Coordinates

-33.7623 115.423

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Department of Environment, Climate Change and Water, New South Wales](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment and Natural Resources, South Australia](#)
- [Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [Environmental and Resource Management, Queensland](#)
- [Department of Environment and Conservation, Western Australia](#)
- [Department of the Environment, Climate Change, Energy and Water](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [SA Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [State Forests of NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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Department of Sustainability, Environment, Water, Population and Communities

GPO Box 787

Canberra ACT 2601 Australia

+61 2 6274 1111

APPENDIX E

Raw Vertebrate Trapping & Recording Results

Yonggarillup Raw Vertebrate Trap and Recording Results - Phase 1 and 2 Surveys

Date	Trap Site	Trap Type	Species	Common Name
3/08/2011	Infrared Camera 1	Infrared Camera	Macropus fuliginosus	Western Grey Kangaroo
3/08/2011	Infrared Camera 2	Infrared Camera	Macropus fuliginosus	Western Grey Kangaroo
5/08/2011	Infrared Camera 2	Infrared Camera	Trichosurus vulpecula	Common Brushtail Possum
10/08/2011	Infrared Camera 2	Infrared Camera	Vulpes vulpes	Red Fox
16/08/2011	Infrared Camera 1	Infrared Camera	Trichosurus vulpecula	Common Brushtail Possum
17/08/2011	Infrared Camera 1	Infrared Camera	Vulpes vulpes	Red Fox
28/08/2011	Infrared Camera 2	Infrared Camera	Rattus rattus	Black Rat
16/09/2011	Infrared Camera 1	Infrared Camera	Podargus strigoides	Tawny Frogmouth
25/09/2011	Infrared Camera 1	Infrared Camera	Dacelo novaeguineae	Laughing Kookaburrah
30/09/2011	Infrared Camera 1	Infrared Camera	Tiliqua rugosa rugosa	Western Bobtail
15/10/2011	Infrared Camera 1	Infrared Camera	Varanus rosenbergi	Heath Monitor
2/12/2011	LE 1	Elliot (B)	Antechinus flavipes	Yellow-footed Antechinus
2/12/2011	TS 1.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 1.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 1.3	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 1.3	Opportunistic	Tiliqua rugosa rugosa	Western Bobtail
2/12/2011	TS 1.4	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 1.5	Bucket	Lerista elegans	West Coast Four-toed Lerista
2/12/2011	TS 1.6	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
2/12/2011	TS 1.6	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
2/12/2011	TS 1.7	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
2/12/2011	TS 1.7	Bucket	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 1.7	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 1.7	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 1.9	Bucket	Aprasia pulchella	Pretty Worm Lizard
2/12/2011	TS 1.9	Funnel	Ctenotus ora	Coastal Plains Ctenotus
2/12/2011	TS 1.9	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.1	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
2/12/2011	TS 2.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.10	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
2/12/2011	TS 2.10	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.2	Funnel	Acritoscincus trilineatum	South-western Cool Skink
2/12/2011	TS 2.3	Bucket	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.4	Bucket	Acritoscincus trilineatum	South-western Cool Skink
2/12/2011	TS 2.4	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.4	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.4	Bucket	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.6	Bucket	Ctenotus impar	South-western Odd-striped Ctenotus
2/12/2011	TS 2.7	Funnel	Acritoscincus trilineatum	South-western Cool Skink
2/12/2011	TS 2.7	Funnel	Menetia greyii	Dwarf Skink
2/12/2011	TS 2.7	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.7	Bucket	Morethia lineocellata	Western Pale-flecked Morethia
2/12/2011	TS 2.8	Funnel	Christinus marmoratus	Marbled Gecko
2/12/2011	TS 2.8	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
2/12/2011	TS 2.9	Bucket	Morethia lineocellata	Western Pale-flecked Morethia
3/12/2011	TS 1.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
3/12/2011	TS 1.10	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
3/12/2011	TS 1.2	Funnel	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
3/12/2011	TS 1.2	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
3/12/2011	TS 1.3	Bucket	Lerista elegans	West Coast Four-toed Lerista
3/12/2011	TS 1.4	Bucket	Ctenotus impar	South-western Odd-striped Ctenotus
3/12/2011	TS 1.4	Funnel	Ctenotus ora	Coastal Plains Ctenotus
3/12/2011	TS 1.4	Bucket	Hemiergis peronii tridactyla	Three-toed Mulch Skink
3/12/2011	TS 1.5	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
3/12/2011	TS 1.8	Funnel	Ctenotus ora	Coastal Plains Ctenotus
3/12/2011	TS 1.8	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
3/12/2011	TS 1.9	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
3/12/2011	TS 1.9	Bucket	Ramphotyphlops australis	Southern Blind Snake
3/12/2011	TS 2.1	Funnel	Ctenotus ora	Coastal Plains Ctenotus
3/12/2011	TS 2.1	Bucket	Egernia napoleonis	Salmon Bellied Skink
3/12/2011	TS 2.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
3/12/2011	TS 2.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
3/12/2011	TS 2.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
3/12/2011	TS 2.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
3/12/2011	TS 2.1	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
3/12/2011	TS 2.10	Bucket	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
3/12/2011	TS 2.10	Funnel	Morethia lineocellata	Western Pale-flecked Morethia
3/12/2011	TS 2.2	Funnel	Acritoscincus trilineatum	South-western Cool Skink
3/12/2011	TS 2.2	Bucket	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
3/12/2011	TS 2.2	Bucket	Ctenotus impar	South-western Odd-striped Ctenotus
3/12/2011	TS 2.2	Bucket	Hemiergis peronii tridactyla	Three-toed Mulch Skink
3/12/2011	TS 2.2	Bucket	Morethia lineocellata	Western Pale-flecked Morethia
3/12/2011	TS 2.3	Bucket	Hemiergis peronii tridactyla	Three-toed Mulch Skink

Date	Trap Site	Trap Type	Species	Common Name
3/12/2011	TS 2.3	Bucket	<i>Lerista elegans</i>	West Coast Four-toed Lerista
3/12/2011	TS 2.3	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 2.3	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 2.4	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
3/12/2011	TS 2.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 2.5	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 2.5	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 2.5	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 2.7	Bucket	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
3/12/2011	TS 2.7	Bucket	<i>Menetia greyii</i>	Dwarf Skink
3/12/2011	TS 2.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 2.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 2.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 2.7	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 2.9	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 3.1	Bucket	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
3/12/2011	TS 3.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 3.2	Bucket	<i>Aprasia pulchella</i>	Pretty Worm Lizard
3/12/2011	TS 3.2	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 3.3	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
3/12/2011	TS 3.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 3.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 3.6	Opportunistic	<i>Acritoscincus trilineatum</i>	South-western Cool Skink
3/12/2011	TS 3.6	Funnel	<i>Ctenotus ora</i>	Coastal Plains Ctenotus
3/12/2011	TS 3.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 3.6	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
3/12/2011	TS 3.9	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
3/12/2011	TS 3.9	Funnel	<i>Morethia obscura</i>	Dusky Morethia
4/12/2011	LE 10	Elliot (B)	<i>Tiliqua rugosa rugosa</i>	Western Bobtail
4/12/2011	LE 15	Elliot (B)	<i>Rattus fuscipes</i>	Western Bush Rat
4/12/2011	LE 20	Elliot (B)	<i>Tiliqua rugosa rugosa</i>	Western Bobtail
4/12/2011	Trap Site 3	Opportunistic	<i>Aprasia pulchella</i>	Pretty Worm Lizard
4/12/2011	TS 1.1	Bucket	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink
4/12/2011	TS 1.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 1.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 1.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 1.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 1.10	Bucket	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
4/12/2011	TS 1.2	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 1.4	Bucket	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink
4/12/2011	TS 1.4	Bucket	<i>Ctenotus ora</i>	Coastal Plains Ctenotus
4/12/2011	TS 1.5	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 1.6	Bucket	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
4/12/2011	TS 1.6	Funnel	<i>Ctenotus ora</i>	Coastal Plains Ctenotus
4/12/2011	TS 1.6	Funnel	<i>Ctenotus ora</i>	Coastal Plains Ctenotus
4/12/2011	TS 1.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 1.8	Bucket	<i>Lerista elegans</i>	West Coast Four-toed Lerista
4/12/2011	TS 1.8	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 1.9	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 1.9	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 2.1	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 2.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 2.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 2.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 2.1	Bucket	<i>Ramphotyphlops australis</i>	Southern Blind Snake
4/12/2011	TS 2.10	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 2.10	Funnel	<i>Morethia obscura</i>	Dusky Morethia
4/12/2011	TS 2.2	Funnel	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink
4/12/2011	TS 2.2	Funnel	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
4/12/2011	TS 2.2	Bucket	<i>Ctenotus ora</i>	Coastal Plains Ctenotus
4/12/2011	TS 2.2	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 2.2	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 2.2	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 2.3	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 2.4	Funnel	<i>Acritoscincus trilineatum</i>	South-western Cool Skink
4/12/2011	TS 2.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 2.5	Funnel	<i>Acritoscincus trilineatum</i>	South-western Cool Skink
4/12/2011	TS 2.5	Funnel	<i>Morethia obscura</i>	Dusky Morethia
4/12/2011	TS 2.5	Funnel	<i>Morethia obscura</i>	Dusky Morethia
4/12/2011	TS 2.5	Funnel	<i>Morethia obscura</i>	Dusky Morethia
4/12/2011	TS 2.6	Funnel	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
4/12/2011	TS 2.7	Funnel	<i>Menetia greyii</i>	Dwarf Skink
4/12/2011	TS 2.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 2.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
4/12/2011	TS 2.8	Funnel	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
4/12/2011	TS 2.8	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
4/12/2011	TS 2.9	Bucket	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink
4/12/2011	TS 2.9	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
4/12/2011	TS 2.9	Bucket	<i>Menetia greyii</i>	Dwarf Skink
4/12/2011	TS 3.1	Funnel	<i>Acritoscincus trilineatum</i>	South-western Cool Skink

Date	Trap Site	Trap Type	Species	Common Name
4/12/2011	TS 3.1	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
4/12/2011	TS 3.1	Bucket	Limnodynastes dorsalis	Banjo Frog
4/12/2011	TS 3.1	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 3.1	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 3.2	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 3.2	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 3.4	Elliot (A)	Rattus fuscipes	Western Bush Rat
4/12/2011	TS 3.5	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 3.5	Elliot (A)	Rattus fuscipes	Western Bush Rat
4/12/2011	TS 3.6	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
4/12/2011	TS 3.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 3.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 3.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 3.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 3.7	Funnel	Ctenotus ora	Coastal Plains Ctenotus
4/12/2011	TS 3.7	Funnel	Ctenotus ora	Coastal Plains Ctenotus
4/12/2011	TS 3.7	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
4/12/2011	TS 3.7	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
4/12/2011	TS 3.7	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
4/12/2011	TS 3.7	Elliot (A)	Rattus fuscipes	Western Bush Rat
4/12/2011	TS 3.8	Bucket	Delma australis	Marbled-faced Delma
4/12/2011	TS 3.8	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 3.9	Bucket	Heleioporus eyrei	Moaning Frog
4/12/2011	TS 4.1	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 4.10	Funnel	Antechinus flavipes	Yellow-footed Antechinus
4/12/2011	TS 4.3	Bucket	Hemiergis peronii tridactyla	Three-toed Mulch Skink
4/12/2011	TS 4.4	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
4/12/2011	TS 4.4	Bucket	Hemiergis peronii tridactyla	Three-toed Mulch Skink
4/12/2011	TS 4.4	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 4.4	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 4.4	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 4.4	Funnel	Morethia obscura	Dusky Morethia
4/12/2011	TS 4.5	Funnel	Ctenotus ora	Coastal Plains Ctenotus
4/12/2011	TS 4.6	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
4/12/2011	TS 4.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 4.6	Funnel	Morethia obscura	Dusky Morethia
4/12/2011	TS 4.7	Bucket	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
4/12/2011	TS 4.7	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 4.7	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 4.8	Bucket	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
4/12/2011	TS 4.8	Bucket	Hemiergis peronii tridactyla	Three-toed Mulch Skink
4/12/2011	TS 4.8	Bucket	Lerista elegans	West Coast Four-toed Lerista
4/12/2011	TS 4.9	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
4/12/2011	TS 4.9	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 5.2	Funnel	Acritoscincus trilineatum	South-western Cool Skink
4/12/2011	TS 5.2	Bucket	Ctenotus impar	South-western Odd-striped Ctenotus
4/12/2011	TS 5.2	Bucket	Ctenotus impar	South-western Odd-striped Ctenotus
4/12/2011	TS 5.3	Funnel	Ctenotus ora	Coastal Plains Ctenotus
4/12/2011	TS 5.5	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 5.5	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 5.7	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
4/12/2011	TS 5.8	Bucket	Hemiergis peronii tridactyla	Three-toed Mulch Skink
4/12/2011	TS 5.8	Funnel	Morethia obscura	Dusky Morethia
4/12/2011	TS 5.9	Funnel	Ctenotus ora	Coastal Plains Ctenotus
4/12/2011	TS 5.9	Funnel	Ctenotus ora	Coastal Plains Ctenotus
4/12/2011	TS 5.9	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
4/12/2011	TS 5.9	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
5/12/2011	TS 1.1	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
5/12/2011	TS 1.2	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
5/12/2011	TS 1.2	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
5/12/2011	TS 1.3	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
5/12/2011	TS 1.4	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
5/12/2011	TS 1.7	Funnel	Morethia obscura	Dusky Morethia
5/12/2011	TS 1.7	Bucket	Ramphotyphlops pinguis	Stout Blind Snake
5/12/2011	TS 1.8	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
5/12/2011	TS 2.1	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
5/12/2011	TS 2.1	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
5/12/2011	TS 2.1	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
5/12/2011	TS 2.1	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
5/12/2011	TS 2.1	Funnel	Morethia obscura	Dusky Morethia
5/12/2011	TS 2.1	Funnel	Morethia obscura	Dusky Morethia
5/12/2011	TS 2.10	Funnel	Tiliqua rugosa rugosa	Western Bobtail
5/12/2011	TS 2.2	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
5/12/2011	TS 2.3	Funnel	Morethia obscura	Dusky Morethia
5/12/2011	TS 2.4	Bucket	Morethia obscura	Dusky Morethia
5/12/2011	TS 2.5	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
5/12/2011	TS 2.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
5/12/2011	TS 2.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
5/12/2011	TS 2.8	Funnel	Lerista elegans	West Coast Four-toed Lerista
5/12/2011	TS 2.8	Funnel	Menetia greyii	Dwarf Skink
5/12/2011	TS 2.8	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia

Date	Trap Site	Trap Type	Species	Common Name
5/12/2011	TS 2.9	Bucket	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink
5/12/2011	TS 2.9	Funnel	<i>Morethia obscura</i>	Dusky Morethia
5/12/2011	TS 3.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 3.10	Bucket	<i>Lerista elegans</i>	West Coast Four-toed Lerista
5/12/2011	TS 3.2	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 3.2	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
5/12/2011	TS 3.5	Funnel	<i>Ctenotus ora</i>	Coastal Plains Ctenotus
5/12/2011	TS 3.5	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
5/12/2011	TS 3.6	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
5/12/2011	TS 3.8	Funnel	<i>Lerista elegans</i>	West Coast Four-toed Lerista
5/12/2011	TS 3.8	Funnel	<i>Lerista elegans</i>	West Coast Four-toed Lerista
5/12/2011	TS 3.8	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.4	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.4	Elliot (A)	<i>Tiliqua rugosa rugosa</i>	Western Bobtail
5/12/2011	TS 4.5	Bucket	<i>Ctenotus ora</i>	Coastal Plains Ctenotus
5/12/2011	TS 4.6	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
5/12/2011	TS 4.6	Bucket	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
5/12/2011	TS 4.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.6	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.8	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 4.9	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 5.10	Funnel	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
5/12/2011	TS 5.3	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 5.5	Funnel	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink
5/12/2011	TS 5.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
5/12/2011	TS 5.8	Bucket	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
5/12/2011	TS 5.9	Funnel	<i>Diplodactylus polyophthalmus</i>	Speckled Stone Gecko
5/12/2011	TS 5.9	Bucket	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
6/12/2011	LE 10	Elliot (B)	<i>Egernia kingii</i>	King's Skink
6/12/2011	LE 15	Elliot (B)	<i>Tiliqua rugosa rugosa</i>	Western Bobtail
6/12/2011	Trap Site 3	Opportunistic	<i>Macropus irma</i>	Western Brush Wallaby
6/12/2011	TS 1.10	Funnel	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
6/12/2011	TS 1.2	Bucket	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink
6/12/2011	TS 1.3	Elliot (A)	<i>Antechinus flavipes</i>	Yellow-footed Antechinus
6/12/2011	TS 1.5	Funnel	<i>Acritoscincus trilineatum</i>	South-western Cool Skink
6/12/2011	TS 1.5	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
6/12/2011	TS 1.5	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
6/12/2011	TS 1.7	Bucket	<i>Aprasia pulchella</i>	Pretty Worm Lizard
6/12/2011	TS 2.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
6/12/2011	TS 2.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
6/12/2011	TS 2.1	Funnel	<i>Morethia obscura</i>	Dusky Morethia
6/12/2011	TS 2.10	Bucket	<i>Menetia greyii</i>	Dwarf Skink
6/12/2011	TS 2.3	Funnel	<i>Tiliqua rugosa rugosa</i>	Western Bobtail
6/12/2011	TS 2.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
6/12/2011	TS 2.8	Funnel	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
6/12/2011	TS 3.2	Bucket	<i>Menetia greyii</i>	Dwarf Skink
6/12/2011	TS 3.2	Bucket	<i>Rattus fuscipes</i>	Western Bush Rat
6/12/2011	TS 3.2	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
6/12/2011	TS 3.2	Funnel	<i>Tiliqua rugosa rugosa</i>	Western Bobtail
6/12/2011	TS 3.4	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
6/12/2011	TS 3.4	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
6/12/2011	TS 3.5	Funnel	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
6/12/2011	TS 3.5	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
6/12/2011	TS 3.6	Bucket	<i>Heleioporus eyrei</i>	Moaning Frog
6/12/2011	TS 3.6	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
6/12/2011	TS 3.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
6/12/2011	TS 3.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
6/12/2011	TS 3.7	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
6/12/2011	TS 3.8	Bucket	<i>Aprasia pulchella</i>	Pretty Worm Lizard
6/12/2011	TS 3.8	Funnel	<i>Varanus rosenbergi</i>	Heath Monitor
6/12/2011	TS 4.1	Bucket	<i>Cercartetus concinnus</i>	Western Pygmy Possum
6/12/2011	TS 4.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
6/12/2011	TS 4.2	Funnel	<i>Egernia napoleonis</i>	Salmon Bellied Skink
6/12/2011	TS 4.2	Funnel	<i>Egernia napoleonis</i>	Salmon Bellied Skink
6/12/2011	TS 4.3	Funnel	<i>Ctenotus ora</i>	Coastal Plains Ctenotus
6/12/2011	TS 4.3	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
6/12/2011	TS 4.3	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
6/12/2011	TS 4.3	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
6/12/2011	TS 4.3	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
6/12/2011	TS 4.4	Funnel	<i>Christinus marmoratus</i>	Marbled Gecko
6/12/2011	TS 4.4	Funnel	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
6/12/2011	TS 4.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia

Date	Trap Site	Trap Type	Species	Common Name
6/12/2011	TS 4.4	Funnel	Morethia obscura	Dusky Morethia
6/12/2011	TS 4.4	Bucket	Morethia obscura	Dusky Morethia
6/12/2011	TS 4.4	Bucket	Morethia obscura	Dusky Morethia
6/12/2011	TS 4.6	Bucket	Lerista elegans	West Coast Four-toed Lerista
6/12/2011	TS 4.6	Bucket	Lerista elegans	West Coast Four-toed Lerista
6/12/2011	TS 4.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
6/12/2011	TS 4.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
6/12/2011	TS 4.7	Bucket	Aprasia pulchella	Pretty Worm Lizard
6/12/2011	TS 4.7	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
6/12/2011	TS 4.8	Funnel	Antechinus flavipes	Yellow-footed Antechinus
6/12/2011	TS 4.9	Funnel	Lerista distinguenda	South-western Four-toed Lerista
6/12/2011	TS 4.9	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
6/12/2011	TS 4.9	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
6/12/2011	TS 5.1	Bucket	Ctenotus impar	South-western Odd-striped Ctenotus
6/12/2011	TS 5.1	Funnel	Ctenotus ora	Coastal Plains Ctenotus
6/12/2011	TS 5.10	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
6/12/2011	TS 5.2	Bucket	Acritoscincus trilineatum	South-western Cool Skink
6/12/2011	TS 5.2	Bucket	Ctenotus impar	South-western Odd-striped Ctenotus
6/12/2011	TS 5.3	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
6/12/2011	TS 5.4	Bucket	Ctenotus impar	South-western Odd-striped Ctenotus
6/12/2011	TS 5.4	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
6/12/2011	TS 5.4	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
6/12/2011	TS 5.5	Bucket	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
6/12/2011	TS 5.5	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
6/12/2011	TS 5.6	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
6/12/2011	TS 5.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
6/12/2011	TS 5.9	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
6/12/2011	TS 5.9	Funnel	Ctenotus ora	Coastal Plains Ctenotus
6/12/2011	TS 5.9	Bucket	Heleioporus eyrei	Moaning Frog
7/12/2011	LE 15	Elliot (B)	Rattus fuscipes	Western Bush Rat
7/12/2011	Opportunistic	Opportunistic	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
7/12/2011	Opportunistic	Opportunistic	Morethia lineoocellata	Western Pale-flecked Morethia
7/12/2011	Trap Site 5	Opportunistic	Macropus fuliginosus	Western Grey Kangaroo
7/12/2011	Trap Site 5	Opportunistic	Macropus fuliginosus	Western Grey Kangaroo
7/12/2011	TS 1.2	Elliot (A)	Antechinus flavipes	Yellow-footed Antechinus
7/12/2011	TS 1.4	Bucket	Limnodynastes dorsalis	Banjo Frog
7/12/2011	TS 1.5	Bucket	Mus musculus	House Mouse
7/12/2011	TS 2.1	Bucket	Crinia insignifera	Squelching Froglet
7/12/2011	TS 2.2	Bucket	Heleioporus eyrei	Moaning Frog
7/12/2011	TS 2.4	Bucket	Acritoscincus trilineatum	South-western Cool Skink
7/12/2011	TS 2.6	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
7/12/2011	TS 2.7	Bucket	Mus musculus	House Mouse
7/12/2011	TS 2.9	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
7/12/2011	TS 2.9	Bucket	Hemiergis peronii tridactyla	Three-toed Mulch Skink
7/12/2011	TS 2.9	Bucket	Menetia greyii	Dwarf Skink
7/12/2011	TS 3.2	Bucket	Limnodynastes dorsalis	Banjo Frog
7/12/2011	TS 3.4	Bucket	Heleioporus eyrei	Moaning Frog
7/12/2011	TS 3.4	Elliot (A)	Rattus fuscipes	Western Bush Rat
7/12/2011	TS 3.6	Elliot (A)	Rattus fuscipes	Western Bush Rat
7/12/2011	TS 3.7	Bucket	Metacrinia nicholli	Nicholls' Toadlet
7/12/2011	TS 3.7	Funnel	Metacrinia nicholli	Nicholls' Toadlet
7/12/2011	TS 3.7	Funnel	Metacrinia nicholli	Nicholls' Toadlet
7/12/2011	TS 3.7	Funnel	Metacrinia nicholli	Nicholls' Toadlet
7/12/2011	TS 4.2	Bucket	Antechinus flavipes	Yellow-footed Antechinus
7/12/2011	TS 4.3	Funnel	Metacrinia nicholli	Nicholls' Toadlet
7/12/2011	TS 4.5	Opportunistic	Hemiergis peronii tridactyla	Three-toed Mulch Skink
7/12/2011	TS 4.5	Bucket	Ramphotyphlops pinguis	Stout Blind Snake
7/12/2011	TS 4.9	Opportunistic	Hemiergis peronii tridactyla	Three-toed Mulch Skink
7/12/2011	TS 5.1	Bucket	Heleioporus eyrei	Moaning Frog
7/12/2011	TS 5.1	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
7/12/2011	TS 5.3	Funnel	Metacrinia nicholli	Nicholls' Toadlet
7/12/2011	TS 5.4	Bucket	Lerista elegans	West Coast Four-toed Lerista
7/12/2011	TS 5.5	Funnel	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
8/12/2011	Bat Site 1	Anabat II Recording	Chalinolobus gouldii	Gould's Wattle Bat
8/12/2011	Bat Site 1	Anabat II Recording	Chalinolobus morio	Chocolate Wattle Bat
8/12/2011	Bat Site 1	Anabat II Recording	Tadarida australis	White-striped Freetail Bat
8/12/2011	Bat Site 1	Anabat II Recording	Vespadelus regulus	Southern Forest Bat
8/12/2011	LE 18	Elliot (B)	Tiliqua rugosa rugosa	Western Bobtail
8/12/2011	LE 2	Elliot (B)	Egernia kingii	King's Skink
8/12/2011	LE 4	Elliot (B)	Antechinus flavipes	Yellow-footed Antechinus
8/12/2011	Opportunistic	Opportunistic	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
8/12/2011	Opportunistic	Opportunistic	Macropus fuliginosus	Western Grey Kangaroo
8/12/2011	Opportunistic	Opportunistic	Macropus fuliginosus	Western Grey Kangaroo
8/12/2011	Opportunistic	Opportunistic	Macropus fuliginosus	Western Grey Kangaroo
8/12/2011	TS 1.1	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
8/12/2011	TS 1.10	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
8/12/2011	TS 1.3	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
8/12/2011	TS 1.3	Bucket	Limnodynastes dorsalis	Banjo Frog
8/12/2011	TS 1.3	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
8/12/2011	TS 1.7	Funnel	Parasuta nigriceps	Black-backed Snake
8/12/2011	TS 2.1	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia

Date	Trap Site	Trap Type	Species	Common Name
8/12/2011	TS 2.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
8/12/2011	TS 2.10	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
8/12/2011	TS 2.2	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
8/12/2011	TS 2.2	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
8/12/2011	TS 2.2	Funnel	<i>Morethia obscura</i>	Dusky Morethia
8/12/2011	TS 2.4	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
8/12/2011	TS 2.4	Bucket	<i>Morethia obscura</i>	Dusky Morethia
8/12/2011	TS 2.5	Funnel	<i>Morethia obscura</i>	Dusky Morethia
8/12/2011	TS 2.5	Funnel	<i>Morethia obscura</i>	Dusky Morethia
8/12/2011	TS 2.6	Bucket	<i>Mus musculus</i>	House Mouse
8/12/2011	TS 2.8	Bucket	<i>Heleioporus eyrei</i>	Moaning Frog
8/12/2011	TS 3.1	Bucket	<i>Crinia insignifera</i>	Squelching Froglet
8/12/2011	TS 3.10	Bucket	<i>Heleioporus eyrei</i>	Moaning Frog
8/12/2011	TS 3.3	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
8/12/2011	TS 3.4	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
8/12/2011	TS 3.5	Bucket	<i>Heleioporus eyrei</i>	Moaning Frog
8/12/2011	TS 3.5	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
8/12/2011	TS 3.6	Funnel	<i>Metacrinia nicholli</i>	Nicholls' Toadlet
8/12/2011	TS 3.6	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
8/12/2011	TS 3.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
8/12/2011	TS 3.6	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
8/12/2011	TS 3.7	Bucket	<i>Heleioporus eyrei</i>	Moaning Frog
8/12/2011	TS 3.9	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
8/12/2011	TS 4.10	Elliot (A)	<i>Antechinus flavipes</i>	Yellow-footed Antechinus
8/12/2011	TS 4.5	Bucket	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
8/12/2011	TS 4.5	Bucket	<i>Morethia obscura</i>	Dusky Morethia
8/12/2011	TS 4.8	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
8/12/2011	TS 5.10	Cage	<i>Tiliqua rugosa rugosa</i>	Western Bobtail
8/12/2011	TS 5.3	Bucket	<i>Crinia insignifera</i>	Squelching Froglet
8/12/2011	TS 5.3	Funnel	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
8/12/2011	TS 5.3	Funnel	<i>Ctenotus ora</i>	Coastal Plains Ctenotus
8/12/2011	TS 5.5	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
8/12/2011	TS 5.6	Bucket	<i>Crinia insignifera</i>	Squelching Froglet
8/12/2011	TS 5.6	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
8/12/2011	TS 5.9	Bucket	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
9/12/2011	Bat Site 2	Anabat II Recording	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat
9/12/2011	Bat Site 2	Anabat II Recording	<i>Vespadelus regulus</i>	Southern Forest Bat
9/12/2011	LE 2	Elliot (B)	<i>Tiliqua rugosa rugosa</i>	Western Bobtail
9/12/2011	LE 4	Elliot (B)	<i>Tiliqua rugosa rugosa</i>	Western Bobtail
9/12/2011	TS 1.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 1.10	Funnel	<i>Acritoscincus trilineatum</i>	South-western Cool Skink
9/12/2011	TS 1.7	Bucket	<i>Ctenotus ora</i>	Coastal Plains Ctenotus
9/12/2011	TS 1.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 1.9	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 2.10	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
9/12/2011	TS 2.2	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 2.3	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 2.4	Funnel	<i>Morethia obscura</i>	Dusky Morethia
9/12/2011	TS 2.5	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 2.6	Bucket	<i>Pogona minor minor</i>	Western Bearded Dragon
9/12/2011	TS 2.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 2.7	Funnel	<i>Pseudonaja affinis</i>	Dugite
9/12/2011	TS 2.8	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
9/12/2011	TS 2.8	Funnel	<i>Morethia obscura</i>	Dusky Morethia
9/12/2011	TS 3.1	Funnel	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
9/12/2011	TS 3.1	Funnel	<i>Limnodynastes dorsalis</i>	Banjo Frog
9/12/2011	TS 3.5	Bucket	<i>Heleioporus eyrei</i>	Moaning Frog
9/12/2011	TS 3.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 3.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 3.8	Funnel	<i>Ctenotus ora</i>	Coastal Plains Ctenotus
9/12/2011	TS 3.9	Opportunistic	<i>Isoodon obesulus fusciventer</i>	Quenda
9/12/2011	TS 4.2	Funnel	<i>Egernia napoleonis</i>	Salmon Bellied Skink
9/12/2011	TS 4.5	Funnel	<i>Lerista distinguenda</i>	South-western Four-toed Lerista
9/12/2011	TS 4.6	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 4.8	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 5.10	Funnel	<i>Morethia obscura</i>	Dusky Morethia
9/12/2011	TS 5.2	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 5.3	Elliot (A)	<i>Antechinus flavipes</i>	Yellow-footed Antechinus
9/12/2011	TS 5.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 5.5	Bucket	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink
9/12/2011	TS 5.5	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
9/12/2011	TS 5.5	Bucket	<i>Lerista distinguenda</i>	South-western Four-toed Lerista
9/12/2011	TS 5.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 5.7	Bucket	<i>Menetia greyii</i>	Dwarf Skink
9/12/2011	TS 5.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 5.8	Bucket	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
9/12/2011	TS 5.8	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 5.8	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 5.8	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 5.8	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
9/12/2011	TS 5.9	Funnel	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
10/12/2011	LE 15	Elliot (B)	<i>Tiliqua rugosa rugosa</i>	Western Bobtail

Date	Trap Site	Trap Type	Species	Common Name
10/12/2011	TS 1.10	Funnel	Ctenotus ora	Coastal Plains Ctenotus
10/12/2011	TS 1.4	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 1.5	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 1.6	Funnel	Acritoscincus trilineatum	South-western Cool Skink
10/12/2011	TS 1.6	Funnel	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
10/12/2011	TS 1.6	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
10/12/2011	TS 1.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 1.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 1.8	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 1.9	Elliot (A)	Antechinus flavipes	Yellow-footed Antechinus
10/12/2011	TS 2.3	Bucket	Morethia obscura	Dusky Morethia
10/12/2011	TS 2.5	Bucket	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
10/12/2011	TS 2.5	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 2.5	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 2.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 2.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 2.6	Funnel	Morethia obscura	Dusky Morethia
10/12/2011	TS 2.7	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 2.8	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 2.9	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 3.1	Bucket	Tiliqua rugosa rugosa	Western Bobtail
10/12/2011	TS 3.10	Funnel	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
10/12/2011	TS 3.10	Funnel	Morethia obscura	Dusky Morethia
10/12/2011	TS 3.10	Funnel	Morethia obscura	Dusky Morethia
10/12/2011	TS 3.7	Funnel	Ctenotus ora	Coastal Plains Ctenotus
10/12/2011	TS 3.9	Elliot (A)	Rattus fuscipes	Western Bush Rat
10/12/2011	TS 4.10	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 4.6	Bucket	Hemiergis peronii tridactyla	Three-toed Mulch Skink
10/12/2011	TS 4.6	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
10/12/2011	TS 4.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 4.6	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 4.7	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 4.7	Funnel	Morethia obscura	Dusky Morethia
10/12/2011	TS 4.8	Funnel	Tiliqua rugosa rugosa	Western Bobtail
10/12/2011	TS 4.9	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 5.1	Funnel	Ctenotus ora	Coastal Plains Ctenotus
10/12/2011	TS 5.10	Funnel	Morethia obscura	Dusky Morethia
10/12/2011	TS 5.2	Bucket	Ctenotus ora	Coastal Plains Ctenotus
10/12/2011	TS 5.4	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 5.4	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 5.5	Funnel	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
10/12/2011	TS 5.5	Funnel	Ctenotus ora	Coastal Plains Ctenotus
10/12/2011	TS 5.5	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 5.7	Bucket	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
10/12/2011	TS 5.7	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
10/12/2011	TS 5.7	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 5.7	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 5.7	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
10/12/2011	TS 5.9	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
12/12/2011	Infrared Camera 1	Infrared Camera	Dromaius novaehollandiae	Emu
16/12/2011	Infrared Camera 1	Infrared Camera	Antechinus flavipes	Yellow-footed Antechinus
3/03/2012	Infrared Camera 1	Infrared Camera	Phascogale tapoatafa	Southern Brush-tailed Phascogale
26/03/2012	Infrared Camera 2	Infrared Camera	Antechinus flavipes	Yellow-footed Antechinus
26/03/2012	TS 4.3	Bucket	Pogona minor minor	Western Bearded Dragon
26/03/2012	TS 4.5	Bucket	Lerista elegans	West Coast Four-toed Lerista
26/03/2012	TS 4.6	Bucket	Hemiergis peronii tridactyla	Three-toed Mulch Skink
26/03/2012	TS 4.8	Elliot (A)	Antechinus flavipes	Yellow-footed Antechinus
26/03/2012	TS 4.9	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
27/03/2012	LE 4	Elliot (B)	Antechinus flavipes	Yellow-footed Antechinus
27/03/2012	TS 1.2	Funnel	Ctenotus impar	South-western Odd-striped Ctenotus
27/03/2012	TS 1.2	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
27/03/2012	TS 1.3	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
27/03/2012	TS 1.4	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
27/03/2012	TS 1.4	Bucket	Mus musculus	House Mouse
27/03/2012	TS 2.2	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
27/03/2012	TS 2.7	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
27/03/2012	TS 3.5	Elliot (A)	Rattus fuscipes	Western Bush Rat
27/03/2012	TS 3.6	Elliot (A)	Rattus fuscipes	Western Bush Rat
27/03/2012	TS 4.3	Bucket	Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
27/03/2012	TS 4.5	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
27/03/2012	TS 4.6	Bucket	Hemiergis peronii tridactyla	Three-toed Mulch Skink
27/03/2012	TS 4.6	Bucket	Lerista elegans	West Coast Four-toed Lerista
27/03/2012	TS 4.9	Funnel	Menetia greyii	Dwarf Skink
27/03/2012	TS 5.1	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
27/03/2012	TS 5.2	Bucket	Ctenotus impar	South-western Odd-striped Ctenotus
28/03/2012	LE 15	Elliot (B)	Antechinus flavipes	Yellow-footed Antechinus
28/03/2012	LE 15	Elliot (B)	Antechinus flavipes	Yellow-footed Antechinus
28/03/2012	LE 8	Elliot (B)	Egernia kingii	King's Skink
28/03/2012	TS 1.1	Elliot (A)	Antechinus flavipes	Yellow-footed Antechinus
28/03/2012	TS 1.1	Bucket	Mus musculus	House Mouse
28/03/2012	TS 1.10	Bucket	Antechinus flavipes	Yellow-footed Antechinus

Date	Trap Site	Trap Type	Species	Common Name
28/03/2012	TS 1.2	Elliot (A)	<i>Rattus rattus</i>	Black Rat
28/03/2012	TS 1.3	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 1.4	Elliot (A)	<i>Antechinus flavipes</i>	Yellow-footed Antechinus
28/03/2012	TS 1.8	Funnel	<i>Elapognathus coronatus</i>	Crowned Snake
28/03/2012	TS 1.8	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 2.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 2.10	Funnel	<i>Morethia obscura</i>	Dusky Morethia
28/03/2012	TS 2.2	Funnel	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
28/03/2012	TS 2.2	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 2.3	Funnel	<i>Acritoscincus trilineatum</i>	South-western Cool Skink
28/03/2012	TS 2.4	Bucket	<i>Acritoscincus trilineatum</i>	South-western Cool Skink
28/03/2012	TS 2.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 2.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 2.4	Bucket	<i>Mus musculus</i>	House Mouse
28/03/2012	TS 2.5	Funnel	<i>Morethia obscura</i>	Dusky Morethia
28/03/2012	TS 2.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 2.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 2.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 2.7	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 2.8	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 2.8	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 2.8	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 3.2	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
28/03/2012	TS 3.8	Funnel	<i>Morethia obscura</i>	Dusky Morethia
28/03/2012	TS 3.8	Funnel	<i>Morethia obscura</i>	Dusky Morethia
28/03/2012	TS 4.1	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 4.10	Cage	<i>Isoodon obesulus fusciventer</i>	Quenda
28/03/2012	TS 4.2	Bucket	<i>Mus musculus</i>	House Mouse
28/03/2012	TS 4.3	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 4.4	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 4.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 4.5	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 4.6	Bucket	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
28/03/2012	TS 4.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 5.1	Bucket	<i>Mus musculus</i>	House Mouse
28/03/2012	TS 5.6	Elliot (A)	<i>Antechinus flavipes</i>	Yellow-footed Antechinus
28/03/2012	TS 5.6	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
28/03/2012	TS 5.7	Funnel	<i>Mus musculus</i>	House Mouse
29/03/2012	Bat Site 4	Anabat II Recording	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat
29/03/2012	Bat Site 4	Anabat II Recording	<i>Mormopterus planiceps</i>	Western Freetail Bat
29/03/2012	Bat Site 4	Anabat II Recording	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat
29/03/2012	Bat Site 4	Anabat II Recording	<i>Tadarida australis</i>	White-striped Freetail Bat
29/03/2012	Bat Site 4	Anabat II Recording	<i>Vespadelus regulus</i>	Southern Forest Bat
29/03/2012	TS 1.2	Elliot (A)	<i>Rattus rattus</i>	Black Rat
29/03/2012	TS 1.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
29/03/2012	TS 1.6	Funnel	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
29/03/2012	TS 1.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
29/03/2012	TS 3.1	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
29/03/2012	TS 3.3	Bucket	<i>Lerista distinguenda</i>	South-western Four-toed Lerista
29/03/2012	TS 3.4	Bucket	<i>Hemiergis peronii tridactyla</i>	Three-toed Mulch Skink
29/03/2012	TS 3.4	Bucket	<i>Lerista distinguenda</i>	South-western Four-toed Lerista
29/03/2012	TS 3.4	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
29/03/2012	TS 3.5	Bucket	<i>Mus musculus</i>	House Mouse
29/03/2012	TS 3.6	Bucket	<i>Christinus marmoratus</i>	Marbled Gecko
29/03/2012	TS 3.9	Funnel	<i>Ctenotus catenifer</i>	Chain-striped Heath Ctenotus
29/03/2012	TS 3.9	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
29/03/2012	TS 5.4	Cage	<i>Trichosurus vulpecula</i>	Common Brushtail Possum
30/03/2012	LE 13	Elliot (B)	<i>Antechinus flavipes</i>	Yellow-footed Antechinus
30/03/2012	LE 9	Elliot (B)	<i>Mus musculus</i>	House Mouse
30/03/2012	TS 1.1	Funnel	<i>Acritoscincus trilineatum</i>	South-western Cool Skink
30/03/2012	TS 1.1	Bucket	<i>Mus musculus</i>	House Mouse
30/03/2012	TS 1.10	Bucket	<i>Mus musculus</i>	House Mouse
30/03/2012	TS 1.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
30/03/2012	TS 1.4	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
30/03/2012	TS 1.6	Funnel	<i>Parasuta nigriceps</i>	Black-backed Snake
30/03/2012	TS 1.7	Funnel	<i>Mus musculus</i>	House Mouse
30/03/2012	TS 1.9	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
30/03/2012	TS 2.1	Funnel	<i>Acritoscincus trilineatum</i>	South-western Cool Skink
30/03/2012	TS 2.1	Bucket	<i>Mus musculus</i>	House Mouse
30/03/2012	TS 2.7	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
30/03/2012	TS 2.7	Bucket	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
30/03/2012	TS 2.8	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
30/03/2012	TS 3.10	Bucket	<i>Pogona minor minor</i>	Western Bearded Dragon
30/03/2012	TS 3.6	Funnel	<i>Morethia lineoocellata</i>	Western Pale-flecked Morethia
30/03/2012	TS 3.6	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
30/03/2012	TS 3.7	Elliot (A)	<i>Rattus fuscipes</i>	Western Bush Rat
30/03/2012	TS 4.4	Elliot (A)	<i>Tiliqua rugosa rugosa</i>	Western Bobtail
30/03/2012	TS 4.7	Funnel	<i>Ctenotus impar</i>	South-western Odd-striped Ctenotus
30/03/2012	TS 5.2	Funnel	<i>Acritoscincus trilineatum</i>	South-western Cool Skink
30/03/2012	TS 5.5	Cage	<i>Trichosurus vulpecula</i>	Common Brushtail Possum
30/03/2012	TS 5.6	Bucket	<i>Mus musculus</i>	House Mouse
30/03/2012	TS 5.8	Funnel	<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink

Date	Trap Site	Trap Type	Species	Common Name
31/03/2012	LE 15	Elliot (B)	Antechinus flavipes	Yellow-footed Antechinus
31/03/2012	LE 7	Elliot (B)	Mus musculus	House Mouse
31/03/2012	TS 1.4	Elliot (A)	Mus musculus	House Mouse
31/03/2012	TS 1.5	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
31/03/2012	TS 2.1	Funnel	Mus musculus	House Mouse
31/03/2012	TS 2.3	Bucket	Acritoscincus trilineatum	South-western Cool Skink
31/03/2012	TS 2.3	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
31/03/2012	TS 3.3	Elliot (A)	Rattus fuscipes	Western Bush Rat
31/03/2012	TS 3.6	Elliot (A)	Rattus fuscipes	Western Bush Rat
31/03/2012	TS 5.3	Bucket	Menetia greyii	Dwarf Skink
1/04/2012	LE 16	Elliot (B)	Antechinus flavipes	Yellow-footed Antechinus
1/04/2012	LE 2	Elliot (B)	Mus musculus	House Mouse
1/04/2012	LE 5	Elliot (B)	Mus musculus	House Mouse
1/04/2012	LE 5	Elliot (B)	Mus musculus	House Mouse
1/04/2012	LE 8	Elliot (B)	Mus musculus	House Mouse
1/04/2012	TS 1.1	Bucket	Mus musculus	House Mouse
1/04/2012	TS 1.3	Bucket	Mus musculus	House Mouse
1/04/2012	TS 1.4	Elliot (A)	Rattus rattus	Black Rat
1/04/2012	TS 2.10	Cage	Trichosurus vulpecula	Common Brushtail Possum
1/04/2012	TS 2.4	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
1/04/2012	TS 2.5	Cage	Trichosurus vulpecula	Common Brushtail Possum
1/04/2012	TS 3.7	Funnel	Metacrinia nicholli	Nicholls' Toadlet
1/04/2012	TS 3.8	Bucket	Metacrinia nicholli	Nicholls' Toadlet
1/04/2012	TS 3.9	Bucket	Heleioporus eyrei	Moaning Frog
1/04/2012	TS 5.1	Bucket	Mus musculus	House Mouse
1/04/2012	TS 5.3	Bucket	Mus musculus	House Mouse
1/04/2012	TS 5.4	Bucket	Mus musculus	House Mouse
1/04/2012	TS 5.6	Elliot (A)	Antechinus flavipes	Yellow-footed Antechinus
2/04/2012	TS 1.2	Elliot (A)	Egernia kingii	King's Skink
2/04/2012	TS 1.2	Bucket	Mus musculus	House Mouse
2/04/2012	TS 1.3	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
2/04/2012	TS 1.6	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
2/04/2012	TS 1.9	Bucket	Limnodynastes dorsalis	Banjo Frog
2/04/2012	TS 1.9	Bucket	Mus musculus	House Mouse
2/04/2012	TS 2.10	Bucket	Morethia lineoocellata	Western Pale-flecked Morethia
2/04/2012	TS 2.10	Bucket	Mus musculus	House Mouse
2/04/2012	TS 2.10	Cage	Trichosurus vulpecula	Common Brushtail Possum
2/04/2012	TS 2.5	Cage	Trichosurus vulpecula	Common Brushtail Possum
2/04/2012	TS 2.6	Bucket	Mus musculus	House Mouse
2/04/2012	TS 3.2	Bucket	Heleioporus eyrei	Moaning Frog
2/04/2012	TS 3.8	Bucket	Limnodynastes dorsalis	Banjo Frog
2/04/2012	TS 3.9	Bucket	Limnodynastes dorsalis	Banjo Frog
2/04/2012	TS 3.9	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia
2/04/2012	TS 5.4	Elliot (A)	Antechinus flavipes	Yellow-footed Antechinus
2/04/2012	TS 5.7	Funnel	Hemiergis peronii tridactyla	Three-toed Mulch Skink
2/04/2012	TS 5.9	Funnel	Morethia lineoocellata	Western Pale-flecked Morethia

APPENDIX F

Habitat Tree Details

Yoongarillup Habitat Trees
Datum - GDA 94

Waypoint Number	Zone	mE	mN	Tree Species	Tree Height (m)	DBH (>50cm)	Number of Hollows	Hollow Type 1	Hollow Size 1 (cm)	Hollow Type 2	Hollow Size 2 (cm)	Hollow Type 3	Hollow Size 3 (cm)	Hollow Type 4	Hollow Size 4 (cm)	Hollow Type 5	Hollow Size 5 (cm)	Occupancy	Chew Marks	Potential Cockatoo Nest Hollow	Comments
wpt001	50H	353898	6262873	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt002	50H	353916	6262868	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt003	50H	353910	6262864	Marri	20+	>50	0											No Signs	No Signs	No	
wpt004	50H	353914	6262861	Jarrah	15-20	>50	5+	Spout Trunk	10-20	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	No Signs	No Signs	No	Depth of hollows unknown
wpt005	50H	353912	6262847	Marri	15-20	>50	5+	Spout Trunk	20+	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	No Signs	No Signs	Yes	Too Low? Depth of hollows unknown
wpt007	50H	353846	6262847	Jarrah	15-20	>50	4	Knot Hole	10-20	Branch	10-20	Branch	10-20	Branch	10-20			No Signs	No Signs	Yes	Depth of hollows unknown
wpt008	50H	353850	6262819	Marri	15-20	>50	2	Knot Hole	<5	Knot Hole	5-10							Bees	No Signs	No	Depth of hollows unknown
wpt009	50H	353841	6262823	Jarrah	15-20	>50	2	Spout Branch	10-20	Spout Branch	10-20							No Signs	No Signs	Yes	Depth of hollows unknown
wpt010	50H	353823	6262852	Marri	20+	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt011	50H	353745	6262866	Marri	15-20	>50	0											No Signs	No Signs	No	
wpt012	50H	353720	6262831	Jarrah	20+	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt013	50H	353711	6262826	Jarrah	15-20	>50	1	Spout Trunk	20+									No Signs	No Signs	No	Too low and shallow
wpt014	50H	353696	6262843	Dead Unknown	20+	>50	5+	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	Spout Trunk	20+	No Signs	No Signs	No	Depth of hollows unknown
wpt015	50H	353683	6262837	Marri	20+	>50	3	Knot Hole	<5	Branch	5-10	Branch	5-10					Bees	No Signs	No	Depth of hollows unknown
wpt016	50H	353678	6262825	Jarrah	15-20	>50	5+	Branch	5-10	Branch	10-20	Branch	20+	Branch	5-10	Branch	10-20	No Signs	No Signs	Yes	Depth of hollows unknown
wpt017	50H	353678	6262856	Jarrah	15-20	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt018	50H	353670	6262857	Marri	20+	>50	0											No Signs	No Signs	No	
wpt019	50H	353644	6262841	Marri	20+	>50	0											No Signs	No Signs	No	
wpt020	50H	353631	6262832	Jarrah	20+	>50	1	Fissure	10-20									No Signs	No Signs	No	Depth of hollows unknown
wpt021	50H	353603	6262831	Jarrah	15-20	>50	5+	Knot Hole	20+	Branch	10-20	Branch	10-20	Branch	5-10	Branch	10-20	No Signs	No Signs	Yes	Depth of hollows unknown
wpt022	50H	353605	6262858	Jarrah	20+	>50	5+	Branch	5-10	Branch	10-20	Branch	20+	Branch	5-10	Branch	10-20	No Signs	No Signs	Yes	Depth of hollows unknown
wpt023	50H	353594	6262869	Marri	20+	>50	0											No Signs	No Signs	No	
wpt024	50H	353563	6262861	Marri	20+	>50	0											No Signs	No Signs	No	
wpt025	50H	353542	6262864	Jarrah	20+	>50	0											No Signs	No Signs	No	
wpt026	50H	353396	6262858	Marri	20+	>50	0											No Signs	No Signs	No	
wpt027	50H	353372	6262862	Marri	20+	>50	0											No Signs	No Signs	No	
wpt028	50H	353378	6262848	Marri	20+	>50	1	Knot Hole	5-10									No Signs	No Signs	No	Depth of hollows unknown
wpt029	50H	353383	6262838	Jarrah	20+	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt030	50H	353366	6262837	Marri	15-20	>50	1	Spout Trunk	20+									No Signs	No Signs	No	Too Shallow
wpt031	50H	353383	6262831	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt032	50H	353391	6262820	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt033	50H	353407	6262826	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt034	50H	353411	6262831	Jarrah	15-20	>50	1	Knot Hole	5-10									No Signs	No Signs	No	Depth of hollows unknown
wpt035	50H	353366	6262832	Jarrah	15-20	>50	1	Knot Hole	5-10									No Signs	No Signs	No	Depth of hollows unknown
wpt036	50H	353354	6262820	Marri	20+	>50	0											No Signs	No Signs	No	
wpt037	50H	353359	6262804	Jarrah	15-20	>50	5+	Knot Hole	5-10	Knot Hole	5-10	Branch	5-10	Branch	10-20	Branch	10-20	No Signs	No Signs	No	Depth of hollows unknown
wpt038	50H	353369	6262808	Jarrah	20+	>50	1	Knot Hole	5-10									No Signs	No Signs	No	Depth of hollows unknown
wpt039	50H	353382	6262814	Jarrah	20+	>50	0											No Signs	No Signs	No	
wpt101	50H	353798	6262792	Marri	10-15	>50	1	Spout Trunk	20+									No Signs	No Signs	Yes	Depth of hollows unknown
wpt121	50H	353736	6262757	Dead Jarrah	20+	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt122	50H	353739	6262775	Jarrah	20+	>50	5+	Knot Hole	5-10	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	No Signs	No Signs	No	Depth of hollows unknown
wpt123	50H	353721	6262786	Jarrah	15-20	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt216	50H	353476	6262816	Jarrah	15-20	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt217	50H	353465	6262794	Jarrah	20+	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt218	50H	353452	6262774	Jarrah	15-20	>50	3	Branch	5-10	Branch	5-10	Branch	5-10					No Signs	No Signs	No	Depth of hollows unknown
wpt219	50H	353436	6262767	Marri	15-20	>50	0											No Signs	No Signs	No	
wpt220	50H	353436	6262784	Jarrah	10-15	>50	2	Spout Trunk	10-20	Spout Trunk	10-20							No Signs	No Signs	No	Depth of hollows unknown
wpt221	50H	353418	6262797	Jarrah	20+	>50	3	Spout Trunk	20+	Branch	5-10	Branch	5-10					No Signs	No Signs	Yes	Depth of hollows unknown
wpt222	50H	353388	6262789	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt223	50H	353379	6262786	Jarrah	15-20	>50	2	Spout Branch	10-20	Spout Trunk	20+							No Signs	No Signs	Yes	Depth of hollows unknown
wpt224	50H	353362	6262773	Jarrah	15-20	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt225	50H	353389	6262752	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt226	50H	353394	6262754	Jarrah	15-20	>50	1	Spout Branch	10-20									No Signs	No Signs	No	Depth of hollows unknown
wpt227	50H	353387	6262730	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt228	50H	353384	6262730	Jarrah	15-20	>50	1	Branch	10-20									No Signs	No Signs	No	Depth of hollows unknown
wpt229	50H	353404	6262740	Jarrah	10-15	>50	3	Branch	5-10	Branch	10-20	Branch	5-10					No Signs	No Signs	No	Depth of hollows unknown
wpt230	50H	353419	6262751	Jarrah	20+	>50	1	Fissure	10-20									No Signs	No Signs	No	Depth of hollows unknown

Waypoint Number	Zone	mE	mN	Tree Species	Tree Height (m)	DBH (>50cm)	Number of Hollows	Hollow Type 1	Hollow Size 1 (cm)	Hollow Type 2	Hollow Size 2 (cm)	Hollow Type 3	Hollow Size 3 (cm)	Hollow Type 4	Hollow Size 4 (cm)	Hollow Type 5	Hollow Size 5 (cm)	Occupancy	Chew Marks	Potential Cockatoo Nest Hollow	Comments
wpt231	50H	353448	6262756	Marri	20+	>50	0											No Signs	No Signs	No	
wpt232	50H	353448	6262759	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt233	50H	353449	6262762	Jarrah	15-20	>50	1	Branch	10-20									No Signs	No Signs	No	Depth of hollows unknown
wpt234	50H	353462	6262759	Marri	15-20	>50	0											No Signs	No Signs	No	
wpt235	50H	353476	6262765	Jarrah	20+	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt236	50H	353469	6262727	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt240	50H	353585	6262707	Jarrah	20+	>50	2	Branch	5-10	Spout Branch	10-20							No Signs	No Signs	No	Too shallow
wpt241	50H	353602	6262711	Jarrah	20+	>50	0											No Signs	No Signs	No	
wpt245	50H	353690	6262738	Marri	15-20	>50	0											No Signs	No Signs	No	
wpt246	50H	353682	6262745	Jarrah	15-20	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt247	50H	353686	6262772	Jarrah	15-20	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt248	50H	353612	6262785	Jarrah	20+	>50	1	Spout Branch	5-10									No Signs	No Signs	No	Depth of hollows unknown
wpt249	50H	353610	6262787	Jarrah	20+	>50	5+	Knot Hole	5-10	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt250	50H	353616	6262761	Jarrah	15-20	>50	2	Spout Branch	5-10	Spout Branch	10-20							No Signs	No Signs	No	Depth of hollows unknown
wpt251	50H	353640	6262764	Jarrah	20+	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Spout Trunk	20+	No Signs	No Signs	No	Too low and shallow
wpt252	50H	353624	6262745	Jarrah	20+	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt253	50H	353616	6262740	Marri	10-15	>50	1	Spout Trunk	20+									No Signs	No Signs	Yes	Depth of hollows unknown
wpt254	50H	353638	6262728	Dead Unknown	15-20	>50	2	Knot Hole	10-20	Branch	10-20							No Signs	No Signs	No	Depth of hollows unknown
wpt255	50H	353591	6262727	Jarrah	20+	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Branch	10-20	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt256	50H	353604	6262735	Jarrah	15-20	>50	5+	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt257	50H	353543	6262709	Jarrah	20+	>50	5+	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt258	50H	353534	6262717	Jarrah	15-20	>50	3	Knot Hole	10-20	Branch	5-10	Branch	10-20					No Signs	No Signs	No	Depth of hollows unknown
wpt259	50H	353526	6262718	Jarrah	20+	>50	1	Branch	5-10									No Signs	No Signs	No	Depth of hollows unknown
wpt260	50H	353508	6262726	Jarrah	20+	>50	5+	Branch	5-10	Branch	10-20	Branch	5-10	Spout Branch	10-20			No Signs	No Signs	No	Depth of hollows unknown
wpt261	50H	353526	6262761	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt262	50H	353518	6262806	Jarrah	20+	>50	0											No Signs	No Signs	No	
wpt263	50H	353560	6262765	Dead Unknown	20+	>50	5+	Knot Hole	10-20	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt264	50H	353538	6262848	Dead Unknown	10-15	>50	0											No Signs	No Signs	No	
wpt265	50H	353548	6262880	Marri	20+	>50	0											No Signs	No Signs	No	
wpt266	50H	353458	6262882	Marri	20+	>50	0											No Signs	No Signs	No	
wpt327	50H	353357	6262727	Jarrah	20+	>50	5+	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt328	50H	353372	6262732	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt330	50H	353344	6262732	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt333	50H	353341	6262755	Jarrah	15-20	>50	5+	Branch	5-10	Spout Branch	10-20	Branch	5-10	Branch	5-10	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt334	50H	353344	6262782	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt335	50H	353343	6262795	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt336	50H	353340	6262797	Jarrah	15-20	>50	4	Branch	<5	Branch	5-10	Branch	<5	Branch	5-10			No Signs	No Signs	No	Depth of hollows unknown
wpt337	50H	353348	6262801	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt338	50H	353344	6262811	Jarrah	15-20	>50	5+	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt343	50H	353268	6262781	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt344	50H	353298	6262786	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt345	50H	353304	6262782	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt346	50H	353299	6262774	Jarrah	15-20	>50	5+	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt347	50H	353287	6262764	Jarrah	15-20	>50	5+	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt348	50H	353306	6262761	Jarrah	15-20	>50	5+	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt349	50H	353314	6262755	Jarrah	15-20	>50	5+	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt350	50H	353317	6262763	Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt354	50H	353298	6262743	Dead Jarrah	15-20	>50	5+	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	Branch	5-10	No Signs	No Signs	No	Depth of hollows unknown
wpt412	50H	353261	6262767	Dead Jarrah	15-20	>50	0											No Signs	No Signs	No	
wpt413	50H	353269	6262773	Jarrah	15-20	>50	1	Spout Trunk	10-20									No Signs	No Signs	No	Depth of hollows unknown
wpt425	50H	353601	6262946	Marri	20+	>50	0											No Signs	No Signs	No	
wpt426	50H	354086	6263071	Marri	20+	>50	0											No Signs	No Signs	No	
wpt427	50H	354400	6263149	Marri	15-20	>50	0											No Signs	No Signs	No	

APPENDIX G

Significant Species Profiles

Carter's Freshwater Mussel *Westralunio carteri*

Status and Distribution: Listed as Priority 4 by DPaW and as Vulnerable by the ICUN. Carter's freshwater Mussel is the only freshwater mussel species endemic to south-western WA, ranging from the Moore River south to the Frankland River (Morgan *et al.* 2011).

Habitat: Occurs in greatest abundance in slower flowing streams with stable sediments that are soft enough for burrowing amongst woody debris and exposed tree roots. Salinity tolerance quite low (Morgan *et al.* 2011).

Likely presence in study area: No suitable habitat.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

Margaret River (Hairy) Marron *Cherax tenuimanus*

Status and Distribution: Listed as Scheduled 1 (Critically Endangered) under the *WC Act* and as Critically Endangered under the *EPBC Act*. The species is currently known from only eleven sites along a section of the Margaret River and occurs in an area less than 50 km in length.

Habitat: Information on the current distribution of the Hairy Marron indicates that the species requires relatively good quality water and a diversity of habitat structure (e.g. they generally prefer sandy areas, particularly where organic matter accumulates and access to shelter and refuge sites) and may struggle to persist in disturbed habitats.

Likely presence in study area: No suitable habitat

Potential impact of proposed development: No impact on this species will occur.

Balston's Pygmy Perch *Nannatherina balstoni*

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Morgan *et al.* (1996) states that this fish is the rarest of all the endemic fish of the south west. Status is defined as fairly secure by Allen *et al.* (2003) presumably given that, on the south coast, significant areas of habitat are within national parks. Confined to drainages and wetlands near the coast from between Margaret River and Two Peoples Bay. Historical records from Moore River.

Habitat: Acidic, tannin stained freshwater pools, streams and lakes within 30km of the coast, typically situated amongst peat flats. Prefers shallow water and is commonly found in association with tall sedge thickets (Allen *et al.* 2003). Morgan (1996) found them most common in shallow pools and creeks that often dry up in summer. Lower numbers were observed in the permanent major rivers surveyed.

Likely presence in study area: No suitable habitat

Potential impact of proposed development: No impact on this species will occur.

Mud Minnow *Galaxias munda*

Status and Distribution: Listed as Scheduled 1 under the *WC Act*. Morgan *et al.* (1996) found during their survey of south west rivers that this species was “rare throughout most of its distribution, but occasionally abundant in the headwaters and tributaries of rivers and in a number of shallow pools connected to streams”. In contrast Allen *et al.* (2003) states that this species is common in coastal drainages of south-western Australia between Albany and Margaret River, with an isolated population known from Gingin (Beatty 2010).

Habitat: Typically found in small flowing streams near submerged vegetation, occasionally in still water of ponds, swamps and roadside drains. Water is usually darkly tannin stained and acidic (pH 3.0 – 6.0) (Allen *et al.* 2003).

Likely presence in study area: No suitable habitat

Potential impact of proposed development: No impact on this species will occur.

Perth Lined Lerista *Lerista lineata*

Status and Distribution: Listed as Priority 3 by DPaW. Found in the lower west coast from Perth to Leschenault Peninsula (and recently at Kemerton - G Harewood pers. obs.). It has also been found at Rottnest Island and Garden Island (Storr *et al.* 1999). Found in the southern suburbs of Perth (Bush *et al.* 2002).

Habitat: This small species of skink inhabits white sands (Storr *et al.* 1999) under areas of shrubs and heath where it inhabits loose soil and leaf litter (Nevill 2005) particularly in association with banksias (Bush *et al.* 2002).

Likely presence in study area: This species has not been found south of Bunbury in recent times. The single documented record south of Bunbury (West

Busselton) is considered erroneous. This species is therefore considered unlikely to be present in the study area even if habitat was suitable.

Potential impact of proposed development: No impact on this species will occur.

Coastal Plains Ctenotus *Ctenotus ora*

Status and Distribution: Listed as Priority 1 by DPaW. *Ctenotus ora* is a recently described species of medium sized skink with a restricted range in the south-west of Western Australia, most of which has been cleared for agriculture and urban development. It cannot reliably be distinguished from the more widespread *C. labillardieri* except by DNA sequences, but the two species appear to have disjunct distributions. Based on only five specimens reliably identified as *Ctenotus ora*, the species is apparently restricted to the southern Swan Coastal Plain and Cape Naturaliste area, as far north as Pinjarra and south as far as Yallingup (Kay & Keogh 2012).

Habitat: Sandy substrates with low vegetation (including heath) in open *Eucalyptus/Corymbia* woodland over *Banksia* (Kay & Keogh 2012). Individuals have been found sheltering under *Banksia* logs on white sand, and trapped in eucalypt woodland with *Banksia* or peppermint mid-storey, or heath (Bamford *et al.* 2010). Open eucalypt woodland over *Banksia* and low vegetation on sandy coastal plain and coastal dunes (Wilson and Swan 2013)

Likely presence in study area: Twenty eight specimens of what is assumed to be *Ctenotus ora* were collected during the field survey period. No specimens were retained for DNA analysis as at the time they were identified as *C. labillardieri*, given the species revision had not been published at the time of the captures in December 2011.

Potential impact of development: Modification/loss of a very small area of habitat. Impacts unlikely to be significant given small impact area and the large areas of adjoining habitat.

Short-nosed Snake *Elapognathus minor*

Status and Distribution: Listed as Priority 2 by DPaW. Found north to Busselton and east to Two Peoples Bay (Storr *et al.* 2002).

Habitat: Restricted to the humid coastal plains of the deep south west (Storr *et al.* 2002). Inhabits heaths edging swamps though also known to inhabit wet sclerophyll forest. Shelters in low dense vegetation such as tussocks and sedges (Wilson and Swan 2013)

Likely presence in study area: Just outside of documented range. No suitable habitat.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

Southern Carpet Python *Morelia spilota imbricata*

Status and Distribution: The south western population is classified as Schedule 4 under the *WC Act*. This sub species has wide distribution within the south west but is uncommon. Occurs north to Geraldton and Yalgoo and east to Pinjin, Kalgoorlie, Fraser Range and Eyre (Storr *et al.* 2002). Records from Dalyellup (2007 Perkins Brothers Builders pers. comm.) and Peppermint Grove Beach (2006 Eleanor Bennett pers. comm.). Also know from Leschenault Conservation Park and in coastal dunes northwards including Yalgorup National Park (G Harewood pers. obs.).

Habitat: This species has been recorded from semi-arid coastal and inland habitats, Banksia woodland, Eucalypt woodlands, and grasslands. Most often found utilising hollow logs in addition the burrows of other animals for shelter. Often arboreal and will also use tree hollows for refuge.

Likely presence in study area: Status on-site is difficult to determine. Habitat appears suitable with areas of dense groundcover and hollow logs/trees. Typically only occurs in low densities.

Potential impact of proposed development: Modification/loss of a very small area of habitat. Impacts unlikely to be significant given small impact area and the large areas of adjoining habitat.

Great Egret *Ardea alba*

Status and Distribution: This species is listed as Schedule 3 under the *WC Act*, as migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. The Great Egret is common and very widespread in any suitable permanent or temporary habitat (Morcombe 2004).

Habitat: Wetlands, flooded pasture, dams, estuarine mudflats, mangroves and reefs (Morcombe 2004).

Likely presence in study area: Likely to utilise the manmade dams and possibly paddocks for foraging at times, in small numbers. This species would be an

infrequent, temporary visitor only. No potential for breeding on-site. Would not utilise forested areas for any purpose.

Potential impact of proposed development: No significant impact on this species or its preferred habitat will occur.

Cattle Egret *Ardea ibis*

Status and Distribution: This species is listed as Schedule 3 under the *WC Act*, as migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. The Cattle Egret is common in the north sections of its range but is an irregular visitor to the better watered parts of the state (Johnstone and Storr 1998). The population is expanding (Morcombe 2004). Observed infrequently in paddocks with cattle near Glen Iris, Bunbury (G. Harewood pers. obs.).

Habitat: Moist pastures with tall grasses, shallow open wetlands and margins, mudflats (Morcombe 2004).

Likely presence in study area: Likely to utilise the manmade dams and possibly paddocks for foraging at times, in small numbers. This species would be an infrequent, temporary visitor only. No potential for breeding on-site. Would not utilise forested areas for any purpose.

Potential impact of proposed development: No significant impact on this species or its preferred habitat will occur.

Migratory Shorebirds

A number of migratory shorebirds species are listed as potentially occurring in the general area. Specific species are not discussed.

Status and Distribution: Migratory shorebirds are listed under the *EPBC Act* and under international agreements to which Australia is a signatory. All species are either widespread summer migrants to Australia or residents. State and Federal conservation status varies between species. Most are also listed as Schedule 3 under the *WC Act*.

Habitat: Varies between species but includes beaches and permanent/temporary wetlands varying from billabongs, swamps, lakes, floodplains, sewerage farms, saltwork ponds, estuaries, lagoons, mudflats sandbars, pastures, airfields, sports fields and lawns.

Likely presence in study area: The study area contains no suitable habitat for migratory shorebirds to utilise.

Potential impact of proposed development: No impact on any species of migratory shorebird will occur.

Malleefowl *Leipoa ocellata*

Status and Distribution: This species is listed as Schedule 1 under the *WC Act* and as Vulnerable and Migratory under the *EPBC Act*. Originally common, but now generally rare to uncommon and patchily distributed.

Current distribution mainly southern arid and semi-arid zones, north to Shark Bay, Jingemarra, Colga Downs and Yeelirrie, east to Earnest Giles Range, Yeo Lake, lower Ponton Creek and to Eucla and west and south to Cockleshell Gully, the Wongan Hills, Stirling Range, Beaufort Inlet, Hatters Hill, Mt Ragged and Point Malcolm (Johnstone and Storr 1998).

Habitat: Mainly scrubs and thickets of mallee *Eucalyptus* spp., boree *Melaleuca lanceolata* and bowgada *Acacia linophylla*, also dense litter forming shrublands.

Likely presence in study area: This species is locally and regionally extinct.

Potential impact of proposed development: No impact on this species will occur.

Australasian Bittern *Botaurus poiciloptilus*

Status and Distribution: Classified as Schedule 1 under the *WC Act* and as Endangered under the *EPBC Act*. The species is uncommon to rare (Morcombe, 2004), but locally common in wetter parts of south west (Johnstone and Storr 1998). Occurs north to Moora and east to Mt Arid (Johnstone and Storr 1998).

Habitat: Freshwater wetlands, occasionally estuarine; prefers heavy vegetation (Morcombe 2004) such as beds of tall dense *Typha*, *Baumea* and sedges in freshwater swamps (Johnstone and Storr 1998).

Likely presence in study area: No suitable habitat

Potential impact of proposed development: No impact on this species will occur.

Glossy Ibis *Plegadis falcinellus*

Status and Distribution: This species is listed as Schedule 3 under the *WC Act* and as Migratory under the *EPBC Act* and under international agreements to

which Australia is a signatory. The Glossy Ibis frequents swamps and lakes throughout much of the Australian mainland, but is most numerous in the north. It is a non-breeding visitor to Tasmania and the south-west of Western Australia. The Glossy Ibis is both migratory and nomadic. Its range expands inland after good rains, but its main breeding areas seem to be in the Murray-Darling Basin of New South Wales and Victoria, the Macquarie Marshes in New South Wales, and in southern Queensland. Glossy Ibis often move north in autumn, then return south to their main breeding areas in spring and summer (Pizzey & Knight 2012).

Habitat: Well vegetated wetlands, wet pastures, rice fields, floodwaters, floodplains, brackish or occasionally saline wetlands, mangroves, mudflats, occasionally dry grasslands (Pizzey & Knight 2012).

Likely presence in study area: Very occasionally recorded in the general area however the study area contains no habitat of significance to this species and it is unlikely to utilise the area except on very rare occasions.

Potential impact of proposed development: No significant impact on this species or its preferred habitat will occur.

White-bellied Sea Eagle *Haliaeetus leucogaster*

Status and Distribution: This species is listed as Schedule 3 under the *WC Act*, as migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. White-bellied Sea Eagles are moderately common to common on Kimberley and Pilbara islands, coasts and estuaries, on Bernier, Dorre and Dirk Hartog Is., in Houtman Abrolhos and in the Archipelago of the Recherche; rare to uncommon elsewhere (Johnstone and Storr 1998). Also found in New Guinea, Indonesia, China, southeast Asia and India. Scarce near major coastal cities (Morcombe 2004).

Habitat: They nest and forage usually near the coast over islands, reefs, headlands, beaches, bays, estuaries, mangroves, but will also live near seasonally flooded inland swamps, lagoons and floodplains, often far inland on large pools of major rivers. Established pairs usually sedentary, immatures dispersive (Morcombe 2004). White-bellied Sea-Eagles build a large stick nest, which is used for many seasons in succession.

Likely presence in study area: No suitable habitat

Potential impact of proposed development: No impact on this species will occur.

Peregrine Falcon *Falco peregrinus*

Status and Distribution: This species is listed as Schedule 4 under the *WC Act*. Individuals of this species are uncommon/rare but wide ranging across Australia. Moderately common at higher levels of the Stirling Range, uncommon in hilly, north west Kimberley, Hamersley and Darling Ranges; rare or scarce elsewhere (Johnstone and Storr 1998).

Habitat: Diverse from rainforest to arid shrublands, from coastal heath to alpine (Morcombe 2004). Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes (Johnstone and Storr 1998). The species utilises the ledges, cliff faces and large hollows/broken spouts of trees for nesting. It will also occasionally use the abandoned nests of other birds of prey.

Likely presence in study area: The species potentially utilises some sections of the study area as part of a much larger home range. No actual nest sites observed.

Potential impact of proposed development: No significant impact on this species is anticipated. This species will continue to utilise the area, if it does now, despite any proposed development.



Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Found in the humid and subhumid south west, mainly hilly interior, north to Gingin and east to Mt Helena, Christmas Tree Well, North Bannister, Mt Saddleback, Rock Gully and the upper King River (Johnstone and Storr 1998).

Habitat: Eucalypt forests, feeds on marri, jarrah, blackbutt, karri, sheoak and snottygobble. The forest red-tailed black cockatoo nests in the large hollows of marri, Jarrah and Karri (Johnstone and Kirkby 1999). In Marri, the nest hollows of the Forest Red-tailed Black Cockatoo range from 8-14m above ground, the entrance is 12 – 41cm in diameter and the depth is one to five metres (Johnstone and Storr 1998).

Breeding commences in winter/spring. There are few records of breeding in the Forest Red-tailed Black Cockatoo (Johnstone and Storr 1998), but eggs are laid in October and November (Johnstone 1997; Johnstone and Storr 1998). Recent data however indicates that breeding in all months of the year occurs with peaks in spring and autumn–winter (Ron Johnstone pers comms). Incubation period 29 – 31 days. Young fledge at 8 to 9 weeks (Simpson and Day 2004).

J	F	M	A	M	J	J	A	S	O	N	D

 Period in which breeding is most likely to commence
 Period in which fledging could extend through

Likely presence in study area: Heard calling on several occasions and foraging evidence attributed to this species found within the study area (chewed jarrah fruits). All marri, mountain marri and jarrah trees and a range of other plant species within the study area represents potential foraging habitat for this species. Larger trees (>50cm DBH) are considered potential breeding habitat by DoE (SEWPaC 2012). This species may also roost on site on occasions. Several trees with evidence of roosting activity observed within the study area.

Potential impact of proposed development: Loss of foraging, breeding and roosting opportunities. The exact extent of clearing is not defined at this stage but any clearing of native remnant vegetation may be regarded as having at least an “uncertain risk of significant impact” using referral guidelines issued by DoE (SEWPaC 2012). The removal of any of the identified black cockatoo habitat trees (i.e. DBH >50cm) will be regarded as having a “high risk of significant” impact (SEWPaC 2012).

Baudin’s Black- Cockatoo *Calyptorhynchus baudinii*



Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Confined to the south-west of Western Australia, north to Gidgegannup, east to Mt Helena, Wandering, Quindanning, Kojonup, Frankland and King River and west to the eastern strip of the Swan Coastal Plain including West Midland, Byford, Nth Dandalup, Yarloop, Wokalup and Bunbury (Johnstone and Storr 1998). On the southern Swan Coastal Plain this cockatoo is in some areas resident but mainly a migrant moving from the deep south-west to the central and northern Darling Range. Between March and September most flocks move north and are concentrated in the northern parts of the Darling Range. During this period birds forage well out onto the southern Swan Coastal Plain to areas such as Harvey, Myalup, Bunbury, Capel, Dunsborough and Meelup. While generally more common in the Darling Range this species can also be common on parts of the southern Swan Coastal Plain especially in mid-August – September when flocks begin to return to their breeding quarters (Johnstone 2008).

Habitat: Mainly eucalypt forests where it feeds primarily on the Marri seeds, (Morcombe 2004), Banksia, Hakeas and *Erodium* sp. Also strips bark from trees in search of beetle larvae (Johnstone and Storr 1998). This species of cockatoo

nests in large tree hollows, 30–40 cm in diameter and more than 30 cm deep (Saunders 1974).

Baudin's Black-Cockatoo breeds in late winter and spring, from August to November or December (Gould 1972; Johnstone 1997; Saunders 1974; Saunders *et al.* 1985). Eggs laid in October (Johnstone and Storr 1998). Based on observations at currently known nest sites breeding mainly occurs within the October-December period (Ron Johnstone pers comms). Incubation is 28 – 30 days. Young fledge at 8 to 9 weeks (Simpson and Day 2004).

J	F	M	A	M	J	J	A	S	O	N	D

 Period in which breeding is most likely to commence
 Period in which fledging could extend through

Likely presence in study area: Foraging evidence attributed to this species found within the study area (chewed marri fruits). All marri, mountain marri, banksia trees and a range of other plant species within the study area represents potential foraging habitat for this species. Larger trees (>50cm DBH) are considered potential breeding habitat by DoE (SEWPaC 2012). This species may also roost on site on occasions. Several trees with evidence of roosting activity observed within the study area.

Potential impact of proposed development: Loss of foraging, breeding and roosting opportunities. The exact extent of clearing is not defined at this stage but any clearing of native remnant vegetation may be regarded as having at least an “uncertain risk of significant impact” using referral guidelines issued by DoE (SEWPaC 2012). The removal of any of the identified black cockatoo habitat trees (i.e. DBH >50cm) will be regarded as having a “high risk of significant” impact (SEWPaC 2012).

Carnaby’s Black- Cockatoo *Calyptorhynchus latirostris*



Status and Distribution: Carnaby’s Black Cockatoo is listed as Scheduled 1 under the *WC Act* and as Endangered under the *EPBC Act*. Confined to the south-west of Western Australia, north to the lower Murchison River and east to Nabawa, Wilroy, Waddi Forest, Nugadong, Manmanning, Durokoppin, Noongar (Moorine Rock), Lake Cronin, Ravensthorpe Range, head of Oldfield River, 20 km ESE of Condingup and Cape Arid; also casual on Rottnest Island (Johnstone and Storr 1998).

Habitat: Forests, woodlands, heathlands, farms; feeds on Banksia, Hakeas and Marri. Carnaby’s Cockatoo has specific nesting site requirements. Nests are mostly in smoothed-barked eucalypts with the nest hollows ranging from 2.5 to 12m above the ground, an entrance from 23-30cm diameter and a depth of 0.1-2.5m (Johnstone and Storr, 1998).

Breeding occurs in winter/spring mainly in eastern forest and wheatbelt where they can find mature hollow bearing trees to nest in (Morcombe 2004). Judging from records in the Storr-Johnstone Bird Data Bank, this species is currently expanding its breeding range westward and south into the jarrah – marri forest of the Darling Scarp and into the Tuart forests of the Swan Coastal Plain including the region between Mandurah and Bunbury. Carnaby’s Black Cockatoo has been known to breed close to the town of Mandurah, as well as at Dawesville, Lake Clifton and Baldivis (pers. comm., Ron Johnstone, WA Museum) and there are small resident populations on the southern Swan Coastal Plain near Mandurah, Lake Clifton and near Bunbury. At each of these sites the birds forage in remnant vegetation and adjacent pine plantations (Johnstone 2008).

Carnaby’s Black-Cockatoo lays eggs from July or August to October or November, with most clutches being laid in August and September (Saunders 1986). Most of the breeding is in September through to December (Ron Johnstone pers comms). Birds in inland regions may begin laying up to three weeks earlier than those in coastal areas (Saunders 1977). The female incubates the eggs over a period of 28-29 days. The young depart the nest 10–12 weeks after hatching (Saunders 1977; Smith & Saunders 1986).

J	F	M	A	M	J	J	A	S	O	N	D

 Period in which breeding is most likely to commence
 Period in which fledging could extend through

Likely presence in study area: Small flocks of this species observed flying over the study area on occasions and foraging evidence attributed to this species found within the study area (chewed marri and jarrah fruits). All marri, mountain marri, jarrah, banksia trees and a range of other plant species within the study area represents potential foraging habitat for this species. Larger trees (>50cm DBH) are considered potential breeding habitat by DoE (SEWPaC 2012). This species may also roost on site on occasions. Several trees with evidence of roosting activity observed within the study area.

Potential impact of proposed development: Loss of foraging, breeding and roosting opportunities. The exact extent of clearing is not defined at this stage but any clearing of native remnant vegetation may be regarded as having at least an “uncertain risk of significant impact” using referral guidelines issued by DoE (SEWPaC 2012). The removal of any of the identified black cockatoo habitat trees (i.e. DBH >50cm) will be regarded as having a “high risk of significant” impact (SEWPaC 2012).

Muir’s Corella *Cacatua pastinator pastinator*

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable and Migratory under the *EPBC Act*. Locally common in farmlands but generally uncommon and patchily distributed. Now confined to small part of the subhumid south western interior from Boyup Brook and Qualeup south to the Perup River, Lake Muir and Cambellup. Casual further east (Johnstone and Storr 1998).

Habitat: Mainly partly cleared eucalypt forests. Attracted to bulbs of guildford grass, *Drosera* spp, orchids, seeding oats and clover. Largely dependent on farming (Johnstone and Storr 1998).

Likely presence in study area: The project area is outside of this species current documented range.

Potential impact of proposed development: No impact on this species is anticipated.

Barking Owl *Ninox connivens connivens*

Status and Distribution: Listed as Priority 2 by DPaW. Found north to Perth (formerly) and east to Northam, Katanning and nearly to Bremer Bay. Declining in south west (Johnstone and Storr 1998).

Habitat: Dense vegetation, especially forest and thickets of waterside vegetation such as melaleucas (Johnstone and Storr 1998). Roosts in tree hollows.

Likely presence in study area: Habitat within the study area appears unsuitable for this species to utilise.

Potential impact of proposed development: No impact on this species is anticipated.

Masked Owl *Tyto novaehollandae novaehollandae*

Status and Distribution: Listed as Priority 3 by DPaW. Found north to Yanchep and east to Yealering, Gnowangerup and Albany, casual further north. Locally common in south west but generally uncommon (Johnstone and Storr 1998).

Habitat: Roosts and nests in heavy forest, hunts over open woodlands and farmlands (Morcombe 2004). Probably breeding in forested deep south west with some autumn–winter wanderings northwards (Johnstone and Storr 1998).

Likely presence in study area: May occasionally reside in general area though status uncertain. May utilise forested areas for roosting and hunt over cleared paddocks.

Potential impact of proposed development: No significant impact on this species is anticipated. This species will continue to utilise the area, if it does now, despite any proposed development.

Fork-tailed Swift *Apus pacificus*

Status and Distribution: The Fork-tailed Swift is listed as Schedule 3 under the *WC Act*, as migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. It is a summer migrant (Oct-Apr) to Australia (Morcombe 2004).

Habitat: Low to very high airspace over varied habitat from rainforest to semi desert (Morcombe 2004).

Likely presence in study area: It is potentially a very occasional summer visitor to air space above the study area but is entirely aerial and largely independent of terrestrial habitats. Not listed as a potential species as it is only likely to occur in the general area on very rare occasions.

Potential impact of proposed development: No impact on this species will occur.

Rainbow Bee-eater *Merops ornatus*

Status and Distribution: This species is listed as Schedule 3 under the *WC Act*, as Migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. The Rainbow Bee-eater is a common summer migrant to southern Australia but in the north they are resident (Morcombe 2004).

Habitat: Open Country, of woodlands, open forest, semi arid scrub, grasslands, clearings in heavier forest, farmlands (Morcombe 2004). Breeds underground in areas of suitable soft soil firm enough to support tunnel building.

Likely presence in study area: Heard calling during field survey work in December 2011. May breed in some sections of the study area where ground conditions permit.

Potential impact of proposed development: No “significant” impact on this species is anticipated as individuals’ present at any one time are unlikely to represent a substantial proportion of the population. It can be expected to continue to utilise the area, if it does now, despite any future development.

Chuditch *Dasyurus geoffroi*

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Formerly occurred over nearly 70 per cent of Australia. The Chuditch now has a patchy distribution throughout the Jarrah forest and mixed Karri/Marri/Jarrah forest of southwest Western Australia. Also occurs in very low numbers in the Midwest, Wheatbelt and South Coast Regions with records from Moora to the north, Yellowdine to the east and south to Hopetoun. Has been translocated to various sites between Cape Arid and Kalbarri.

Habitat: Chuditch are known to have occupied a wide range of habitats from woodlands, dry sclerophyll (leafy) forests, riparian vegetation, beaches and deserts. Riparian vegetation appears to support higher densities of Chuditch, possibly because food supply is better or more reliable and better cover is offered by dense vegetation. Chuditch appear to utilise native vegetation along road sides in the wheatbelt (CALM 1994). The estimated home range of a male Chuditch is over 15 km² whilst that for females is 3-4 km² (Sorena and Soderquist 1995). This species is rarely recorded on the coastal plain (Dell 2000).

Likely presence in study area: No evidence of this species found during the survey period. This species may however occur on some occasions as it has previously been recorded in state forest areas of the south west.

Potential impact of proposed development: This species appears to be currently absent from the study area and based on this information it is considered unlikely that the proposed development will have any significant impact on this species despite the fact that on some occasions it may frequent the area.

Southern Brush-tailed Phascogale *Phascogale tapoatafa ssp*

Status and Distribution: Listed as Scheduled 1 under the *WC Act*. Present distribution is believed to have been reduced to approximately 50 per cent of its former range. Now known from Perth and south to Albany, west of Albany Highway. Occurs at low densities in the northern Jarrah forest. Highest densities occur in the Perup/Kingston area, Collie River valley, and near Margaret River and Busselton (DPaW information pamphlet). Records are less common from wetter forests.

Habitat: This subspecies has been observed in dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover. A nocturnal carnivore relying on tree hollows as nest sites. The home range for a female Brush-tailed Phascogale is estimated at between 20 and 70 ha, whilst that for males is given as twice that of females. In addition, they tend to utilise a large number of different nest sites (~ 20) throughout their range (Soderquist, 1995). Rhind's 1998 study indicated a preference for hollows in older and senescent or dead trees and small hollow entrances (Rhind 1998).

Likely presence in study area: This species was recorded within the state forest area during the field survey (Camera site 1).

Potential impact of proposed development: Loss/modification of an area of potential habitat in particular hollow bearing trees. Potential for individuals to be killed or injured during clearing operations.

Quenda *Isodon obesulus fusciventer*

Status and Distribution: Listed as Priority 5 by DPaW. Widely distributed in the south west from near Cervantes north of Perth to east of Esperance, patchy distribution through the Jarrah and Karri forest and on the Swan Coastal Plain, and inland as far as Hyden. Has been translocated to Julimar State Forest, Hills Forest Mundaring, Tutanning Nature Reserve, Boyagin Nature Reserve, Dongolocking Nature Reserve, Leschenault Conservation Park, and Karakamia and Paruna Sanctuaries (DPaW information pamphlet - ND) and Nambung National Park (DPaW pers. comm.)

Habitat: Dense scrubby, often swampy, vegetation with dense cover up to one metre high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Populations inhabiting jarrah and wandoo forests are usually associated with watercourses. Quendas can thrive in more open habitat subject to exotic predator control (DPaW information pamphlet).

Likely presence in study area: This species was recorded within the national park area (Trap Site 3) during the field survey. Appears to be favouring areas with the densest groundcover as it was not captured or observed in areas with relatively sparse groundcover.

Potential impact of proposed development: This species was not recorded in the area of main impact and is possibly absent from most of this area due to relatively sparse groundcover. However there is some potential for the loss of some habitat and death of individuals in some small areas of Sate Forest 33.

Bilby *Macrotis lagotis*

Status and Distribution: The Bilby is listed as Schedule 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Current distribution in suitable habitat from Tanami Desert west to near Broome and south to Warburton. Former distribution extended south to Margaret River, though apparently absent from the coastal plain (Burbidge 2004).

Habitat: Current habitat included Acacia shrublands, spinifex and hummock grassland (Menkhorst and Knight 2011).

Likely presence in study area: Regionally extinct.

Potential impact of proposed development: No impact on this species will occur as a consequence of the proposal proceeding.

Western Ringtail Possum *Pseudocheirus occidentalis*

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Common in suitable habitat (de Tores 2008). The highest densities of this species are recorded in peppermint tree habitat near Busselton area; relatively high densities are found in jarrah/marri forest at Perup (de Tores 2008). The species is also widespread and relatively common in vegetated remnants within the southern Swan Coastal Plain and along the Whicher Scarp between Bunbury and Busselton (G. Harewood per. obs.). Most northern known natural population is centred on the Binningup townsite.

The western ringtail possum has a restricted distribution in south-western Western Australia. Most known populations (natural and translocated) are now restricted to near coastal areas of the south west from the Dawesville area to the Waychinicup National Park. Inland, it is also known to be relatively common in a small part of the lower Collie River valley, the Perup Nature Reserve and surrounding forest blocks near Manjimup. It has also been recorded in stands of

Peppermint near the Harvey River and in jarrah/marri forest near Collie; however, the long term persistence of the species in these areas is not confirmed (de Tores *et al.* 2004). The western ringtail was formerly more widespread: in the 1970s it was known from Casuarina woodlands in the wheatbelt near Pingelly (south-east of Perth), and it is thought to have once occurred throughout much of south-western Western Australia (but not necessarily continuously distributed) (Maxwell *et al.* 1996; de Tores 2008).

Habitat: The western ringtail possum was once located in a variety of habitats including coastal peppermint, coastal peppermint-tuart, jarrah-marri associations, sheoak woodland, and eucalypt woodland and mallee. Coastal populations mostly inhabit peppermint-tuart associations with highest densities in habitats with dense, relatively lush vegetation. In these areas the main determinants of suitable habitat for WRPs appears to be the presence of *Agonis flexuosa* either as the dominant tree or as an understorey component of eucalypt forest or woodland (Jones *et al.* 1994a). Inland, the largest known populations occur in the upper Warren area east of Manjimup (Wayne *et al.* 2005). In this area the peppermint tree is naturally absent and jarrah-marri associations constitute the species refuge and foraging habitat. In areas where peppermint is absent or rare WRPs have been observed feeding predominately on young jarrah, *Nuytsia floribunda* and *Allocasuarina fraseriana* (G Harewood pers. obs.).

Likely presence in study area: No evidence of this species was found within the bounds of the study area despite two repeat night surveys and extensive daytime transects across the site. Based on this information it is concluded to be absent from the site despite the presence of some areas of suitable habitat.

Potential impact of proposed development: Based on available information gathered during the two field surveys no significant impact on this species is anticipated as it appears to be absent from areas that may be impacted upon.

Quokka *Setonix brachyurus*

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Rare and restricted in south west W.A. from south of Perth to Two Peoples Bay. The distribution of the Quokka includes Rottnest and Bald Islands, and at least 25 known sites on the mainland, including Two Peoples Bay Nature Reserve, Torndirrup National Park, Mt Manypeaks National Park, Walpole-Nornalup National Park, and various swamp areas through the south-west forests from Jarrahdale to Walpole. Only known population on the coastal plain is located just south of Bunbury (Stratham).

Habitat: Mainland populations of this species are currently restricted to densely vegetated coastal heaths, swamps, riverine habitats including tea-tree thickets on sandy soils along creek systems where they are less vulnerable to predation. The species is nocturnal.

Likely presence in study area: A population of this species could not persist within the habitats present with the study area.

Potential impact of proposed development: No impact on this species will occur.

Woylie *Bettongia penicillata ogibyi*

Status and Distribution: Listed as Schedule 1 under the *WC Act* and as Endangered under the *EPBC Act*. Restricted to remnant habitat patches in south west WA where populations are managed by way of fox control and reintroduction programs (e.g. Batalling State Forest, Avon Valley, Walyunga National Park and Paruna Sanctuary). Woylie populations have declined by about 80% since 2001. The declines of affected populations in Western Australia and South Australia have been rapid, substantial (>90% lost) and apparently biased toward the largest and most important populations. The declines are continuing in some areas and as yet there have been no clear signs of a sustained post decline recovery. Most of the remaining unaffected populations are small (<300 individuals), isolated and inherently vulnerable (DEC 2009).

Habitat: Open forest and woodland with a low, dense, understorey of tussock grasses or woody scrub. Formerly occurred in a wider range of habitats including spinifex hummock grasslands.

Likely presence in study area: Historically this species has rarely if ever been recorded in this general area. Can be regarded as being locally extinct.

Potential impact of proposed development: No significant impact on this species is anticipated as it is unlikely to utilise the study area for any purpose.

Western Brush Wallaby *Macropus irma*

Status and Distribution: Listed as Priority 4 by DPaW. The Western Brush Wallaby is distributed across the south-west of Western Australia from north of Kalbarri to Cape Arid (DPaW information pamphlet).

Habitat: The species optimum habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets.

It is also found in some areas of mallee and heathland, and is uncommon in karri forest (DPaW information pamphlet).

Likely presence in study area: A single individual of this species was seen within the national park area during the December 2011 survey period.

Potential impact of proposed development: Potential for the modification/loss of a small area of habitat. Impacts are however very unlikely to be significant given the small impact area and the large areas of adjoining habitat.

Western False Pipistrelle *Falsistrellus mackenziei*

Status and Distribution: Listed as Priority 4 by DPaW and as Vulnerable by the ICUN. Confined to south west W.A. south of Perth and east to the wheat belt. Most records from karri forests but also recorded in wetter stands of jarrah and tuart and woodlands on the Swan Coastal Plain (Menkhorst and Knight 2011). Range appears to be contracting southwards, presumably due to drying climate. Author has recorded this species at Kemerton and Stratham.

Habitat: This species of bat occurs in high forest and coastal woodlands. It roosts in small colonies in tree hollows and forages at canopy level and in the cathedral-like spaces between trees.

Likely presence in study area: This species was not recorded during the two filed survey periods and it appears based on this information to be currently absent from the area.

Potential impact of proposed development: Potential for the modification/loss of a small area of habitat. Impacts are however very unlikely to be significant given the small impact area, the large areas of adjoining habitat and the fact that it appears to be absent from the area.

Water Rat *Hydromys chrysogaster*

Status and Distribution: Listed as Priority 4 by DPaW. The water rat is widely distributed around Australia and its offshore islands, New Guinea and some adjacent islands. It occurs in fresh brackish water habitats in the south-west of Western Australia, but occurs in marine environments along the Pilbara coastline and offshore islands. Previous survey work in the south west suggested this species is relatively common and widespread though difficult to capture (Christensen *et al.* 1985, How *et al.* 1987). Persists in the Preston River (G. Harewood pers. obs)

Habitat: The water rat occupies habitat in the vicinity of permanent water, fresh, brackish or marine. Likely to occur in all major rivers and most of the larger streams as well as bodies of permanent water in the lower south west (Christensen *et al* 1985).

Likely presence in study area: No suitable habitat.

Potential impact of proposed development: No impact on this species will occur.

APPENDIX H

Invertebrate Identification Reports

Invertebrate specimens

ID	Type	Date of Capture	Trap Site	Lat	Long	Datum	# specimens
13	Spider	2-Dec-2011	1.07	33° 45' 55"S	115° 25' 14"E	(WGS84)	1
14	Spider	2-Dec-2011	2.06	33° 45' 57"S	115° 24' 55"E	(WGS84)	1
15	Spider	3-Dec-2011	2.04	33° 45' 55"S	115° 24' 54"E	(WGS84)	1
16	Spider	3-Dec-2011	2.04	33° 45' 55"S	115° 24' 54"E	(WGS84)	1
17	Spider	4-Dec-2011	5.05	33° 45' 56"S	115° 25' 06"E	(WGS84)	1
18	Scorpion	4-Dec-2011	3.04	33° 46' 16"S	115° 25' 28"E	(WGS84)	1
19	Scorpion	4-Dec-2011	4.02	33° 46' 14"S	115° 25' 13"E	(WGS84)	1
20	Spider	4-Dec-2011	2.08	33° 45' 58"S	115° 24' 55"E	(WGS84)	1
21	Spider	4-Dec-2011	1.03	33° 45' 53"S	115° 25' 13"E	(WGS84)	1
22	Scorpion	5-Dec-2011	3.07	33° 46' 14"S	115° 25' 27"E	(WGS84)	1
23	Scorpion	5-Dec-2011	1.10	33° 45' 58"S	115° 25' 14"E	(WGS84)	1
24	Scorpion	6-Dec-2011	1.01	33° 45' 52"S	115° 25' 13"E	(WGS84)	1
25	Spider	8-Dec-2011	2.01	33° 45' 53"S	115° 24' 54"E	(WGS84)	1

ScorpionID

172D Odin Road, Innaloo, WA 6018 | Ph: 0457 11 13 17 | email: evolsche@gmail.com

Whicher Range Scorpion Identification Report

Report ID: GH.WR.2012.01

Prepared for: Greg Harewood

By Dr Erich S. Volschenk

Tuesday, 21 February 2012

Greg Harewood is undertaking a short-range endemic survey at Whicher Range, and has requested:

- Taxonomic identifications of scorpion from the survey;
- SRE assessment of the species represented in the collection, and;
- Lodgement of these specimens in the Western Australian Museum Arachnology Collection

The collection is comprised of 5 samples.

FAMILY: Urodacidae Pocock, 1893

The family Urodacidae is endemic to Australia (Fet 2000; Prendini 2000; Prendini 2003; Volschenk *et al.* 2000) where it is represented by the genera *Urodacus* Peters, 1861 and *Aops* Volschenk and Prendini, 2008.

GENUS: *Urodacus* Peters, 1861

Urodacus has been considered a member of the family Scorpionoidea for many years, but in a revision of the superfamily Scorpionoidea Latreille, Prendini (Prendini 2000) placed *Urodacus* in its own family. Unlike the species designations for Buthidae, LE Koch's (Koch 1977) species' of *Urodacus* have been mostly supported by subsequent authors (Harvey & Volschenk 2002; Volschenk & Prendini 2008; Volschenk *et al.* 2000). The biggest issue confronting *Urodacus* taxonomy is the number of undescribed species being uncovered through current revisionary work (Volschenk unpublished data). Currently 22 species of *Urodacus* are described; however, this may represent as little as 20% of the real diversity of this genus in Australia. *Urodacus* appears to be most diverse in Western Australia and few species are recorded east of the Great Dividing Range in eastern Australia. *Urodacus* contains both widespread and SRE species. During a large-scale survey of the pilbara fauna, Volschenk, *et al.* (2010) recorded nine undescribed species and only one formerly describes species were reported in that study.

Species: *Urodacus novaehollandiae* Peters, 1861

SRE STATUS

Urodacus novaehollandiae is not an SRE.

TAXONOMIC RESOLUTION

Urodacus novaehollandiae is a well-defined and clearly recognised species. There appears to be two colour variants, one pale form on the coastal plain, and a darker form on the Darling Escarpment and on the Yilgarn plateau. Other than differing in their intensity of colouration, these forms are extremely similar and currently considered to be one species. Ongoing molecular work on this species is under-way to investigate phylogeography of this species.

DISTRIBUTION

Urodacus novaehollandiae is widespread in south-western WA.

RECOMENDATIONS

Urodacus novaehollandiae is not an SRE and no management is recommended.

WAM Rego.	Client Rego.	♂	♀	Juv.	Location	Notes	Identified by
114244	GH.19-4.02	1	0	0	Yoongarillup - Whicher Range	4.02	
114218	GH.22-3.07	0	1	0	Yoongarillup - Whicher Range	3.07	
114245	GH.23-1.1	1	0	0	Yoongarillup - Whicher Range	1.1	
114243	GH.24-1.01	0	0	1	Yoongarillup - Whicher Range	1.01	
114246	GH.18-3.04	0	0	1	Yoongarillup - Whicher Range	3.04	

Number of samples: 5

References

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PHOENIX

ENVIRONMENTAL SCIENCES

Short-range endemic invertebrates from Yoongarillup, Whicher Range, Western Australia

Prepared for Greg Harewood

March 2012

Taxonomic Report



Short-range endemic invertebrates from Yoongarillup, Whicher Range, Western Australia

Prepared for Greg Harewood

Taxonomic report

Author/s: Volker W. Framenau

Reviewer/s:

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Submitted to: Greg Harewood

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Phoenix Environmental Sciences Pty Ltd

1/511 Wanneroo Rd BALCATTWA WA 6021

P: 08 9345 1608

F: 08 6313 0680

E: admin@phoenixenv.com.au

Project code: T028

Contents

EXECUTIVE SUMMARY	III
1 SCOPE OF WORKS	1
2 BACKGROUND	1
2.1.1 Short-range endemic invertebrates.....	1
2.1.2 Categories of short-range endemism	3
2.2 Identification and personnel.....	4
2.3 Taxonomy and nomenclature	5
2.4 Specimen depository	5
3 RESULTS	6
3.1 Summary	6
3.2 Mygalomorphae (Trapdoor Spiders).....	7
3.2.1 Family Nemesiidae	7
4 REFERENCES	9
APPENDIX 1 IDENTIFICATION SRE INVERTEBRATES FROM YOONGARILLUP.....	11

List of Tables

Table 2-1 Phoenix SRE categories reflecting survey, taxonomic and identification uncertainties.....	4
Table 2-2 Phoenix personnel involved in identification.....	4
Table 2-3 Nomenclatural references, morphospecies designations and reference collections for the invertebrates of Yoongarillup, Whicher Range	5
Table 3-1 Status of SRE target invertebrates from Yoongarillup, Whicher Range	6

EXECUTIVE SUMMARY

In January 2012, Phoenix Environmental Sciences Pty Ltd (Phoenix) was commissioned by Greg Harewood to identify invertebrates collected at Yoongarillup, Whicher Range. A total of eight samples were identified and screened for short-range endemic (SRE) taxa.

There are uncertainties in determining the range-restrictions of many invertebrates in Western Australia due to lack of surveys, lack of taxonomic resolutions within target taxa and problems in identifying certain life stages. To account for these uncertainties Phoenix uses a three-tier categorisation for short-range endemism: confirmed SRE, likely SRE and potential SRE.

The material included two species of *Aname* (*A. tepperi*, *Aname* 'MYG184') and a single species of *Yilgarnia* (*Yilgarnia* 'MYG248'), all of the mygalomorph spider family Nemesiidae.

None of the species presented is considered an SRE.

1 SCOPE OF WORKS

In January 2012, Phoenix Environmental Sciences Pty Ltd (Phoenix) was commissioned by Greg Harewood to identify terrestrial invertebrates collected at Yoongarillup, Whicher Range, south-west WA. A total of eight samples were screened for short-range endemic (SRE) taxa.

2 BACKGROUND

2.1.1 Short-range endemic invertebrates

Short-range endemic fauna (also known as narrow-range taxa) are defined as animals that display restricted geographic distributions, nominally less than 10,000 km², that may also be disjunct and highly localised (Harvey 2002; Ponder & Colgan 2002). Short-range endemism in terrestrial arthropods is believed to have evolved through two primary processes (Harvey 2002; Ponder & Colgan 2002):

- **Relictual short-range endemism:** relictual SREs are thought to have had wider distributions during more mesic geological periods. Australia's aridification over the last 60 million years resulted in a contraction of the ranges of these species into relatively small habitat pockets where moist conditions persist (relictual Gondwanan habitats). Evolutionary processes over long periods of isolation typically resulted in each population developing into a distinctive species. Millipedes and terrestrial snails are typical relictual SREs and they are generally found in deep gullies often on the south-facing slopes of mountains, hills and ridges. Relictual SREs often inhabit areas with: high rainfall, areas where topography induces fog, areas with permanent water (swamps, creek lines and river systems) or deep litter beds. Sometimes habitats have various combinations of these features.
- **Habitat specialisation:** habitat specialist SREs are restricted to specific isolated habitat types. Unlike relictual SREs in mesic habitats, habitat specialist SREs are restricted by environmental parameters other than microclimatic, moist conditions. Such habitat islands include rocky outcrops (pseudoscorpions in the genus *Synsphyronus* or selenopid spiders are typical examples here), salt lakes (e.g. wolf spiders of the genus *Tetrallycosa*) or isolated dune systems (species in the scorpion genus *Urodacus*).

Invertebrate groups that contain SRE taxa are generally well distributed across the Australian landscape and well adapted to semi-arid environments due to a variety of behavioural and morphological features that have developed to avoid desiccation and predation. They generally possess (Harvey 2002; Ponder & Colgan 2002):

- poor powers of dispersal
- confinement to discontinuous habitats
- seasonality, i.e. only active in cooler or wetter months
- slow growth
- low levels of fecundity.

The current knowledge of SREs in WA is relatively poor and the rarity of collections from certain regions makes it difficult to assess the distribution and likely occurrence of SRE species. Habitats such as mountains containing gullies/gorges and south-facing slopes, wetlands and rivers often include unique habitat attributes set amongst a relatively homogeneous surrounding landscape. These isolated micro habitats often harbour SRE taxa (Harvey 2002). Potential SRE taxa include the following groups (EPA 2009):

- spiders and relatives (Arachnida)
 - spiders (Araneae), in particular trapdoor spiders (Mygalomorphae) and selected modern spiders (Araneomorphae) (here mainly Flat Rock Spiders, Selenopidae)
 - harvestmen (Opiliones)
 - false scorpions (Pseudoscorpiones)
 - true scorpions (Scorpiones)
 - whip spiders (Schizomida) (although the majority of SREs in this order are troglobites) (Harvey *et al.* 2008; Harvey *et al.* 2011)
- multipedes (Myriapoda)
 - centipedes (Chilopoda), mainly the order Geophilomorpha and the Cryptopidae in the order Scolopendromorpha; other Scolopendromorpha are generally widespread and are not considered target taxa (e. g. Colloff *et al.* 2005; Koch 1982, 1983a, b, c)
 - millipedes (Diplopoda)
- crustaceans (Crustacea)
 - slaters (Isopoda)
- snails and relatives (Mollusca)
 - land snails (Eupulmonata, Gastropoda)
- earth worms (Oligochaeta).

Whilst other invertebrate groups have recently been proposed to contain a substantial proportion of range-restricted species, e.g. epigaeic (ground-dwelling), often wingless beetles in the Pilbara (Guthrie *et al.* 2010), these are currently not targeted in SRE invertebrate surveys (EPA 2009).

2.1.2 Categories of short-range endemism

There is currently no accepted system in place to define the varying probabilities of a species to be an SRE. The uncertainty in categorising a specimen as SRE originates in a number of factors including:

- **Poor regional survey density** (sometimes taxon-specific): A regional fauna is simply not known well enough to assess the distribution of species. This factor also considers the fact that, simply because a species has not been found regionally, does not mean it is really absent; this confirmation ('negative proof') is almost impossible to obtain ("absence of proof is not proof of absence").
- **Lack of taxonomic resolution**: many potential SRE taxa (based on preferences for typical SRE habitats, SRE status of closely related species, or morphological peculiarities such as troglomorphism) have never been taxonomically treated and identification to species level is very difficult or impossible as species-specific character systems have not been defined. Good taxonomic resolution does not necessarily require a published revision, but generally requires a taxonomist to be actively working on this group or a well-established, preferably publicly available, reference collection (i.e. museum collection).
- **Problems of identification**: SRE surveys often recover life stages of potential SRE taxa that cannot be confidently identified based on morphological characters, even if revisions exist. These include, for example, juvenile or female millipedes, mygalomorph spiders and scorpions. Molecular techniques are increasing being employed to overcome these identification problems.

Considering these factors of uncertainty, Phoenix currently employs a simple three-tier system to categorise the different probabilities of short-range endemism: confirmed, likely or potential SRE (Table 2-1). These categories are dynamic and can change with every survey.

Life stages of species that cannot be identified at the species level, e.g. some females and juveniles, are here assessed based on the knowledge of the higher taxon they belong to, i.e. family or genus. For example, all juvenile or female *Antichiropus* millipedes would be classified as 'confirmed SRE' as all but two of the known species in this genus are considered SREs (Wojcieszek *et al.* 2011).

The different categories of 'SRE-likelihood' may help to set conservation priorities; however, SRE taxa of all categories should be considered to determine appropriate conservation measures in order to adhere to the Precautionary Principle within Environmental Impact Assessments. That is, "*where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation*" (e. g. EPA 2002).

Table 2-1 Phoenix SRE categories reflecting survey, taxonomic and identification uncertainties

SRE category	Criteria	Typical representative
(Confirmed) SRE	Confirmed or almost certainly SRE; taxonomy of the group is well known (but not necessarily published); group well represented in collections, in particular from the region in question; high levels of endemism in documented species; inference is often possible from immature specimens	<i>Antichiropus</i> millipedes and araneomorph spiders in the genus <i>Karaops</i> (Selenopidae)
Likely	Taxonomically poorly resolved group; unusual morphology for the group (i.e. some form of troglomorphism); often singleton in survey and few, if any, regional records	Opiliones, some pseudoscorpions and slaters, many mygalomorph spiders
Potential	Taxonomically poorly resolved group; often common in certain microhabitats in SRE surveys (i.e. litter dwellers), but no other regional records; congeners often widespread	Cryptopidae, Geophilida

2.2 IDENTIFICATION AND PERSONNEL

All spiders were examined in 70% or 100% ethanol under Leica M205A and M80 stereomicroscopes.

The method of identification for each taxon, i.e. by taxonomic literature or comparison with type or other reference material, is indicated in the taxonomic part of this report. Phoenix personnel involved in the identification are listed in Table 2-2.

Table 2-2 Phoenix personnel involved in identification

Taxonomic group	Title	Qualification
Dr Volker Framenau	Manager, Terrestrial Invertebrates	One of Australia's leading arachnologists with taxonomic expertise in major araneomorph and mygalomorph spiders; established the WAM mygalomorph reference collection
Dr Peter Langlands	Invertebrate Zoologist	Ph.D. and peer-reviewed papers on the taxonomy and ecology of WA spiders

2.3 TAXONOMY AND NOMENCLATURE

The taxonomic nomenclature of invertebrates follows the references detailed in Table 2-3.

Morphospecies designations of undescribed species are generally adopted from the systems of the scientist(s) working on the group. For mygalomorph spiders, the Western Australian Museum has established a morphological reference collection of males that aids in the identification of spiders. Morphospecies are numbered consecutively with the prefix “MYG”, e.g. *Aname* ‘MYG001’ (Nemesiidae).

Table 2-3 Nomenclatural references, morphospecies designations and reference collections for the invertebrates of Yoongarillup, Whicher Range

Taxonomic group	Taxonomic reference for described species and higher taxa	Morphospecies designation and reference collection
Araneae (Mygalomorphae)	Platnick (2012)	“MYG”-numbering system developed by V.W. Framenau (WAM, Phoenix), reference collection at WAM

2.4 SPECIMEN DEPOSITORY

The EPA guidance statement No. 20 (*‘Sampling of short-range invertebrate fauna for environmental impact assessment in Western Australia’*) (EPA 2009) recommends that all specimens representing SRE target groups are lodged with the WAM to enhance the knowledge of the distribution of putatively rare species. Phoenix adheres to this recommendation and all of the survey specimens will be lodged with the Western Australian Museum.

3 RESULTS

3.1 SUMMARY

The survey material belongs to at least three morphospecies in two genera from the family Nemesiidae (Table 3-1, Appendix 1). None of these are considered short-range endemics.

Table 3-1 Status of SRE target invertebrates from Yoongarillup, Whicher Range

Taxon	SRE status	Remarks
<u>Araneae (spiders)</u>		
Nemesiidae		
<i>Aname tepperi</i> (Hogg, 1902)	Not SRE	Widespread in central WA
<i>Aname</i> 'MYG184'	Not SRE	Also found in Chittering, north of Perth
<i>Yilgarnia</i> 'MYG248'	Not SRE	Also found east of Albany

3.2 MYGALOMORPHAE (TRAPDOOR SPIDERS)

Trapdoor spiders represent one of the focal groups in surveys of short-range endemic taxa (EPA 2009; Harvey 2002). A number of mygalomorph spiders, e.g. *Idiosoma nigrum* Main, 1952, *Kwonkan eboracum* Main, 1983, and *Moggridgea tingle* Main, 1991, are listed on Schedule 1 (“Fauna that is rare or likely to become extinct”) of the Wildlife Conservation (Specially Protected Fauna) Notice 2010(2) of the Western Australian Government (Western Australian Government 2010).

The Western Australian mygalomorph fauna is vast and remains taxonomically poorly known for many families and genera (e.g. Barychelidae: *Idiommata*; Idiopidae: *Aganippe*; Nemesiidae: *Aname*, *Chenistonia*, *Kwonkan*).

3.2.1 Family Nemesiidae

Members of the mygalomorph spider family Nemesiidae are represented in Western Australia by several genera, including *Aname*, *Chenistonia*, *Yilgarnia*, *Stanwellia*, *Teyl*, *Swolnpes* and *Kwonkan* (Main & Framenau 2009). They usually dig burrows in the soil, and do not cover their burrow entrances with lids.

3.2.1.1 Genus *Aname*

The genus *Aname* currently includes 33 named species in Australia and is well represented by four named and numerous unnamed species from many different regions in Western Australia. *Aname* currently represent a highly diverse array of species of very small to large spiders. Males generally have a spur and spine on the first tibia of males opposing an often incrassate metatarsus. Members of the genus *Aname* are believed to be most common in sclerophyll forest, but are also known from rainforests and deserts (Raven 1981). *Aname* regularly belongs to the most diverse mygalomorph genera in biological spider surveys and with 12 species the Pilbara survey (Durrant *et al.* 2010) resulted in a similar number as found during the Carnarvon Basin survey (13 species) (Main *et al.* 2000). Many *Aname* species appear to have restricted distributions as shown by a review of species from northern Australia (Raven 1985).

***Aname tepperi* (Hogg, 1902)**

Aname tepperi is a species that is widespread in southwest and central WA and also occurs into SA (Main 1982). It is not a short-range endemic species.

***Aname* ‘MYG184’**

This species belongs to the *Aname mainae*-group which includes species that appear to be fairly widespread in the south-west of WA. *Aname* ‘MYG184’ has previously been found at Chittering, north of Perth, approx. 260 km north of the specimens submitted for identification. It is not considered an SRE.

3.2.1.2 Genus *Yilgarnia*

The genus *Yilgarnia* is characterised by the presence of patches of cuspules on the ventral side of the third and fourth coxa. The genus is currently known from two described species in Western Australia (Main 2008), but many more undescribed species are known from collections. Generic boundaries between *Yilgarnia* and *Kwonkan* remain uncertain as some species have the characteristics of both genera, i.e. cuspules on coxae III and IV (*Yilgarnia*) and tarsal spines (*Kwonkan*). This intermittent

group was listed as “*Kwonkan/Yilgarnia*” in the WAM/DEC Carnarvon survey, where three species were recovered at a variety of sites (Main *et al.* 2000). Species of *Yilgarnia* have been found throughout WA and occur as far north as the Kimberleys.

***Yilgarnia* ‘MYG248’**

This species is morphologically similar to *Yilgarnia currycombooides* Main, 1986, originally described from Peak Charles, but differs sufficiently to warrant species status. Another similar species, *Yilgarnia* ‘MYG096’ is known from Fitzgerald River National Park and near Kambalda. It is possible that all these specimens belong to the same, somewhat variable species, pending an examination of more material to allow judging intra- vs interspecific variation. *Yilgarnia* ‘MYG248’ has previously been found at Wellstead, 90 km east of Albany, approximately 300 km east from the specimen submitted for identification. It is not considered an SRE.

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APPENDIX 1 IDENTIFICATION SRE INVERTEBRATES FROM YOONGARILLUP

Field number	Order	Family	Genus and species	location	♂♂	♀♀	Juv.	total
15	Araneae	Nemesiidae	<i>Aname tepperi</i>	site 2.04			1	1
16	Araneae	Nemesiidae	<i>Aname tepperi</i>	site 2.04			1	1
17	Araneae	Nemesiidae	<i>Aname tepperi</i>	site 2.08		1		1
20	Araneae	Nemesiidae	<i>Aname tepperi</i>	site 5.05			1	1
21	Araneae	Nemesiidae	<i>Aname</i> 'MYG184'	site 1.03	1			1
13	Araneae	Nemesiidae	<i>Aname</i> 'MYG184'	site 1.07	1			1
14	Araneae	Nemesiidae	<i>Aname</i> 'MYG184'	site 2.06	1			1
25	Araneae	Nemesiidae	<i>Yilgarnia</i> '248'	site 2.01	1			1

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