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ENVIRONMENTAL SCIENCES

Vertebrate Fauna Desktop Report for the Extended Mining Areas

Prepared for South32 Worsley Alumina Pty Ltd

January 2025

Final



Vertebrate fauna desktop for the Extended Mining Areas Project

Prepared for South32 Worsley Alumina Pty Ltd

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P. Strickland	P. Strickland	Final, client comments addressed	2.0	13-Jan-25	S. Kenny

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EXECUTIVE SUMMARY

South32 Worsley Alumina Pty Ltd are seeking to complete additional environmental studies within the Extended Mining Areas (EMAs) Project (the Project). This is a requirement of condition 8 of Ministerial Statement 719, enabling South32 to meet the requirements of this condition prior to undertaking any operations in these areas. Under the 2005 Public Environmental Review, Worsley obtained conditional approval to mine the EMAs, comprising areas known as Brookton, Mid-Central, Hotham North Extension, Quindanning East and Morgans.

Prior to the commencement of operations in these areas, Worsley must first meet a number of conditions, including the completion of biodiversity-related investigations, and provide a report to the Minister for the Environment for approval. Part of this requirement is to gather contextual information regarding the vertebrate fauna habitats and species of the study area through completion of a desktop review, including a literature review and database searches in accordance with EPA guidance.

The study area and region have been the focus of numerous vertebrate fauna surveys over the past 2 decades. However, the majority of these surveys have been conducted as desktop assessments and targeted black cockatoo surveys, rather than detailed fauna surveys that provide comprehensive fauna assemblages of the survey areas. The desktop data can guide planning for comprehensive fauna surveys to gain a better understanding of the conservation significant fauna in the study area.

The availability of detailed vegetation mapping can also be utilised to guide survey efforts to detect the conservation significant species in the area. Ground truthing potential suitable habitat is essential to planning comprehensive fauna and targeted surveys. The previously completed vegetation surveys identified 4 broad fauna habitats, including:

- Uplands: Jarrah/Marri/Wandoo open woodland/forest on lateritic uplands and or heath shrubland on uplands and outcrops (142,918 ha)
- Valleys: Open Jarrah/Marri on slopes with Blackbutt/Wandoo woodlands on valley floors (108,601 ha)
- Valley Floors and Swamps: Flooded Gum/Melaleuca and Casuarina woodland on valley floors (4,002 ha)
- Depressions/Swamps: Melaleuca woodlands/shrublands on seasonally wet or water-logged clays and clay loams in swamps or depressions (22,352 ha)

The most dominant fauna habitat in the study area is the uplands, followed by valleys, depressions and swamps, and valley floors and swamps.

The desktop review identified a total of 426 vertebrate taxa within the search extent, with 51 conservation significant vertebrate species identified, comprising a variety of Threatened, Conservation Dependent, Migratory, Extinct, and Priority species. This included 2 conservation significant reptile species considered likely to occur or previously recorded in the study area, the Southern Death Adder (*Acanthophis antarcticus*; P3) and Dell's Skink (*Ctenotus delli;* P4). The desktop also determined that 17 conservation significant birds have been recorded, or are likely or possible to occur within the study area. This includes black cockatoos, water bird species, migratory shorebirds and forest/woodland birds and wide-ranging species. The uplands, Valleys, Depressions and Swamps also consist of suitable habitat for 13 conservation significant mammal species including Numbat (*Myrmecobius fasciatus*; EN (EPBC & BC Acts)), Woylie *Bettongia penicillata ogilbyi*; (EN/CR (EPBC & BC Acts)), Quokka (*Setonix brachyurus*; VU (EPBC & BC Acts)), and 2 species of Phascogale. These habitats span over 270,000 ha across the study area.

Based on the above information, the study area holds significant potential for comprehensive fauna surveys and targeted conservation efforts, especially for the conservation of significant vertebrate species and their habitats. To survey the large study area for a broad range of conservation significant species, the following survey techniques are recommended:

- Diurnal searches
- Nocturnal searches
- Walking transects
- Funnel trapping
- Pitfall trapping
- Elliot trapping
- Cage trapping
- Echolocation recordings
- Audio recordings
- Camera trapping
- Habitat and habitat tree assessments
- DNA and scat analyses.

The improved understanding of the habitats gathered from the basic fauna survey available has guided the sampling plan, informing targeted and detailed survey effort for conservation significant species and the overall vertebrate fauna assemblage.

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ACRONYMS AND ABBREVIATIONS

Abbreviations	Meaning
ALUM	Australian Land Use and Management
BC	Biodiversity Conservation Act 2016 (WA)
BoM	Bureau of Meteorology
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EMAs	Extended Mining Areas
ENE	East northeast
EPA	Environmental protection authority
EPBA	Environment Protection and Biodiversity Conservation Act 1999
ESE	East southeast
IBRA	Interim Biogeographic Regionalisation of Australia
IBSA	Index of Biodiversity Surveys for Assessment
NES	National Environmental Significance
NNW	North northwest
OS	Of special
RAMSAR	Representative, rare or unique wetlands, or are important for conserving biological diversity
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
SP	Specially protected
TEC	Threatened ecological community
WA	Western Australia
WSW	West southwest

1 INTRODUCTION

South32 Worsley Alumina Pty Ltd (Worsley) are seeking to complete additional environmental studies within the Extended Mining Areas; (EMAs; the Project). Under the 2005 Public Environmental Review, Worsley obtained conditional approval to mine the EMAs, comprising areas known as Brookton, Mid-Central, Hotham North Extension, Quindanning East and Morgans (WA; Figure 1-1). Prior to commencement of operations in these areas, Worsley must first meet a number of conditions including the completion of biodiversity-related investigations (condition 8-1 of MS719) and provide a report to the Minister for the Environment for approval.

In February 2024, Phoenix Environmental Sciences Pty Ltd (Phoenix) was commissioned by Worsley to undertake a desktop review for the Project. The purpose of the desktop review was to inform a basic vertebrate fauna survey, as well as subsequent detailed and targeted surveys. The desktop review will guide survey site selection and targeted survey requirements for conservation significant fauna. The study area is located across multiple shires in the South-West and the Southern Climatic Regions as defined by EPA (2020).

1.1 SCOPE OF WORK

Condition 8-1 of MS719 requires investigation of the following matters with respect to this scope of works:

8. the identification and spatial extent of fauna habitat, including specifically, habitat for Threatened, Priority listed and other significant fauna, and significant Short Range Endemic fauna, and other significant invertebrate taxa.

9. the occurrence and abundance of vertebrate fauna, including specifically, Threatened fauna as defined in the Biodiversity Conservation Act 2016 or the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act); Priority fauna as defined and listed by the Department of Environment and Conservation (now Department of Biodiversity, Conservation and Attractions; 'DBCA'); obligate tree-hollow nesting or roosting species; and species requiring specialised habitats or resources, including Honey Possums.

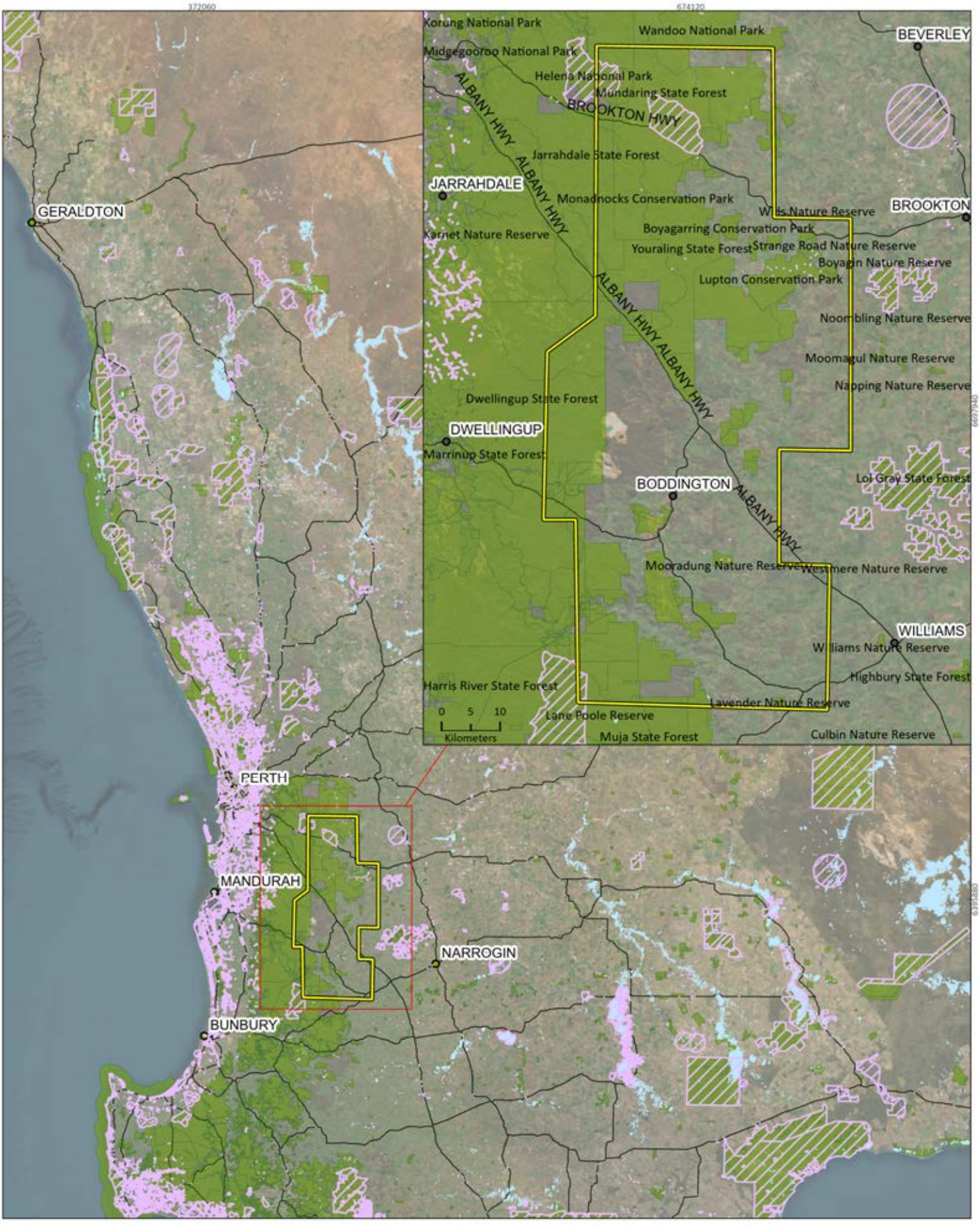
The scope of work for this report was to conduct a desktop review comprising an assessment of the vertebrate fauna habitats and species of the study area, including a literature review and database searches in accordance with EPA guidance.

This desktop review represents the first phase of the scope of works planned to address the relevant sections of condition 8-1.

1.2 STUDY AREA

The study area for the survey is approximately 456,544 ha in size. It is largely rectangular and is 114 km north to south and 62 km east to west (Figure 1-1). It encompasses 5 areas of interest (north-south):

- Brookton
- Mid-Central
- Hotham North Extension
- East Quindanning
- Morgans





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- Study area
- Lakes
- DBCA managed land
- Environmentally sensitive areas
- Road

Figure 1-1

Project location and study area

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2 LEGISLATIVE CONTEXT

The protection of fauna in WA is principally governed by 3 acts:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- State *Biodiversity Conservation Act 2016* (BC Act)
- State *Environmental Protection Act 1986* (EP Act).

2.1 COMMONWEALTH

The EPBC Act is administered by the Federal Department of Climate Change, Energy, the Environment and Water (DCCEEW). The EPBC Act provides for the listing of Threatened fauna as matters of National Environmental Significance (NES). Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of NES, require approval from the Australian Government Minister for the Environment through a formal referral process. Key threats and habitat critical to the survival of EPBC Act Threatened species are usually defined in the conservation advice and/or recovery plan for the species.

Conservation categories applicable to Threatened fauna species under the EPBC Act are as follows:

- Extinct (EX)[1] – there is no reasonable doubt that the last individual has died
- Extinct in the Wild (EW) – taxa known to survive only in captivity
- Critically Endangered (CR) – taxa facing an extremely high risk of extinction in the wild in the immediate future
- Endangered (EN) – taxa facing a very high risk of extinction in the wild in the near future
- Vulnerable (VU) – taxa facing a high risk of extinction in the wild in the medium-term
- Conservation Dependent (CD)[1] – taxa whose survival depends upon ongoing conservation measures; without these measures, a conservation dependent taxon would be classified as Vulnerable, Endangered or Critically Endangered.

The EPBC Act is also the enabling legislation for protection of Migratory species as matters of NES under several international agreements:

- Japan-Australia Migratory Bird Agreement (JAMBA)
- China-Australia Migratory Bird Agreement (CAMBA)
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn)
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

2.2 STATE

2.2.1 Threatened and Priority species

In WA, the BC Act provides for the listing of Threatened fauna species (Government of Western Australia 2018a, b) in the following categories:

- Critically Endangered (CR) – species facing an extremely high risk of extinction in the wild in the immediate future[2]
- Endangered (EN) – species facing a very high risk of extinction in the wild in the near future[2]

[1] Species listed as Extinct and Conservation Dependent are not matters of NES and therefore do not trigger the EPBC Act.

[2] As determined in accordance with criteria set out in the ministerial guidelines.

- Vulnerable (VU) – species facing a high risk of extinction in the wild in the medium-term future[2].

Species may also be listed as specially protected (SP) under the BC Act in one or more of the following categories:

- species of special conservation interest (conservation dependent fauna, CD) – species with a naturally low population, restricted natural range, of special interest to science, or subject to or recovering from a significant population decline or reduction in natural range
- Migratory species (Mig.), including birds subject to international agreement
- species otherwise in need of special protection (OS).

The DBCA administers the BC Act and also maintains a non-statutory list of Priority fauna. Priority species are still considered to be of conservation significance – that is they may be Threatened – but cannot be considered for listing under the BC Act until there is adequate understanding of threat levels imposed on them. Species on the Priority fauna list are assigned to one of 4 Priority (P) categories, P1 (highest) – P4 (lowest), based on level of knowledge/concern.

2.2.2 Critical habitat

Under the BC Act, habitat is eligible for listing as critical habitat if it is critical to the survival of a Threatened species or a TEC and its listing is otherwise in accordance with the ministerial guidelines.

2.2.3 Other significant fauna

Under the EPA's environmental factor guideline (EPA 2016), fauna may be considered significant for reasons other than listing as a Threatened or Priority species, including:

- species with restricted distribution
- species subject to a degree of historical impact from threatening processes
- providing an important function required to maintain the ecological integrity of a significant ecosystem.

3 EXISTING ENVIRONMENT

3.1 INTERIM BIOGEOGRAPHIC REGIONALISATION OF AUSTRALIA

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies Australia's landscapes into large 'bioregions' and 'subregions' based on climate, geology, landform, native vegetation and species information (DoEE 2016). The study area is located in the Northern Jarrah Forest subregion (JF1) and the Avon Wheatbelt subregion (AW2) of the Jarrah Forest bioregion (Figure 3-1).

The Northern Jarrah Forest is characterised by Jarrah-Marri forest on laterite gravels and Wandoo woodlands on clay soils with eluvial deposits. This subregion includes areas of the Darling Scarp, with areas of granite outcropping and hills with dispersed deep drainage. Rainfall in the region varies from 1300 mm on the scarp to 700 mm in the east and northern areas. Woodlands of Jarrah-Marri, Bullich, Blackbutt and Wandoo follow the rainfall and topography. Areas of Banksia woodlands and heath are found on granite substrates in the forests of the north and east. Diversity appears to favour lower slopes and granite soils.

The Avon Wheatbelt is a gently undulating region rich in endemic Proteaceae and heath vegetation on rich laterite uplands. Mixed eucalypts including York Gum, Salmon Gum and Wandoo occur on erosional soils and laterite derived sandplains. This region is home to a variety of habitats that support rich biodiversity including Toolibin Lake, Boyagin-Tutanning Nature Reserve and Dryandra Woodland.

3.2 LAND SYSTEMS AND SURFACE GEOLOGY

DPIRD undertakes land system mapping for WA using a nesting soil-landscape mapping hierarchy (Schoknecht & Payne 2011). While the primary purpose of the mapping is to inform pastoral and agricultural land capability, it is also useful for informing biological assessments. Under this hierarchy, land systems are defined as areas with recurring patterns of landforms, soils, vegetation and drainage (Payne & Leighton 2004).

The study area intersects 8 land systems, which tend to occur patchily across the landscape (Table 3-1; Figure 3-2). The most extensive land system is the Marradong Upland System, followed by the Darling Plateau System, which are both dominated by Jarrah-marri-wandoo forest on plateaus with sandy and loamy gravels. Combined, these two systems account for approximately half the study area.

Table 3-1 Land systems and extent in study area

Land system	Description	Area (ha)	% of study area
Pumphreys Bridge System	Valley floors, in the central Zone of Rejuvenated Drainage, with deep sandy duplex, pale deep sand and wet soil (often saline).	1,060.7	0.2
Murray Valleys System	Western Darling Range from the Avon Valley to Harvey. Deeply incised valleys with Red loamy earths, shallow duplexes and rock outcrop and Jarrah-Marri-Wandoo forest and woodland with mixed shrubland.	5,211.9	1.1
Dryandra System	Gently undulating granitic terrain, in the central Zone of Rejuvenated Drainage, with deep sandy duplex, loamy duplex and brown loamy earth.	12,069.5	2.6
Dale System	Sediments of the ancestral Avon river, from Beverley through West Dale to the Helena	13,161.4	2.9

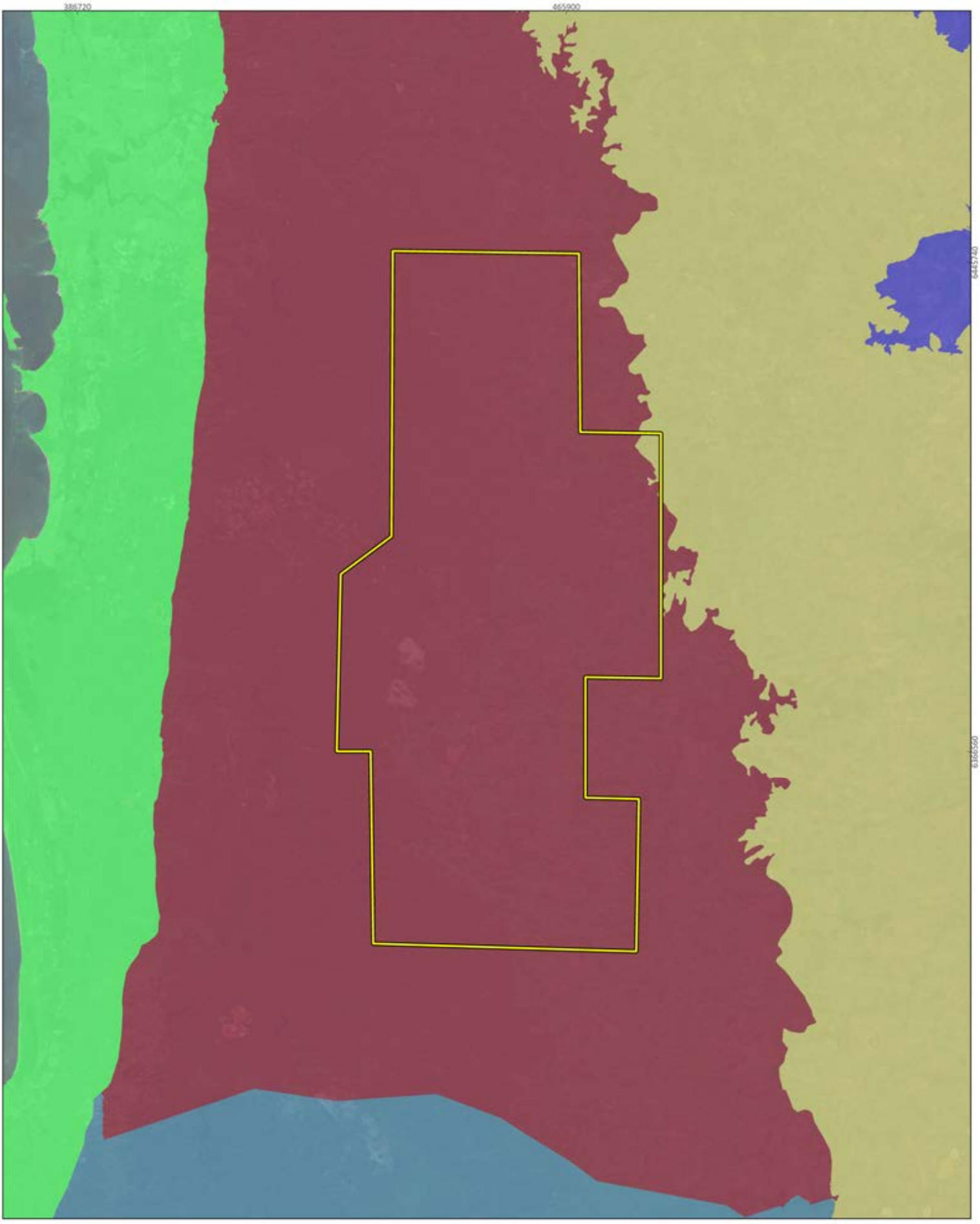
Land system	Description	Area (ha)	% of study area
	valley, that now occupies both valley and low rolling uplands.		
Clackline System	Moderately dissected areas with gravelly slopes and ridges and minor rock outcrop on the eastern side of the Darling Plateau over weathered granite and granitic gneiss. Loamy gravels, shallow duplexes and pale deep sands common.	19,629.5	4.3
Boyagin System	Large duricrust remnants surrounded by stripped terrain of rock outcrops and fresh soils in Eastern Darling Range Zone. Gravels have Jarrah-Marri-Parrotbush forest. Loams and duplexes with York and Wandoo. Mallet and Powderbark on scarp.	43,711.5	9.6
Wundowie System	Intact undulating lateritic terrain with minor rock outcrops in the north-eastern Darling Range. "Buckshot" gravels, duricrust and some deep sands vegetated by Jarrah forest.	67,268.7	14.7
Quindanning System	Deep granitic valleys, in the northern and central Eastern Darling Range, with deep sandy duplex soils, shallow sand, loamy duplex and bare rock. Marri-Wandoo-York gum-jam woodland.	80,638.5	17.7
Darling Plateau System	Lateritic plateau. Duplex sandy gravels, loamy gravels and wet soils. Jarrah-Marri-Wandoo forest and woodland.	98,853.4	21.7
Marradong Upland System	Plateau remnants, in the central Eastern Darling Range, with sandy gravel, loamy gravel, grey deep sandy duplex and loamy duplex. Jarrah-Marri-Wandoo forest and woodland.	114,938.9	25.2
	Total	**456,544.0**	**100**

According to the Surface Geology of Australia 1:1,000,000 scale, Western Australia database (Stewart *et al.* 2008), the study area intersects 12 geological formations (Table 3-2; Figure 3-2). The most extensive formation is the Felsic intrusives 74292, which accounts for nearly two-thirds of the study area, with all other formations primarily occurring in small patches throughout.

Table 3-2 Surface geology of the study area, extent by deposit type

Surface geology	Abbreviation	Description	Area (ha)	% of study area
Nakina Formation	Czan	Cross-bedded, fluviatile sands.	196.6	0.0
Pelitic and volcanic sedimentary rocks 74323	Ass	Pelite, siltstone, greywacke, grit, pyroclastics.	250.8	0.1
Undivided sediments 74488	Cz	Undivided poorly consolidated sediments: colluvium, weathered rocks, alluvium, sand, silt, clay, lacustrine and swamp deposits; silcrete, ferricrete, calcrete; shallow-marine sediments.	788.0	0.2
Alluvium 74331	Cza	Reworked or incised sandy alluvium in older stream channels; lateritised alluvium;	1500.1	0.3

Surface geology	Abbreviation	Description	Area (ha)	% of study area
		alluvial terraces above younger alluvium; alluvial and colluvial outwash deposits not in defined channel systems; sand, silt, gravel, clay, evaporites.		
Sand plain 38499	Czs	Sand or gravel plains; quartz sand sheets commonly with ferruginous pisoliths or pebbles, minor clay; local calcrete, laterite, silcrete, silt, clay, alluvium, colluvium, aeolian sand.	1672.9	0.4
Felsic volcanic rocks and porphyry 74290	Afs	Plagiophyric dacite, felsic lavas and pyroclastics.	2957.8	0.7
Amphibolite 74334	Aty	Amphibolite, mafic schist, mafic rock intercalated with granite, para-amphibolite; metabasalt, metagabbro, metapyroxenite and metadolerite; Youanmi Terrane.	5175.8	1.1
Alluvium 38485	Qa	Channel and flood plain alluvium; gravel, sand, silt, clay, locally calcreted.	10637.4	2.3
Colluvium 38491	Qrc	Colluvium, sheetwash, talus; gravel piedmonts and aprons over and around bedrock; clay-silt-sand with sheet and nodular kankar; alluvial and aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin; local calcrete, reworked laterite.	13552.9	3.0
Gneiss, granulite, migmatite 74310	An	Banded granitic gneiss (monzogranitic to granodioritic), quartzofeldspathic gneiss with mafic bands, migmatite, granofels, mafic and felsic granulites, hypersthene-plagioclase-quartz granulite; schist, pelitic or mafic granofels.	19064.4	4.2
Ferruginous duricrust 38498	Czl	Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite.	101004.5	22.1
Felsic intrusives 74292	Ag	Undifferentiated felsic intrusive rocks, including monzogranite, granodiorite, granite, tonalite, quartz monzonite, syenogranite, diorite, monzodiorite, pegmatite. Locally metamorphosed, foliated, gneissic. Local abundant mafic and ultramafic inclusions.	299742.8	65.7
		Total	**456,544.00**	**100**





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Study area

Region, subregion

- Avon Wheatbelt, Katanning
- Avon Wheatbelt, Merredin
- Jarrah Forest, Northern Jarrah Forest
- Jarrah Forest, Southern Jarrah Forest
- Swan Coastal Plain, Perth

Figure 3-1

Study area in relation to IBRA bioregions and subregions

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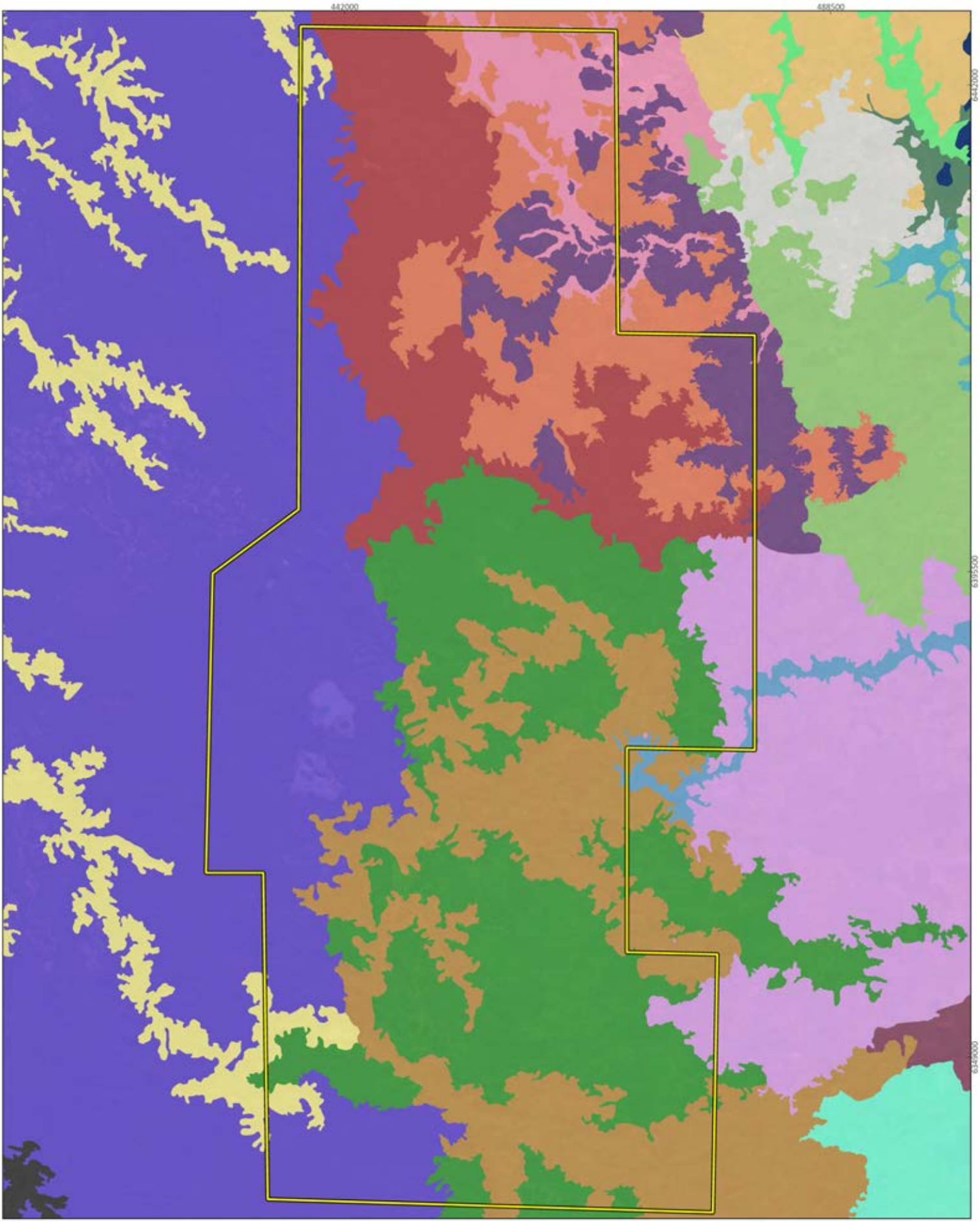



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Study area

Land system

- Avon Flats System
- Boyagin System
- Brookton System
- Clackline System
- Dale System
- Darling Plateau System
- Dellyanine System
- Dryandra System
- Goomalling System
- Greenhills System
- Jelcobine System
- Lowden Valleys System
- Marradong Upland System
- Morbinning System
- Murray Valleys System
- Narrogin System
- Pingelly System
- Pumphreys Bridge System
- Quindanning System
- West Kokeby System
- Wundowie System

Figure 3-2

Land systems in the study area

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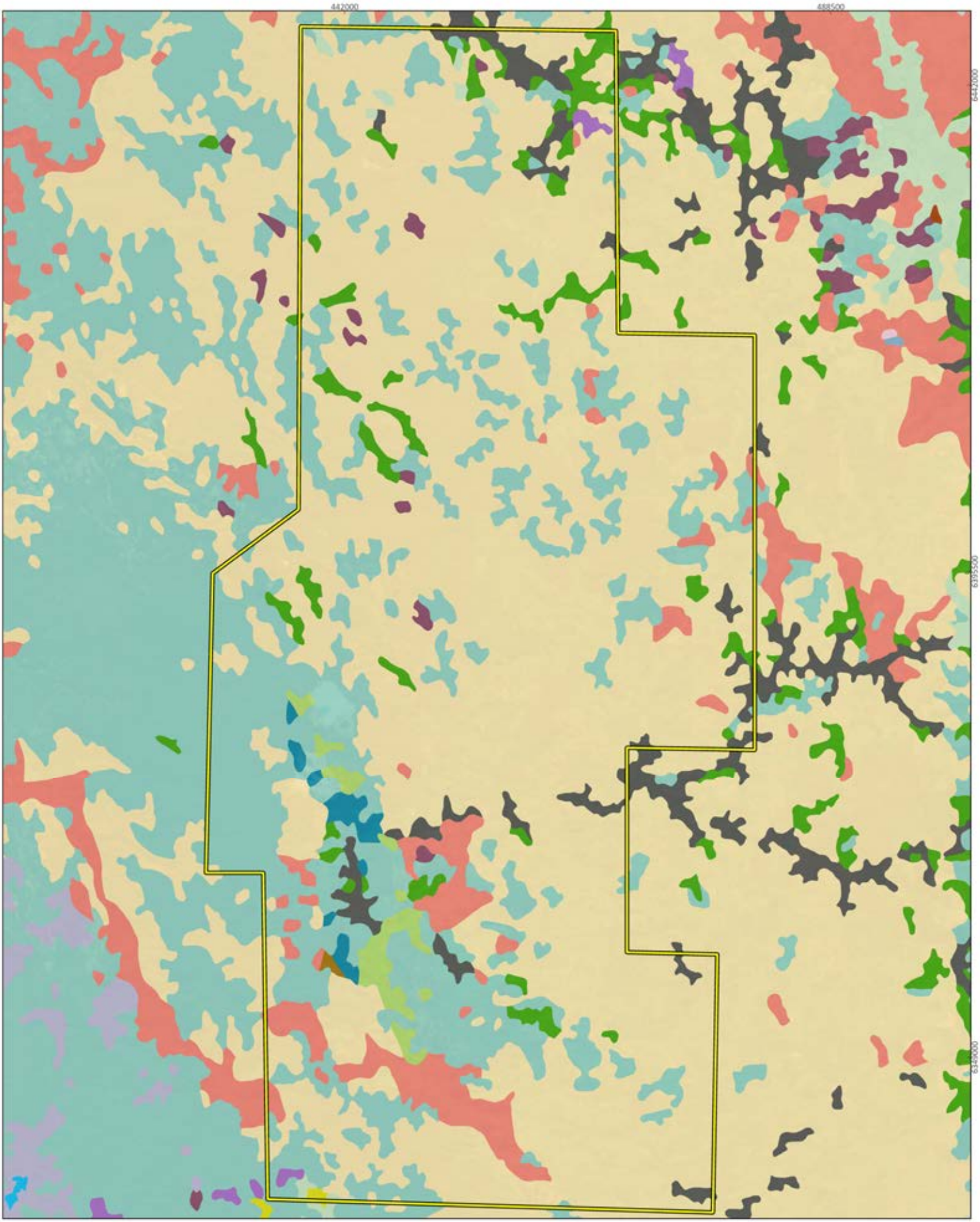



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Study area

Surface geology

- Afs
- Ag
- Agbr
- An
- Ans
- Ass
- Aty
- Aus
- Ays
- Cz
- Cza
- Czan
- Czl
- Czs
- Qa
- Qd
- Qrc
- water

Figure 3-3

Surface geology in the study area

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3.3 CLIMATE AND WEATHER

The climate of the Northern Jarrah Forest subregion is Warm Mediterranean, with cool wet winters and warm dry summers.

Two Bureau of Meteorology (BoM) weather stations with comprehensive data collection and recent historic climate data are located in close proximity to the study area. Dwellingup (no. 009538, Latitude: -32.71, Longitude: 116.06) is located immediately west of the study area. Wandering, (no. 010917, Latitude: -32.67, Longitude 116.67) is located in the east of the study area.

Dwellingup (1934–2023) records the highest mean maximum monthly temperature (29.7°C) in January and February (lowest in July, 15.1°C) and the lowest minimum mean monthly temperature (5.5°C) in July and August, with the highest (14.6°C) in February (BoM 2024). The average annual rainfall at Dwellingup is 1,225.9 mm, with June recording the highest monthly average of 235.1 mm.

Wandering records the highest mean maximum monthly temperature (33°C) in January (lowest in July 15.8°C) and the lowest minimum mean monthly temperature (4°C) in August (highest in January, 13.8°C). Average rainfall at Wandering is much lower than at Dwellingup, with an average annual rainfall of 521.6 mm and the highest monthly average of 98.1 mm falling in July and 93.5 mm falling in August (BoM 2024).

Long term data from the BoM indicates a trend towards reduction in rainfall and an increase in drought years. The effects of a warmer, drier climate may include less available suitable habitat due to areas becoming drier and changes in vegetation structure. Vegetation is generally thicker and denser in areas where water drains or pools, such as broad or deeply incised valleys and at the base of granite outcrops.

3.4 LAND USE

The land use statistics (Table 3-3) are derived from the Australian Bureau of Agriculture and Resource Economics and Sciences' (ABARES) Catchment Scale Land Use Mapping for WA 2018 dataset (ABARES 2018), for the IBRA subregions JAF01 and JAF02. The dataset is a compilation derived from various vector datasets. The date (2008 to 2018) and scale (1:5,000 to 1:250,000) of each dataset, therefore, reflects the source data. Land use is classified according to the Australian Land Use and Management (ALUM) Classification (v8); a three-tiered hierarchical structure. According to ABARES (2018) land use is dominated by production of native forests (50.9%), cropping (23.7%), National Parks (7.5%) and grazing of modified pastures (7.5%; Table 3-3).

Table 3-3 Land use of the study area

Land use	Area (ha)		Land use	Area (ha)
1.1 Nature conservation	34,192.71		5.2 Intensive animal production	22.87
1.1.1 Strict nature reserves	2,469.93		5.2.5 Aquaculture	16.16
1.1.3 National Park	31,457.57		5.2.6 Horse studs	6.72
1.1.7 Other conserved area	265.21		5.3 Manufacturing and industrial	15.92
1.2 Managed resource protection	70.99		5.3.0 Manufacturing and industrial	13.59
1.2.0 Managed resource protection	64.98		5.3.4 Bulk grain storage	2.32
1.2.2 Surface water supply	6.00		5.4 Residential and farm infrastructure	195.95
1.3 Other minimal use	29,329.49		5.4.1 Urban residential	177.46
1.3.0 Other minimal use	317.17		5.4.2 Rural residential with agriculture	18.48
1.3.3 Residual native cover	29,012.31		5.5 Services	118.43
2.1 Grazing native vegetation	2,224.26		5.5.1 Commercial services	6.59
2.1.0 Grazing native vegetation	2,224.26		5.5.2 Public services	4.25
2.2 Production native forests	232,425.63		5.5.3 Recreation and culture	107.58
2.2.0 Production native forests	232,425.63		5.7 Transport and communication	556.29
2.2.1 Wood production forestry	0.32		5.7.1 Airports/aerodromes	14.40
3.1 Plantation forests	11,012.97		5.7.2 Roads	541.89
3.1.0 Plantation forests	10,990.30		5.8 Mining	1,510.55
3.1.2 Softwood plantation forestry	22.67		5.8.0 Mining	1,480.36
3.2 Grazing modified pastures	34,134.28		5.8.3 Tailings	30.19
3.2.0 Grazing modified pastures	34,134.28		5.9 Waste treatment and disposal	16.14
3.3 Cropping	108,304.53		5.9.1 Effluent pond	0.91
3.3.0 Cropping	108,304.53		5.9.3 Solid garbage	15.23
3.6 Land in transition	48.59		6.1 Lake	70.79
3.6.1 Degraded land	48.59		6.1.0 Lake	70.79
4.4 Irrigated perennial horticulture	167.86		6.2 Reservoir/dam	1,418.51
4.4.0 Irrigated perennial horticulture	83.27		6.2.1 Reservoir	2.75
4.4.1 Irrigated tree fruits	15.92		6.2.2 Water storage - intensive use/farm dams	1,415.76
4.4.2 Irrigated olives	10.27		6.3 River	1.47
4.4.8 Irrigated citrus	14.15		6.3.0 River	1.47
4.4.9 Irrigated grapes	44.25		6.5 Marsh/wetland	705.78
			6.5.0 Marsh/wetland	705.78
Total: 456,544.00 ha				

3.5 CONSERVATION RESERVES AND ENVIRONMENTALLY SENSITIVE AREAS

The study area intersects 16 conservation reserves (Table 3-4; Figure 1 1) and these are scattered throughout the study area. The largest portions of conservation reserve within the study area are located in the north, with Wandoo National Park, Helena National Park, and Lupton Conservation Park occupying the largest areas in the northern part of the study area, and Lane Poole Reserve in the south. (Figure 1-1).

Table 3-4 Conservation reserves within the study area

PA/ Reserve ID	Name	Type	Gazetted date	Total area (ha)	Area (ha) within study area
WA_04596	Unnamed WA04596	5(1)(g) Reserve	19-Sep-1924	65.0	65.0
WA_19740	Bartram	Nature Reserve	9-Mar-1928	58.0	58.0
WA_19741	Unnamed WA19741	Nature Reserve	9-Mar-1928	44.8	44.8
WA_20182	Lavender	Nature Reserve	6-Sep-1929	281.2	276.5
WA_26666	Lupton	Conservation Park	15-Mar-1963	9443.2	9443.2
WA_32448	Mooradung	Nature Reserve	7-Mar-1974	361.0	631.0
WA_36063	Strange Road	Nature Reserve	11-May-1979	552.6	552.6
WA_36742	Brookton Highway	Nature Reserve	12-Sep-1980	420.8	420.8
WA_38420	Wills	Nature Reserve	26-Aug-1983	36.2	0.9
WA_36096	Unnamed WA36096	Nature Reserve	6-Jul-1979	485.9	485.9
WA_39821	Lane Poole Reserve	5(1)(g) Reserve	6-Feb-1987	29444.7	1844.8
WA_39822	Lane Poole Reserve	Conservation Park	6-Feb-1987	2542.1	862.8
WA_39826	Monadnocks	5(1)(g) Reserve	6-Feb-1987	15608.5	796.9
WA_41850	Boyagarring	Conservation Park	15-Nov-1991	1215.4	1215.4
WA_47882	Helena	National Park	30-Nov-1904	12267.7	3500.9
WA_47883	Wandoo	National Park	30-Nov-1904	46332.9	13942.9

4 METHODS

4.1 DESKTOP REVIEW

Searches of several biological databases were undertaken to identify and prepare lists of significant vertebrate fauna that may occur within the study area (Table 4-1). Standard 40 km buffers were applied where possible. Some databases supply data based on available records and size of the study area. For this reason, some searches received 25 km buffers if deemed appropriate. A literature search was conducted for accessible reports for biological surveys conducted within 40 km of the study area to build on the lists developed from the database searches (Table 4-2).

Table 4-1 Database searches conducted for the desktop review

Database	Target group/s	Search coordinates and extent
BirdLife BirdData (Birdlife 2024)	Avifauna records	Study area plus a 40 km buffer
Protected Matters Search Tool (DCCEEW 2024a)	EPBC Act Threatened fauna and ecological communities	Study area plus a 40 km buffer
DBCA Threatened and Priority Fauna Database (DBCA 2024c)	Threatened and Priority fauna	Study area plus a 25 km buffer
Dandjoo Biodiversity Data Repository (DBCA 2024a)	Fauna records	Study area plus a 40 km buffer
NatureMap (DBCA 2024b)	Fauna records	Study area plus a 25 km buffer
Index of Biodiversity Surveys for Assessment (IBSA) database (2024) for nearby survey reports and data (DWER 2024)	Fauna survey records and data	Study area plus a 40 km buffer

Table 4-2 Survey reports included in the desktop review

Report author	Survey description	Project
Ninox Wildlife Consulting (2003)	Detailed fauna survey	Vertebrate fauna survey of the Boddington Gold mine
Bamford (2004)	Desktop review	Worsley Alumina Extension Area: northern mining envelopes
Ninox (2012)	Detailed fauna survey	Vertebrate fauna survey of the Newmont Boddington Gold mine
Terrestrial Ecosystems (2015)	Habitat assessment	Level 1 fauna risk assessment of the Jackson Block of Lot 3 Buller Road
Harewood and Ecoedge (2016)	Habitat assessment	Level 2 Flora and vegetation survey and Level 1 fauna survey along Collie-Lake King Road at Bowelling
Harewood (2017)	Targeted fauna assessment	Black cockatoo habitat assessment of proposed clearing areas
Biostat (2017)	Habitat assessment	Level 1 fauna assessment for the mining extension areas associated with the Worsley Alumina production increase
Harewood (2019)	Targeted fauna assessment	Targeted fauna assessment at the Minninup pool Project
360 Environmental (2019)	Targeted fauna assessment	Biological assessment conducted for co-operative bulk handling pty

Report author	Survey description	Project
Biostat (2019a) Biostat (2019b)	Desktop review and monitoring	Worsley mine expansion offset fauna habitat assessment and Boddington fauna monitoring
Biostat (2020a) Biostat (2020b)	Desktop review	PA offset fauna habitat assessment desktop study/ ecological value field survey
GHD (2021)	Detailed fauna survey	Terrestrial fauna survey and black cockatoo habitat assessment for Huntly Mine
Phoenix (2021b)	Targeted fauna assessment	Potential habitat tree survey and foraging analysis for the Worsley mine expansion proposal
Phoenix (2020) Phoenix (2021c)	Desktop review	Terrestrial and aquatic fauna desktop review for the Worsley Alumina future mining area – Mid-Central/Brookton
Biostat (2021)	Habitat assessment	Worsley mine expansion offset fauna habitat assessment
Biologic (2023)	Habitat assessment	Numbat habitat assessment for the Boddington Mine and Offset Properties
Bamford Consulting Ecologists (2023)	Targeted fauna assessment	South32 Collie offset areas Threatened fauna assessment
Phoenix (2023)	Targeted fauna assessment	Black cockatoo breeding habitat assessment for the Worsley Mine Expansion Project
Biologic (2024b)	Baseline fauna survey	Lot 100 and Lot 102 offset properties, Collie baseline vertebrate fauna survey
Biologic (2024a)	Targeted fauna survey	Gibbs offset property, Quindanning targeted vertebrate fauna survey
ecologia (2024)	Detailed and targeted fauna survey	Newmont Boddington Gold, Future Tailings detailed and targeted fauna assessment

4.2 LIKELIHOOD OF OCCURRENCE ASSESSMENT

Following the desktop review, the likelihood of occurrence for each significant fauna species identified in the desktop review was assessed and assigned to one of 4 ratings:

- recorded – species recorded within the study area by previous survey
- likely – study area within current known range of species, suitable habitat within the study area and home range of species intersects study area based on known records
- possible – study area within current known range of species, suitable habitat within the study area and home range of species does not intersect study area based on known records
- unlikely – study area outside current known range of species or no suitable habitat present in study area.

5 RESULTS

5.1 VERTEBRATE FAUNA

The desktop review identified records of 426 vertebrate taxa within the desktop search extent. The list comprised 19 amphibians, 256 birds (including 9 naturalised species), 56 mammals (including 11 introduced species) and 95 reptiles (including 2 introduced species; Table 5-1; Appendix 2). Protected Matters and NatureMap database results include species without location data, however their projected distribution intersects the desktop search extent. Marine species and projected distribution records of non-conservation significant taxa that were exceptionally outside their known range were removed from the dataset.

Fifty-one significant vertebrate species were identified in the desktop review, comprising 21 species listed as Threatened, Conservation Dependent or Specially Protected under the EPBC Act and/or BC Act (Table 5-2; Figure 5-1). Nineteen avifauna species are listed as Migratory under the EPBC Act and BC Act (Table 5-2). A further 15 species are listed as Priority by DBCA (Table 5-2).

An additional 38 conservation significant species returned in the desktop review that are not relevant to the study area due to current known range, habitat requirements or species extinction are excluded from the results in Table 5-1, Table 5-2 and Figure 5-1 and are presented separately (Appendix 2).

Table 5-1 Summary of terrestrial fauna desktop results

Class	Native	Introduced	Total
Amphibians	19	0	19
Birds	247	9	256
Mammals	45	11	56
Reptiles	93	2	95
Total	**404**	**22**	**426**

Previous surveys within the study area recorded a variety of conservation significant species. Many surveys that have occurred within the desktop search extent have focussed on black cockatoo habitat assessment, and targeted searches for Carnaby's Cockatoo (*Zanda latirostris*; EN (EPBC & BC Acts)), Baudin's Cockatoo (*Zanda Baudinii*; EN (EPBC & BC Acts)) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*; VU (EPBC & BC Acts)) have observed these species throughout much of the study area (360 Environmental 2019; Ninox Wildlife Consulting 2003; Phoenix 2021b, 2023).

Targeted and detailed fauna surveys have recorded a number of conservation significant species including Chuditch (*Dasyurus geoffroii*; VU (EPBC & BC Acts)), Quenda (*Isoodon fusciventer*: P4), South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*; CD (BC Act), Western False Pipistrelle (*Falsistrellus mackenziei*: P4), Western Ringtail Possum (*Pseudocheirus occidentalis:* CR (EPBC & BC Acts)), and Woylie (*Bettongia penicillata ogilbyi*; EN/CR (EPBC & BC Acts)) inside the study area between 2003 and 2023 (Bamford Consulting Ecologists 2023; Biostat 2017; Ninox Wildlife Consulting 2003).

Table 5-2 Significant vertebrate fauna identified in the desktop review

Species	Status	Nearest record to study area	Habitat
Birds (36)			
Oxyura australis Blue-billed Duck	P4 (DBCA list)	Within study area	Endemic to Australia's temperate regions, inhabiting terrestrial wetlands (fresh or saline) with extensive bordering vegetation, including artificial wetland, such as sewage ponds (Birdlife International 2015); (del Hoyo *et al.* 2014).
Apus pacificus Fork-tailed Swift	Mig. (EPBC & BC Acts)	31.3 km NNW	Non-breeding habitat only: Found across a range of habitats, from inland open plains to coastal and wooded areas, where it is exclusively aerial (1-300m above ground).Occurs in a wide range of dry or open habitats, including riparian woodlands, Tea-tree swamps, low scrub, heathland, Saltmarsh, grassland and Spinifex sandplains, open farmland and inland and coastal sand-dunes (DCCEEW 2024b).
Charadrius cucullatus Hooded Plover	P4 (DBCA)	38.4 km NW	In WA, this species is found on ocean beaches but can also be seen at inland salt lakes, however they are not abundant. Occasionally occurs inland on the edges of lakes, on nearby grassy freshwater seepages and in estuaries (Birdlife Australia N.D.; Threatened Species Scientific Committee 2014; DCCEEW 2024b).
Charadrius dubius Little Ringed Plover	Mig. (EPBC & BC Acts)	Projected distribution	Rare but regular summer migrant to Australia. Occupies coastal mudflats, freshwater wetlands, estuaries, lakes and lagoons.
Pluvialis fulva Pacific Golden Plover	Mig. (EPBC & BC Acts)	38.1 km NW	Typically inhabits coastal environments and occasionally can be found in wetlands, mudflats and sandflats in sheltered areas. Have also been found on islands, sand and coral cays, as well as terrestrial environments, usually near waterbodies and paddocks (DCCEEW 2024b).
Glareola maldivarum Oriental Pratincole	Mig. (EPBC & BC Acts)	Projected distribution	In Australia, it inhabits open plains, floodplains and grasslands, often with extensive bare areas (DCCEEW 2024b).
Rostratula australis Australian Painted Snipe	EN (EPBC & BC Acts)	Projected distribution	Inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans (DCCEEW 2024b).
Actitis hypoleucos Common Sandpiper	Mig. (EPBC & BC Acts)	Within study area	Found across a wide range of wetlands: small ponds, large inlets and mudflats where they forage on the shore usually close to the vegetation (DCCEEW 2023). Prefers rocky creeks, channels, dams, and mangrove-lined inlets (Geering *et al.* 2007).
Calidris acuminata Sharp-tailed Sandpiper	VU/Mig./Mig. (EPBC Act; BC Act)	22.5 km SSE	Found on muddy edges of shallow fresh or brackish vegetated wetlands, including lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland (DCCEEW 2024b).

Species	Status	Nearest record to study area	Habitat
Calidris ferruginea Curlew Sandpiper	CR/Mig./CR (EPBC Act; BC Act)	37.3 km SW	Occurs on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons. They are known to favour non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bores/drains, usually with bare edges of mud or sand (DCCEEW 2024b).
Calidris melanotos Pectoral Sandpiper	Mig. (EPBC & BC Acts)	38.1 km NW	Shallow fresh to saline wetlands such as coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands (DCCEEW 2024b).
Calidris ruficollis Red-necked Stint	Mig. (EPBC & BC Acts)	3.8 km NNW	Mostly found in coastal areas, including sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores (DCCEEW 2024b). Foraging habitat: forages on bare wet mud on intertidal mudflats or sandflats, or in very shallow water; mostly in areas with a film of surface water and mostly close to edge of water. During high tides they sometimes forage in non-tidal wetlands. Red-necked Stints may also forage in samphire, generally avoid beds of seagrass, but may feed along edges. On Pelsaert Island, Western Australia, they have been recorded foraging on mud beneath mangroves. On sandy ocean beaches they sometimes forage in beachcast seaweed. They have been recorded foraging in flooded paddocks and in a freshly cropped lucerne paddock near lagoons (Higgins & Davies 1996). Roosting habitat: roosts on sheltered beaches, spits, banks or islets, of sand, mud, coral or shingle, sometimes in saltmarsh or other vegetation. They occasionally roost on exposed reefs or shoals (Higgins & Davies 1996).
Calidris subminuta Long-toed Stint	Mig. (EPBC & BC Acts)	18.3 km NE	Occupy a variety of wetlands, favouring shallow, freshwater and brackish wetlands including river floodplains, sewage ponds, swamps and lagoons (DCCEEW 2024b). Foraging habitat: wet mud or in shallow water, often among short grass, weeds and other vegetation on islets or around the edges of wetlands. They occasionally feed on open water, well away from the shore; this is more common in drying ephemeral wetlands (Higgins & Davies 1996). Roosting habitat: wet mud or in shallow water, often among short grass, weeds and other vegetation on islets or around the edges of wetlands. They occasionally feed on open water, well away from the shore; this is more common in drying ephemeral wetlands (Higgins & Davies 1996).
Gallinago stenura Pin-tailed Snipe	Mig. (EPBC & BC Acts)	Projected distribution	Usually found in the edges of swamps, ponds and lakes with vegetation available. They have also been found in open claypans in arid parts of the range. They have been recorded in sewage ponds and less often in intertidal wetlands (DCCEEW 2024b).

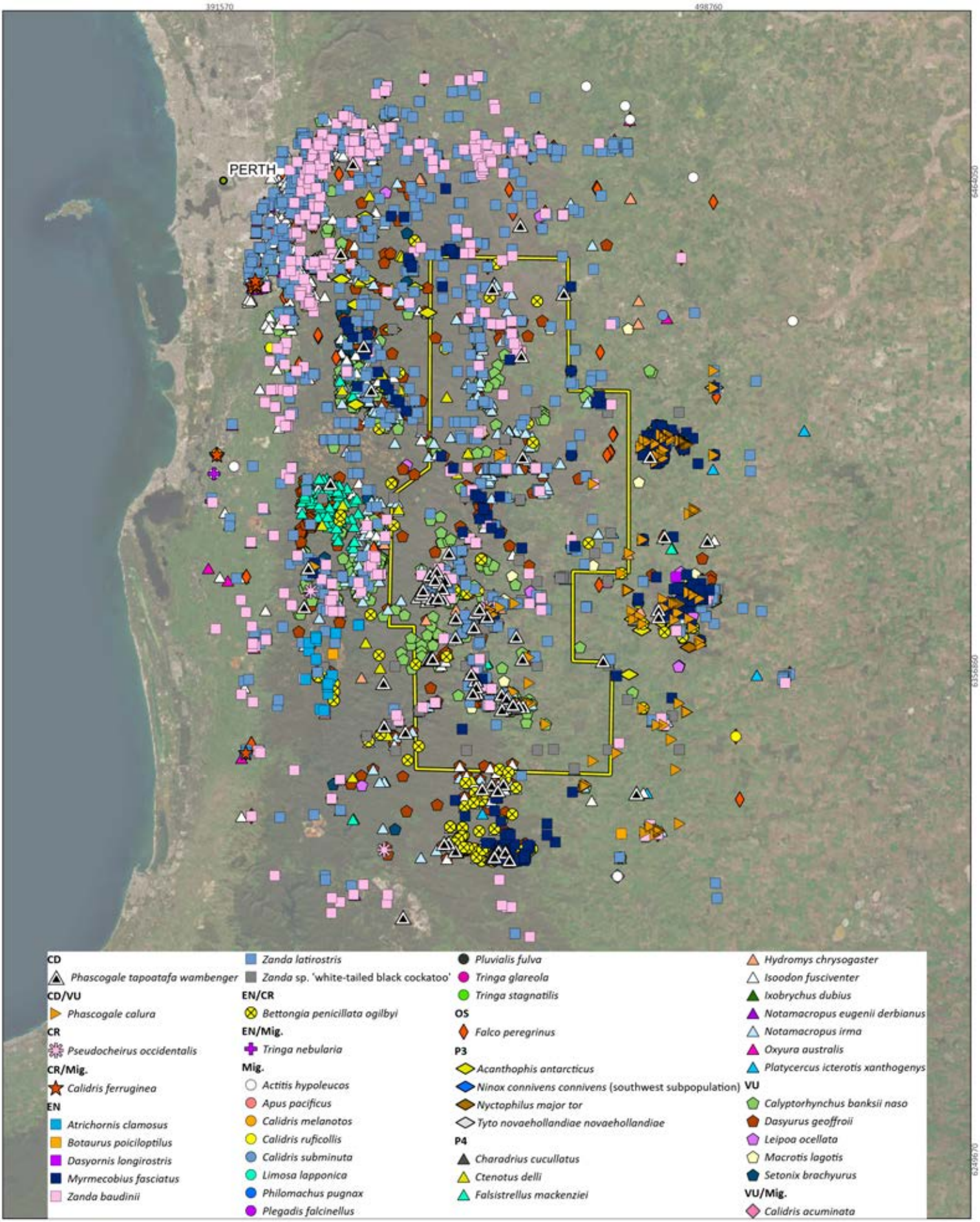
Species	Status	Nearest record to study area	Habitat
Limosa lapponica Bar-tailed Godwit	Mig. (EPBC & BC Acts)	37.3 km SW	Occupies a variety of aquatic habitats such as intertidal sandflats, banks, mudflats, estuaries coastal lagoons and harbours. They have also been found in saltmarshes and brackish coastal wetlands (DCCEEW 2024b)
Limosa limosa Black-tailed Godwit	En/Mig./Mig. (EPBC Act; BC Act)	38.1 km NW	Typically found in coastal environments with sheltered bays, estuaries and lagoons. Habitat use is dictated by the tides. They are also found in shallow and sparsely vegetated near-coastal wetlands (DCCEEW 2024b).
Philomachus pugnax Ruff	Mig. (EPBC & BC Acts)	37.7 km NW	Typically occupies saline and brackish wetlands with mudflats. They have been found in a range of wetlands including lakes, swamps, tidal rivers, and floodlands. There are some records of them occupying sheltered coastal areas such as harbours, estuaries and wetlands surrounded by dense vegetation (DCCEEW 2023)
Tringa glareola Wood Sandpiper	Mig. (EPBC & BC Acts)	38.1 km NW	Uses well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes (DCCEEW 2024b).
Tringa nebularia Common Greenshank	EN/Mig./Mig. (EPBC Act; BC Act)	30.0 km WSW	Mostly occurs on the coast but sometimes inland; uses permanent and ephemeral terrestrial wetlands, including rivers and creeks (DCCEEW 2024b).
Tringa stagnatilis Marsh Sandpiper	Mig. (EPBC & BC Acts)	32.1 km NW	Inhabits coastal and inland wetlands, estuarine and mangrove mudflats, beaches, swamps, lakes and several other types of wetlands (Morcombe 2004).
Gelochelidon nilotica Gull-billed Tern	Mig. (EPBC & BC Acts)	Projected distribution	Occur in freshwater swamps, salt lakes, beaches, mudflats and sewage farms, and are rarely found over the ocean (DCCEEW 2024b).
Botaurus poiciloptilus Australasian Bittern	EN (EPBC & BC Acts)	Within study area	Found in large, relatively undisturbed freshwater or brackish swamps with dense vegetation (Birdlife Australia 2013). They can occasionally feed in more open habitats, often at night (McKilligan 2005).
Ixobrychus dubius Australian Little Bittern	P4 (DBCA list)	38.1 km NW	Occurs in diverse freshwater swamp habitats, mainly where tall rushes, reeds, Typha (cumbungi), shrub thickets or other dense cover is inundated by at least 30 cm of water (Marchant & Higgins 1990)
Ixobrychus flavicollis subsp. *australis* Black Bittern (southwest subpop.)	P2 (DBCA list)	Projected distribution	Restricted to the southwest. Found in wetland, esturine and littoral habitats such as mangroves, tidal creeks, sheltered mudflats, dense surrounds of freshwater springs and billabongs.
Plegadis falcinellus Glossy Ibis	Mig. (EPBC & BC Acts)	36.2 km NW	Predominantly inhabits terrestrial wetlands, foraging in shallow water over soft substrate or on grassy or muddy verges of wetlands providing a variety of water depths. Inland, freshwater

Species	Status	Nearest record to study area	Habitat
			wetlands are preferred, especially permanent or ephemeral waterbodies on floodplains and shallow swamps with abundant aquatic flora (Johnstone *et al.* 2013a; Marchant & Higgins 1990).
Falco peregrinus Peregrine Falcon	OS (BC Act)	Within study area	Preferred habitat includes cliffs and wooded watercourses. Nesting occurs mainly on cliff ledges, granite outcrops, quarries and in trees with old raven or Wedge-tailed Eagle nests (Johnstone & Storr 1998).
Leipoa ocellata Malleefowl	VU (EPBC & BC Acts)	Within study area	Malleefowl occur mainly in scrubs and thickets of Mallee (*Eucalyptus* spp.), boree (*Melaleuca lanceolata*) and bowgada (*Acacia linophylla*), and other dense litter-forming shrublands including Mulga Shrublands (Johnstone & Storr; Johnstone & Storr 2004). Nest mounds require sandy soil as well as abundant litter (Benshemesh 2007).
Atrichornis clamosus Noisy Scrub-bird	EN (EPBC & BC Acts)	6.6 km WSW	Found in dense vegetation, including low forest, scrub thicket and (rarely) heath. These vegetation formations generally occur in the gullies and drainage lines of hills and granite mountains and in lowland areas, in overgrown swamps, lake margins and beside streams. Most abundant in vegetation more than 10 years post fire (DPaW 2014). Breeding habitat: Wetter areas characterised by a dense ground cover of sedges (mostly Lepidosperma) and/or small shrubs which provide a source of nest material, nest sites and cover (Danks *et al.* 1996). Foraging habitat: Drier and more elevated areas and is characterised by a less dense ground cover, a dense layer of leaf litter and an abundant population of litter-dwelling invertebrates (Smith 1996).
Dasyornis longirostris Western Bristlebird	EN/VU (EPBC Act; BC Act)	10.4 km ESE	This species is restricted to floristically diverse low dense coastal heathlands. They also occur on Grass Tree (*Xanthorrhoea* spp.) flats with dense heathland that is about 1 m (DCCEEW 2024b).
Calyptorhynchus banksii subsp. *naso* Forest Red-tailed Black Cockatoo	VU (EPBC & BC Acts)	Within study area	Occurs in dense Jarrah, Karri and Marri forests, mainly in the hilly interior, and a range of other forest and woodland types (DCCEEW 2024b). May also be a casual visitor to Perth's southern suburbs in search of Cape Lilac (Johnstone *et al.* 2013b).
Platycercus icterotis subsp. *xanthogenys* Western Rosella (inland)	P4 (DBCA list)	Within study area	The Western Rosella (inland form) is primarily found in eucalypt and casuarina woodlands, preferring Salmon Gum, Wandoo and tall mallees (Johnstone & Storr 1998). They feed on a range of fruits, seeds and Marri flowers both on the ground and in trees. Salmon Gum, Gimlet, Wandoo, Marri, Flooded Gum and York Gum are preferentially used for nesting (KLA 2011).
Zanda baudinii Baudin's Cockatoo	EN (EPBC & BC Acts)	Within study area	Mainly occurs in eucalypt forests of far south-west WA, especially Jarrah, Marri and Karri forest. Breeds predominately in forests averaging more than 750 mm of rainfall annually. During the non-breeding season, the range is determined by the distribution of Marri (DCCEEW 2024b).

Species	Status	Nearest record to study area	Habitat
Zanda latirostris Carnaby's Cockatoo	EN (EPBC & BC Acts)	Within study area	Occurs in uncleared or remnant native eucalypt woodlands of south-west WA. During the breeding season, it occurs mainly in eucalypt woodlands with suitable hollow-bearing trees in the wheatbelt. In the non-breeding season, they occur on coastal plains. Foraging habitat includes native vegetation surrounding breeding areas during the breeding season, and Banksia heath and woodlands in the non-breeding season (DCCEEW 2024b).
Zanda sp. White-tailed Black Cockatoo	EN (EPBC & BC Acts)	Within study area	Represents either Carnaby's Cockatoo or Baudin's Cockatoo.
Ninox connivens subsp. *connivens* Barking Owl (southwest subpop.)	P3 (DBCA list)	12.4 km ESE	Found in open forests, woodlands, dense scrubs, large trees near watercourses, paperbark woodlands.
Tyto novaehollandiae subsp. *novaehollandiae* Masked Owl (southwest)	P3 (DBCA list)	15.0 km ESE	Masked Owls have a preference for woodlands with large old trees in the proximity to open grasslands where they can hunt for mammals (DCCEEW 2024b).
Mammals (13)			
Falsistrellus mackenziei Western False Pipistrelle	P4 (DBCA list)	Within study area	Restricted to areas in or adjacent to high rainfall old growth forest. This includes wet sclerophyll dominated by Karri and Marri, and in Jarrah and Tuart in higher rainfall areas (Armstrong *et al.* 2017).
Nyctophilus major subsp. *tor* Central Long-eared Bat	P3 (DBCA list)	16.8 km ESE	Inhabits a range of habitats including eucalypt and she-oak woodlands and forests. It roosts in tree hollows, crevices and under loose bark.
Dasyurus geoffroii Chuditch	VU (EPBC & BC Acts)	Within study area	The Chuditch is now confined to south-WA, occurring in only 5% of its former range. Prior to European settlement the species occupied approximately 70% of continental Australia (Smith *et al.* 2004); (Van Dyck & Strahan 2008). The species is now mostly found in Jarrah forest and woodland of the southwest or heath and Mallee habitats along the south coast. Uses horizontal hollow logs or earth burrows as refugia and dens (DEC 2012b).
Phascogale calura Red-tailed Phascogale	VU/CD (EPBC Act; BC Act)	Within study area	Occurs in Allocasuarina woodlands with hollow-containing eucalypts, prefers vegetation that is unburnt for a long time, which provides continuous canopy cover to assist their arboreal habits (DCCEEW 2024b).
Phascogale tapoatafa subsp. *wambenger*	CD (BC Act)	Within study area	Occurs in mature dry sclerophyll forests and open woodlands that contain hollow-bearing trees. These nocturnal, arboreal carnivores forage for food under the bark of trees (DEC 2012a) and nest in the hollows of dead and mature Jarrah and Marri trees (Burbidge & Woinarksi 2020).

Species	Status	Nearest record to study area	Habitat
South-western Brush-tailed Phascogale			
Myrmecobius fasciatus Numbat	EN (EPBC & BC Acts)	Within study area	The species is now restricted to 2 isolated wild populations in south-west Australia and nests in hollow logs, trees or in burrows (DCCEEW 2024b). Inhabits eucalypt woodland and forests with abundant termites, and hollow logs for shelter (DPaW 2017a).
Notamacropus eugenii subsp. *derbianus* Tammar wallaby	P4 (DBCA list)	5.1 km ENE	Found in coastal scrub, heath, forest, or woodland with dense, low vegetation for shelter (DEC 2012d).
Notamacropus irma Western Brush Wallaby	P4 (DBCA list)	Within study area	A grazing species that occurs in open forest or woodland with low grasses and scrubby thickets, and also found in some areas of Mallee and heathland (DEC 2012f). Prefer open grassy areas and are absent in Karri forests with dense understorey (Woinarksi & Burbidge 2016).
Setonix brachyurus Quokka	VU (EPBC & BC Acts)	Within study area	Quokkas inhabit dense riparian vegetation and use a range of other habitats on the mainland such as heath and shrublands, swamps, and forests (DCCEEW 2024b).
Bettongia penicillata subsp. *ogilbyi* Woylie	EN/CR (EPBC/BC Act)	Within study area	Inhabited a wide range of landscapes prior to European colonisation. Remnant subpopulations inhabit woodlands and adjacent heaths with a dense understorey of shrubs, particularly Gastrolobium spp. (poison pea) (Threatened Species Scientific Committee 2018).
Pseudocheirus occidentalis Western Ringtail Possum	CR (EPBC & BC Acts)	Within study area	Formerly found in several types of forest and woodland (DPaW 2017b), the species is now mostly restricted to long unburnt mature peppermint/tuart closed forest and relatively unburnt Jarrah and Marri forests and woodlands with limited disturbance. It also occurs in coastal heath, peppermint woodland, myrtaceous heaths and shrubland, riparian zones and Karri forest (DPaW 2017b).
Isoodon fusciventer Quenda	P4 (DBCA list)	Within study area	Found in scrubby vegetation with dense cover, often around swamps, wetlands or in Banksia and Jarrah woodland. Feeds in frequently burnt forest and woodland close to dense cover. Populations inhabiting Jarrah and Wandoo forests are usually associated with watercourses. Also occur in more open habitat if it is subjected to introduced predator control (DBCA 2017).
Hydromys chrysogaster Water-rat	P4 (DBCA list)	Within study area	In the south-west of Western Australia, the Water-rat occupies habitats in the vicinity of permanent water, favouring areas with dense, low-lying vegetation. In the south-west of Western Australia, the Water-rat occupies habitats in the vicinity of permanent water, favouring areas with dense, low-lying vegetation, low density canopy cover, good water quality, narrow water bodies and some habitat complexity (DEC 2012e); (Speldewinde *et al.* 2013). It is likely

Species	Status	Nearest record to study area	Habitat
			that woody debris, rock ledges and wetland islands are important for refuge and feeding (DEC 2012g). Can also occur in mangrove and estuarine areas (IUCN 2019).
Reptiles (2)			
Acanthophis antarcticus Southern Death Adder	P3 (DBCA list)	0.6 km NNW	Inhabits a range of habitats from rainforests and woodlands to grasslands and heath (Wilson & Swan 2021).
Ctenotus delli Dell's skink	P4 (DBCA list)	Within study area	Occurs in Jarrah and Marri forests and woodlands on lateritic, clay and sandy soils (Wilson & Swan 2021).





South32 Worsley Alumina Pty Ltd
Extended Mining Areas Project

Project No	1652
Date	20/09/2024
Drawn by	JL
Map author	KF

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Kilometers

1:1,071,900(at A4) GDA 1994 MGA Zone 50

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Study area

Figure 5-1

Desktop records of significant vertebrate fauna

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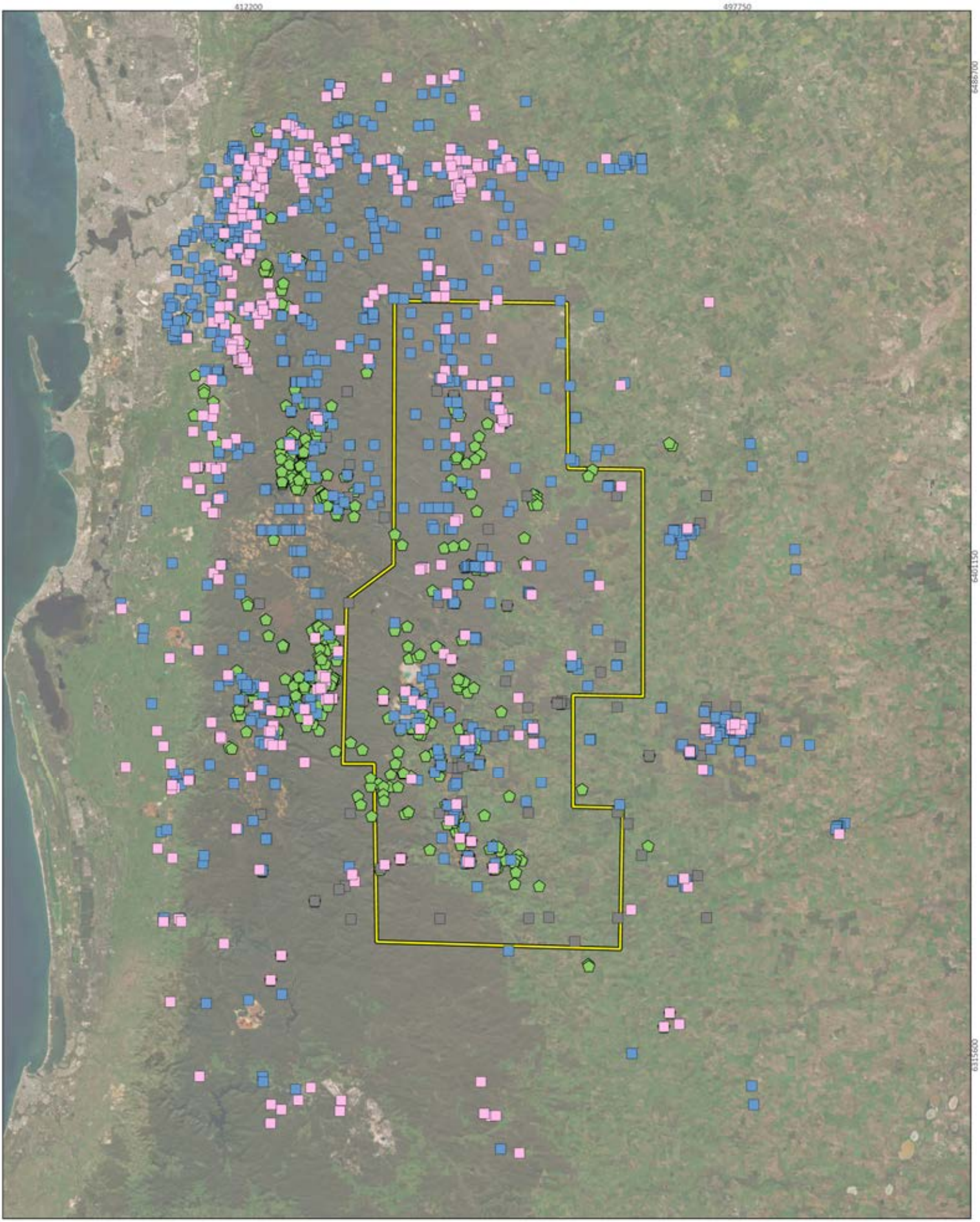



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Study area

EN

- Baudin's Cockatoo
- Carnaby's Cockatoo
- White-tailed Black Cockatoo

VU

- Forest Red-tailed Black Cockatoo

Figure 5-1a

Black cockatoo desktop records

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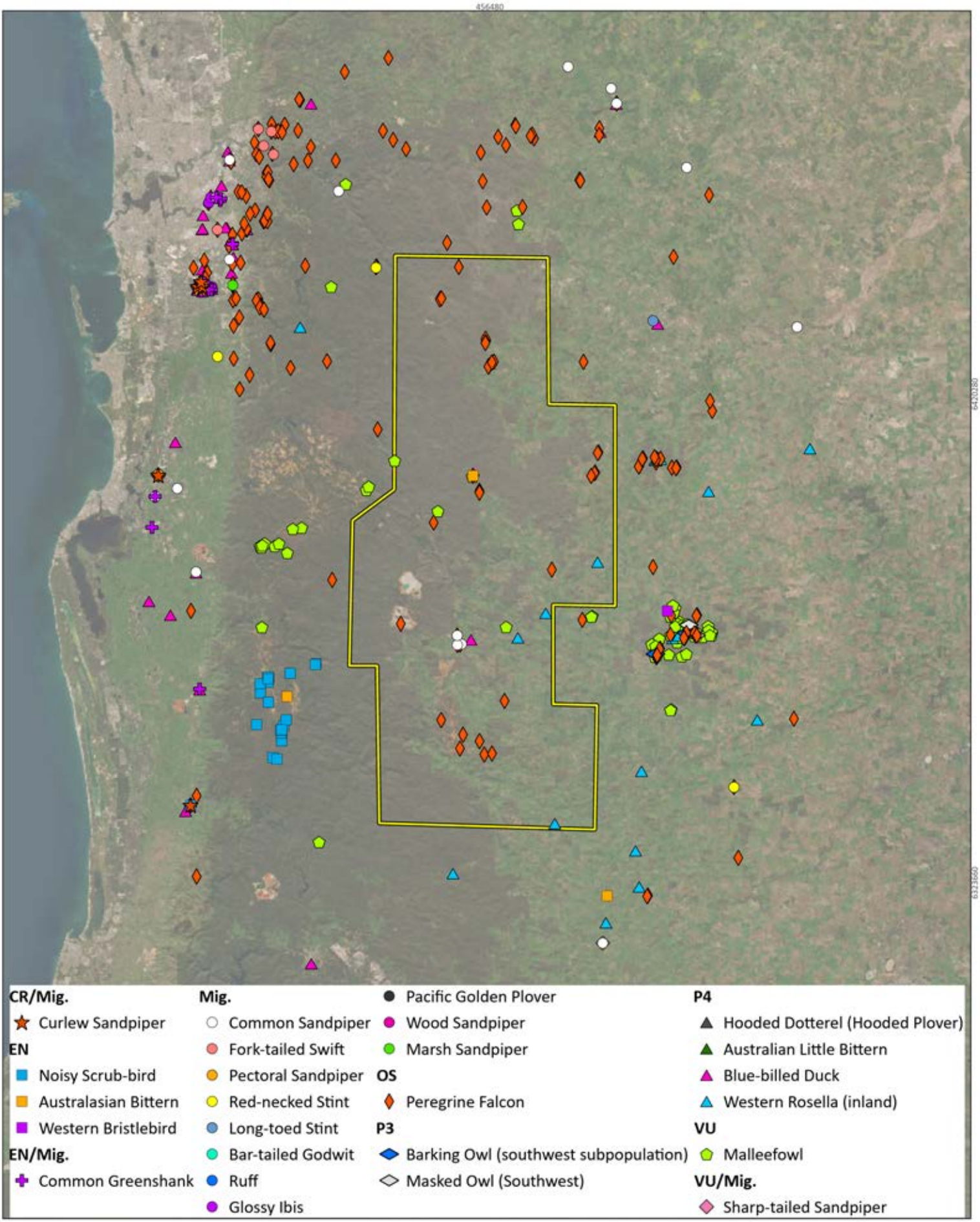



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Study area

Figure 5-1b

Desktop records of significant birds

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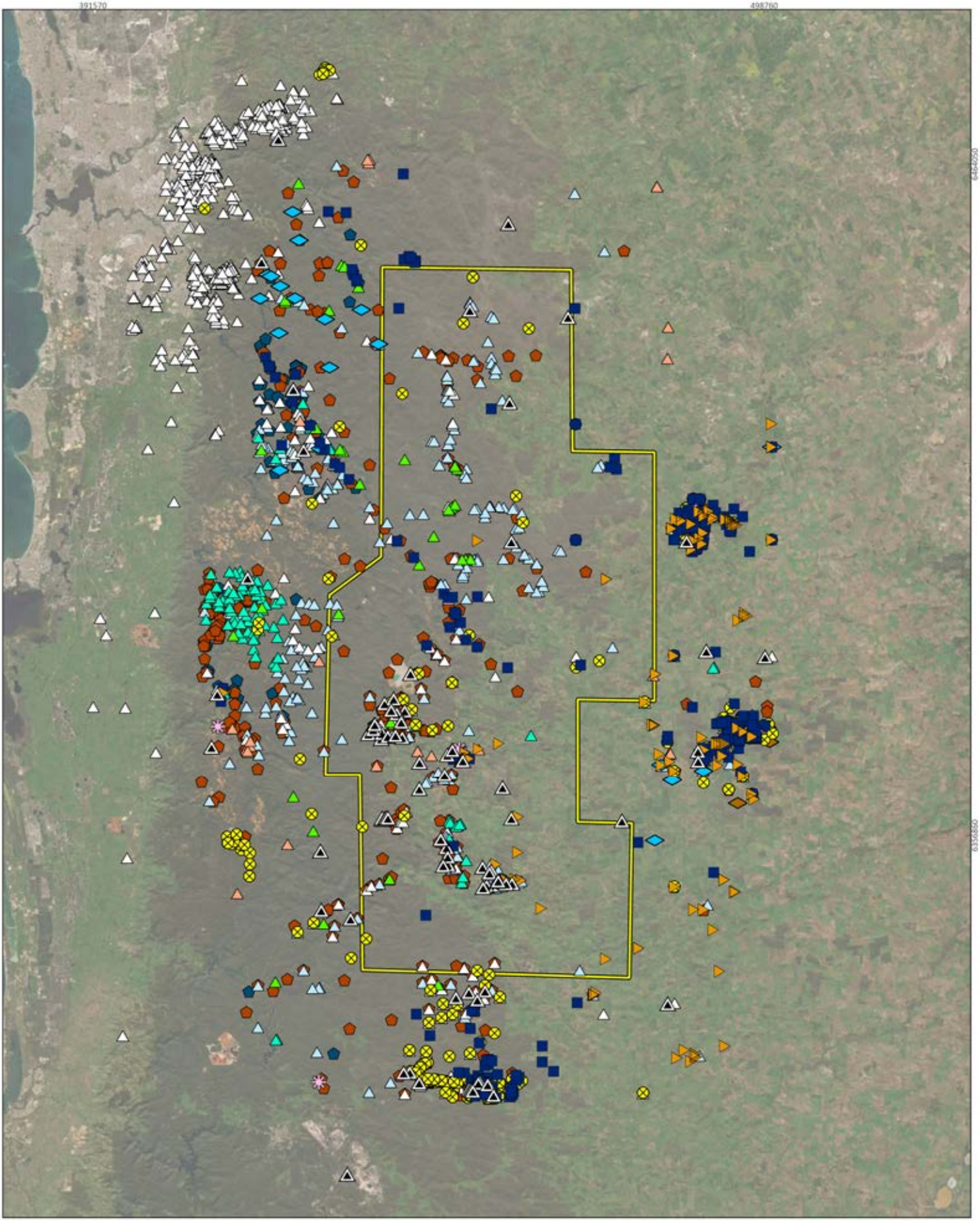



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1:780,722 (at A4) GDA 1994 MGA Zone 50

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- Study area
- CD
  - South-western Brush-tailed Phascogale
- CD/VU
  - Red-tailed Phascogale
- CR
  - Western Ringtail Possum
- EN
  - Numbat
- EN/CR
  - Woylie
- P3
  - Southern Death Adder
  - Central Long-eared Bat
- P4
  - Dell's Skink
  - Western False Pipistrelle
  - Water-rat
  - Quenda
  - Tammar Wallaby
  - Western Brush Wallaby
- VU
  - Chuditch
  - Quokka

Figure 5-1c

Desktop records of significant mammals and reptiles

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5.2 HABITATS

Initial habitat characterisation of the study area was undertaken using various remote geographical tools, including aerial photography, land system maps and topographic maps. Habitats with the potential to support significant terrestrial fauna species were identified based on known habitats of such species within the Northern Jarrah Forest bioregion.

Existing mapping of vegetation complexes of the south-west (Mattiske & Havel 1998) was re-interpreted into vertebrate fauna habitat. Re-interpretation comprises assessing the suitability of habitats described and mapping in the landscape, vegetation structure, and soil type and their potential to provide functional habitat to vertebrate fauna (Table 5-3; Figure 5-2).

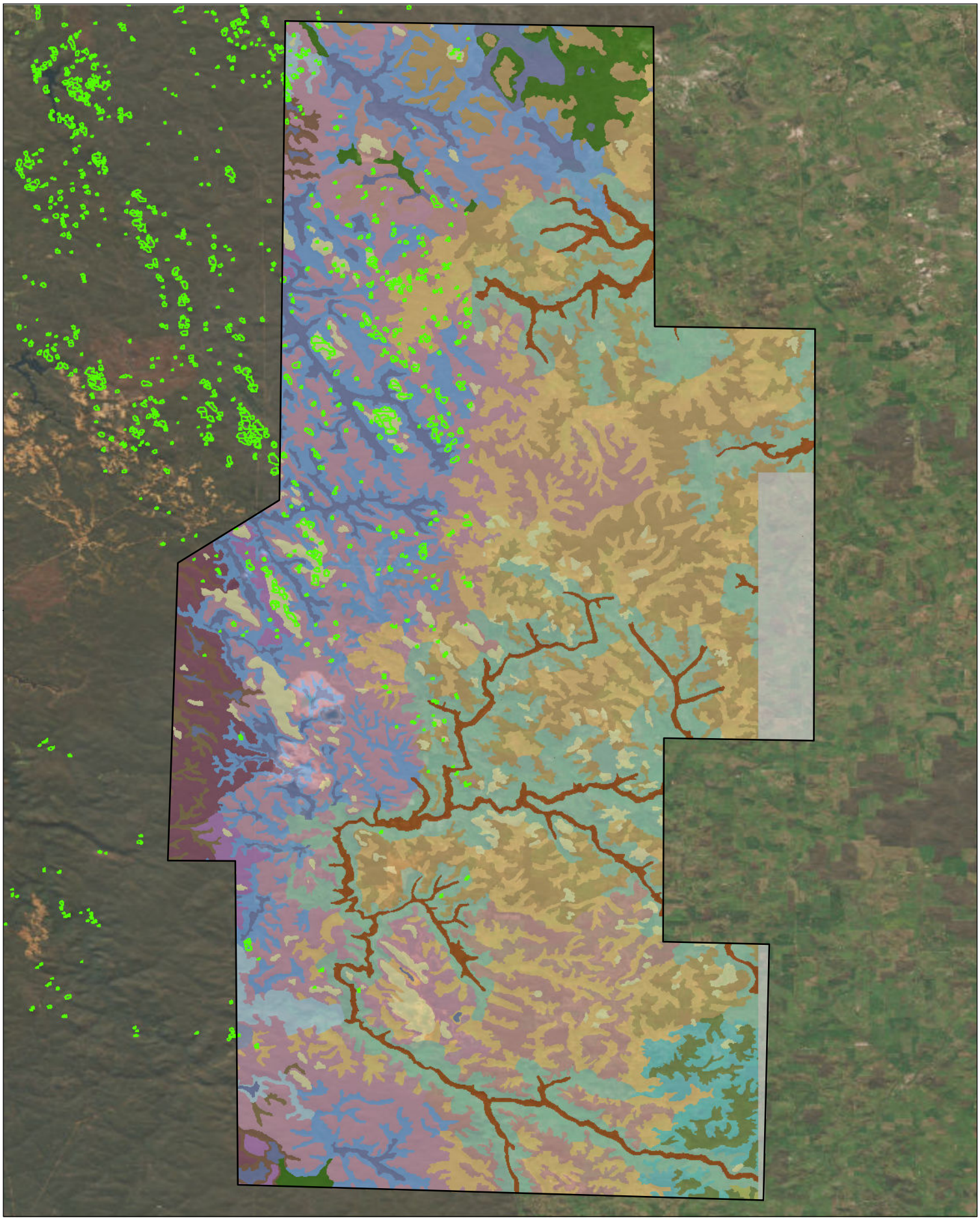
Remnant vegetation within the study area occupies a total of 277,871 ha (60.9%; Table 5-3; Figure 5-3). The remaining area is cleared (178,638 ha; 39.1%).

A total of 13,393 ha (2.9%) of the study area was not mapped under the Mattiske and Havel (1998) South-west forest vegetation complex mapping, however, Pre-European vegetation mapping suggests these areas comprise of a mixture of Jarrah/Marri/Wandoo/Powderbark or York Gum woodlands. These habitats were matched with the Mattiske and Havel (1998) vegetation complex of Jarrah/Marri/Wandoo open woodland/forest on lateritic uplands.

Table 5-3 Vegetation complexes in the study area

Veg. complex, code	Sub-category	Habitat description	Total area	Area of remnant veg.
Cooke, Ce	Uplands	Woodland and/or heath/shrubland on shallow soils on granite or outcrops	17,192	12,471
Coolakin, Ck	Valleys	Wandoo woodland with Jarrah/Marri/Blackbutt on valley slopes	68,599	34,111
Dalmore 2, DM2	Uplands	Woodland and/or heath/shrubland on shallow soils on granite or outcrops	6,792	2,081
Dalmore, DMg	Uplands	Woodland and/or heath/shrubland on shallow soils on granite or outcrops	81	3
Darkin 1, Dk1	Uplands	Jarrah/Marri/Wandoo open woodland/forest on lateritic uplands	152	0
Dwellingup, D1	Uplands	Jarrah/Marri forest/woodland on lateritic uplands	9,121	8,725
Dwellingup, D2	Uplands	Jarrah/Marri forest/woodland on lateritic uplands	3627	3,550
Dwellingup, D4	Uplands	Jarrah/Marri forest/woodland on lateritic uplands	67,524	57,471
Goonaping, G	Depressions/ Swamps	Open Jarrah forest on moist sandy soils in swamps or depressions	8,526	6,708
Lukin 2, LK2	Valleys	Mixed Eucalypt woodland on slopes and valley floors	4,587	697
Michibin, Mi	Valleys	Woodland and/or heath/shrubland on shallow soils on granite or outcrops	71,897	19,366
Murray 1, My1	Valleys	Mixed Eucalypt woodland on slopes and valley floors	268	251
Murray 2, My2	Valleys	Mixed Eucalypt woodland on slopes and valley floors	4,363	3,693
Pindalup, Pn	Valleys	Open Jarrah/Marri on slopes with Blackbutt/Wandoo woodlands on valley floors	51,277	45,425

Veg. complex, code	Sub-category	Habitat description	Total area	Area of remnant veg.
Swamp, S	Depressions/ Swamps	Melaleuca woodlands/shrublands on seasonally wet or water-logged clays and clay loams in swamps or depressions	17,772	15,644
Williams, Wi	Valley Floors and Swamps	Flooded Gum/Melaleuca and Casuarina woodland on valley floors	14,475	4,002
Yalanbee, Y5	Uplands	Jarrah/Marri/Wandoo open woodland/forest on lateritic uplands	35,497	22,918
Yalanbee, Y6	Uplands	Jarrah/Marri/Wandoo open woodland/forest on lateritic uplands	56,222	32,700
Yarragil 1, Yg1	Valleys	Open Jarrah/Marri on slopes with Blackbutt/Wandoo woodlands on valley floors	1,760	1,722
Yarragil 2, Yg2	Valleys	Open Jarrah/Marri on slopes with Blackbutt/Wandoo woodlands on valley floors	3,422	3,336
n/a[2]	Uplands[2]	Jarrah/Marri/Wandoo open woodland/forest on lateritic uplands[2]	13,393	2,999
		Total	**456,544**	**277,871**





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EMA regional study area

Granite outcops (JF01 bioregion only)

vegetation complex

unmapped

Ce
Ck
D1
D2
D4
DM2
DMg
Dk1
G
LK2
Mi
My1
My2
Pn
S
Wi
Y5
Y6
Yg1
Yg2

Figure 5-2

Vegetation complexes within the study area

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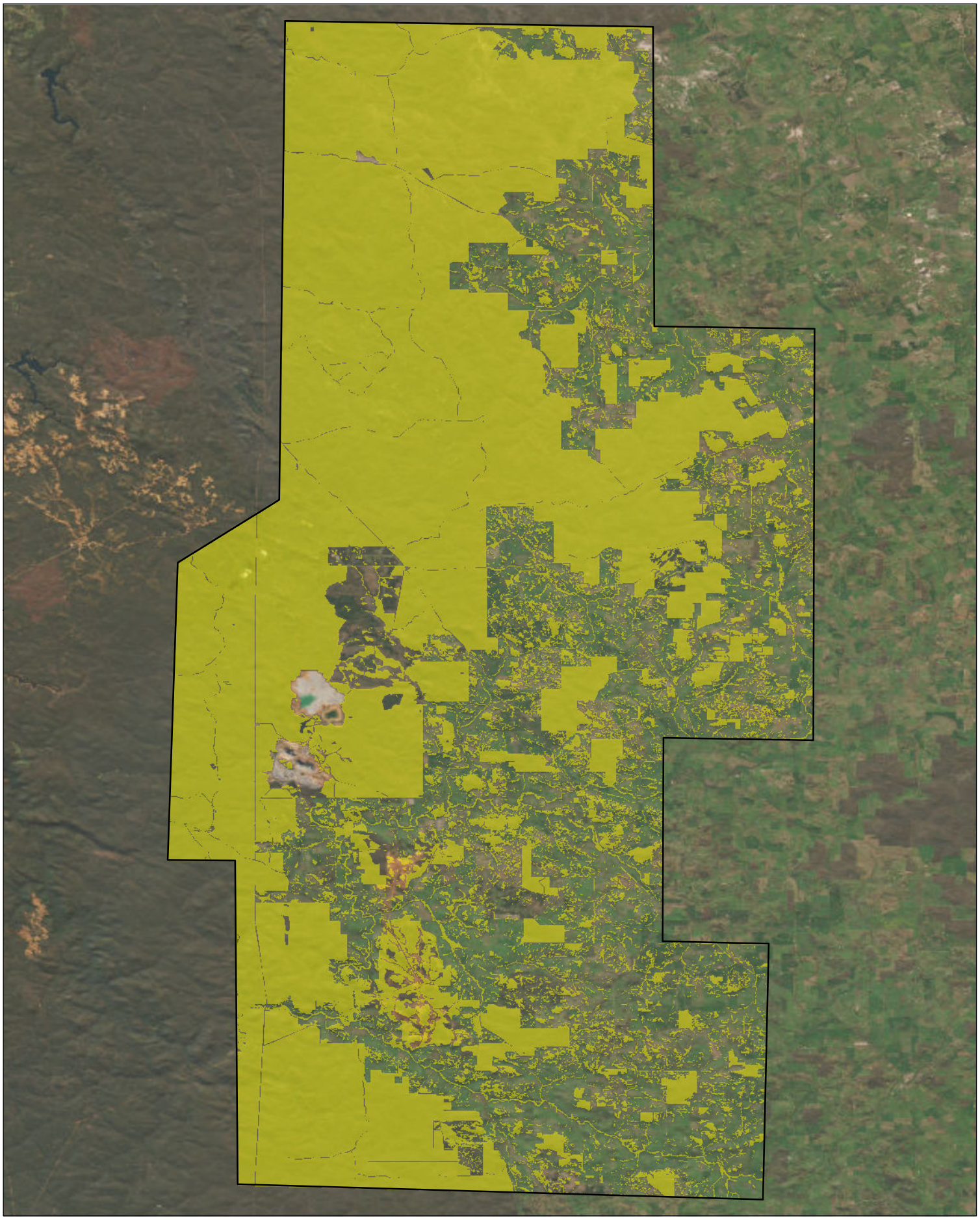



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Project No	1632
Date	22-Mar-24
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EMA regional study area
Native Vegetation Extent (DPIRD_005)

Figure 5-3

Native vegetation extent (DPIRD 005) within the study area

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5.3 LIKELIHOOD OF OCCURRENCE

Reviewing the conservation significant fauna identified in the desktop review and the habitat mapping of the area, the amount of potentially suitable habitat across the study area for each conservation significant species can be inferred. While the vegetation complexes in the study area are very descriptive, much of the fauna habitat values are similar. For this reason, the vegetation complexes have been simplified and their sub-categories have been used for reference to vertebrate fauna habitats (Table 5-4).

The 4 sub-categories used to summarise fauna habitat values include:

- Uplands - Jarrah/Marri/Wandoo open woodland/forest on lateritic uplands and or heath shrubland on uplands and outcrops
- Valleys - Open Jarrah/Marri on slopes with Blackbutt/Wandoo woodlands on valley floors
- Valley Floors and Swamps - Flooded Gum/Melaleuca and Casuarina woodland on valley floors
- Depressions/Swamps - Melaleuca woodlands/shrublands on seasonally wet or water-logged clays and clay loams in swamps or depressions

A review of the habitats available in the study area and the habitat associations for the 51 conservation significant species was completed to determine the likelihood of occurrence within the study area. The likelihood of occurrence assessment determined 22 species had previously been recorded within the study area, one is likely to occur, 8 are possible, and 20 are unlikely to occur in the study area.

Table 5-4 Likelihood of occurrence of species identified in the desktop review

Species	Status	Nearest record to study area	Likelihood of occurrence	Habitats			
				Uplands	Valleys	Valley floors and swamps	Depressions /swamps
Birds (36)							
Oxyura australis Blue-billed Duck	P4 (DBCA list)	Within study area	**Recorded** – previously recorded within the study area			•	•
Apus pacificus Fork-tailed Swift	Mig. (EPBC & BC Acts)	31.3 km NNW	**Possible** – study area within known range, exclusively aerial so not associated with any particular habitat, closest record over 30 km from study area	•	•	•	•
Charadrius cucullatus Hooded Plover	P4 (DBCA)	38.4 km NW	**Unlikely –** study area within known range, but no suitable coastal or salt lake habitat present within the study area				
Charadrius dubius Little Ringed Plover	Mig. (EPBC & BC Acts)	Projected distribution	**Unlikely** – rare but regular summer migrant, typically coastal but has been recorded inland. Within range, potentially suitable swamps and dams present in study area, no records within desktop extent			•	•
Pluvialis fulva Pacific Golden Plover	Mig. (EPBC & BC Acts)	38.1 km NW	**Unlikely** – regular, common, widespread summer migrant, mostly coastal but many inland records. Within range, potentially suitable swamps present in study area, closest record over 30 km from study area near the coast			•	•
Glareola maldivarum Oriental Pratincole	Mig. (EPBC & BC Acts)	Projected distribution	**Unlikely** – summer migrant to northern Aus. some reach SW Aus. Within range, potentially suitable open plain and wetland habitat present in the study area, no records within desktop extent			•	•
Rostratula australis Australian Painted Snipe	EN (EPBC & BC Acts)	Projected distribution	**Unlikely** – primarily distributed across the north and east of Aus., also known from southwest WA but scarce and erratic. Within range, potentially suitable swamps and pastures present in study area, no records within desktop extent			•	•
Actitis hypoleucos Common Sandpiper	Mig. (EPBC & BC Acts)	Within study area	**Recorded** – previously recorded within the study area		•	•	•

Species	Status	Nearest record to study area	Likelihood of occurrence	Habitats			
				Uplands	Valleys	Valley floors and swamps	Depressions /swamps
Calidris acuminata Sharp-tailed Sandpiper	VU/Mig./Mig. (EPBC Act; BC Act)	22.5 km SSE	**Unlikely** – widespread summer migrant to coastal and inland Aus. Within range, potentially suitable shallow wetlands and pastures present in the study area, closest record over 20 km from study area			•	•
Calidris ferruginea Curlew Sandpiper	CR/Mig./CR (EPBC Act; BC Act)	37.3 km SW	**Unlikely** – widespread, common summer migrant, mostly coastal but many inland. Within range, potentially suitable wetlands in the study area, closest record over 30 km from study area near the coast			•	•
Calidris melanotos Pectoral Sandpiper	Mig. (EPBC & BC Acts)	38.1 km NW	**Unlikely** – regular, uncommon summer migrant, coastal and inland. Within range, potentially suitable wetlands and pastures in the study area, closest record over 30 km from study area near the coast			•	•
Calidris ruficollis Red-necked Stint	Mig. (EPBC & BC Acts)	3.8 km NNW	**Possible** – abundant summer migrant to coastal and inland Aus. Within range, potentially suitable wetlands in the study area, recent record with 5 km of the study area			•	•
Calidris subminuta Long-toed Stint	Mig. (EPBC & BC Acts)	18.3 km NE	**Unlikely** – regular, uncommon summer migrant to coastal and inland Aus. Within range, potentially suitable shallow wetlands in the study area, closest record almost 20 km from study area			•	•
Gallinago stenura Pin-tailed Snipe	Mig. (EPBC & BC Acts)	Projected distribution	**Unlikely** – regular, uncommon summer migrant to coastal northwest and west Aus., occasional records south to Perth. Within range, potentially suitable wetlands and pastures in the study area, no records within desktop extent			•	•
Limosa lapponica Bar-tailed Godwit	Mig. (EPBC & BC Acts)	37.3 km SW	**Unlikely** – widespread summer migrant, mostly on coasts but regular inland passage. Within range, potentially suitable pastures in the study area, closest record over 30 km from study area near the coast			•	•
Limosa limosa Black-tailed Godwit	En/Mig./Mig. (EPBC Act; BC Act)	38.1 km NW	**Unlikely** – regular summer migrant, widespread but scarce in southern Aus. Within range, potentially suitable shallow freshwaters in the study area, closest record over 30 km from study area near the coast			•	•

Species	Status	Nearest record to study area	Likelihood of occurrence	Habitats			
				Uplands	Valleys	Valley floors and swamps	Depressions /swamps
Philomachus pugnax Ruff	Mig. (EPBC & BC Acts)	37.7 km NW	**Unlikely** – regular, uncommon summer migrant, mostly coastal but some inland. Within range, potentially suitable wetlands in the study area, closest record over 30 km from study area near the coast			•	•
Tringa glareola Wood Sandpiper	Mig. (EPBC & BC Acts)	38.1 km NW	**Unlikely** – uncommon, regular summer migrant to southern Aus., sparse through inland in suitable habitat. Within range, potentially suitable wetlands in the study area, closest record over 30 km from study area near the coast			•	•
Tringa nebularia Common Greenshank	EN/Mig./Mig. (EPBC Act; BC Act)	30.0 km WSW	**Unlikely** – regular, widespread summer migrant, mostly coastal but inland in suitable habitat. Within range, potentially suitable wetlands in the study area, closest record 30 km from study area near the coast			•	•
Tringa stagnatilis Marsh Sandpiper	Mig. (EPBC & BC Acts)	32.1 km NW	**Unlikely** – regular summer migrant, mostly coastal but widespread although scattered inland. Within range, potentially suitable wetlands in the study area, closest record over 30 km from study area near the coast			•	•
Gelochelidon nilotica Gull-billed Tern	Mig. (EPBC & BC Acts)	Projected distribution	**Unlikely** – scarce and patchy in southern WA, coastal and inland. Within range, potentially suitable wetlands in the study area, no records within desktop extent			•	•
Botaurus poiciloptilus Australasian Bittern	EN (EPBC & BC Acts)	Within study area	**Recorded** – previously recorded within the study area			•	•
Ixobrychus dubius Australian Little Bittern	P4 (DBCA list)	38.1 km NW	**Possible** – study area within known range, suitable swamps and wetlands in the study area, closest record over 30 km from study area near the coast, however the species is known to be patchy and uncommon throughout its distribution			•	•
Ixobrychus flavicollis subsp. *australis* Black Bittern (southwest subpop.)	P2 (DBCA list)	Projected distribution	**Possible** – study area within known range, suitable wetlands in the study area, no recent records within desktop extent however Atlas of living Australia (ALA) has historical records at Dwellingup and Collie			•	•

Species	Status	Nearest record to study area	Likelihood of occurrence	Habitats			
				Uplands	Valleys	Valley floors and swamps	Depressions /swamps
Plegadis falcinellus Glossy Ibis	Mig. (EPBC & BC Acts)	36.2 km NW	**Possible** - study area within known range, suitable wetlands in the study area, closest record over 30 km from study area near the coast			•	•
Falco peregrinus Peregrine Falcon	OS (BC Act)	Within study area	**Recorded** – previously recorded within the study area	•	•	•	•
Leipoa ocellata Malleefowl	VU (EPBC & BC Acts)	Within study area	**Recorded** – previously recorded within the study area	•	•		
Atrichornis clamosus Noisy Scrub-bird	EN (EPBC & BC Acts)	6.6 km WSW	**Unlikely** – current known range is restricted to the vicinity of Two Peoples Bay east of Albany. Translocated birds were released south of Dwellingup between 1997 and 2003; however it is likely these populations failed as no birds have been recorded since 2004			•	•
Dasyornis longirostris Western Bristlebird	EN/VU (EPBC Act; BC Act)	10.4 km ESE	**Unlikely** – current known range is between Albany and Hopetoun on the south coast of WA. A single 2016 record from Dryandra was returned in the DBCA Threatened and Priority fauna database search, however it has only moderate certainty listed and may be invalid			•	•
Calyptorhynchus banksii subsp. *naso* Forest Red-tailed Black Cockatoo	VU (EPBC & BC Acts)	Within study area	**Recorded** – previously recorded within the study area	•	•		
Platycercus icterotis subsp. *xanthogenys* Western Rosella (inland)	P4 (DBCA list)	Within study area	**Recorded** – previously recorded within the study area	•	•	•	
Zanda baudinii Baudin's Cockatoo	EN (EPBC & BC Acts)	Within study area	**Recorded** – previously recorded within the study area	•	•		
Zanda latirostris Carnaby's Cockatoo	EN (EPBC & BC Acts)	Within study area	**Recorded** – previously recorded within the study area	•	•		

Species	Status	Nearest record to study area	Likelihood of occurrence	Habitats			
				Uplands	Valleys	Valley floors and swamps	Depressions /swamps
Zanda sp. White-tailed Black Cockatoo	EN (EPBC & BC Acts)	Within study area	**Recorded** – previously recorded within the study area	•	•		
Ninox connivens subsp. *connivens* Barking Owl (southwest subpop.)	P3 (DBCA list)	12.4 km ESE	**Possible** – study area within known range, suitable open forest and woodland present within the study area, only records within the desktop extent from Dryandra in 2005	•	•	•	
Tyto novaehollandiae subsp. *novaehollandiae* Masked Owl (southwest)	P3 (DBCA list)	15.0 km ESE	**Possible** – study area within known range, suitable open forest and woodland present within the study area, only records within the desktop extent from Dryandra in 2001 and 2003	•	•	•	
Mammals (13)							
Falsistrellus mackenziei Western False Pipistrelle	P4 (DBCA list)	Within study area	**Recorded** – previously recorded within the study area	•	•		
Nyctophilus major subsp. *tor* Central Long-eared Bat	P3 (DBCA list)	16.8 km ESE	**Unlikely** – study area is outside current known range, the desktop records are from Dryandra, the western limit of *N. n. tor.*	•	•	•	
Dasyurus geoffroii Chuditch	VU (EPBC & BC Acts)	Within study area	**Recorded** – previously recorded within the study area	•	•	•	
Phascogale calura Red-tailed Phascogale	VU/CD (EPBC Act; BC Act)	Within study area	**Recorded** – previously recorded within the study area	•	•	•	
Phascogale tapoatafa subsp. *wambenger* South-western Brush-tailed Phascogale	CD (BC Act)	Within study area	**Recorded** – previously recorded within the study area	•	•	•	
Myrmecobius fasciatus Numbat	EN (EPBC & BC Acts)	Within study area	**Recorded** – previously recorded within the study area	•	•	•	

Species	Status	Nearest record to study area	Likelihood of occurrence	Habitats			
				Uplands	Valleys	Valley floors and swamps	Depressions /swamps
Notamacropus eugenii subsp. *derbianus* Tammar wallaby	P4 (DBCA list)	5.1 km ENE	**Possible** – study area within known range, suitable woodland with dense understorey present in the study area, nearest recent records are from Boyagin and Dryandra	•	•	•	
Notamacropus irma Western Brush Wallaby	P4 (DBCA list)	Within study area	**Recorded** – previously recorded within the study area	•	•	•	
Setonix brachyurus Quokka	VU (EPBC & BC Acts)	Within study area	**Recorded** – previously recorded within the study area			•	•
Bettongia penicillata subsp. *ogilbyi* Woylie	EN/CR (EPBC/BC Act)	Within study area	**Recorded** – previously recorded within the study area	•	•	•	
Pseudocheirus occidentalis Western Ringtail Possum	CR (EPBC & BC Acts)	Within study area	**Recorded** – previously recorded within the study area	•	•	•	
Isoodon fusciventer Quenda	P4 (DBCA list)	Within study area	**Recorded** – previously recorded within the study area	•	•	•	•
Hydromys chrysogaster Rakali/Water-rat	P4 (DBCA list)	Within study area	**Recorded** – previously recorded within the study area			•	•
Reptiles (2)							
Acanthophis antarcticus Southern Death Adder	P3 (DBCA list)	0.6 km NNW	**Likely** – study area is within known range, there is suitable woodland present in the study area, nearest record is within 1 km of the study area	•	•	•	
Ctenotus delli Dell's skink	P4 (DBCA list)	Within study area	**Recorded** – previously recorded within the study area	•	•		

6 DISCUSSION

The study area and region have been subject to many vertebrate fauna surveys over the past 20 years. However, many of these surveys have been desktop assessments and targeted black cockatoo surveys rather than detailed fauna surveys that provide comprehensive fauna assemblages of the survey areas. The desktop data can guide planning for comprehensive fauna surveys to better understand the conservation significant fauna in the study area. Similarly, the availability of detailed vegetation mapping within the study area can be used to guide survey efforts to detect the conservation significant species in the area. Given the age of the vegetation mapping, ground truthing of potentially suitable habitat to identify conservation significant fauna habitats is essential to planning comprehensive fauna and targeted surveys.

The vegetation surveys that have previously been completed identified 4 broad fauna habitats including:

- Uplands: Jarrah/Marri/Wandoo open woodland/forest on lateritic uplands and or heath shrubland on uplands and outcrops
- Valleys: Open Jarrah/Marri on slopes with Blackbutt/Wandoo woodlands on valley floors
- Valley Floors and Swamps: Flooded Gum/Melaleuca and Casuarina woodland on valley floors
- Depressions/Swamps: Melaleuca woodlands/shrublands on seasonally wet or water-logged clays and clay loams in swamps or depressions

Uplands is the most dominant fauna habitat in the study area consisting of 142,918 ha of remnant vegetation. Valleys are a similar habitat type, categorised by eucalypts, and lacking heathlands consisting of 108,601 ha of remnant vegetation. Depressions and swamps consist of 22,352 ha of remnant vegetation, followed by valley floors and swamps consisting of only 4,002 ha of remnant vegetation. Except for the valley floors and swamps being relatively restricted to only 4,002 ha, the remaining habitat types occur in high abundance and are likely to provide essential resources to many vertebrate fauna species.

The desktop review identified a diverse assemblage of vertebrate fauna, totalling of 426 taxa within the desktop search extent. The list comprised 19 amphibians, 95 reptiles (including 2 introduced species), 256 birds (including 9 naturalised species) and 56 mammals (including 11 introduced species). The desktop review indicated that the study area may support a large number of threatened species, with 51 conservation significant vertebrate taxa, comprising 21 species listed as Threatened, Conservation Dependent or Specially Protected under the EPBC Act and/or BC Act (Table 5-2). Nineteen avifauna species are listed as Migratory under the EPBC Act and BC Act (Table 5-2). A further 15 species are listed as Priority by DBCA (Table 5-2). Each of these species has a record either inside the study area or near the study area. Of these 51 species, 22 have been previously recorded in the study area, one is likely to occur based on habitat preferences, and 8 may possibly occur.

6.1 CONSERVATION SIGNIFICANT REPTILES

Two species of priority reptiles were identified as likely to occur or previously recorded in the study area; Southern Death Adder (*Acanthophis antarcticus*; P3) and Dell's Skink (*Ctenotus delli;* P4). Southern Death Adder has been recorded less than 1 km from the study area while Dell's Skink has previously been recorded inside the study area. Given the relatively limited recent survey effort across a very large study area, limited records for these species are available. More than 251,000 ha of potential habitat remains as remnant vegetation in the study area, suggesting ample habitat is available for both of these species to occur.

6.2 CONSERVATION SIGNIFICANT BIRDS

Seventeen conservation significant birds have previously been recorded in the study area or are considered likely or possible to occur. This includes black cockatoos, water birds, migratory shorebirds, forest/woodland birds and wide-ranging species.

Targeted black cockatoo surveys have been completed throughout the study area and region. These surveys have generated widespread records of all 3 black cockatoo species that occur in the area (Baudin's Cockatoo, *Zanda baudinii* EN (EPBC & BC Acts); Carnaby's Cockatoo*, Zanda latirostris* EN (EPBC & BC Acts); and Forest Red-tailed Black Cockatoo*, Calyptorhynchus banksii naso* VU (EPBC & BC Acts)), as well as *Zanda* sp. records for when definitive species identification is not possible. Vegetation mapping suggests that almost all remaining vegetation in the study area provides suitable habitat for these species, and as such these black cockatoo species will be targeted during the field surveys.

Two water bird species have been recorded in the study area; Blue-billed Duck (*Oxyura australis*: P4) and Australasian Bittern (*Botaurus poiciloptilus*; EN (EPBC & BC Acts)). Three additional species are considered possible to occur: Australian Little Bittern (*Ixobrychus dubius*; P4), Black Bittern (southwest subpop.) (*Ixobrychus flavicollis australis* P2) and Glossy Ibis (*Plegadis falcinellus*; Mig; (EPBC & BC Acts)). Each of the bittern species are elusive, and targeted surveys have not been completed in the study area. Given that the other 2 bittern species are known to occupy the region and prefer similar habitats to Australasian Bittern (recorded in 2017), it is possible for them to use the same available habitats. Glossy Ibis may also be recorded in the same habitats.

One migratory shorebird species has been recorded in the study area; Common Sandpiper (*Actitis hypoleucos*; Mig. EPBC & BC Acts)), and Red-necked stint (*Calidris ruficollis* Mig. (EPBC & BC Acts)) is also considered possible to occur in the study area. Both species are most likely to occupy wetlands or swampy areas during the migratory shorebird season (September – April).

Four forest/woodland bird taxa have been recorded or possibly occur in the study area, including:

- Masked Owl (southwest subpop.) (*Tyto novaehollandiae novaehollandiae*; P3)
- Barking Owl (southwest subpop.) (*Ninox connivens* subsp. *connivens* P3)
- Western Rosella (inland) (*Platycercus icterotis* subsp. *xanthogenys* P4)
- Malleefowl (*Leipoa ocellata*; VU (EPBC & BC Acts))

Western Rosella (inland) has been recorded multiple times from the east of the study area, and Malleefowl has also been recorded multiple times within the study area, as well both east and west of the study area. Both of these species are most likely to occur in open woodland/shrubland habitat in the east of the study area. The study area is also within the known range of Masked Owl (southwest subpop.) and Barking Owl (southwest subpop.), though all records in the desktop search extent are from Dryandra woodland east of the study area over 15 years ago.

Peregrine Falcon (*Falco peregrinus*: OS (BC Act)) has also been recorded in the study area. This wide-ranging species forages across a variety of habitats, and may nest in large trees in the study area. Similarly, Fork-tailed Swift (*Apus pacificus*; Mig (EPBC & BC Acts)) are exclusively aerial so are not associated with any specific habitat. Given they are found across Australia and the closest record is 30 km away, it is possible they travel through the study area.

6.3 CONSERVATION SIGNIFICANT MAMMALS

The desktop review indicates that the study area potentially supports a diverse and significant assemblage of mammals. Eleven conservation significant mammal species have been recorded from the study area, including:

- Woylie (*Bettongia penicillata ogilbyi*; EN/CR (EPBC & BC Acts))
- Chuditch (*Dasyurus geoffroii*; VU (EPBC & BC Acts))

- Western False Pipistrelle (*Falsistrellus mackenziei*; P4)
- Rakali, Water-rat (*Hydromys chrysogaster*: P4)
- Quenda (*Isoodon fusciventer*:P4)
- Numbat (*Myrmecobius fasciatus*; EN (EPBC & BC Acts))
- Western Brush Wallaby (*Notamacropus Irma*; P4)
- Red-tailed Phascogale (*Phascogale calura*; VU/CD (EPBC & BC Acts))
- South-western Brush-tailed Phascogale (*Phascogale tapoatafa* subsp. *wambenger*; CD (BC Act))
- Quokka (*Setonix brachyurus;* VU (EPBC & BC Acts))
- Western Ringtail Possum (*Pseudocheirus occidentalis*; CR (EPBC & BC Acts))

Each of these mammals has previous known records inside the study area and an abundance of suitable habitat. For this reason, these species likely have sustainable populations in the study area and throughout the region. A comprehensive survey effort over multiple seasons would provide further insight into how these conservation significant species are using the study area and in what frequency they reside.

Tammar Wallaby (*Notamacropus eugenii* subsp. *derbianus*; P4) is considered possible to occur based on the known range and presence of suitable habitat. Central Long-eared Bat (*Nyctophilus major* subsp. *tor*; P3) is considered unlikely to occur as records from the desktop search are all from Dryandra woodland, the western limit of the subspecies.

7 FIELD SURVEY REQUIREMENTS

Based on the results from the desktop review, 31 species require targeted survey methods, including 2 reptiles, 16 birds and 12 mammal species. Targeted search methods are outlined in Table 7-1. The basic fauna survey will inform the sampling plan and targeted searches. The basic fauna survey results will also guide the implementation of the survey methods and site selection for the detailed fauna surveys. Based on the species recorded in the desktop review, targeted methods for each species are summarised in Table 7-1.

Table 7-1 Checklist of survey methods per significant species recorded, likely or possible to occur

Common name (*Species*, Cons. status)	Diurnal searches	Nocturnal searches	Funnel trap	Pitfall trap	Elliot trap	Cage trap	Echolocation recordings	Audio recordings	Camera trapping	Habitat and/or habitat tree assessment	DNA/scat analyses
Reptiles (2)											
Southern Death Adder (P3; *Acanthophis antarcticus*)	✓	✓	✓	✓							
Dell's Skink (P4; *Ctenotus delli*)	✓		✓	✓							
Birds (16)											
Blue-billed Duck (P4; Oxyura australis)	✓							✓		✓	
Fork-tailed Swift (Mig. (EPBC & BC Acts); *Apus pacificus*)	✓										
Common Sandpiper (Mig. (EPBC & BC Acts); *Actitis hypoleucos*)	✓									✓	
Red-necked Stint (Mig. (EPBC & BC Acts); *Calidris ruficollis*)	✓										
Australasian Bittern (EN (EPBC & BC Acts); *Botaurus poiciloptilus*)	✓							✓		✓	
Australian Little Bittern (P4; *Ixobrychus dubius*)	✓							✓		✓	
Black Bittern (P2; *Ixobrychus flavicollis australis*)	✓							✓		✓	
Glossy Ibis (Mig. (EPBC Act & BC Act); *Ixobrychus flavicollis australis*)	✓									✓	
Peregrine Falcon (OS BC Act); *Falco peregrinus*)	✓										
Forest Red-tailed Black Cockatoo (VU (EPBC & BC Acts)*; Calyptorhynchus banksii naso*)	✓							✓		✓	
Western Rosella (inland) (P4; *Platycercus icterotis* subsp. *xanthogenys*)	✓										
Barking Owl (P3; *Ninox connivens connivens*)	✓	✓						✓			

Common name (*Species*, Cons. status)	Diurnal searches	Nocturnal searches	Funnel trap	Pitfall trap	Elliot trap	Cage trap	Echolocation recordings	Audio recordings	Camera trapping	Habitat and/or habitat tree assessment	DNA/scat analyses
Masked Owl (P3; *Tyto novaehollandiae novaehollandiae*)		✓						✓		✓	
Baudin's Cockatoo (EN (EPBC & BC Acts); *Zanda baudinii)*	✓							✓		✓	
Carnaby's Cockatoo (EN (EPBC & BC Acts); *Zanda latirostris)*	✓							✓		✓	
Malleefowl (VU; *Leipoa ocellata*)	✓								✓	✓	
Mammals (13)											
Woylie (EN/CR (EPBC & BC Acts); *Bettongia penicillata ogilbyi*)	✓	✓				✓			✓	✓	✓
Chuditch (VU (EPBC & BC Acts) *Dasyurus geoffroii*)	✓	✓			✓	✓			✓	✓	✓
Western False Pipistrelle (P4; *Falsistrellus mackenziei*)							✓			✓	
Rakali, Water-rat (P4; *Hydromys chrysogaster*)	✓					✓			✓		
Quenda (P4; *Isoodon fusciventer*)	✓	✓			✓	✓			✓		
Numbat (EN (EPBC & BC Acts) *Myrmecobius fasciatus*)	✓								✓		✓
Tammar Wallaby (P4; *Notamacropus eugenii derbianus*)	✓								✓		
Western Brush Wallaby (P4; *Notamacropus irma*)	✓										
Red-tailed Phascogale (VU/CD (EPBC & BC Acts) *Phascogale calura*)	✓	✓			✓				✓	✓	✓
South-western Brush-tailed Phascogale (CD (BC Act) *Phascogale tapoatafa wambenger*)	✓	✓			✓				✓	✓	✓
Quokka (VU (EPBC & BC Acts); *Setonix brachyurus*)	✓	✓				✓			✓	✓	✓
Western Ringtail Possum (CR; *Pseudocheirus occidentalis*)	✓	✓				✓			✓	✓	✓
Honey Possum (Not listed; *Tarsipes rostratus*)		✓		✓	✓					✓	

7.1 REPTILES

Surveying for Southern Death Adder and Dell's Skink is best completed with systematic trapping, implemented during detailed Fauna surveys. The EPA technical guidelines suggest aluminium box traps, pitfall traps and spotlighting (EPA 2020). Additionally, habitat assessments for this species and diurnal searches will be completed while traversing the study area.

7.2 BLACK COCKATOOS

The study area has an abundance of records of:

- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*; Vulnerable),
- Baudin's Cockatoo (*Zanda baudinii;* Endangered), and
- Carnaby's Cockatoo (*Zanda latirostris*; Endangered),

including areas known to be used for breeding by at least 2 of these species (Phoenix 2023). A black cockatoo habitat assessment will therefore be undertaken and include assessment and mapping of breeding habitat, foraging habitat quality and night roosting habitat.

Breeding habitat for black cockatoos is generally woodland or forest but may also include partially cleared areas with isolated trees; dead trees with suitable hollows, and artificial nestboxes may be used. For most species of trees, suitable nest hollows are only found in live trees with a diameter at breast height (DBH) of at least 500 mm, but any eucalypt tree of 300 to 500 mm DBH is considered to have potential to develop a nest hollow in the future (DAWE 2022). In the superseded guidelines (DSEWPaC 2012) suitable DBH to develop a nest hollow was defined as 500 mm for most tree species known to support breeding hollows, but 300 mm for Salmon Gum and Wandoo; no such distinction based on tree species is included in the current guidelines.

Determination of breeding habitat value will follow methods slightly modified from Phoenix (Phoenix 2021a, 2023), based on habitat tree inventories within 100 x 100 m (1 ha) quadrats sampling all forest and woodland habitat types, spread geographically across the study area. Within each quadrat, all live and dead eucalypts with a DBH ≥300 mm will be inspected from ground level (with binoculars) for presence of hollows and any signs of use by black cockatoos. Where hollows appear suitable or show signs of nesting evidence, pole cameras will be used to inspect the hollows (currently limited to ~8 m height; use of drones to be investigated for higher hollows if required). Hollows will be assessed for suitability based on the size of opening, height above ground, near-vertical orientation and (estimated) internal depth (based on dimensions of known nesting hollows (e.g. DEC 2010; Johnstone *et al.* 2013b).

Attributes recorded for each tree will include GPS location, DBH, tree species (if determinable), the estimated height, diameter and depth of any potentially suitable hollows, signs of use (e.g., chewing around opening) and presence of any black cockatoo species, feral bees, or other hollow-using fauna. Habitat trees will be assigned to one of the following categories:

1. Confirmed nesting trees – trees currently or recently used for breeding by any black cockatoo species. Confirmed breeding such as incubating females (flushed), presence of eggs or chicks.
2. Nesting trees with suitable hollows with evidence of breeding (such as chewing or prospecting) but unconfirmed breeding (incubating female, eggs, or chicks not observed).
3. Nesting trees with suitable hollows but no evidence of use – trees with suitable hollows (minimum opening diameter 10-40 cm, hollow height >2 m above ground, orientation close to vertical, estimated depth >0.5 m), but not known to be used.
4. Potential nesting trees – DBH ≥300, hollow present but not currently suitable for use by black cockatoo species.

5. Potential Habitat Tree – DBH ≥300, no visible hollows.

Breeding habitat value (based on average density of each tree category) will then be extrapolated from quadrats. Foraging habitat differs among the 3 black cockatoo species, but with considerable overlap. Foraging habitat quality will be assessed using criteria used in the scoring systems of both DAWE (2022), including presence of vegetation types and known food plants used by each species (DAWE 2022) (Groom 2010; Johnstone *et al.* 2010). Provision of the latest detailed vegetation maps of the study area are required to determine extent and quality of foraging habitat.
At survey sites, searches will target foraging evidence on Marri nuts (Fleming 2022), inflorescences of *Banksia* and other proteaceous plants, and pine cones will be recorded to supplement scores calculated using the DAWE (2022) and Bamford (2021) scoring system.
Roosting habitat comprises tall trees, usually near water sources (DAWE 2022), and roost sites are usually indicated by presence of clipped leaves and branches and droppings under suitable trees. Some roosting sites within the study area will have been previously identified and their locations will be available in reports and databases (Phoenix 2023); others may be detected through observations of birds in early morning and evening during the survey (e.g. triangulation of flight direction as birds approach or leave a roost).
Note that the systematic recording of tree hollows and their use by fauna may be used to assess abundance of various fauna species in addition to black cockatoos (provided that survey occurs during a season when the species would be detectable at hollows).

7.3 BITTERNS

The Australasian Bittern, Australian Little Bittern and Black Bittern were detected during the desktop review. Formerly widespread in the south-west of WA, from Moora in the north to Cape Arid in the east. However, since the 1980's these species have dramatically declined and have only been recorded from a handful of locations, including wetlands along the south coast from Augusta, east to Cape Arid. Habitat critical to survival of these species are described in the Australasian Bittern Recovery plan as (DBCA 2018):

> "generally large, fresh to moderately brackish wetlands with pH levels ranging from 5.5 to 8.5. Extensive areas of water plants, especially rushes, reeds and sedges, provide habitat for the bitterns and support abundant prey (Pickering 2013). Shallow water, less than 30cm deep with a low to medium density of water plants mixed with, or near short fine sedges are favoured for foraging while higher density emergent vegetation is preferred for nesting (Jaensch 1982; A. Clarke, pers.2017)."

Due to historic records of these species in the area, plus the fact many of the wetlands in the study area may be considered to have the potential to support these species based on the description of critical habitat (DBCA 2018), bitterns will be targeted during the field surveys.

The most effective survey methodology for detecting presence of Australasian Bitterns is by using passive acoustic surveys via autonomous recording units (ARUs). Currently there is no survey technique available to irrefutably prove that bitterns are absent from a site, and as such habitat assessments are a critical component of determining the likelihood of occurrence. The ARUs are deployed with the aim of detecting males vocalising with their "booming" calls. These surveys should be conducted during the breeding season, between mid-October and late-March (Birdlife Australia 2024).

7.4 ADDITIONAL CONSERVATION SIGNIFICANT AVIFAUNA

Eight conservation significant bird species will be targeted using habitat assessment and avifauna surveys. These include Blue-billed Duck, Glossy Ibis, Common Sandpiper, Red-necked stint, Peregrine

Falcon, Fork-tailed Swift, Western Rosella (inland) and Malleefowl. Notably, Common Sandpiper and Red-necked Stint are migratory shorebirds, so may only be present during September – April.

While traversing the study area, areas of suitable habitat will be identified for each of these species. This may include

- Blue-billed Duck – avifauna surveys and ARUs at lakes, ponds and Melaleuca wetlands
- Glossy Ibis – avifauna surveys at lakes, ponds and Melaleuca wetlands
- Common Sandpiper – avifauna surveys at wetlands with suitable mudflats
- Red-necked Stint – avifauna surveys at wetlands with suitable mudflats
- Western Rosella (inland) – avifauna surveys at suitable open woodlands and shrublands
- Malleefowl – bird surveys and habitat assessments at suitable woodlands and shrublands.

Peregrine Falcons and Fork-tailed Swift are wide-ranging species, so are not confined to specific habitat types.

To target these species, 20-minute avifauna surveys will be undertaken throughout the study area. Avifauna surveys targeting each species will be confined to suitable habitat (up to 2 ha). The avifauna surveys will be undertaken throughout the day with a focus on periods of higher activity around sunrise and sunset. Surveys will consist of bird recordings from visual sightings, call recognition and secondary evidence such as tracks, scats, feeding residue, feathers, and structures such as nests. If any Malleefowl signs are discovered (e.g. mounds), GPS points will be recorded and any observable Malleefowl presence will be documented and photographed. Activity assessments will be conducted for all mounds identified.

Audio recorders deployed in suitable habitat may also increase the detectability of some of these conservation significant species.

Some species (e.g. Malleefowl) may also be captured on camera traps deployed in suitable habitat.

7.5 OWLS

Barking Owl (southwest subpop.) and Masked Owl (southwest subpop.) are 2 Priority species that occur in the southwest and were recorded during the desktop review. Barking Owls are known to be sparsely distributed in dry sclerophyll woodlands, however their range is also associated with watercourses (Davis 2022). Similarly, the Masked Owl inhabits forests and woodlands with waterways and open areas (Liddelow *et al.* 2002). Targeted searches for these species will be completed during nocturnal searches, where recorded calls for each species in suitable habitats will be played while the survey team listen for replies to calls. Spotlighting during nocturnal surveys will also be undertaken, where survey teams can identify wildlife with eye-shine. Additionally, ARUs will be deployed in areas of suitable habitat and left for a minimum of 4 nights to record the presence of Barking Owl and Masked Owl in the study area.

7.6 WESTERN FALSE PIPISTRELLE

Western False Pipistrelle has previously been found in the study area. This species inhabits open woodlands and roosts in tree hollows and loose bark of large trees. Echolocation recordings will be completed at each systematic site using Song Meter SM4 recorders, as well as areas identified as suitable habitat to determine the presence of Western False Pipistrelle. Sites will be selected based on the suitability of the habitat as either potential roosting, foraging, or transit habitat. Recorders will operate from sunset to sunrise for a minimum of 3 nights at each site.

7.7 CHUDITCH

Chuditch or Western Quoll is the largest marsupial carnivore in WA; formerly distributed across most of the continent, it still occurs sparsely in the Wheatbelt and Goldfields but is mainly restricted to the Jarrah forest of the southwest. The species is regarded as important for rebalancing local ecosystems in favour of native species, so that actions to protect the species have an umbrella effect and improve ecosystem function (DCCEEW 2024d). Individuals have large home ranges and move frequently between many den or refuge sites (horizontal hollow logs, earth burrows or crevices in outcrop), rather than spending long periods in any one place.

Chuditch scat is relatively conspicuous and distinctive in appearance and was used to detect presence of the species during the basic fauna survey and will be used in area searches at targeted sites. Scats will be collected in labelled, sealed containers with desiccant to allow subsequent DNA extraction, sequencing and analysis for microsatellite markers (dependent on sufficient freshness of samples) where required.

Motion sensitive cameras will be installed within forest/woodland habitat containing hollow logs or at granite outcrops with crevices, representing high-quality foraging and potential denning habitat for Chuditch. Between 2 and 4 cameras will be deployed at each such site and left in place for a minimum 6 nights, with settings to record at least 2 stills and a short video for each trigger event. Cameras will be baited either with universal bait or (if left for longer than 3 nights) with non-consumable attractant, being a thick rope soaked in fish oil tied to a tree or log. Spot patterns will be used to characterise and distinguish individuals if multiple images of this species are obtained. Minimum abundance will be estimated from number of individuals detected by any method.

While Chuditch are predominantly nocturnal, camera traps will be set to record images when triggered at any time during day or night, in order to obtain data on presence and abundance of additional species with overlapping habitat.

7.8 WOYLIE

The Woylie or Brush-tailed Bettong previously occupied much of the study area but now has a restricted, relictual distribution mainly confined to 3 reserves east and southeast of the study area (Dryandra, Tutanning and Perup). These small nocturnal macropods have a diet based on fungi, seeds, roots and invertebrates rather than grazing or browsing foliage, and shelter during the day in patches of dense undergrowth, logs, rocks cavities and occasionally burrows. Thickets of *Gastrolobium* occur at the sites where the species survived and are thought to provide refuge from introduced predators sensitive to 1080 poisoning (DCCEEW 2024c; Short *et al.* 2005). Populations are vulnerable to cats and foxes and have also been severely impacted by disease in recent decades. There have also been many reintroductions within its former range, mostly failing to establish populations except within predator-exclusion fences.

The species is inconspicuous (scats difficult to find; diggings and tracks not very distinctive; nests very well concealed) and may occur only sporadically and at low density within the large study area, so that most targeted survey methods would be inefficient and not recommended (DSEWPaC 2011). For this reason, the suggested approach is:

- identify potentially suitable habitat, characterised as open forest and woodland with tussock grass ground layer and/or thickets of *Gastrolobium*, in Desktop review using recorded sightings and previous vegetation mapping, and during basic and detailed surveys
- consultation and community liaison via South32 to obtain information on sightings and reintroductions not available in published reports and databases
- photograph and record location of scats, tracks and diggings potentially belonging to this species during basic and detailed survey

- collect scats in labelled, sealed containers with desiccant for DNA extraction and sequencing to confirm identity if required
- at systematic sites and targeted Chuditch sites, use of baited camera traps
- at any recently burnt woodland site, search for shallow depressions

7.9 WALLABIES

Two species of conservation significant wallaby identified during the desktop review, including Tammar Wallaby and Western Brush Wallaby. Both species inhabit open forests and woodland, however Tammar Wallabies also favour seasonally wet flats (DEC 2012d) and Western Brush Wallabies also inhabit coastal scrub, heath thickets and Mallee woodlands (DEC 2012f). While traversing the study area, areas of suitable habitat will be identified and signs of these species such as visual observations, tracks and scats will be recorded while searching. Additionally, camera traps that will be deployed as part of detailed survey methods and targeting Chuditch, Woylie, Quokka and Numbat will be used to identify the presence of these wallabies. Where possible, population estimates (such as relative abundance) may be possible to determine from transects where scats and tracks have been identified.

7.10 QUOKKA

The Northern Jarrah Forest region contains one of several isolated mainland subpopulations of the Quokka, a small grazing macropod endemic to the southwest (DCCEEW 2024e). Habitat critical to survival of this subpopulation comprises *Taxandria linearifolia* swamps, including areas of natural vegetation where the understorey is sufficiently thick and complex to provide a predation refuge close to more open, recently burnt vegetation which is used as a food source (DEC 2013). The swamps where Quokka are known to occur are mostly outside the study area to the west, but similar habitat is likely to occur and will be targeted in habitat assessment and survey.
If suitable habitat is identified, presence of Quokka will be determined by walking transects in suitable habitat, checking for presence of tracks and scats within characteristic runways through dense vegetation (Hayward *et al.* 2007). If presence is confirmed, recording number of scats along transects allows estimation of population density (Hayward *et al.* 2005).

7.11 NUMBAT

The Numbat was formerly widespread across southern Australia, including through the Northern Jarrah Forest region and the study area, but only 2 remnant subpopulations persist (around Dryandra and Perup) as well as a number of reintroduction sites. The distribution mapped by DPaW (2017a) indicates no extant population known to remain in the study area, additionally, a recent record inside the study area recorded a single Numbat. Remnant and reintroduced populations occur in upland Jarrah forest, open eucalypt woodland of Wandoo and Powderbark Wandoo, Banksia woodland and tall closed shrubland. Habitats usually have abundant soil termites, hollow logs and branches for shelter, ideally an open understorey interspersed with thickets and hollow logs (DPaW 2017a). The species is unlikely to persist in the presence of cats or foxes.
Habitat suitability will be assessed at survey sites, and Numbat will be targeted in a general way during low-intensity survey and active searches for diggings around termite galleries, burrows, hollow logs, scats, and sightings while traversing the study area. Since generally suitable habitat is widespread but the species is considered unlikely to persist, more specific targeted search effort would only be warranted if evidence of presence is identified (Project Numbat Inc. 2017; Seidlitz *et al.* 2021). Additionally, wide spread camera trapping may detect individuals moving through the study area.

7.12 PHASCOGALES

Two species of conservation significant Phascogales were identified during the desktop review, Red-tailed Phascogale and South-western Brush-tailed Phascogale. The Red-tailed Phascogale is known to inhabit Wandoo woodlands, with a preference for habitat that is long unburnt and has continuous canopy cover. These habitats have an abundance of tree hollows, and grass tree skirts, which provide ideal nesting habitat (DEC 2012c). South-western Brush-tailed Phascogale has been identified in habitats wit dry sclerophyll forests and open woodlands, also favouring areas with an abundance of tree hollows (DEC 2012a).

A range of survey methods can be combined in order to detect the presence of both species of Phascogale in the study area. During both diurnal and nocturnal surveys, suitable looking tree hollows will be inspected for the presence of Phascogales. Spotlighting during nocturnal surveys will also be undertaken, where survey teams can identify wildlife with eye-shine. Additionally, tracks and scats may be identified while traversing the study area. Scats identified as potentially Phascogale will be collected for DNA analyses.

During the detailed fauna surveys, baited Elliot traps in suitable woodland habitats are likely to lure Phascogales for capture. In the same way, baited camera arrays established for other targeted fauna including Numbats, Woylie and Chuditch are also likely to detect Phascogales due to the overlapping habitat characteristics and baited lures. Habitat assessments will be completed throughout the basic fauna survey in order to identify targeted survey efforts.

7.13 RAKALI

The Rakali (also known as water-rat) is widely distributed around Australia inhabiting fresh, coastal and brackish habitats. In the south-west, Rakali has shown habitat preferences to riparian areas with an amount of habitat preferences; such as those with an sufficient woody debris, rock ledges and better water quality (DEC 2012e).

Targeted searches for Rakali include identifying suitable habitat and conducting diurnal searches for visual observations, scats, feeding middens and tracks. During the detailed fauna surveys, baited cage traps in suitable woodland habitats are likely to lure Rakali for capture. In the same way, baited camera arrays throughout riparian and wetland habitats are likely to detect the presence of Rakali in the study area.

7.14 QUENDA

Quenda is found in scrubby vegetation with dense cover throughout the south-west. They often occur around swamps, wetlands or in Banksia and Jarrah woodland and feed in frequently burnt forest and woodland close to dense cover. Populations inhabiting Jarrah and Wandoo forests are usually associated with watercourses (DBCA 2017). Quenda are nocturnal, and eat invertebrates, seeds, fungi, and plant root which they find through diggings (DBCA 2017).

Quenda likely occur nearby swamps and drainages in the study area, though may be more widespread.

Methods for targeting Quenda include:

- Diurnal searches in suitable habitat to observe and identify secondary evidence (e.g. diggings, scat). Scats will be collected in labelled, sealed containers with desiccant for DNA extraction and sequencing to confirm identity if required.
- Nocturnal searches for other nocturnal species in suitable Quenda habitat may observe the species.
- Baited cage and Elliott traps in suitable habitats (e.g. around swamps or watercourses) are likely to lure Quenda for capture.

- Baited camera arrays in suitable habitat are likely to detect the presence of the species.

7.15 WESTERN RINGTAIL POSSUM

Western Ringtail Possum was formerly found in several types of forest and woodland across south-western WA (DPaW 2017b). However, due to range contraction associated with habitat loss and feral predation, the species is now mostly restricted to long unburnt mature peppermint/tuart closed forest and relatively unburnt Jarrah and Marri forests and woodlands with limited disturbance (DPaW 2017b). It has been recorded 3 times from within the study area, though there are many records from south-west of the study area.

Surveys for Western Ringtail Possum will involve habitat assessment, diurnal and nocturnal field surveys. Surveys for scats and dreys or tree hollows will be undertaken concurrently with habitat assessments during the day, in areas with suitable habitat. These diurnal surveys will involve active searches for scats and other secondary evidence of Western Ringtail Possum evidence (dreys, tracks, remains) in vegetation most likely to support the species.

The nocturnal survey will comprise spotlighting at night to catch the eye-shine of Western Ringtail Possum individuals and directly sight the species. When eye-shine is observed, the individual will be confirmed to be Western Ringtail Possum using binoculars. This will be undertaken during favourable weather conditions.

7.16 HONEY POSSUM

The Honey Possum (*Tarsipes rostratus*) is identified as a survey target; while not conservation listed, it may be a significant indicator of vegetation health and fire recovery of kwongan (*Proteaceae*/*Myrtaceae* heath) and *Banksia* woodland habitats. This tiny nectivorous marsupial, endemic to south-western Australia, is considered an important pollinator of many plant species in the region and can be highly abundant at times. However, fires kill most resident individuals and full recovery can take 20-25 years (Bradshaw 2014). Abundance is also related to trends in rainfall over similar time scales (Wilson *et al.* 2012), while the species is impacted to some extent but appears quite resilient to occurrence of *Phytophthora* dieback disease (Dundas *et al.* 2016).

Surveys for Honey Possum will include identifying suitable habitat, nocturnal surveys and trapping. Habitat assessment will be limited to general observations to determine if the habitat preferred by the species is present. Honey Possums are often captured in traps (particularly pitfall traps) in suitable habitat, and these will be the most likely way to observe the species during the detailed fauna survey. They may also be observed opportunistically during a nocturnal survey for other species.

8 CONCLUSION

The study area and region host a diverse range of vertebrate fauna, including an extensive list of conservation significant reptiles, birds, and mammals. The availability of detailed vegetation mapping and the presence of remnant vegetation indicate ample habitat for various species. However, it is crucial to conduct comprehensive fauna surveys to obtain a more thorough understanding of the fauna assemblages in the study area. The potential presence of species such as the Southern Death Adder, Dell's Skink, black cockatoos, water bird species and a range of Threatened mammals underscores the importance of adequately surveying each habitat type in the study area and ensuring comprehensive information is available for informed decision-making. Further survey efforts should be undertaken to identify and monitor the occurrence of these species, particularly in areas with suitable habitats.

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Appendix 1 Vertebrate fauna desktop review results

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Amphibians (19)											
Hylidae	*Litoria adelaidensis*	Slender Tree Frog				•	•				
Hylidae	*Litoria moorei*	Motorbike Frog				•	•				
Limnodynastidae	*Heleioporus albopunctatus*	Western Spotted Frog				•	•				
Limnodynastidae	*Heleioporus barycragus*	Hooting Frog				•	•				•
Limnodynastidae	*Heleioporus eyrei*	Moaning Frog				•	•				
Limnodynastidae	*Heleioporus inornatus*	Whooping Frog				•	•				
Limnodynastidae	*Heleioporus psammophilus*	Sand Frog				•	•				•
Limnodynastidae	*Limnodynastes dorsalis*	Western Banjo Frog				•	•				
Limnodynastidae	*Neobatrachus kunapalari*	Kunapalari Frog				•	•				
Limnodynastidae	*Neobatrachus pelobatoides*	Humming Frog				•	•				
Limnodynastidae	*Neobatrachus sutor*	Shoemaker Frog				•					
Myobatrachidae	*Crinia georgiana*	Quacking Frog				•	•				
Myobatrachidae	*Crinia glauerti*	Clicking Frog				•	•				
Myobatrachidae	*Crinia insignifera*	Squelching Froglet				•	•				
Myobatrachidae	*Crinia pseudinsignifera*	Bleating Froglet				•	•				•
Myobatrachidae	*Geocrinia leai*	Ticking Frog				•	•				
Myobatrachidae	*Myobatrachus gouldii*	Turtle Frog				•	•				
Myobatrachidae	*Pseudophryne guentheri*	Crawling Toadlet				•	•				•
Myobatrachidae	*Pseudophryne occidentalis*	Western Toadlet				•	•				
Birds (256)											

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Acanthizidae	*Acanthiza apicalis*	Broad-tailed Thornbill			•	•	•				•
Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill			•	•	•				•
Acanthizidae	*Acanthiza inornata*	Western Thornbill			•	•	•				•
Acanthizidae	*Acanthiza uropygialis*	Chestnut-rumped Thornbill			•	•	•				
Acanthizidae	*Calamanthus campestris*	Rufous Fieldwren			•		•				
Acanthizidae	*Gerygone fusca*	Western Gerygone			•	•	•				•
Acanthizidae	*Hylacola cauta*	Shy Groundwren			•						
Acanthizidae	*Pyrrholaemus brunneus*	Redthroat			•	•	•				
Acanthizidae	*Sericornis frontalis*	White-browed Scrubwren			•	•	•				
Acanthizidae	*Sericornis maculatus*	Spotted Scrubwren				•					
Acanthizidae	*Smicrornis brevirostris*	Weebill			•	•					•
Accipitridae	*Accipiter cirrocephalus*	Collared Sparrowhawk			•	•	•				
Accipitridae	*Accipiter fasciatus*	Brown Goshawk			•	•	•				
Accipitridae	*Aquila audax*	Wedge-tailed Eagle			•	•	•				
Accipitridae	*Circus approximans*	Swamp Harrier			•	•					
Accipitridae	*Circus assimilis*	Spotted Harrier			•	•	•				
Accipitridae	*Elanus axillaris*	Black-shouldered kite			•	•	•				
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle			•	•	•				
Accipitridae	*Haliastur sphenurus*	Whistling Kite			•	•	•				
Accipitridae	*Hamirostra isura*	Square-tailed Kite			•	•	•				
Accipitridae	*Hieraaetus morphnoides*	Little Eagle			•	•	•				
Accipitridae	*Milvus migrans*	Black Kite			•	•	•				
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar			•	•	•				•

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Anatidae	*Anas castanea*	Chestnut Teal			•	•					
Anatidae	*Anas gracilis*	Grey Teal			•	•					
Anatidae	*Anas platyrhynchos*	Mallard			•		•				
Anatidae	*Anas rhynchotis*	Australasian Shoveler			•	•					
Anatidae	*Anas superciliosa*	Pacific Black Duck			•	•	•				•
Anatidae	*Aythya australis*	Hardhead			•	•					
Anatidae	*Biziura lobata*	Musk Duck			•	•					
Anatidae	*Chenonetta jubata*	Australian Wood Duck			•	•					
Anatidae	*Cygnus atratus*	Black Swan			•	•					
Anatidae	*Cygnus olor*	Mute Swan		*	•	•	•				
Anatidae	*Malacorhynchus membranaceus*	Pink-eared Duck			•	•					
Anatidae	*Oxyura australis*	Blue-billed Duck	P4 (DBCA list)		•		•	•			
Anatidae	*Stictonetta naevosa*	Freckled Duck			•	•	•				
Anatidae	*Tadorna tadornoides*	Australian Shelduck			•	•					
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter			•	•	•				
Apodidae	*Apus pacificus*	Fork-tailed Swift	Mig. (EPBC & BC Acts)		•		•		•		
Ardeidae	*Ardea alba*	Great Egret			•	•					
Ardeidae	*Ardea garzetta*	Little Egret			•	•	•				
Ardeidae	*Ardea ibis*	Cattle Egret			•	•	•				
Ardeidae	*Ardea pacifica*	White-necked Heron			•	•					
Ardeidae	*Ardea sacra*	Eastern Reef Egret			•		•				

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern	EN (EPBC & BC Acts)		•		•	•	•		
Ardeidae	*Egretta novaehollandiae*	White-faced Heron			•	•	•				
Ardeidae	*Ixobrychus dubius*	Australian Little Bittern	P4 (DBCA list)		•		•				
Ardeidae	*Ixobrychus flavicollis* subsp. *australis*	Black Bittern (southwest subpop.)	P2 (DBCA list)				•				
Ardeidae	*Nycticorax caledonicus*	Rufous Night Heron			•	•	•				
Artamidae	*Artamus cinereus*	Black-faced Woodswallow			•	•	•				
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow			•	•	•				•
Artamidae	*Artamus personatus*	Masked Woodswallow			•	•	•				
Artamidae	*Artamus superciliosus*	White-browed Woodswallow			•						
Artamidae	*Gymnorhina tibicen*	Australian Magpie			•	•	•				•
Atrichornithidae	*Atrichornis clamosus*	Noisy Scrub-bird	EN (EPBC & BC Acts)		•		•	•	•		
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew			•	•	•				
Campephagidae	*Coracina maxima*	Ground Cuckoo-shrike				•	•				
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike			•	•	•				•
Campephagidae	*Lalage leucomela*	Varied Triller				•	•				
Campephagidae	*Lalage tricolor*	White-winged Triller			•	•	•				•
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar				•	•				
Charadriidae	*Charadrius cucullatus*	Hooded Dotterel (Hooded Plover)	P4 (DBCA)		•						
Charadriidae	*Charadrius dubius*	Little Ringed Plover	Mig. (EPBC & BC Acts)						•		

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover			•	•					
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel			•	•	•				
Charadriidae	*Erythrogonys cinctus*	Red-kneed Dotterel			•	•					
Charadriidae	*Pluvialis fulva*	Pacific Golden Plover	Mig. (EPBC & BC Acts)		•		•				
Charadriidae	*Vanellus miles*	Masked Lapwing			•	•	•				
Charadriidae	*Vanellus tricolor*	Banded Lapwing			•	•					
Cinclosomatidae	*Cinclosoma clarum*	Copper-backed Quail-thrush				•	•				
Climacteridae	*Climacteris rufus*	Rufous Treecreeper			•	•	•				•
Columbidae	*Columba livia*	Rock Dove		*	•	•	•				•
Columbidae	*Geopelia cuneata*	Diamond Dove			•	•	•				
Columbidae	*Ocyphaps lophotes*	Crested Pigeon			•	•					
Columbidae	*Phaps chalcoptera*	Common Bronzewing			•	•	•				•
Columbidae	*Phaps elegans*	Brush Bronzewing			•	•	•				•
Columbidae	*Streptopelia chinensis*	Spotted Dove		*	•	•	•				
Columbidae	*Streptopelia senegalensis*	Laughing Dove		*	•	•	•				
Corvidae	*Corvus bennetti*	Little Crow			•	•	•				
Corvidae	*Corvus coronoides*	Australian Raven			•	•					•
Corvidae	*Corvus orru*	Torresian Crow					•				
Corvidae	*Corvus splendens*	House Crow				•	•				
Cracticidae	*Cracticus nigrogularis*	Pied Butcherbird			•	•	•				
Cracticidae	*Cracticus torquatus*	Grey Butcherbird			•	•	•				•
Cracticidae	*Strepera versicolor*	Grey Currawong			•	•	•				•

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo			•	•	•				•
Cuculidae	*Chalcites basalis*	Horsfield's Bronze Cuckoo			•	•	•				•
Cuculidae	*Chalcites osculans*	Black-eared Cuckoo			•	•					
Cuculidae	*Chrysococcyx lucidus*	Shining Bronze Cuckoo			•	•	•				•
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo			•	•	•				•
Dasyornithidae	*Dasyornis longirostris*	Western Bristlebird	EN/VU (EPBC Act; BC Act)				•	•			
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird			•	•	•				•
Dicruridae	*Grallina cyanoleuca*	Magpie-lark			•	•	•				
Dicruridae	*Myiagra inquieta*	Restless Flycatcher			•	•	•				
Dicruridae	*Rhipidura albiscapa*	Grey Fantail			•	•	•				•
Dicruridae	*Rhipidura leucophrys*	Willie Wagtail			•	•	•				•
Dromaiidae	*Dromaius novaehollandiae*	Emu			•	•	•				•
Estrilidae	*Lonchura castaneothorax*	Chestnut-breasted Mannikin			•	•	•				
Estrilidae	*Stagonopleura oculata*	Red-eared Firetail			•	•	•				
Estrilidae	*Taeniopygia castanotis*	Zebra Finch			•	•	•				
Falconidae	*Falco berigora*	Brown Falcon			•	•	•				
Falconidae	*Falco cenchroides*	Australian Kestrel			•	•	•				
Falconidae	*Falco longipennis*	Australian Hobby			•	•	•				
Falconidae	*Falco peregrinus*	Peregrine Falcon	OS (BC Act)		•		•	•			•
Falconidae	*Falco subniger*	Black Falcon				•	•				
Glareolidae	*Glareola maldivarum*	Oriental Pratincole	Mig. (EPBC & BC Acts)				•				

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Haematopodidae	*Haematopus fuliginosus*	Sooty Oystercatcher			•		•				
Haematopodidae	*Haematopus longirostris*	Pied Oystercatcher			•	•					
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		*	•	•	•				•
Halcyonidae	*Todiramphus pyrrhopygius*	Red-backed Kingfisher				•					
Halcyonidae	*Todiramphus sanctus*	Sacred Kingfisher			•	•	•				•
Hirundinidae	*Cheramoeca leucosterna*	White-backed Swallow			•	•	•				
Hirundinidae	*Hirundo neoxena*	Welcome Swallow			•	•					
Hirundinidae	*Petrochelidon ariel*	Fairy Martin			•	•	•				
Hirundinidae	*Petrochelidon nigricans*	Tree Martin			•	•	•				•
Hydrobatidae	*Pelagodroma marina*	White-faced Storm Petrel				•					
Laridae	*Larus dominicanus*	Kelp Gull				•					
Laridae	*Larus novaehollandiae*	Silver Gull			•	•	•				
Laridae	*Larus pacificus*	Pacific Gull			•						
Laridae	*Sterna fuscata*	Sooty Tern					•				
Laridae	*Sterna hybrida*	Whiskered Tern				•					
Maluridae	*Malurus assimilis*	Purple-backed fairy-wren			•	•	•				
Maluridae	*Malurus elegans*	Red-winged Fairy-wren			•	•	•				•
Maluridae	*Malurus leucopterus*	White-winged Fairy-wren			•	•	•				
Maluridae	*Malurus pulcherrimus*	Blue-breasted Fairy-wren			•	•	•				
Maluridae	*Malurus splendens*	Splendid Fairy-wren			•	•	•				•
Maluridae	*Stipiturus malachurus*	Southern Emu-wren			•	•	•				
Megapodiidae	*Leipoa ocellata*	Malleefowl	VU (EPBC & BC Acts)		•		•	•	•		

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Meliphagidae	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater			•	•	•				
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill			•	•	•				•
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird			•	•	•				•
Meliphagidae	*Anthochaera lunulata*	Western Little Wattlebird			•	•	•				•
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater					•				
Meliphagidae	*Epthianura albifrons*	White-fronted Chat			•	•	•				
Meliphagidae	*Epthianura tricolor*	Crimson Chat			•	•	•				
Meliphagidae	*Gavicalis virescens*	Singing Honeyeater			•	•	•				
Meliphagidae	*Gliciphila melanops*	Tawny-crowned honeyeater			•	•	•				
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater			•	•	•				•
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner			•	•					
Meliphagidae	*Melithreptus brevirostris*	Brown-headed Honeyeater			•	•	•				
Meliphagidae	*Melithreptus chloropsis*	Western White-naped Honeyeater				•	•				•
Meliphagidae	*Nesoptilotis leucotis*	White-eared Honeyeater			•	•	•				
Meliphagidae	*Phylidonyris niger*	White-cheeked Honeyeater			•	•	•				
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland Honeyeater			•	•	•				•
Meliphagidae	*Ptilotula ornata*	Yellow-plumed Honeyeater			•	•	•				
Meliphagidae	*Purnella albifrons*	White-fronted Honeyeater			•	•	•				
Meliphagidae	*Sugomel nigrum*	Black Honeyeater			•	•	•				
Meropidae	*Merops ornatus*	Rainbow Bee-eater			•	•	•				
Motacillidae	*Anthus australis*	Australian Pipit			•	•	•				
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella			•	•	•				•

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Otididae	*Ardeotis australis*	Australian Bustard			•	•	•				
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush			•	•	•				•
Pachycephalidae	*Falcunculus frontatus*	Crested Shrike-tit			•	•	•				
Pachycephalidae	*Oreoica gutturalis*	Crested Bellbird				•	•				
Pachycephalidae	*Pachycephala inornata*	Gilbert's Whistler				•					
Pachycephalidae	*Pachycephala occidentalis*	Western Golden Whistler			•	•	•				•
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler			•	•	•				•
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote			•	•	•				•
Pardalotidae	*Pardalotus striatus*	Striated Pardalote			•	•	•				•
Passeridae	*Passer domesticus*	House Sparrow		*		•					
Passeridae	*Passer montanus*	Eurasian Tree Sparrow		*		•					
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican			•	•					
Pelecanoididae	*Pelecanoides urinatrix*	Common Diving Petrel				•					
Petroicidae	*Eopsaltria georgiana*	White-breasted Robin			•	•	•				
Petroicidae	*Eopsaltria griseogularis*	Western Yellow Robin			•	•	•				•
Petroicidae	*Melanodryas cucullata*	Hooded Robin			•	•	•				
Petroicidae	*Microeca fascinans*	Jacky Winter			•	•	•				
Petroicidae	*Petroica boodang*	Scarlet Robin			•	•	•				•
Petroicidae	*Petroica goodenovii*	Red-capped Robin			•	•	•				
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant			•	•	•				
Phalacrocoracidae	*Phalacrocorax fuscescens*	Black-faced Cormorant			•						
Phalacrocoracidae	*Phalacrocorax melanoleucos*	Little Pied Cormorant			•	•	•				
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant			•	•					

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant			•	•					
Phasianidae	*Coturnix pectoralis*	Stubble Quail			•	•	•				
Phasianidae	*Coturnix ypsilophora*	Brown Quail			•	•	•				
Podargidae	*Podargus strigoides*	Tawny Frogmouth			•	•	•				
Podicipedidae	*Podiceps cristatus*	Great Crested Grebe			•	•					
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe			•	•					
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe			•	•	•				
Pomatostomidae	*Pomatostomus superciliosus*	White-browed Babbler			•	•	•				
Procellariidae	*Daption capense*	Cape Petrel				•					
Procellariidae	*Pachyptila belcheri*	Slender-billed Prion				•					
Procellariidae	*Pachyptila desolata*	Antarctic Prion				•					
Procellariidae	*Pachyptila salvini*	Salvin's Prion				•					
Procellariidae	*Pachyptila turtur*	Fairy Prion				•					
Procellariidae	*Pachyptila vittata*	Broad-billed Prion				•					
Procellariidae	*Pterodroma lessonii*	White-headed Petrel				•					
Procellariidae	*Pterodroma macroptera*	Great-winged Petrel				•					
Procellariidae	*Puffinus assimilis*	Little Shearwater				•					
Psittacidae	*Cacatua galerita*	Sulphur-crested Cockatoo			•	•	•				
Psittacidae	*Cacatua leadbeateri*	Major Mitchell's Cockatoo			•		•				
Psittacidae	*Cacatua pastinator*	Western Long-billed Corella			•	•	•				
Psittacidae	*Cacatua sanguinea*	Little Corella			•	•	•				
Psittacidae	*Cacatua tenuirostris*	Eastern Long-billed Corella		*	•	•	•				

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Psittacidae	*Calyptorhynchus banksii* subsp. *naso*	Forest Red-tailed Black Cockatoo	VU (EPBC & BC Acts)			•	•	•	•	•	•
Psittacidae	*Melopsittacus undulatus*	Budgerigar			•	•	•				
Psittacidae	*Neophema elegans*	Elegant Parrot			•	•	•				•
Psittacidae	*Neophema petrophila*	Rock Parrot			•	•	•				
Psittacidae	*Nymphicus hollandicus*	Cockatiel			•	•	•				
Psittacidae	*Parvipsitta porphyrocephala*	Purple-crowned Lorikeet			•	•	•				
Psittacidae	*Platycercus icterotis*	Western Rosella				•0					•
Psittacidae	*Platycercus icterotis* subsp. *xanthogenys*	Western Rosella (inland)	P4 (DBCA list)			•	•	•			
Psittacidae	*Platycercus spurius*	Red-capped Parrot			•	•	•				•
Psittacidae	*Polytelis anthopeplus*	Regent Parrot			•	•	•				
Psittacidae	*Trichoglossus moluccanus*	Rainbow Lorikeet		*	•	•	•				
Psittacidae	*Zanda baudinii*	Baudin's Cockatoo	EN (EPBC & BC Acts)		•		•	•	•	•	•
Psittacidae	*Zanda latirostris*	Carnaby's Cockatoo	EN (EPBC & BC Acts)		•		•	•	•	•	•
Psittacidae	*Zanda* sp.	White-tailed Black Cockatoo	EN (EPBC & BC Acts)				•	•		•	•
Psittaculidae	*Barnardius zonarius*	Australian Ringneck			•	•	•				•
Psittaculidae	*Eolophus roseicapilla*	Galah			•	•	•				
Psittaculidae	*Psephotellus varius*	Mulga Parrot			•	•	•				
Rallidae	*Fulica atra*	Eurasian Coot			•	•					
Rallidae	*Gallinula tenebrosa*	Dusky Moorhen			•	•	•				

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Rallidae	*Gallirallus philippensis*	Buff-banded Rail			•	•	•				
Rallidae	*Porphyrio porphyrio*	Purple Swamphen			•	•	•				
Rallidae	*Porzana fluminea*	Australian Spotted Crake			•	•	•				
Rallidae	*Porzana pusilla*	Baillon's Crake			•	•	•				
Rallidae	*Porzana tabuensis*	Spotless Crake			•	•					
Rallidae	*Tribonyx ventralis*	Black-tailed Native-hen			•	•					
Recurvirostridae	*Cladorhynchus leucocephalus*	Banded Stilt			•	•					
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt			•	•	•				
Recurvirostridae	*Recurvirostra novaehollandiae*	Red-necked Avocet				•					
Rostratulidae	*Rostratula australis*	Australian Painted Snipe	EN (EPBC & BC Acts)				•		•		
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	Mig. (EPBC & BC Acts)		•		•		•		•
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	VU/Mig./Mig. (EPBC Act; BC Act)		•		•		•		
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	CR/Mig./CR (EPBC Act; BC Act)		•		•		•		
Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	Mig. (EPBC & BC Acts)		•		•		•		
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	Mig. (EPBC & BC Acts)		•		•	•	•		
Scolopacidae	*Calidris subminuta*	Long-toed Stint	Mig. (EPBC & BC Acts)		•		•	•	•		

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Scolopacidae	*Gallinago stenura*	Pin-tailed Snipe	Mig. (EPBC & BC Acts)						•		
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	Mig. (EPBC & BC Acts)		•		•		•		
Scolopacidae	*Limosa limosa*	Black-tailed Godwit	En/Mig./Mig. (EPBC Act; BC Act)		•		•		•		
Scolopacidae	*Philomachus pugnax*	Ruff	Mig. (EPBC & BC Acts)		•		•		•		
Scolopacidae	*Tringa glareola*	Wood Sandpiper	Mig. (EPBC & BC Acts)		•		•		•		
Scolopacidae	*Tringa nebularia*	Common Greenshank	EN/Mig./Mig. (EPBC Act; BC Act)		•		•		•		
Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	Mig. (EPBC & BC Acts)		•		•		•		
Strigidae	*Ninox boobook*	Boobook Owl			•	•	•				
Strigidae	*Ninox connivens* subsp. *connivens*	Barking Owl (southwest subpop.)	P3 (DBCA list)			•	•	•			
Sturnidae	*Gelochelidon nilotica*	Gull-billed Tern	Mig. (EPBC & BC Acts)				•				
Sulidae	*Morus serrator*	Australasian Gannet				•					
Sylviidae	*Acrocephalus australis*	Australian Reed Warbler			•	•	•				
Sylviidae	*Cincloramphus cruralis*	Brown Songlark			•	•	•				
Sylviidae	*Cincloramphus mathewsi*	Rufous Songlark			•	•	•				

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Sylviidae	*Megalurus gramineus*	Little Grassbird			•	•					
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill			•	•					
Threskiornithidae	*Platalea regia*	Royal Spoonbill			•	•	•				
Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	Mig. (EPBC & BC Acts)		•		•				
Threskiornithidae	*Threskiornis moluccus*	Australian White Ibis			•	•	•				
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis			•	•					
Turnicidae	*Turnix varius*	Painted Button-quail			•	•	•				
Turnicidae	*Turnix velox*	Little Button-quail			•	•	•				
Tytonidae	*Tyto alba*	Barn Owl			•						
Tytonidae	*Tyto javanica*	Eastern barn owl				•	•				
Tytonidae	*Tyto novaehollandiae* subsp. *novaehollandiae*	Masked Owl (southwest)	P3 (DBCA list)			•	•	•			•
Zosteropidae	*Zosterops lateralis*	Silvereye			•	•	•				•
Mammals (57)											
Bovidae	*Bos taurus*	European Cattle		*			•				
Bovidae	*Ovis aries*	Sheep				•	•				
Burramyidae	*Cercartetus concinnus*	Western Pygmy-possum				•	•				•
Canidae	*Canis familiaris*	Dog		*		•	•				
Canidae	*Vulpes vulpes*	Red Fox		*		•	•				
Cervidae	*Dama dama*	Fallow Deer		*		•	•				
Dasyuridae	*Antechinomys laniger*	Kultarr				•	•				
Dasyuridae	*Antechinus flavipes*	Yellow-footed Antechinus				•	•				•

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Dasyuridae	*Dasyurus geoffroii*	Chuditch	VU (EPBC & BC Acts)				•	•	•	•	•
Dasyuridae	*Phascogale calura*	Red-tailed Phascogale	VU/CD (EPBC Act; BC Act)				•	•	•		
Dasyuridae	*Phascogale tapoatafa* subsp. *wambenger*	South-western Brush-tailed Phascogale	CD (BC Act)			•	•	•		•	•
Dasyuridae	*Sminthopsis crassicaudata*	Fat-tailed Dunnart				•	•				
Dasyuridae	*Sminthopsis dolichura*	Little long-tailed Dunnart				•	•				
Dasyuridae	*Sminthopsis fuliginosus*	Dusky Dunnart				•	•				
Dasyuridae	*Sminthopsis gilberti*	Gilbert's Dunnart				•	•				•
Dasyuridae	*Sminthopsis granulipes*	White-tailed Dunnart					•				
Dasyuridae	*Sminthopsis griseoventer*	Grey-bellied Dunnart				•	•				•
Equidae	*Equus caballus*	Horse		*			•				
Felidae	*Felis catus*	Cat		*		•	•				
Leporidae	*Oryctolagus cuniculus*	Rabbit		*		•	•				
Macropodidae	*Lagostrophus fasciatus*	Banded Hare-wallaby					•				
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo				•	•				•
Macropodidae	*Notamacropus eugenii* subsp. *derbianus*	Tammar wallaby	P4 (DBCA list)			•	•	•			
Macropodidae	*Notamacropus irma*	Western Brush Wallaby	P4 (DBCA list)				•	•		•	•
Macropodidae	*Osphranter robustus*	Euro				•					
Macropodidae	*Setonix brachyurus*	Quokka	VU (EPBC & BC Acts)				•	•	•		•
Molossidae	*Austronomus australis*	White-striped Free-tailed Bat				•	•				•

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Molossidae	*Mormopterus kitcheneri*	South-western Free-tailed Bat				•	•				
Muridae	*Hydromys chrysogaster*	Water-rat	P4 (DBCA list)				•	•			•
Muridae	*Mus musculus*	House Mouse		*		•	•				
Muridae	*Notomys alexis*	Spinifex Hopping-mouse					•				
Muridae	*Notomys mitchellii*	Mitchell's Hopping-mouse					•				
Muridae	*Pseudomys albocinereus*	Ash-grey Mouse					•				
Muridae	*Pseudomys delicatulus*	Delicate Mouse				•	•				
Muridae	*Rattus fuscipes*	Western Bush Rat				•	•				
Muridae	*Rattus norvegicus*	Brown Rat		*		•	•				
Muridae	*Rattus rattus*	Black Rat		*		•	•				
Myrmecobiidae	*Myrmecobius fasciatus*	Numbat	EN (EPBC & BC Acts)				•	•	•		•
Peramelidae	*Isoodon fusciventer*	Quenda	P4 (DBCA list)			•	•	•		•	•
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum				•	•				
Potoroidae	*Bettongia penicillata* subsp. *ogilbyi*	Woylie	EN/CR (EPBC/BC Act)			•	•	•	•		•
Pseudocheiridae	*Pseudocheirus occidentalis*	Western Ringtail Possum	CR (EPBC & BC Acts)				•	•	•		•
Pteropodidae	*Pteropus scapulatus*	Little Red Flying-fox				•	•				
Suidae	*Sus scrofa*	Pig		*		•	•				
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna				•	•				
Tarsipedidae	*Tarsipes rostratus*	Honey Possum				•	•				
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat				•	•				•
Vespertilionidae	*Chalinolobus morio*	Chocolate Wattled Bat				•	•				•

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Vespertilionidae	*Falsistrellus mackenziei*	Western False Pipistrelle	P4 (DBCA list)				•	•		•	•
Vespertilionidae	*Nyctophilus geoffroyi*	Lesser Long-eared Bat				•	•				
Vespertilionidae	*Nyctophilus gouldi*	Gould's Long-eared Bat				•	•				
Vespertilionidae	*Nyctophilus holtorum*	Holt's Long-eared Bat				•					
Vespertilionidae	*Nyctophilus major*	Greater Long-eared Bat				•	•				
Vespertilionidae	*Nyctophilus major* subsp. *tor*	Central Long-eared Bat	P3 (DBCA list)					•			
Vespertilionidae	*Scotorepens balstoni*	Inland Broad-nosed Bat				•	•				
Vespertilionidae	*Vespadelus regulus*	Southern Forest Bat				•	•				•
Reptiles (95)											
Agamidae	*Amphibolurus longirostris*	Long-nosed Dragon					•				
Agamidae	*Ctenophorus adelaidensis*	Southern Heath Dragon				•	•				
Agamidae	*Ctenophorus nuchalis*	Central Netted Dragon				•					
Agamidae	*Ctenophorus ornatus*	Ornate Crevice-Dragon				•	•				
Agamidae	*Ctenophorus pictus*	Painted Dragon					•				
Agamidae	*Ctenophorus reticulatus*	Western Netted Dragon				•	•				
Agamidae	*Moloch horridus*	Thorny Devil				•	•				
Agamidae	*Pogona minor*	Dwarf Bearded Dragon				•	•				
Boidae	*Antaresia childreni*	Children's Python				•	•				
Boidae	*Aspidites ramsayi*	Woma					•				
Boidae	*Morelia imbricata*	South-west Carpet Python				•	•				
Cheluidae	*Chelodina oblonga*	South-western Long-necked Turtle				•	•				
Diplodactylidae	*Crenadactylus ocellatus*	South-western Clawless Gecko				•	•				

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Diplodactylidae	*Diplodactylus calcicolus*	South Coast Gecko				•	•				
Diplodactylidae	*Diplodactylus granariensis*	Western Stone Gecko				•	•				
Diplodactylidae	*Diplodactylus lateroides*	Speckled Stone Gecko				•	•				
Diplodactylidae	*Diplodactylus polyophthalmus*	Spotted Sandplain Gecko				•	•				
Diplodactylidae	*Diplodactylus pulcher*	Fine-faced gecko				•	•				
Diplodactylidae	*Hesperoedura reticulata*	Reticulated Velvet Gecko				•	•				
Diplodactylidae	*Lucasium alboguttatum*	White-spotted Ground Gecko				•					
Diplodactylidae	*Strophurus spinigerus*	South-western Spiny-tailed Gecko				•	•				
Elapidae	*Acanthophis antarcticus*	Southern Death Adder	P3 (DBCA list)				•	•			
Elapidae	*Brachyurophis fasciolatus*	Narrow-banded Shovel-nosed Snake				•					
Elapidae	*Brachyurophis semifasciatus*	Southern Shovel-nosed Snake				•	•				
Elapidae	*Demansia reticulata*	Reticulated Whipsnake					•				
Elapidae	*Echiopsis curta*	Bardick				•	•				
Elapidae	*Elapognathus coronatus*	Crowned Snake				•	•				
Elapidae	*Neelaps bimaculatus*	Black-naped Snake				•	•				
Elapidae	*Notechis scutatus*	Tiger Snake				•	•				
Elapidae	*Pseudechis australis*	Mulga Snake				•	•				
Elapidae	*Pseudonaja affinis*	Dugite				•	•				
Elapidae	*Pseudonaja mengdeni*	Western Brown Snake				•	•				
Elapidae	*Pseudonaja modesta*	Ringed Brown Snake				•	•				
Elapidae	*Pseudonaja nuchalis*	Gwardar				•					

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Elapidae	*Simoselaps bertholdi*	Jan's Banded Snake				•	•				
Elapidae	*Simoselaps littoralis*	West Coast Banded Snake				•					
Elapidae	*Suta gouldii*	Gould's Hooded Snake				•	•				
Elapidae	*Suta nigriceps*	Black-backed Hooded Snake				•	•				
Gekkonidae	*Christinus marmoratus*	Marbled Gecko				•	•				
Gekkonidae	*Gehyra variegata*	Variegated gehyra				•	•				
Gekkonidae	*Hemidactylus frenatus*	Asian House Gecko		*		•					
Gekkonidae	*Heteronotia binoei*	Bynoe's Gecko				•	•				
Gekkonidae	*Underwoodisaurus milii*	Barking Gecko				•	•				
Pygopodidae	*Aprasia pulchella*	Granite Worm-lizard				•	•				
Pygopodidae	*Aprasia repens*	Sand-plain Worm-lizard				•	•				
Pygopodidae	*Delma australis*	Marble-faced Delma				•	•				
Pygopodidae	*Delma fraseri*	Fraser's Legless Lizard				•	•				
Pygopodidae	*Delma grayii*	Side-barred Delma				•	•				
Pygopodidae	*Delma tincta*	Excitable Delma				•					
Pygopodidae	*Lialis burtonis*	Burton's Legless Lizard				•	•				
Pygopodidae	*Pletholax gracilis*	Keeled Legless Lizard				•	•				
Pygopodidae	*Pygopus lepidopodus*	Common Scaly-foot				•	•				
Scincidae	*Acritoscincus trilineatus*	Western Three-lined Skink				•	•				
Scincidae	*Cryptoblepharus buchananii*	Buchanan’s Snake-eyed Skink				•	•				
Scincidae	*Cryptoblepharus plagiocephalus*	Peron's Snake-eyed Skink				•	•				

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Scincidae	*Ctenotus australis*	West Coast Long-tailed Ctenotus				•	•				
Scincidae	*Ctenotus delli*	Dell's skink	P4 (DBCA list)				•	•			•
Scincidae	*Ctenotus fallens*	West Coast Ctenotus				•	•				
Scincidae	*Ctenotus impar*	South-western Odd-striped Ctenotus				•	•				
Scincidae	*Ctenotus labillardieri*	Red-legged Ctenotus				•	•				
Scincidae	*Ctenotus pantherinus*	Leopard Ctenotus				•	•				
Scincidae	*Ctenotus schomburgkii*	Barred Wedge-snout Ctenotus				•	•				
Scincidae	*Cyclodomorphus celatus*	Western Slender Blue-tongue				•					
Scincidae	*Egernia depressa*	Southern Pygmy Spiny-tailed Skink				•	•				
Scincidae	*Egernia kingii*	King's Skink				•	•				
Scincidae	*Egernia napoleonis*	Southwestern Crevice-skink				•	•				
Scincidae	*Eremiascincus richardsonii*	Broad-banded Sand Swimmer				•	•				
Scincidae	*Hemiergis gracilipes*	South-western Mulch-skink				•	•				
Scincidae	*Hemiergis initialis*	Western Earless Skink				•	•				
Scincidae	*Hemiergis peronii*	Peron's Earless Skink				•	•				
Scincidae	*Hemiergis quadrilineata*	Two-toed Earless Skink				•	•				
Scincidae	*Lerista christinae*	Bold-striped Slider				•	•				
Scincidae	*Lerista distinguenda*	South-western Four-toed Slider				•	•				
Scincidae	*Lerista elegans*	Elegant Slider				•					
Scincidae	*Lerista lineopunctulata*	Line-spotted Robust Slider				•	•				
Scincidae	*Lerista microtis*	South Coast Five-toed Slider				•	•				

Family	Species	Common name	Status	Introduced	Source						
					BirdLife BirdData	Dandjoo	DBCA NatureMap	DBCA T&P	EPBC Protected Matters	PES DB	Unpublished reports
Scincidae	*Lerista praepedita*	West-coast Worm-slider				•	•				
Scincidae	*Liopholis multiscutata*	Bull Skink				•	•				
Scincidae	*Liopholis pulchra*	South-western Rock Skink				•	•				
Scincidae	*Lissolepis luctuosa*	Western Swamp Skink				•	•				
Scincidae	*Menetia greyii*	Common Dwarf Skink				•	•				
Scincidae	*Morethia butleri*	Woodland Morethia Skink					•				
Scincidae	*Morethia lineoocellata*	West Coast Pale-flecked Morethia				•	•				
Scincidae	*Morethia obscura*	Shrubland Pale-flecked Morethia				•	•				
Scincidae	*Tiliqua occipitalis*	Western Blue-tongue				•	•				
Scincidae	*Tiliqua rugosa*	Bobtail				•	•				
Typhlopidae	*Anilios australis*	Southern Blind Snake				•	•				
Typhlopidae	*Anilios bituberculatus*	Prong-snouted Blind Snake				•	•				
Typhlopidae	*Anilios hamatus*	Pale-headed Blind Snake				•	•				
Typhlopidae	*Anilios pinguis*	Rotund Blind Snake				•	•				
Typhlopidae	*Anilios waitii*	Beaked Blind Snake				•	•				
Typhlopidae	*Indotyphlops braminus*	Brahminy Blind Snake		*		•	•				
Varanidae	*Varanus gouldii*	Bungarra or Sand Monitor				•	•				
Varanidae	*Varanus rosenbergi*	Heath Monitor				•	•				
Varanidae	*Varanus tristis*	Racehorse Monitor				•	•				

Appendix 2 Species excluded from the desktop search results

Species	Status	Rationale for exclusion
Birds (25)		
Cereopsis novaehollandiae Cape Barren Goose	VU (BC Act)	Study area outside current known range - in WA range along south coast from Augusta to Esperance
Charadrius leschenaultii Greater Sand Plover	VU/Mig./VU (EPBC Act; BC Act)	Study area outside current known range - almost exclusively coastal
Pluvialis squatarola Grey Plover	VU/Mig./Mig. (EPBC Act; BC Act)	Study area outside current known range - almost exclusively coastal
Anous stolidus Common Noddy	Mig. (EPBC & BC Acts)	Study area outside current known range - pelagic, occurs offshore
Hydroprogne caspia Caspian Tern	Mig. (EPBC & BC Acts)	Study area outside current known range - almost exclusively coastal
Stercorarius antarcticus subsp. *lonnbergi* Brown Skua	P4	Study area outside current known range - pelagic, occurs offshore
Stercorarius parasiticus Arctic Jaeger	Mig. (EPBC & BC Acts)	Study area outside current known range - pelagic, occurs offshore
Sternula nereis Fairy Tern	VU (EPBC & BC Acts)	Study area outside current known range - almost exclusively coastal
Thalasseus bergii Crested Tern	Mig. (EPBC & BC Acts)	Study area outside current known range - almost exclusively coastal
Arenaria interpres Ruddy Turnstone	VU/Mig./Mig. (EPBC Act; BC Act)	Study area outside current known range - almost exclusively coastal
Calidris canutus Red Knot	VU/Mig./EN (EPBC Act; BC Act)	Study area outside current known range - almost exclusively coastal
Calidris tenuirostris Great Knot	VU/Mig./CR (EPBC Act; BC Act)	Study area outside current known range - almost exclusively coastal
Gallinago megala Swinhoe's Snipe	Mig. (EPBC & BC Acts)	Study area outside current known range - occurs in northern Aus. from the Pilbara to far north QLD
Numenius madagascariensis Eastern Curlew	CR/Mig./CR (EPBC Act; BC Act)	Study area outside current known range - almost exclusively coastal
Numenius minutus Little Curlew	Mig. (EPBC & BC Acts)	Study area outside current known range - occurs north of Perth
Numenius phaeopus Whimbrel	Mig. (EPBC & BC Acts)	Study area outside current known range - almost exclusively coastal
Tringa brevipes Grey-tailed Tattler	Mig. (EPBC & BC Acts) P4 (DBCA list)	Study area outside current known range - almost exclusively coastal
Pandion cristatus Osprey	Mig. (EPBC & BC Acts)	Study area outside current known range - almost exclusively coastal in its southern distribution
Falco hypoleucos Grey Falcon	VU (EPBC & BC Acts)	Study area outside current known range - occurs to the north and inland
Aphelocephala leucopsis Southern Whiteface	VU (EPBC Act)	Study area outside current known range - occurs to the north and inland
Amytornis textilis subsp. *textilis* Western Grasswren	P4 (DBCA list)	Study area outside current known range - occurs around Shark Bay
Motacilla cinerea Grey Wagtail	Mig. (EPBC & BC Acts)	Study area outside current known range - summer visitor to northern Australia

Phaethon rubricauda Red-tailed Tropicbird	P4 DBCA List	Study area outside current known range - pelagic, occurs offshore
Cacatua pastinator subsp. *pastinator* Muir's Corella	CD (BC Act)	Study area outside current known range - Albany to Boyup Brook region of the southwest
Polytelis alexandrae Princess Parrot	P4 (DBCA list)	Study area outside current known range – occurs in inland WA
Mammals (9)		
Petrogale lateralis subsp. *lateralis* Black-flanked Rock-wallaby	EN (EPBC & BC Acts)	Study area outside current known range - captive population at Nangeen Hill in the wheatbelt over 100 km NE of study area
Wyulda squamicaudata Scaly-tailed Possum	P4 (DBCA list)	Study area outside current known range - Kimberley endemic
Bettongia lesueur subsp. *graii* Burrowing Bettong, Boodie	EX (EPBC & BC Acts)	Species extinct
Bettongia lesueur subsp. *lesueur* Shark Bay Burrowing Bettong	VU/CD (EPBC Act; BC Act)	Species locally extinct. Captive population at Barna Mia in Dryandra.
Potorous gilbertii Gilbert's Potoroo	CR (EPBC & BC Acts)	Study area outside current known range - occurs only at Two Peoples Bay, east of Albany.
Potorous platyops Broad-faced Potoroo	EX (EPBC & BC Acts)	Species extinct
Petropseudes dahli Rock Ringtail Possum	P3 (DBCA list)	Study area outside current known range - Kimberley and Northern Territory endemic
Perameles eremiana Desert Bandicoot	EX (EPBC & BC Acts)	Species extinct
Macrotis lagotis Bilby	VU (EPBC & BC Acts)	Study area outside current known range - now found to the north between the Pilbara and SW QLD
Reptiles (3)		
Ctenotus ora Coastal Plains Skink	P3 (DBCA list)	Study area outside current known range and habitat - only occurs on coastal sandplain
Lerista lineata Perth Slider	P3 (DBCA list)	Study area outside current known range and habitat - only occurs on coastal sandplain
Pseudemydura umbrina Western Swamp Tortoise	CR (EPBC & BC Acts)	Study area outside current known range - only known populations are north of the Swan River, Perth

