Appendix 4: Vertebrate Fauna Survey: North Star Junction Additional Area

Vertebrate Fauna Survey

North Star Junction Additional Area

Fortescue Pty Ltd

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Making Sustainability Happen

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
01	1 August 2025	P. Dean S. Girando C. Baharom	E. Webb B. Mason	E. Webb
02	17 September 2025	P. Dean S. Girando	P. Brooshooft	

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Fortescue Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

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Executive Summary

Fortescue Pty Ltd is decarbonising all existing and future operations in an effort to achieve zero carbon emmissions by 2030. The 100 MW North Star Junction solar farm, northwest of Fortescue's Iron Bridge mine, is already operational as part of the Pilbara Generation Project.

Fortescue Ltd commissioned SLR Consulting Australia to undertake a detailed vertebrate fauna assessment for areas near the existing North Star Junction solar farm. An initial single-phase detailed survey was conducted in 2022, and a two-phase detailed survey was conducted in 2024 and 2025 within an adjacent area. These areas are herein referred to collectively as the Survey Area. The Survey Area covers 6,527.7 ha and is located approximately 100 km South of Port Hedland, in the Pilbara bioregion of Western Australia.

The objective of the survey was to identify fauna values within the Survey Area as part of the environmental impact assessment process. This report presents the findings of the survey.

Fauna habitat mapping was based on a combination of field observations, vegetation mapping, fauna habitat assessment data, and aerial imagery. Seven fauna habitats were mapped within the Survey Area: Plain (sand), Plain (stony/gibber), Drainage Line/River/Creek (major), Drainage Line/River/Creek (minor), Hills/Ranges/Plateaux, Rocky Escarpments/Ridges/Mesa, and Granite Outcrop. These habitats are consistent with habitats and assemblages identified by previous studies in the region. Most habitats identified within the Survey Area extend outside the Survey Area to form larger ecosystems; however, Granite Outcrops and Rocky Escarpments/Ridges/ Mesa habitats are patchy and isolated from similar habitats outside the Survey Area. The Drainage Line/River/Creek (major and minor) habitats are likely to provide important dispersal corridors across the landscape.

The detailed terrestrial vertebrate fauna survey used a variety of detection methods, including pitfall traps, active searches, autonomous recording units, camera traps, and opportunistic observations. A total of 175 fauna taxa from 60 families were recorded, comprising 25 mammal taxa, 68 bird taxa, 77 reptile taxa, and five amphibian taxa. Four significant fauna taxa were recorded within the Survey Area during the current surveys, with a potential fifth taxon that could not be identified to species level: Northern Quoll (*Dasyurus hallucatus*), listed as Endangered, Grey Falcon (*Falco hypoleucos*), listed as Vulnerable, Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia* Pilbara form), listed as Vulnerable, and Western Pebble-mound Mouse (*Pseudomys chapmani*), listed as Priority 4. An *Anilios* sp. individual with scale counts that match *Anilios ganei*, listed as Priority 1, was recorded during the 2024 survey; however, its appearance was not consistent with *A. ganei,* therefore it could not be identified to species level.

One significant fauna taxon has been recorded within the Survey Area during previous surveys but was not recorded during the current survey, Bilby (*Macrotis lagotis*), listed as Vulnerable. A further eight significant fauna taxa were assessed as having a high likelihood, two significant fauna taxa were assessed as having a medium likelihood, and 28 significant fauna taxa were assessed as having a low likelihood of occurring within the Survey Area.

Five introduced taxa were recorded during the survey: European Cattle (*Bos primigenius taurus*), Dog/Dingo (*Canis familiaris*), Cat (*Felis catus*), Horse (*Equus caballus*) and House Mouse (*Mus musculus*).

The single-phase detailed fauna survey was undertaken in March 2022, and the two-phase detailed fauna survey was undertaken in October 2024 and March 2025. All three surveys aligned within the recommended primary survey periods for amphibians, birds, mammals, and reptiles.

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Acronyms and Abbreviations

°C	Degree Celsius
ALA	Atlas of Living Australia
BAM Act	*Biosecurity and Agriculture Management Act 2007*
BC Act	*Biodiversity Conservation Act 2016*
BoM	Bureau of Meteorology
CR	Critically Endangered
DAWE	Department of Agriculture Water and Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DBH	Diameter at breast height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEE	Department of the Environment and Energy
DEWHA	Department of the Environment, Water, Heritage and the Arts
Study Area	The area that was studied during the desktop assessment encompassing the Survey Area and surrounds within 50 km.
DMIRS	Department of Mines, Industry Regulation and Safety
DoE	Department of the Environment
DPIRD	Department of Primary Industries and Regional Development
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
DWER	Department of Water and Environmental Regulation
EIA	Environmental Impact Assessment
EN	Endangered
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection Biodiversity and Conservation Act 1999*
ESA	Environmentally Sensitive Area
GIS	Geographic Information System
GPS	Global Positioning System
ha	Hectare
IBRA	Interim Biogeographic Regionalisation for Australia
IBSA	Index of Biodiversity Surveys for Assessments
ILUA	Indigenous land Use Agreement
km	Kilometres
Lat	Latitude
Long	Longitude
m	Metres
MA	Marine

MI	Migratory
mm	Millimetres
NNTT	National Native Title Tribunal
MNES	Matters of National Environmental Significance
P	Priority
PMST	Protected Matters Search Tool
Fortescue	Fortescue Limited
Sp.	Species
Spp.	More than one species
SLR	SLR Consulting Australia
Survey Area	The area that was surveyed
T	Threatened
VU	Vulnerable
WA	Western Australia
WAM	Western Australian Museum

1.0 Introduction

1.1 The Project

Fortescue Pty Ltd (Fortescue) is decarbonising all existing and future operations in an effort to achieve zero carbon emissions by 2030. Fortescue is investigating areas close to the existing integrated electricity network, transmission lines, and substations with the potential to be developed into solar farms. The 100 MW North Star Junction solar farm, northwest of Fortescue's Iron Bridge mine, is already operational as part of the Pilbara Generation Project (herein referred to as the Project).

Fortescue commissioned SLR Consulting Australia (SLR) to undertake a detailed vertebrate fauna assessment for areas near the existing North Star Junction solar farm. An initial single-phase detailed survey was conducted in 2022 within a defined area (2022 Survey Area), and a two-phase detailed survey was conducted in 2024 and 2025 within an adjacent area (2024 – 2025 Survey Area). These areas are herein referred to collectively as the Survey Area. The Survey Area covers 6,527.7 ha and is located approximately 100 km South of Port Hedland, in the Pilbara bioregion of Western Australia (**Map 1**). All maps are provided in **Appendix A**.

1.2 Objective and Scope

The objective of the survey was to identify key fauna values within the Survey Area as part of the environmental impact assessment process for the Project.

The following scope of work was completed:

- A desktop assessment including relevant database searches and a literature review to compile and summarise existing records of fauna, including from Fortescue's GIS database and public records in the vicinity of the Survey Area.

- A single-phase detailed vertebrate fauna survey of the 2022 Survey Area using a variety of detection methods, including pitfall traps, active searches, autonomous recording units (ARUs), camera traps, and opportunistic observations.

- A two-phase detailed vertebrate fauna survey of the 2024 – 2025 Survey Area using a variety of detection methods, including pitfall traps, active searches, ARUs, camera traps, and opportunistic observations.

- A technical biological report.

- A geospatial data package prepared in accordance with Fortescue Geographic Information Systems and Raw Data Guideline (100-GU-EN-0009).

2.0   Background

2.1   Statutory and Regulatory Framework

Western Australian fauna is governed by the following legislative measures:

- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act) (Commonwealth of Australia, 1999).

- *Biodiversity Conservation Act 2016* (WA) (BC Act) (Government of Western Australia, 2016).

- *Environmental Protection Act 1986* (WA) (EP Act) (Government of Western Australia, 1986).

In addition to these legislative measures, the following non-legislative lists are considered on a case-by-case basis:

- WA Department of Biodiversity Conservation and Attractions (DBCA) Priority lists for fauna, flora, and ecological communities.

- Weeds of National Significance (WoNS).

- Recognition of locally significant populations by DBCA.

The EIA process is supported by guidance documents published by the Environmental Protection Authority (EPA), DBCA and the Department of Climate Change, Energy, the Environment and Water (DCCEEW).

Western Australia

- *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA, 2020).

- *Environmental Factor Guideline – Terrestrial Fauna* (EPA, 2016).

- *Guidelines for surveys to detect the presence of bilbies and assess the importance of habitat in Western Australia* (DBCA, 2017b).

- *Guidelines for determining the likely presence and habitat usage of night parrot (Pezoporus occidentalis) in Western Australia* (DBCA, 2024b).

Commonwealth

- *Matters of National Environmental Significance – Significant Impact Guidelines 1.1* (DoE, 2013).

- *EPBC Act Referral guideline for the endangered northern quoll Dasyurus hallucatus* (DoE, 2016).

- *Survey guidelines for Australia's threatened bats* (DEWHA, 2010a).

- *Survey guidelines for Australia's threatened birds* (DEWHA, 2010b).

- *Survey guidelines for Australia's threatened frogs* (DEWHA, 2010c).

- *Survey guidelines for Australia's threatened mammals* (DSEWPaC, 2011a).

- *Survey guidelines for Australia's threatened reptiles* (DSEWPaC, 2011b).

2.2 Existing Environment

2.2.1 Climate

The closest long-term Bureau of Meteorology (BoM) weather station to the 2022 and 2024 - 2025 Survey Areas with a complete temperature dataset is Marble Bar (Station 004106), located approximately 82 km north of the Survey Area. The closest BoM weather station to the Survey Area with a complete rainfall dataset is Indee (Station 004016), located approximately 40 km northwest of the Survey Area.

Climate statistics were calculated utilising data from the most current climate normal, which is defined as a 30-year interval (BoM, 2007), where possible. A climate normal is a period long enough to include year-to-year variations while avoiding the influence of longer-term changes in climate (BoM, 2007).

The long-term (2000 – 2025) mean minimum temperature for Marble Bar ranges from 12.2˚C (July) to 26.5˚C (January), and the long-term mean maximum temperature ranges from 27.1˚C (June) to 42˚C (March) (**Figure 1**) (BoM, 2022).

2.2.1.1 2022 Survey

The Indee Weather Station recorded 135.5 mm of rainfall in the 12 months prior to the survey (March 2021 to February 2022), which is 251.7 mm below the long-term average of 387.2 mm (BoM, 2022). In the three months prior to the survey (December 2021 to February 2022), 45.8 mm of rainfall was recorded, which is 162.6 mm below the long-term average of 208.4 mm for the same time period (BoM, 2022). Temperatures in the months preceding the survey (December 2021 to February 2022) were all above the long-term average, except for February, which were slightly below, and temperatures during the month of the survey (March) were also higher than average (**Figure 1**).

Figure 1: 2022 climate summary of Marble Bar Weather Station (004106) temperature data and Indee Weather Station (004016) rainfall data

2.2.1.2   2024 – 2025 Survey

The Indee Weather Station recorded 152 mm of rainfall in the 12 months prior to the phase one survey (October 2023 to September 2024), which is 183.3 mm below the long-term (2000 to 2024) average of 335.3 mm (BoM, 2025). In the three months prior to the phase one survey (July to September 2024), 12.6 mm of rainfall was recorded, which is 2.8 mm below the long-term average of 15.4 mm for the same period (BoM, 2025). The lack of rainfall in the 12 months prior to the phase one survey appears to be from an absence of summer rainfall in the region (**Figure 2**), when it would receive most of the rain for the year. This meant the Survey Area was dry during the phase one survey despite decent rainfall immediately prior. The temperatures in the months preceding the 2024 survey (July to September 2024) were consistently above average, and the temperatures during the 2024 survey (October) were also higher than average (**Figure 2**).

The Indee Weather Station recorded 326.5 mm of rainfall in the 12 months prior to the phase two survey (April 2024 to March 2025), which is 8.8 mm below the long-term (2000 to 2025) average of 335.3 mm (**Figure 2**) (BoM, 2025). In the three months prior to the phase two survey (January to March 2025), 234.8 mm of rainfall was recorded, which is 15 mm above the long-term average of 219.8 mm for the same period (BoM, 2025). The high rainfall three months prior to the phase two survey was due to an intense cyclone that swept through most of the Pilbara and delivered above-average rainfall for the summer period. Despite the lower-than-average rainfall during March (**Figure 2**), the Survey Area still had pools of standing water throughout most of the drainage and low-lying areas. The temperatures in the months preceding the 2025 survey (December 2024 to March 2025) were slightly below the long-term average, while the temperatures during the 2025 survey (March) were above average (**Figure 2**).
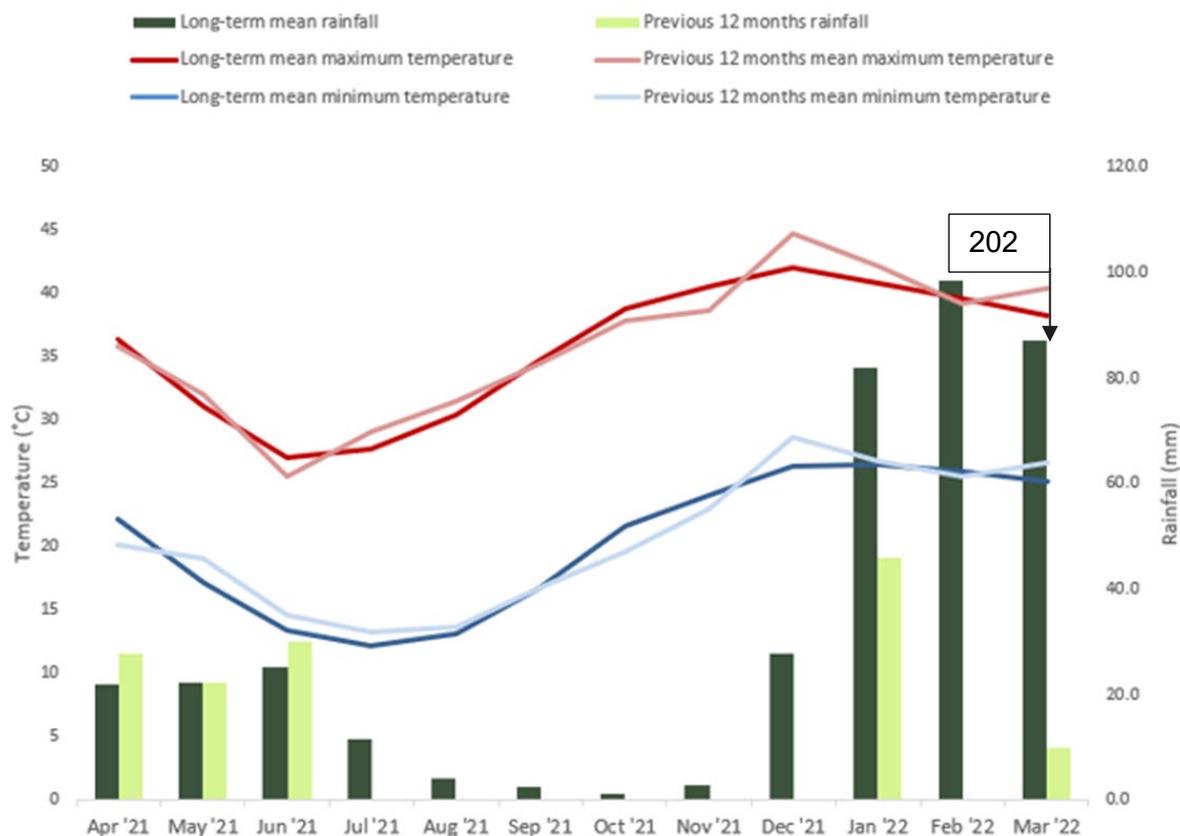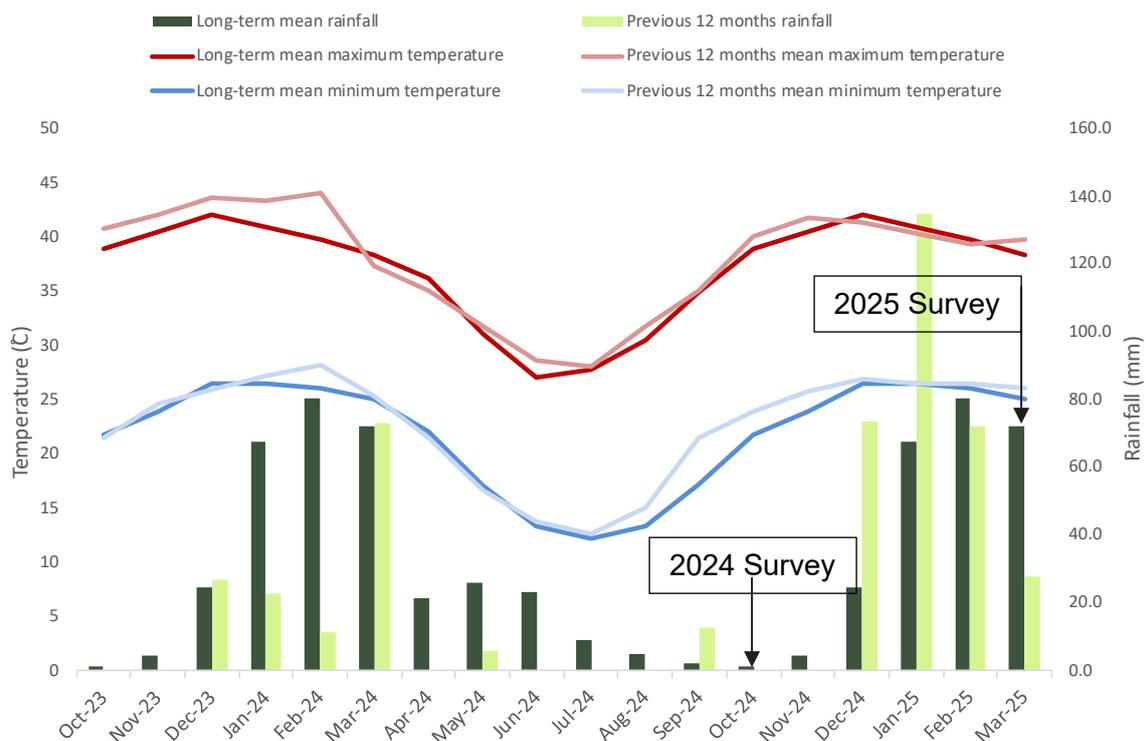
Figure 2: 2024-2025 climate summary of Marble Bar Weather Station (004106) temperature data and Indee Weather Station (004016) rainfall data

2.2.2 Interim Biogeographic Regionalisation of Australia

The Interim Biogeographic Regionalisation of Australia (IBRA) divides Australia into 89 bioregions based on major biological, geographical, and geological attributes. These bioregions are subdivided into 419 subregions as part of a refinement of the IBRA framework (DEE, 2016). The Survey Area occurs within the Pilbara Craton IBRA bioregion and the Chichester subregion (PIL01) subregion (**Map 2**).

The Chichester subregion is characterised by undulating Archaean granite and basalt plains with significant areas of basaltic ranges. The plains are dominated by hummock grasslands, characterised by shrub steppe of *Acacia pyrifolia* over *Triodia pungens,* with the ranges supporting *Eucalyptus leucophloia* tree steppes. The climate is semi-desert-tropical, receiving approximately 300 mm of rainfall annually, with numerous drainage lines in the north, including six major rivers (e.g. De Grey, Oakover, Nullagine, Shaw, Yule, Sherlock) (Kendrick and McKenzie, 2001).

2.2.3 Soil Landscape Mapping

Soil landscape mapping of Western Australia consists of a compilation of various surveys at different scales, varying between 1:20,000 and 1:3,000,000 (DPIRD, 2022). The mapping comprises a nested hierarchy of levels (e.g. landscapes, systems, subsystems), with each level a subdivision of the preceding level. Soil landscape mapping provides an indication of potential vegetation types and fauna habitats within the Survey Area and has been described below to the finest detail available from the database for the Survey Area.

The Survey Area occurs across 11 soil landscape subsystems (**Table 1; Map 3**).

Table 1:   Soil landscape subsystems within the Survey Area

Subsystem		Description	Area (ha) and percentage within Survey Area
Name	Code		
Uaroo system	283Ua	Broad sandy plains, pebbly plains and drainage tracts supporting hard and soft spinifex hummock grasslands with scattered acacia shrubs	1,426.04 (21.9%)
River system	283Ri	Narrow, seasonally active flood plains and major river channels supporting moderately close, tall shrublands or woodlands of acacias and fringing communities of eucalypts, sometimes with tussock grasses or spinifex	165.81 (2.5%)
Macroy system	283Mc	Stony plains and occasional tor fields based on granite, supporting hard and soft spinifex shrubby grasslands	2,142.36 (32.7%)
Talga system	280Tl	Hills and ridges of greenstone and chert, and stony plains supporting hard and soft spinifex grasslands	107.68 (1.7%)
River system	280Ri	Narrow, seasonally active flood plains and major river channels supporting moderately close, tall shrublands or woodlands of acacias and fringing communities of eucalypts, sometimes with tussock grasses or spinifex	98.19 (1.5%)
Macroy system	280Mc	Stony plains and occasional tor fields based on granite, supporting hard and soft spinifex shrubby grasslands	404.46 (6.2%)
Boolgeeda system	280Bg	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands	1,968.36 (30.2%)
Boolaloo system	283Bo	Granite hills, domes, tor fields and sandy plains supporting spinifex grasslands with scattered shrubs	26.78 (0.4%)
Robe system	280Ro	Low plateaux, mesas and buttes of limonite supporting soft spinifex and occasionally hard spinifex grasslands	89.18 (1.4%)
Platform system	280Pl	Dissected slopes and raised plains supporting shrubby hard spinifex grasslands	51.33 (0.8%)
Capricorn system	280Cp	Rugged sandstone hills, ridges, stony footslopes and interfluves supporting low acacia shrublands or hard spinifex grasslands with scattered shrubs	47.20 (0.7%)

2.2.4   Hydrography

Hydrographic features that either intersect or occur in the vicinity of the Survey Area are described in **Table 2** and shown in **Map 4** (DWER, 2018).

Table 2:   Hydrographic features in the vicinity of the Survey Area

Hydrographic feature	Description
Turner River	A minor river which flows in a northwest direction through the Survey Area towards Port Hedland.
Gillam Creek	A minor non-perennial tributary which flows in a northwest direction through the Survey Area towards Port Hedland.

2.2.5   Pre-European Vegetation

The major source of data for pre-European vegetation mapping in Western Australia is the published and unpublished mapping of J. S. Beard at a 1:250,000 scale. These vegetation types were later refined by Shepherd, Beeston, and Hopkins (2002), resulting in 819 Vegetation Association-level units, and a subsequent reclassification resulted in the creation of over 2,175 finer-scale System Associations (Beard *et al.*, 2013). Four System Associations are mapped within the Survey Area (**Table 3; Map 5**).

Representation of Vegetation Associations at the state, regional, and local levels is shown in **Table 4** (Government of Western Australia, 2019).

Table 3:   Vegetation System Associations within the Survey Area

System Association	Description	Area (ha) and percentage within Survey Area
Abydos Plain – Chichester 93	Shrub-steppe: Hummock grassland with scattered shrubs or mallee. *Triodia* spp. *Acacia* spp., *Grevillea* spp. *Eucalyptus* spp.	5,984.88 (91.6%)
Abydos Plain – Chichester 626	Sparse shrub-steppe: Hummock grassland with sparse shrubs. *Triodia* spp. *Acacia* spp.	193.97 (3%)
Abydos Plain – Chichester 619	Woodland other: Wheatbelt; York gum, salmon gum etc., *Eucalyptus loxophleba*, *E. salmonophloia*. Goldfields; gimlet, redwood etc., *E. salubris*, *E. oleosa*. Riverine; rivergum, *E. camaldulensis*. Tropical; messmate, woollybutt, *E. tetrodonta, E. miniata*.	162.21 (2.5%)
George Ranges - 82	Low tree-steppe: Hummock grassland with scattered bloodwoods and snappy gum. *Triodia* spp., *Corymbia dichromophloia*, *Eucalyptus leucophloia*.	186.37 (2.9%)

Table 4:   Representation of Vegetation Associations within the consolidated Survey Area at a state, regional, and local level

Vegetation Association	Extent				
	Pre-European (ha)	Current (ha)	Remaining (%)	Managed in DBCA lands (%)*	Within Survey Area (%)*
Representation across Western Australia					
82	2,565,901.28	2,553,206.19	99.51	11.57	<0.01
93	3,044,309.52	3,040,640.98	99.88	1.96	0.2
619	119,373.78	118,205.01	99.02	0.20	0.1
626	117,724.44	117,198.13	99.55	15.66	0.2
Representation across the Pilbara Bioregion					
82	2,563,583.23	2,550,888.14	99.50	11.58	<0.01
93	3,042,114.27	3,038,471.67	99.88	1.96	0.2
619	118,920.31	118,116.78	99.32	0.20	0.1
626	117,724.44	117,198.13	99.55	15.66	0.2

Vegetation Association	Extent				
	Pre-European (ha)	Current (ha)	Remaining (%)	Managed in DBCA lands (%)*	Within Survey Area (%)*
Representation across the Chichester Subregion					
82	360,666.90	360,322.69	99.90	0.00	0.05
93	2,940,348.04	2,936,731.54	99.88	2.03	0.2
619	85,543.15	85,520.95	99.97	0.28	0.2
626	117,724.44	117,198.13	99.55	15.66	0.16
Representation across the Town of Port Hedland					
82	8,581.42	8,581.42	100.00	0.00	2.2
93	1,015,339.22	1,014,599.99	99.93	0.00	0.6
619	63,650.59	62,598.14	98.35	0.00	0.3
626	57,006.69	56,494.13	99.10	0.00	0.3
Representation across the Shire of East Pilbara					
82	927,709.76	919,072.17	99.07	0.50	0.02
93	1,709,522.24	1,706,780.57	99.84	2.70	0.3
619	52,765.30	52,763.69	100.00	0.00	0.3

*as a portion of the current extent

2.2.6   Land Use

The Survey Area resides within two pastoral stations, Kangan and Wallareenya, and has been historically used as pastoral land. The Survey Area also exists within four mining tenement areas and has one mining rail network and associated roads and infrastructure along the western extent.

2.2.7   Conservation Areas

Conservation areas consist of areas protected for the purpose of conservation, including but not limited to National Parks, Nature Reserves, Conservation Parks, and Regional Parks. The Survey Area does not intersect any conservation areas (DBCA, 2023a, 2023b). The nearest conservation area is Mungaroona Range Nature Reserve, vested under the Conservation Commission of Western Australia, is located 65 km to the southwest of the Survey Area (**Map 6**).

2.2.8   Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared by the Department of Water and Environmental Regulation (DWER) to prevent the degradation of important environmental values such as Threatened flora, Threatened Ecological Communities (TECs), or significant wetlands. The Survey Area does not intersect any mapped ESAs (DWER, 2023). The nearest ESA is Mungaroona Range Nature Reserve, located approximately 65 km southwest of the Survey Area (Map 6).

3.0   Methods

The surveys documented in this report were undertaken in accordance with relevant EPA and DCCEEW guidelines (see Section 2.1).

3.1   Desktop Assessment

3.1.1   Literature Review

Background information on the Survey Area, and a 50 km buffered area surrounding the Survey Area (the Study Area), was compiled prior to the field survey. The literature review considered a selection of relevant reports detailing assessments undertaken in the region that were either publicly available from sources such as the Index of Biodiversity Surveys for Assessments (IBSA) website, the EPA Consultation Hub, or internet searches, or provided by the client. These reports are listed below in **Table 5** in order of distance from the current Survey Area, and summarised in **Appendix B**. Their locations in relation to the current Survey Area, as represented by their nearest point, are shown in **Map 7**.

Table 5:   Literature review results

Report Name	Author	Distance from Survey Area
Pippingara and Wodgina Roads: Flora and Fauna Survey	Ecoscape, 2020	Overlaps the Survey Area.
Pilbara Ghost Bat Review	Biologic & Bat Call WA, 2014	Overlaps the Survey Area
North Star Project Level 2 Terrestrial Vertebrate Fauna Assessment	Ecologia Environment, 2012	Overlaps the Survey Area.
Proposed Gas Pipeline Targeted Threatened Fauna Survey	Outback Ecology, 2013	Overlaps the Survey Area
Fauna Habitats and Fauna Assemblage of the Proposed FMG Stage A Rail Corridor	Biota Environmental Sciences, 2004	Adjacent to the west of the Survey Area
North Star Junction West Detailed Terrestrial Vertebrate Fauna Assessment	Spectrum, 2024	4.7 km southwest of the Survey Area.
Targeted Fauna Assessment of The Rail Duplication	Bamford Consulting Ecologists, 2010	5 km north of the Survey Area
Warrawoona Gold Project Targeted Vertebrate Fauna Survey	Biologic, 2018	6 km southeast of the Survey Area
Wodgina Lithium Project: Level 2 Vertebrate Fauna Survey	Western Wildlife, 2020	7.3 km west-northwest of the Survey Area
Wodgina Aerodrome Targeted Fauna Survey	360 Environmental Pty Ltd, 2018	17 km northwest of the Survey Area
Reconnaissance Flora and Vegetation Survey and Fauna Survey for The Croydon Gold Project	Phoenix Environmental Sciences, 2021	65 km southwest of the Survey Area

3.1.2 Database Searches

Database searches were undertaken to compile a list of fauna known to occur in the Desktop Study Area and identify significant fauna with the potential to occur within the Survey Area (**Table 6**).

Table 6: Database search details

Database name	Date received	Search target	Buffer around the Survey Area
Threatened and Priority Fauna database search (DBCA, 2024c)	07 August 2024	Threatened and Priority fauna	50 km
Protected Matters Search Tool (PMST) (DCCEEW, 2024)	20 August 2024	Threatened fauna	50 km
NatureMap (DBCA, 2024a)	15 August 2024	Fauna	50 km

3.1.3 Likelihood of Occurrence

Significant fauna taxa identified during the desktop assessment were assessed to determine the likelihood of their occurrence within the Survey Area before and after the field survey. The assessment used the likelihood of occurrence criteria presented in **Table 7**.

As the Survey Area does not contain any marine habitats, birds listed as Marine only under the EPBC Act were not considered significant and were not assessed for their likelihood of occurrence. Taxa assessed as having a low likelihood of occurrence are not discussed in further detail.

Table 7: Likelihood of occurrence criteria

Rank	Criteria
Recorded	The taxon was recorded within the Survey Area during the current survey.
Previously Recorded	The taxon has been previously recorded within the Survey Area in the last 15 years.
High (Likely to occur)	Suitable habitat is present within the Survey Area and the taxon has been recorded within the Desktop Study Area more than once in the last 15 years.
Medium (May occur)	Suitable habitat is marginal or limited in extent within the Survey Area, or suitable habitat is present within the Survey Area, and the taxon has not been recorded within the Desktop Study Area more than once in the last 15 years.
Low (Unlikely to occur)	Suitable habitat is not present within the Survey Area, or the Survey Area is outside the taxon's known distribution, or the taxon is very infrequently recorded in the locality and only likely to occur as a transient or vagrant, or the taxon is believed to be extinct or locally extinct.

3.2   Field Surveys

3.2.1   Survey Timing

The field surveys were undertaken across three field trips, as shown in **Table 8**.

Table 8:   Survey timing

Survey year	Tasks completed	Dates	Person field days
2022	Single-phase detailed and targeted terrestrial vertebrate fauna survey (2022 Survey Area)	15 – 27 March 2022	52
2024	Phase 1 detailed and targeted terrestrial vertebrate fauna survey (2024 – 2025 Survey Area)	21 October – 03 November 2024	56
2025	Phase 2 detailed and targeted terrestrial vertebrate fauna surveys (2024 – 2025 Survey Area)	04 – 17 April 2025	48

3.2.2   Field Personnel and Licences

Details of field personnel and years of experience undertaking similar scopes are detailed in **Table 9.** The fieldwork was completed under the following licences and are provided in **Appendix C**:

2022

- Fauna Taking (Biological Assessment) License – Regulation 27 (BA270000606).

- Authorisation to take or disturb threatened species under Section 40 of the BC Act (TFA 2022 –0015).

2024 - 2025

- Fauna Taking (Biological Assessment) License – Regulation 27 (BA27001150).

- Authorisation to take or disturb threatened species under Section 40 of the BC Act (TFA-2425-0095).

- Animal ethics approval was obtained under scientific use licence number U336 / 2023 - 2025 and permit number WAEC 24-02-11.

Table 9:   Field personnel and experience for each trip

Personnel	Role	Experience
2022 survey		
Dr Michael Lohr	Principal Zoologist	10+ years
Evan Webb	Principal Zoologist	8 years
Lachlan Crossley	Ecologist	5 years
Lewis Berry	Ecologist	2 years

Personnel	Role	Experience
2024 – 2025 survey		
Simon Girando	Associate Ecologist	7 years
Matthew McIntosh	Associate Ecologist	10 years
Phillippa Dean	Zoologist	6 years
Serin Subaraj	Zoologist	3 years
Kelly Griffith	Ecologist	2 years

3.2.3 Weather Conditions

Weather conditions during the fauna surveys are presented in **Table 10**; **Table 11**; and **Table 12**. This information is important as weather conditions can affect fauna detection during a survey.

Daily temperature for the 2022 survey is from Marble Bar (Station 004106), and rainfall data is from the Indee (Station 004016) (Bureau of Meteorology, 2022). A severe thunderstorm passed through the Survey Area on 18th April 2022; however, this is not reflected in the rainfall data as the thunderstorm was localised and was not recorded at Indee.

Table 10: 2022 survey daily temperatures and rainfall

Date	Temperature (°C)		Rainfall (mm)
	Min	**Max**	
15/03/2022	30.4	43.9	0.0
16/03/2022	27.3	43.8	0.0
17/03/2022	27.2	43.1	0.0
18/03/2022	28.7	41.4	0.0
19/03/2022	27.1	40.0	0.0
20/03/2022	24.0	41.6	0.8
21/03/2022	26.6	41.4	0.0
22/03/2022	28.0	42.6	0.0
23/03/2022	29.6	41.9	0.0
24/03/2022	29.6	40.4	0.0
25/03/2022	27.5	40.1	0.0
26/03/2022	24.4	40.6	0.0
27/03/2022	26.3	39.2	0.0

Daily temperature data for the 2024 – 2025 survey is from the Marble Bar Weather Station (Station 004106), and daily rainfall data is from the Port Hedland Airport Weather Station (Station 004032) (BoM, 2025).

Small thunderstorms passed through the Survey Area frequently during the 2024 survey but are not reflected in the weather data as these storms were localised and not recorded at Port Hedland Airport. The 2025 survey had fair weather for the duration of the survey.

Table 11: 2024 survey daily temperatures and rainfall

Date	Temperature (°C)		Rainfall (mm)
	Min	Max	
21/10/2024	25.0	42.3	0.0
22/10/2024	26.7	43.5	0.0
23/10/2024	27.6	43.2	0.0
24/10/2024	28.4	42.1	0.0
25/10/2024	24.6	42.7	0.0
26/10/2024	26.2	44.5	0.0
27/10/2024	27.4	43.3	0.0
28/10/2024	28.3	41.6	0.0
29/10/2024	25.8	40.8	0.0
30/10/2024	25.1	42.0	0.0
31/10/2024	25.7	44.6	0.0
01/11/2024	24.6	44.7	0.0
02/11/2024	25.5	42.8	0.0
03/11/2024	25.4	42.7	0.0

Table 12: 2025 survey daily temperatures and rainfall

Date	Temperature (°C)		Rainfall (mm)
	Min	Max	
04/04/2025	19.5	36.1	0.0
05/04/2025	20.7	36.6	0.0
06/04/2025	26.3	37.5	0.0
07/04/2025	23.1	39.0	0.0
08/04/2025	25.5	38.9	0.0
09/04/2025	25.8	39.8	0.0
10/04/2025	24.4	38.1	0.0
11/04/2025	27.1	38.8	1.6
12/04/2025	21.1	38.2	0.0
13/04/2025	20.4	37.3	0.0
14/04/2025	21.0	37.5	0.0
15/04/2025	21.4	38.5	0.0
16/04/2025	24.4	38.2	0.0
17/04/2025	24.0	36.1	0.0

3.2.4   Habitat Assessment and Mapping

Habitat assessments were undertaken in representative areas of fauna habitat within the Survey Area to record habitat values. A total of 47 habitat assessments were completed within the Survey Area, including one at each trapping site, camera line and bilby search area. A further 17 habitat assessments were conducted in areas that required additional habitat information. Where possible, at least one habitat assessment was recorded within each habitat type. Habitat assessment locations are shown in **Map 8**.

The following information was collected at each habitat assessment location using a GPS-enabled handheld device:

- Site photo.

- Landform.

- Soil type and colour.

- Rock types, surface stone cover, and size classes.

- Key habitat and microhabitat features including leaf litter, logs, burrows, rocky outcrops, rock crevices, hollows, and water sources.

- Habitat quality, fire history, and evidence of disturbance.

- General description of vegetation structure.

Fauna habitat mapping was based on a combination of field observations, habitat assessment data, aerial imagery, and, if available, vegetation type mapping. Polygons were digitised using GIS software.

3.2.5   Trap Sites

Seven trap sites were installed during the 2022 survey, and eight trap sites were installed during the 2024 – 2025 surveys within areas of suitable and representative habitat. Each trap site consisted of two trap lines spaced roughly 50 m apart to account for the possibility that fauna assemblages can be distributed unevenly within a given habitat. Individual trap lines were roughly 30 m long and comprised a 30 cm tall flywire drift fence passing over five pitfall traps (20 L buckets and 150 mm PVC pipes) with six funnel traps attached to the drift fence in pairs. Elliot traps were not deployed at trap sites during the 2022 and 2024 surveys due to concerns regarding animal welfare in extreme heat. Conditions were milder during the 2025 survey, and five small Elliott traps were positioned approximately 10 m away from the pitfall trap line. Vegetation and hessian bags were used to shade the Elliott traps. A diagram of the trap site layout is provided in **Figure 3**.
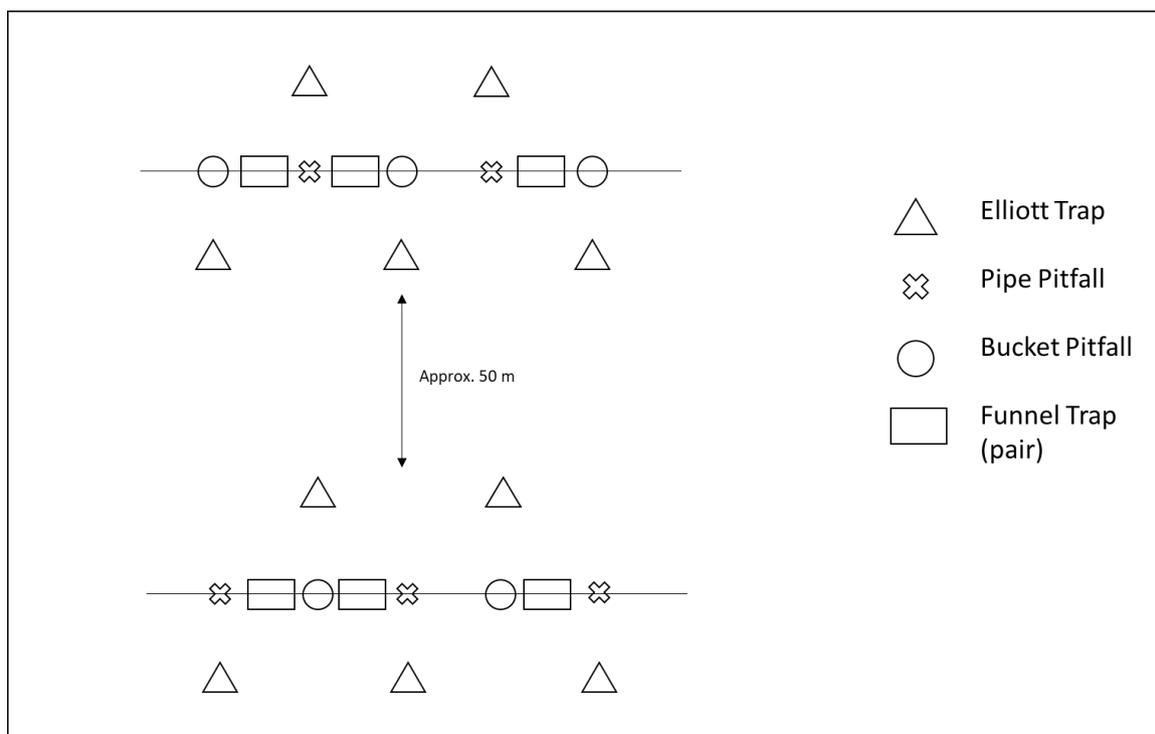
Figure 3: Trap site layout

Site selection was based on a review of available literature and aerial imagery with the aim of installing a minimum of two trap sites (i.e. four replicate trap lines) per habitat type. Due to site access issues during the 2022 survey and risks to personnel safety due to extreme heat during the 2024 survey, two trap sites per habitat type were not achieved; only one trap site was installed within Hills/Ranges/Plateaux and one and a half trap sites were installed in the Plain (stony/gibber) habitats. Trap site locations are shown in **Map 8**, trapping site survey effort for each phase is detailed in **Appendix D**, and the combined total trapping effort is summarised in **Table 13**.

Table 13: Total trapping effort

Habitat type	Pitfall Trap Nights	Funnel Trap Nights	Elliott Trap Nights	Motion Camera	Bird Surveys	Bilby Searches	Acoustic Recorder	Ultrasonic Recorder
Plain (stony/gibber)	420	504	105	42	42	6	7	8
Plain (sand)	350	420	140	70	35	5	13	37
Granite Outcropping	70	84	-	84	7	-	-	7
Hills/Ranges/Plateaux	-	168	70	28	14	1	-	9
Rocky Escarpments/Ridges/Mesa	-	-	-	90	-	-	-	10
Drainage Line/River/Creek (major)	420	504	140	346	42	1	6	61

Habitat type	Pitfall Trap Nights	Funnel Trap Nights	Elliott Trap Nights	Motion Camera	Bird Surveys	Bilby Searches	Acoustic Recorder	Ultrasonic Recorder
Drainage Line/River/Creek (minor)	210	252	70	78	21	-	-	10
Regrowth	-	-	-	-	-	-	-	-
Cleared	-	-	-	-	-	-	-	-
Total	**1,470**	**1,932**	**525**	**738**	**161**	**13**	**26**	**142**

3.2.6 Camera Traps

Lines of 10 motion-sensitive camera traps spaced approximately 50 m apart were set in areas of suitable Northern Quoll habitat. Four camera lines were set during the 2022 survey, four camera lines were set during the 2024 survey, and two camera lines were set during the 2025 survey. Additionally, during the 2024 – 2025 surveys, two cameras were set up at each trap site, and additional cameras were placed ad hoc at locations of interest (e.g. water points, cave entrances, etc.). Cameras were baited with universal bait (rolled oats, peanut butter, and sardines). Camera trap effort within each habitat type is shown in **Table 13**, camera trap locations are shown in **Map 8** and the total camera trap effort is shown in **Appendix D**.

3.2.7 Acoustic Bat Surveys

Song Meter SM4BAT ultrasonic ARUs were used to detect bats with a particular focus on two significant taxa, the Pilbara Leaf-nosed Bat and Ghost Bat. During 2022, ultrasonic ARUs were deployed in habitats likely to be used by bats, such as water sources or rocky areas, for a minimum of four nights at each location. During the 2024 and 2025 surveys, ultrasonic ARUs were deployed at each trap site for a minimum of four nights in addition to habitats likely to be used by bats.

The ARU recordings were analysed by Robert Bullen from Bat Call WA. If recorded, the number and time of significant bat calls were documented. Non-significant bat taxa were simply recorded as present or absent at each location.

Table 13 summarises the trapping effort for ultrasonic ARUs and locations are shown in **Map 8** and the total trapping effort for ultrasonic ARUs is shown in **Appendix D**.

3.2.8 Acoustic Night Parrot Surveys

During the 2022 and 2024 surveys, Song Meter SM4 ARUs were used to target the Night Parrot (*Pezoporus occidentalis*) in accordance with the *Interim Guideline for Preliminary Surveys of Night Parrot (*Pezoporus occidentalis*) in Western Australia* (DPAW, 2017). Following the publication of the *Guidelines for determining the likely presence and habitat usage of the night parrot (*Pezoporus occidentalis*) in Western Australia* (DBCA, 2024b), SM4 ARUs were removed from the 2025 survey effort due to a change in the requirements for needing a field survey under this guideline. Another consultant was engaged to assess the likelihood of presence of Night Parrots, and it was determined that the Night Parrot is unlikely to be present within the Survey Area. **Table 13** summarises the SM4 ARU survey effort, and locations are shown in **Map 8** and the total the total SM4 ARU survey effort is shown in **Appendix D**.

3.2.9   Bilby Searches

Five targeted Bilby searches were undertaken during the 2022 survey, and four targeted bilby searches were undertaken during the 2024 – 2025 surveys (two per survey). During 2022, Bilby searches consisted of four personnel walking an approximately 1.5 km transect spaced approximately 20 m apart (i.e. approximately 6 km total per transect).

During the 2024 – 2025 surveys, Bilby searches consisted of personnel systematically traversing a 2-ha plot with transects spaced approximately 20 m apart. Evidence of Bilby activity, such as burrows, diggings, scats, and tracks, was recorded if observed. The Bilby search effort is summarised in **Table 13**, and locations are shown in **Map 8**.

3.2.10   Northern Quoll Spot Analysis

Northern Quoll population estimates were not included in the original scope of the detailed vertebrate fauna survey, so camera positioning was not optimised for spot analysis when they were set up in the field (horizontal facing instead of vertical facing). It was determined post-survey that spot analysis was possible with the data that was collected and was then included within this report. Unique spot patterns of Northern Quoll were used to determine the number of individuals recorded by camera traps. Bait was placed in multiple areas in front of the cameras to encourage changes in body positions to increase the likelihood of individual spot pattern visibility. Photographs where Northern Quoll spot patterns were clearly visible were examined, and distinguishable groupings of spots were noted as well as photo timings and camera locations to determine separate individuals. Where possible, new individuals were differentiated from recaptures. The spot analysis is provided in **Appendix E**.

3.2.11   Opportunistic Observations

Opportunistic observations of fauna were recorded throughout the Survey Area, including primary evidence (direct sightings, calls, remains) and secondary evidence (tracks, scats, diggings).

3.2.12   Active Searches

Timed active searches were undertaken at each trap site for a minimum duration of one person-hour. These searches included raking leaf litter, peeling bark, splitting dead wood, and flipping rocks in search of evidence of fauna. Additional untimed active searches were undertaken opportunistically.

3.2.13   Timed Bird Surveys

Timed bird surveys were undertaken during the morning trap checks at each trap site for 20 minutes in a 2-ha quadrat. Where practicable, this was undertaken during peak periods of activity when birds are calling and moving about, which is typically within three to four hours of sunrise, particularly during warmer periods. Each trap site had a minimum of seven timed bird surveys, with a total survey time of 140 minutes per site.

3.2.14   Spotlighting

Spotlighting was undertaken on five nights across the field surveys. Spotlighting commenced approximately one hour after sunset and consisted of opportunistic searches along roads and causeways while driving to and from areas of suitable habitat, which were then traversed on foot. Spotlighting sessions were usually conducted for a total of two hours. A total of 40 person-hours was completed.

3.2.15   Identification and Taxonomy

Terrestrial vertebrate fauna taxa were identified in the field and released on site. Bat calls and Night Parrot calls were analysed by Robert Bullen from Bat Call WA.

Where there was doubt on a species name (through subsequent name changes or taxonomic reviews), an effort was made to determine the current scientific name for each taxon. Taxonomy and nomenclature in this report follow the Checklist of the Terrestrial Vertebrate Fauna of Western Australia (WAM, 2025) where relevant.

3.3   Analysis

3.3.1   Species Accumulation Curves

All species accumulation curves were plotted for vertebrate fauna groups using Primer v7 (K. R. Clarke & R. N. Gorley, 2015) to estimate the number of fauna taxa in a particular area and provide an indication of the adequacy of survey effort at trap sites within the Survey Area. Using this method, we obtained the Sobs (the total number of species observed; Mao Tau), which effectively smooths the curve of observed species by simulating an infinite number of randomisations of the sample order. To account for undetected species and sampling variability, richness estimators (Chao, Jackknife 1, Jackknife 2, and Bootstrap) were implemented to predict the theoretical maximum number of species that could potentially be recorded (Clarke and Gorley, 2006).

- Chao: Accounts for unseen species by weighting rare species (singletons and doubletons).
- Jackknife 1: Number of species that occur in one sampling unit.
- Jackknife 2: Number of species in one and two sampling units for correction.
- Bootstrap: Estimates the number of unobserved species by resampling based on species incidences.

Species accumulation curves were calculated using systematic sampling data from trap sites, with the exception of ultrasonic acoustic recorder data as they did not have the same sampling effort. Opportunistic fauna records were excluded from species accumulation curves. Results were visualised and the graphs were plotted using the software's internal plotting package. Each estimator's accumulation curve was plotted with a coloured line. The x-axis represents the cumulative number of trap nights, and the y-axis reflects the accumulative species count.

3.4   Limitations

Limitations and constraints of the fauna survey are detailed below in **Table 14**.

Table 14: Limitations and constraints associated with the survey

Variable	Degree of limitation	Potential constraints on survey outcomes
Availability of data and information	No limitation	Sufficient data and information, including regional and local contextual information, were available to complete the scope of the survey.
Competency and experience of the survey team	No limitation	The survey was undertaken by a team with extensive experience in undertaking similar scopes within the bioregion. 2022 Field Team:

Variable	Degree of limitation	Potential constraints on survey outcomes
		• Principal Zoologist Dr Michael Lohr – 10+ years' experience • Principal Zoologist Evan Webb – 8 years' experience • Ecologist Lachlan Crossley – 5 years' experience • Ecologist Lewis Berry – 2 years' experience 2024 – 2025 Field Team: • Associate Ecologist Simon Girando– 7 years' experience • Associate Ecologist Matthew Macintosh – 10 years' experience • Zoologist Phillippa Dean – 6 years' experience • Zoologist Serin Subaraj – 3 years' experience • Ecologist Kelly Griffith – 2 years' experience
The proportion of fauna identified, recorded, or collected	No limitation	The desktop analysis identified 355 vertebrate fauna occurring within the Survey Area, of which 175 fauna taxa (49%) were recorded and identified to species level during the survey effort. None of the species accumulation curves (see section 4.5) are approaching asymptote, which shows that with more sampling effort it is likely more species would have been recorded. However, this is not considered a limitation of the survey as the fauna recorded represent appropriate subsets of the fauna groups that were expected. During the 2024 survey, an *Anilios* sp. individual was recorded with scale counts that matched *A. ganei*, however, its appearance was not consistent with *A. ganei* therefore it could not be identified to species. *Taphozous* sp. calls were recorded and unable to be identified to species level because *T. hilli* and *T. georgianus* calls could not be distinguished. A further 18 records could not be identified to species level because camera trap photos or secondary evidence were not clear enough to identify with confidence; however, these 18 records were not analogous to significant fauna taxa.
Scope of the survey	No limitation	The scope of the survey was limited to terrestrial vertebrate fauna. No further exclusions were made within this group.
Adequacy of the survey intensity and proportion of survey achieved	Minor limitation	The relevant EPA guidance (2020) recommends two complementary survey phases for detailed surveys. The 2024 – 2025 two-phase survey was undertaken in accordance with this recommendation; however, the 2022 single-phase survey was not. Due to site access issues during the 2022 survey and risks to personnel safety due to extreme heat during the 2024 survey, two trap sites per habitat type were not achieved; only one trap site was installed in the Hills/Ranges/Plateaux habitat, and one and a half trap sites were installed in the Plain (stony/gibber) habitat. The reduced effort in these habitats is considered a minor limitation of the survey.
Access problems	No limitation	During the 2022 survey, a helicopter was not available and trap site locations were limited to areas accessible by vehicle to avoid time constraints associated with undertaking daily trap checks in accordance with animal welfare requirements. During the 2024 – 2025 surveys, the entire 2024 – 2025 Survey Area was sufficiently accessed by helicopter, vehicle, and on foot.

Variable	Degree of limitation	Potential constraints on survey outcomes
Timing, weather, and season	No limitation	The recommended primary survey periods for the Eremaean broad climatic regions are: • Amphibians – after rainfall events • Birds – after rainfall events • Mammals – no preferred time • Reptiles – September to April All three fauna surveys (March, October, & April) were undertaken within the recommended primary survey period for reptiles, and, given that rainfall events occurred during all three field surveys, the surveys also occurred within the recommended periods for amphibians, birds, and mammals. The 2022 and 2024 surveys were impacted by extreme heat, and Elliott traps were excluded from trap sites during these surveys due to animal welfare concerns. This may have contributed to low capture rates of mammals; however, this is considered a minor limitation of the survey.
Disturbance that may have affected the results of survey	No limitation	Areas of disturbance associated with roads, revegetation, and burn scars were present within the Survey Area but were not a limitation on the results of the survey. During the 2022 survey, large areas of Granite Outcrop habitat were recently burnt, which may have resulted in low fauna detection rates within these areas.
Problems with data and analysis, including sampling biases	No limitation	Species accumulation curves provide an indication of survey adequacy at each sampling location but do not necessarily reflect survey adequacy across the entire Survey Area; however, this is not considered a limitation on the survey outcomes. Survey effort for significant fauna taxa was concentrated in preferred habitats. This may introduce a bias where the use of non-preferred habitats is underrepresented; however, this is not considered a limitation on the survey outcomes.

4.0 Results

4.1 Desktop Assessment

The database searches and literature review identified 355 terrestrial vertebrate fauna taxa occurring within the Desktop Study Area, comprising:

- 51 mammals, of which 11 are significant.

- 181 birds, of which 27 are significant.

- 113 reptiles, of which four are significant

- 10 amphibians, of which none are significant.

Key findings of the literature review are summarised in **Appendix B**, a complete list of fauna taxa recorded within the Desktop Study Area is presented in **Appendix F**, and database search results are displayed in **Map 9**.

4.2 Fauna Habitats

Seven fauna habitats (excluding highly modified habitats, including cleared areas and regrowth) were identified and mapped within the Survey Area. Fauna habitats are presented in **Map 10**, described below in **Table 15**, and site sheets for each habitat assessment are provided in **Appendix G**. Small discrepancies in fauna habitat extents (i.e., not adding up to the exact area extent of the Survey Area) are due to rounding.

Table 15: Fauna habitats recorded within the Survey Area

Fauna habitat	Total area, percentage of Survey Area	Habitat description	Representative photograph
Plain (sand)	1,962.2 ha, 30.1 %	**Open mixed Acacia shrubland over sand.** Vegetation consists of low isolated *Corymbia hamersleyana* trees over mid to tall isolated *Acacia inaequilatera* (*Grevillea wickhamii* subsp. *hispidula*), *A. stellaticeps*, *Pluchea ferdinandi-muelleri* and *A. orthocarpa* (*A. ancistrocarpa*) shrubs over a mosaic of mid open *A. ancistrocarpa, A. acradenia* and *Petalostylis labicheoides* shrubland over low open *Triodia lanigera* (*T. epactia*) hummock grassland. Microhabitats include hummocks and termite mounds. This habitat contained no disturbances. This habitat constitutes critical habitat for the Bilby (*Macrotis lagotis*), and is suitable habitat for the Brush-tailed Mulgara (*Dasycercus blythi*), and Grey Falcon (*Falco hypoleucos*).	
Plain (stony/gibber)	3,030.3 ha, 46.5 %	**Open Acacia shrubland over stony plain.** Vegetation consists of low isolated *Corymbia hamersleyana* trees over tall isolated to sparse *Acacia inaequilatera* (*Grevillea wickhamii* subsp. *hispidula*) over a mosaic *of A. ancistrocarpa, A. acradenia,* and *Petalostylis labicheoides* mid open shrubland over low *Triodia lanigera, T. chichesterensis* and *T. wiseana* hummock grassland. Microhabitats include hummocks, woody debris, termite mounds and burrows. This habitat had no disturbances. This habitat constitutes suitable habitat for the Western Pebble-mound Mouse (*Pseudomys chapmani*) and supporting habitat for Bilby (*Macrotis lagotis*), Ghost Bat (*Macroderma gigas*), and Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia* Pilbara form).	

Fauna habitat	Total area, percentage of Survey Area	Habitat description	Representative photograph
Drainage Line/River/Creek (major)	355.3 ha, 5.5 %	**Major drainage line with orange/red sand.** Vegetation consists of low to mid open *Melaleuca argentea* (*Eucalyptus camaldulensis* subsp. <u>refulgens</u>, *E. victrix*), low open woodland over tall isolated *Acacia coriacea* subsp. *pendens*, and *A. trachycarpa* (*A. ampliceps*) and tall open *Melaleuca glomerata* and *M linophylla* shrubs over mid sparse *Cyperus vaginatus*, and *C. ixiocarpus* sedges over low sparse *Triodia longiceps,* (*T. epactia*) hummock grasses. Microhabitats include hummocks, tree hollows, peeling bark, woody debris and burrows. Disturbances caused by cattle were observed. This habitat constitutes critical habitat for the Northern Quoll (*Dasyurus hallucatus*), and Grey Falcon (*Falco hypoleucos*), and supporting habitat for the Pilbara Olive Python (*Liasis olivaceus barroni*), Ghost Bat (*Macroderma gigas*) and Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia* Pilbara form).	
Drainage Line/River/Creek (minor)	304.2 ha, 4.7 %	**Minor drainage line with orange/red sands.** Vegetation consists of low isolated *Corymbia hamersleyana* trees over mid to tall *Acacia inaequilatera*, *A. acradenia* and *A. bivenosa, A. eriopoda*, and *A. colei* var. *colei* shrubland over low isolated **Cenchrus ciliaris,* (*Chrysopogon fallax*) tussock grassland over low open *Triodia epactia* and *T. wiseana* hummock grassland. Microhabitats include hummocks, tree hollows, peeling bark, woody debris and burrows. This habitat contained disturbances caused by cattle.	

Fauna habitat	Total area, percentage of Survey Area	Habitat description	Representative photograph
		This habitat constitutes supporting habitat for the Pilbara Olive Python (*Liasis olivaceus barroni*) and Grey Falcon (*Falco hypoleucos*), Ghost Bat (*Macroderma gigas*), Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia* Pilbara form), and Northern Quoll (*Dasyurus hallucatus*),	
Hills/Ranges/Plateaux	654.9 ha, 9.9 %	**Stony undulating hills and slopes over clay.** Vegetation consists of *Corymbia hamersleyana* low isolated trees over tall isolated *Acacia inaequilatera* (*Grevillea wickhamii* subsp. *hispidula*) shrubs over a mosaic of mid open *A. ancistrocarpa*, *A. acradenia* and *Petalostylis labicheoides* shrubland over *Triodia lanigera,* (*T. epactia*) hummock grassland. Microhabitats include hummocks, exfoliating rock, and rock crevices. This habitat contained no disturbances. This habitat constitutes suitable habitat for the Western Pebble-mound Mouse (*Pseudomys chapmani*) and supporting habitat for the Northern Quoll (*Dasyurus hallucatus*), Ghost Bat (*Macroderma gigas*), and Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia* Pilbara form).	

Fauna habitat	Total area, percentage of Survey Area	Habitat description	Representative photograph
Rocky Escarpments/Ridges/Mesa	3 ha, 0.05 %	**Rocky escarpments and ironstone outcropping over thin clay.** Vegetation consists of tall isolated *Acacia inaequilatera* (*Grevillea wickhamii* subsp. *hispida*) shrubs over low open *Triodia wiseana* hummock grassland. Microhabitats include caves, exfoliating rock, hummocks, and rock crevices. No disturbed areas were observed. This habitat constitutes critical habitat for the Northern Quoll (*Dasyurus hallucatus*) and supporting habitat for the Ghost Bat (*Macroderma gigas*) and Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia* Pilbara form).	
Granite Outcrop	84 ha, 1.3 %	**Isolated granite/ironstone outcropping.** Vegetation consists of low, isolated *Triodia chichesterensis* and *T. wiseana*. Microhabitats include hummocks, exfoliating rock and rock crevices. During the 2022 survey, large areas of the Granite Outcrop habitat had been recently burnt. Granite outcrop constitutes critical habitat for the Northern Quoll (*Dasyurus hallucatus*) and supporting habitat for the Pilbara Olive Python (*Liasis olivaceus barroni*).	

Fauna habitat	Total area, percentage of Survey Area	Habitat description	Representative photograph
Regrowth	39.8 ha, 0.6 %	**Previously cleared area of regrowth.** Vegetation consists of a mosaic of low sparse *A. ancistrocarpa*, *A. acradenia* and *Petalostylis labicheoides* shrubland regrowth over low sparse *Triodia lanigera,* (*T. epactia*) hummock grassland. Regrowth currently constitutes low fauna habitat value but may provide higher value in future.	
Cleared	94.1 ha, 1.4 %	Cleared land for existing tracks/roads and previously cleared revegetated land. Low/negligible fauna habitat value.	
Total	**6,527.7 ha, 100%**		

4.3   Fauna Assemblage

The fauna surveys combined recorded a total of 175 fauna taxa from 60 families. The fauna diversity within each habitat type is summarised in **Table 16** and a full inventory of fauna taxa recorded during the field surveys is provided in **Appendix H**.

Table 16: Fauna diversity by habitat type

Fauna habitat	Amphibians	Birds	Mammals	Reptiles	Total
Plain (stony/gibber)	1	24	16	40	**81**
Plain (sand)	2	23	11	49	**85**
Granite Outcropping	-	9	2	6	**17**
Hills/Ranges/Plateaux	-	7	11	6	**24**
Rocky Escarpments/Ridges/Mesa	-	4	7	6	**17**
Drainage Line/River/Creek (major)	5	49	18	33	**105**
Drainage Line/River/Creek (minor)	1	8	12	26	**47**
Regrowth	-	-	-	-	**-**
Cleared	-	8	7	1	**16**

Mammals

A total of 20 native mammal taxa from nine families were recorded within the Survey Area, comprising 14 non-volant (non-flying) mammals and six volant mammals (bats). The most frequently recorded mammal taxa were the European Cattle (*Bos primigenius taurus*), Western Pebble-mound Mouse (*Pseudomys chapmani*), and Northern Quoll (*Dasyurus hallucatus*). The most diverse mammal families were Muridae (nine taxa), Dasyuridae (three taxa), and Vespertilionidae (three taxa).

Three significant mammals (Northern Quoll, Pilbara Leaf-nosed Bat, and Western Pebble-mound Mouse) (see Section 4.4.1) and five introduced mammals were recorded: European Cattle (*Bos primigenius taurus*), Dog/Dingo (*Canis familiaris*), Cat (*Felis catus*), Horse (*Equus caballus*), and House Mouse (*Mus musculus*).

Birds

A total of 68 native bird taxa from 33 families were recorded within the Survey Area. The most frequently recorded bird taxa were the Zebra Finch (*Taeniopygia castanotis*), Cockatiel (*Nymphicus hollandicus*) and Budgerigar (*Melopsittacus undulatus*). The most diverse bird families were Accipitridae (seven taxa), Meliphagidae (eight taxa) and Columbidae (six taxa).

One significant bird (Grey Falcon) (see Section 4.4.1) and no introduced birds were recorded.

Reptiles

A total of 77 native reptile taxa from 10 families were recorded within the Survey Area. The most frequently recorded reptile taxa were the Rock Ctenotus (*Ctenotus saxatilis*), Western Two-toed Slider (*Lerista bipes*), and Grand Ctenotus (*Ctenotus grandis*). The most diverse reptile families were Scincidae (31 taxa), Gekkonidae (10 taxa), and Varanidae (eight taxa).

No significant reptiles were recorded with certainty; however, one *Anilios* sp. individual could not be identified to species level (see Section 4.4.1). No introduced reptiles were recorded.

Amphibians

A total of five native amphibian taxa from three families were recorded within the Survey Area. The most frequently recorded amphibian taxa were Spencer's Burrowing Frog (*Platyplectrum spenceri*) and Little Red Tree Frog (*Litoria rubella*). The most diverse amphibian families were Limnodynastidae (two taxa) and Pelodryadidae (two taxa).

No significant amphibians and no introduced amphibians were recorded.

4.4 Significant Fauna

4.4.1 Recorded Within the Survey Area

Four significant fauna taxa were recorded within the Survey Area during the current surveys, with a potential fifth taxon that could not be identified to species level. These are listed below, with locations presented in **Map 10** and a list of records provided in **Appendix I**:

- Northern Quoll (*Dasyurus hallucatus*), listed as EN under the BC Act and EPBC Act, was recorded 99 times at nine locations during the field surveys. Spot analysis identified 14 individuals recorded by camera trap within Drainage Line/River/Creek (major), Hills/Ranges/Plateaux, Rocky, Escarpments/Ridges/Mesa, and Granite Outcrop habitats (**Figure 4** and **Figure 5**). One individual was recorded by accidental capture (small Elliott trap) in Drainage Line/River/Creek (major), and one scat was recorded.

- Grey Falcon (*Falco hypoleucos*), listed as VU under the BC Act and EPBC Act, was recorded once by sighting during the field survey within Drainage Line/River/Creek (major) habitat. The taxon was recorded flying over the Drainage Line/River/Creek (major) habitat heading north within the Survey Area.

- Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia* Pilbara form), listed as VU under the BC Act and EPBC Act, was recorded five times by ARU during the field surveys within Drainage Line/River/Creek (major) and Plain (sand).

- Western Pebble-mound Mouse (*Pseudomys chapmani*), listed as P4 by the DBCA, was recorded 24 times during the field surveys. All 24 records were of mounds in Hills/Ranges/Plateaux, Plain (stony/gibber), and Plain (sand) habitats (**Figure 6**).

- One *Anilios* sp. individual was recorded in the 2024 survey with scale counts that match *A. ganei*; however, its appearance was not consistent with *A. ganei*, therefore it could not be identified to species level (**Figure 7**).

Figure 4: **Northern Quoll (*Dasyurus hallucatus*) recorded by camera trap within Granite Outcrop during the 2022 survey.**

Figure 5: **Northern Quoll (*Dasyurus hallucatus*) recorded by camera trap within Rocky Escarpments/Ridges/Mesa during the 2024 survey.**

Figure 6: **Western Pebble-mound Mouse (*Pseudomys chapmani*) recorded within Hills/Ranges/Plateaux during the 2024 survey.**

Figure 7: ***Anilios* sp. captured within Plain (sand) habitat during the 2024 survey.**

4.4.2 Previously Recorded Within the Survey Area

One significant fauna taxon has been previously recorded within the Survey Area:

- Bilby (*Macrotis lagotis*), listed as Vulnerable under the BC Act and EPBC Act, was recorded four times within the Survey Area during previous surveys within the Plain (sand) and Plain (stony/gibber) habitats.

4.4.3 Potentially Occurring Within the Survey Area

Eight significant fauna taxa were assessed as having a high likelihood of occurring within the Survey Area:

- Ghost Bat (*Macroderma gigas*), listed as Vulnerable under the BC Act and EPBC Act.

- Pilbara Olive Python (*Liasis olivaceus barroni*), listed as Vulnerable under the BC Act and EPBC Act, was recorded once 260 m east of the Survey Area within Drainage Line/River/Creek (major) habitat that extends into the Survey Area (**Figure 8**).

- Oriental Plover (*Anarhynchus veredus*), listed as Migratory under the BC Act and as Marine and Migratory under the EPBC Act.

- Pacific Swift (*Apus pacificus*), listed as Migratory under the BC Act and as Marine and Migratory under the EPBC Act.

- Gane's Blind Snake (*Anilios ganei*), listed as Priority 1 by DBCA.

- Long-tailed Dunnart (*Antechinomys longicaudatus*), listed as Priority 4 by DBCA.

- Brush-tailed Mulgara (*Dasycercus blythi*), listed as Priority 4 by DBCA.

- Spectacled Hare-wallaby (*Lagorchestes conspicillatus*), listed as Priority 4 by DBCA.

Two significant fauna taxa were assessed as having a medium likelihood of occurring within the Survey Area:

- Peregrine Falcon (*Falco peregrinus*), listed as Other Specially protected under the BC Act.

- Common Sandpiper (*Actitis hypoleucos*), listed as Migratory under the BC Act and the EPBC Act.

The remaining 28 significant fauna taxa were assessed as having a low likelihood of occurring within the Survey Area. The complete results of the significant fauna likelihood of occurrence assessment, including justification for the assessment outcome for each taxon is provided in **Appendix J**.

Figure 8: **Pilbara Olive Python recorded 260 m east of the Survey Area in Drainage Line/River/Creek (major) habitat during the 2022 survey.**

4.5 Species Accumulation Curves

4.5.1 Birds

Analysis of the timed bird survey data was separated into the data from the 2022 survey and the data from the 2024 – 2025 survey. The 2022 Sobs curve produced is not approaching an asymptotic plateau (**Figure 9**). All richness estimators were greater than the Sobs curve, indicating that the observed species richness was lower than predicted by the analysis. The observed species richness for the Survey Area was 25, whereas estimated species richness ranged from 30 (boot) to 42 (jack2); therefore, approximately 60 to 83% of the theoretical maximum number of bird species was recorded during the field survey.

Bird records were relatively low during the survey, likely due to high daytime temperatures during the survey, which impacted the number of records used to estimate richness. Forty-six of the total 101 bird records were used, of which 17 were singletons and six were doubletons. The Chao estimate sees a spike in the richness estimate due to the small sample size and large number of singletons within the data.
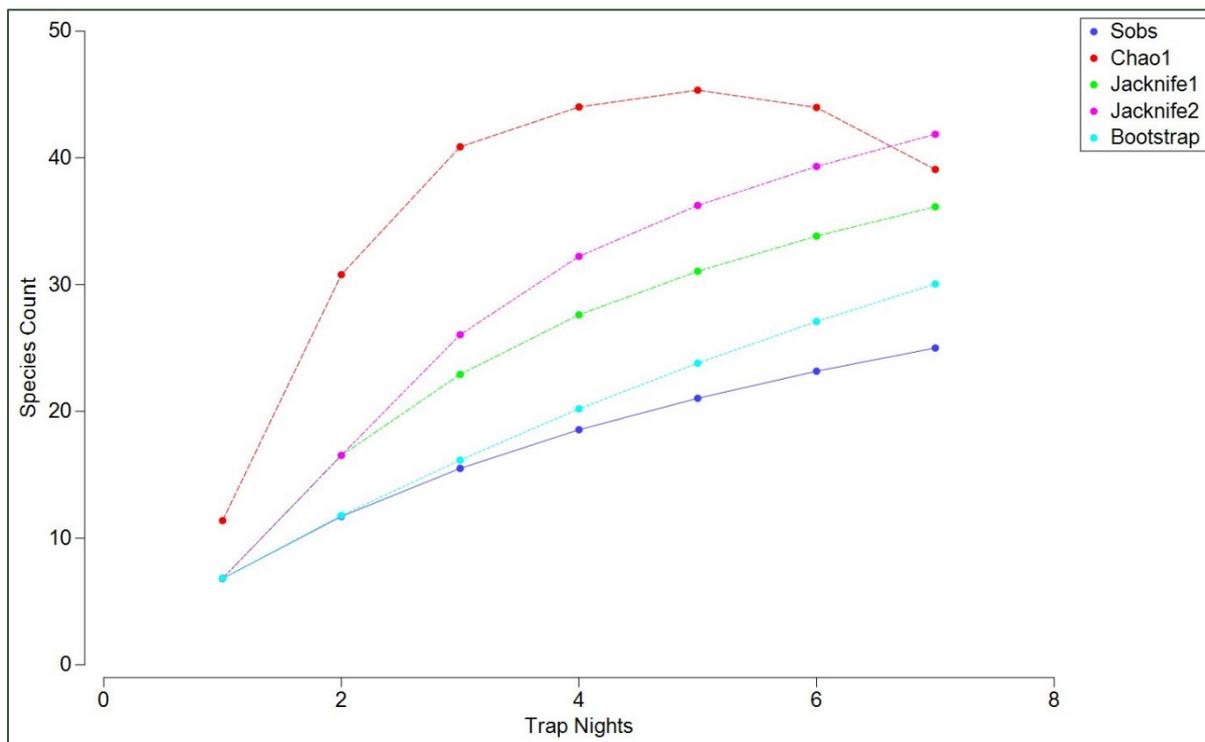
Figure 9: **2022 avian species accumulation curve**

The 2024 – 2025 Sobs curve produced is not approaching an asymptotic plateau (**Figure 10**). All richness estimators were greater than the Sobs curve, indicating that the observed species richness was lower than predicted by the analysis. The observed species richness for the Survey Area was 51, whereas estimated species richness ranged from 60 (boot) to 79 (jack2); therefore, approximately 65 to 85% of the theoretical maximum number of bird species was recorded during the field survey.

Bird records during the field survey were low, potentially due to the extremely high temperatures during the 2024 survey, particularly within the first seven days. The chao estimate was high until day ten due to large numbers of singletons recorded and the two-survey period occurring over two different seasons, thus incurring an influx of different species recorded from the varying climatic conditions of the Survey Area.
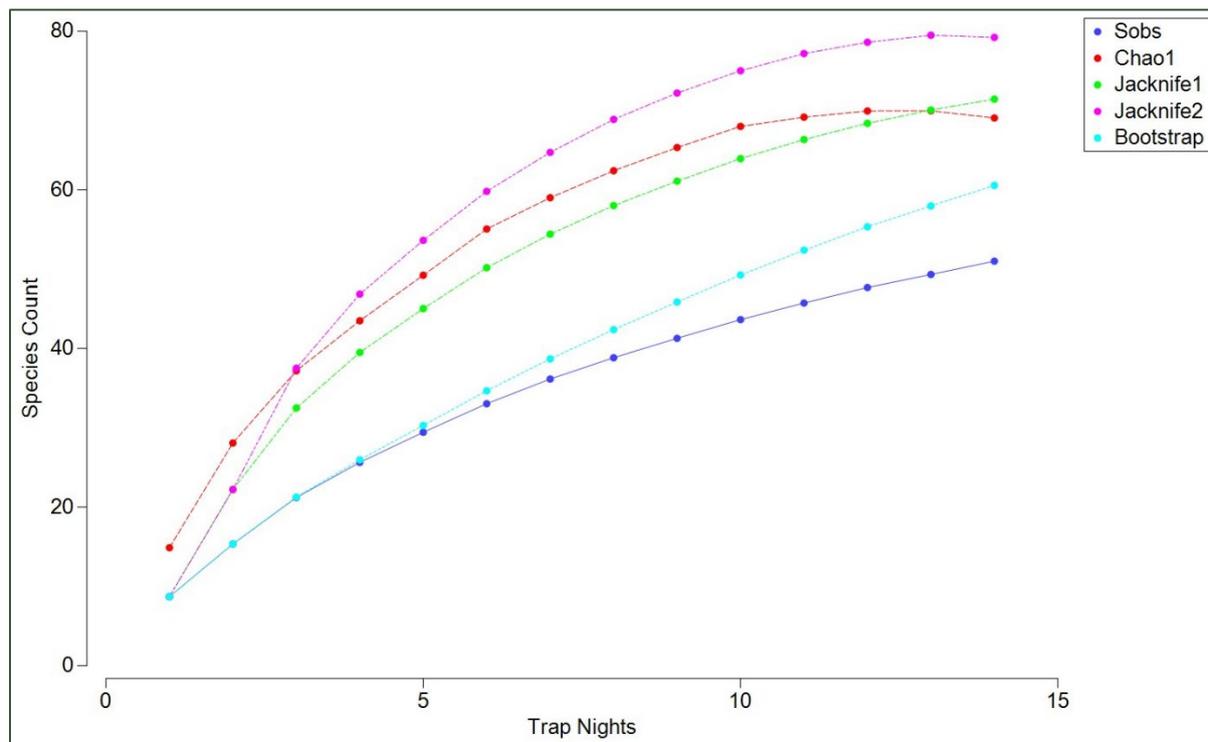
Figure 10: 2024 – 2025 avian species accumulation curve

4.5.2 Trap Sites

The number of records for all other species groups caught within the trap sites was relatively low and were combined to produce more accurate species accumulation plots. Analysis of the trap site data in 2022 produced a Sobs curve that is not approaching an asymptotic plateau (**Figure 11**). All richness estimators were greater than the Sobs curve, indicating that the observed species richness was lower than predicted by the analysis. The observed species richness for the Survey Area was 62, whereas estimated species richness ranged from 70 (boot) to 87 (jack2); therefore, approximately 71 to 89% of the theoretical maximum number of species were recorded during the field survey.

Records were relatively low during the survey, likely due to high daytime temperatures. This impacted the number of records used to estimate richness, as did the fact that only records located at trap sites (i.e. systematic replicated survey effort) were used. The initial high chao estimate due to multiple singletons quickly lowered over the course of the survey, with consistent species records over the seven-night trapping survey.
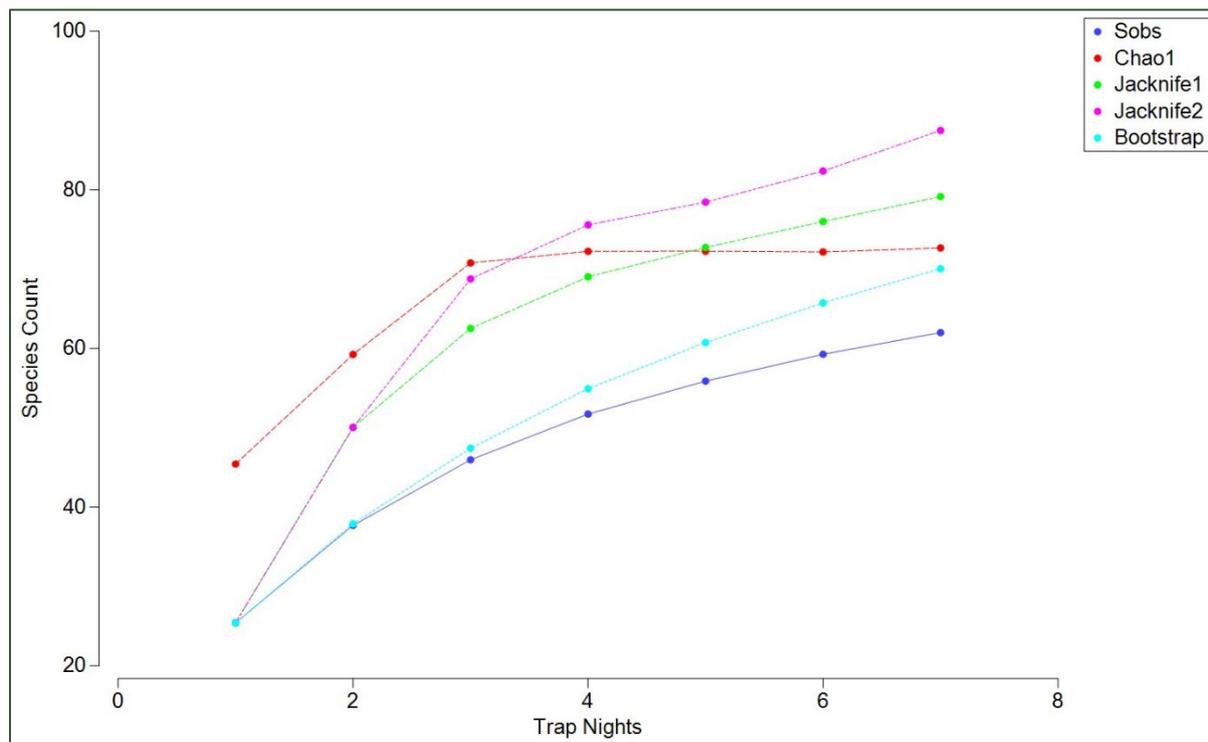
Figure 11: 2022 trap site species accumulation curve

Analysis of the trap site data in 2024 – 2025 produced a Sobs curve that is not approaching an asymptotic plateau (**Figure 12**). All richness estimators were greater than the Sobs curve, indicating that the observed species richness was lower than predicted by the analysis. The observed species richness for the Survey Area was 73, whereas estimated species richness ranged from 85 (boot) to 118 (jack2), therefore, approximately 62 to 86% of the theoretical maximum number of species were recorded during the field surveys.

Records were low over the 14 nights of trapping due to high temperatures during the 2024 survey and the first half of the 2025 survey. The chao estimate dropped off after night five as the number of singletons and doubletons became lower and repeat species were recorded more frequently.
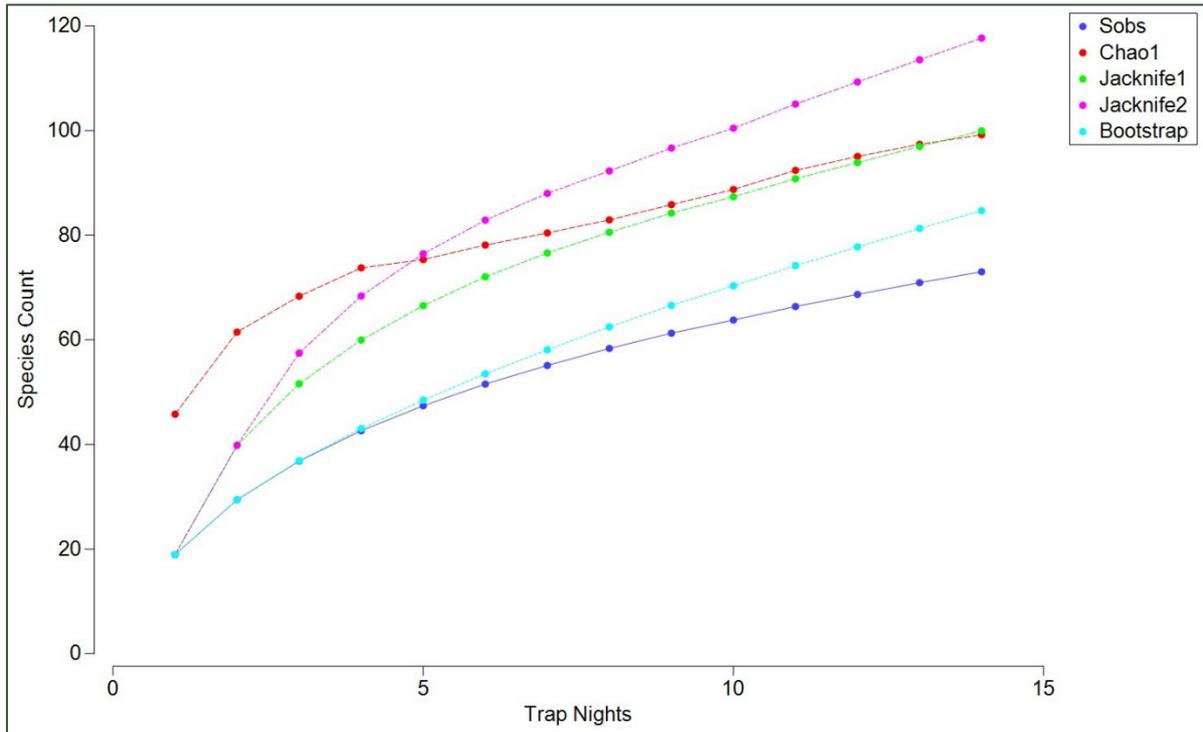
Figure 12: 2024 – 2025 trap site species accumulation curve

5.0 Discussion

5.1 Fauna Habitats and Assemblages

The seven fauna habitats (excluding highly modified habitats, including cleared areas and regrowth) identified within the Survey Area are typical of the Pilbara bioregion and consistent with habitats identified by previous studies in the region (**Appendix B**). Most habitats identified within the Survey Area extend outside the Survey Area to form larger ecosystems; however, Granite Outcrops and Rocky Escarpments/Ridges/Mesa are patchy and isolated from similar habitats outside the Survey Area. Most of the Survey Area is not important for regional connectivity because it occurs within an intact landscape that retains large areas of native vegetation, and fauna movement can occur outside the Survey Area. However, the Turner River is a river system that runs through the Survey Area and continues north to the coast. This habitat is important for regional connectivity as it is a movement corridor for many mammal and bird species.

The Drainage Line/River/Creek (major) habitats are of high value to several significant fauna taxa due to an abundance of microhabitats such as hollow-bearing trees, logs, leaf litter, and dense vegetation compared to other habitats within the Survey Area. Significant bird taxa such as Peregrine Falcons and Grey Falcons may find nesting opportunities in the *Eucalyptus* trees. Both the major and minor Drainage Line/River/Creek habitats are valuable for their role as ecological linkages through the landscape, as they provide continuous corridors of vegetation cover that allow fauna to traverse large distances. Significant taxa such as the Northern Quoll, Bilby and Pilbara Olive Python are likely to use these habitats for dispersal, and Pilbara Leaf-nosed Bat and Ghost Bat will utilise these habitats for hunting and dispersal. These habitats may also occasionally be inundated, providing a temporary water source for fauna species. The Drainage Line/River/Creek (major and minor) were found to have high species diversity across all vertebrate fauna classes, with particularly high bird diversity in Drainage Line/River/Creek (major) habitat, suggesting that these habitats provide high value for the overall fauna assemblage within the Survey Area.

Granite Outcrops and Rocky Escarpments/Ridges/mesas contain numerous crevices, cavities, and overhangs that provide excellent refuge for a wide variety of small fauna taxa, particularly reptiles and small mammals. These habitats may occasionally hold water following rainfall events, providing a water source for significant species such as Pilbara Olive Python and Northern Quoll, as well as the wider fauna assemblage. Large areas of the Granite Outcrop habitat were recently burnt during the 2022 survey; therefore, the habitat value was impacted by low vegetation and leaf litter, which potentially resulted in reduced food and shelter availability and low fauna detection rates. This disturbance is expected to be temporary, and regeneration will occur. Aerial imagery indicates that Granite Outcrops and Rocky Escarpments/Ridges/Mesa habitats are relatively abundant in the surrounding region; however, they are typically patchy and lacking in continuity. Recorded species diversity within these habitats was low compared with other habitats; however, this is likely due to survey effort rather than an actual reflection of low diversity, as it was often not possible to install pitfall traps in rocky substrate, and only one trap site was installed at the base of Granite Outcropping during the 2022 survey.

The Hills/Ranges/Plateaux, Plain (stony/gibber), and Plain (sand) habitats contain fewer microhabitats and shelter opportunities than the habitats discussed above and are widespread and abundant across the surrounding landscape. The Hills/Ranges/Plateaux and Plain (stony/gibber) habitats provide similar habitat values and constitute suitable habitat for the Western Pebble-mound Mouse.

The Plain (sand) habitat provides habitat for burrowing fauna taxa. The Plain (sand) and Plain (stony/gibber) habitats were found to have high species diversity; however, this may be due to their large extents within the Survey Area. Survey effort within these habitats will be higher than in habitats with small extents simply by virtue of traversing the Survey Area. The Hills/Ranges/Plateaux habitat was found to have low species diversity; however, survey effort was limited because only one trap site was able to be installed within the rocky/stony substrate.

5.2 Significant Fauna

5.2.1 Recorded Within the Survey Area

Northern Quoll (*Dasyurus hallucatus*) – EN (BC Act; EPBC Act)

The range of the Northern Quoll has reduced across northern Australia since the introduction of the cane toad, and it now occurs as several disjunct populations (Baker & Gynther, 2023). The Pilbara region is considered the last stronghold for the Northern Quoll as it is currently uninhabited by Cane Toads (Dunlop et al., 2024). The Northern Quoll can be locally common and is found in dissected rocky escarpments, utilising a variety of den sites, including rock crevices, tree hollows, logs, and termite mounds (Baker & Gynther, 2023). An important distinction noted between Northern Quolls in the Pilbara compared with those in areas further north is that the breeding season for Pilbara Northern Quolls tends to occur 1-3 months later, with pouch young first appearing in August and being carried till end of October (Dunlop et al., 2024). The Northern Quoll has a relatively large home-range size of up to 500 ha for males (~25 ha for females). Nocturnal foraging requires long-distance movements with a female travelling up to 2.8 km and a male travelling up to 5 km during a single night's activities (Henderson, 2015; Oakwood, 2002).

During 2022, two individual Northern Quolls were detected at sites NS-TRA-06 and NS-TRA-07 by camera trap, the images at both trap sites were less than 24 hours apart with the trap sites separated by more than 15 km of connective habitat to allow movement between the trap sites, confirming two separate individuals. A third individual was recorded during spotlighting at site NS-TRA-07; however, this may be the same individual that was recorded by the camera trap. During 2024 – 2025, analysis of the spot patterns recorded in camera trap photos identified 12 individuals. Northern Quoll were recorded from Drainage Line/River/Creek (major), Hills/Ranges/Plateaux, Rocky Escarpments/Ridges/Mesa, and Granite Outcrop habitats within the Survey Area. The Rocky Escarpments/Ridges/Mesa and Granite Outcrop habitats constitute critical habitat for the Northern Quoll for their denning values, and the Drainage Line/River/Creek (major and minor) constitute supporting habitat as they may be used for foraging and dispersal.

Grey Falcon (*Falco hypoleucos*) – VU (BC Act; EPBC Act)

The Grey Falcon is an elusive and endemic bird of the arid interior (Schoenjahn, Pavey and Walter, 2019). It is distributed sparsely over Australia's arid and semi-arid zones and is rarely encountered (Menkhorst et al., 2019; BirdLife International, 2016). The Grey Falcon is restricted largely to areas of the highest annual average temperatures where there is average annual rainfall of less than 500 mm. It favours lightly timbered and untimbered lowland plains that are crossed by tree-lined watercourses, but frequents other habitats, including grassland and sand dune habitats (Johnstone and Storr, 1998; BirdLife International, 2016).

A Grey Falcon was recorded within Drainage Line/River/Creek (major) habitat within the Survey Area. A pair was also recorded in the Spectrum (2024) survey 4 km southwest of the Survey Area. Drainage Line/River/Creek (major) habitat is considered to be critical habitat for this species due to its potential to be used for nesting. All remaining habitats within the Survey Area are considered to be supporting habitats used for foraging.

Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia* Pilbara form) – VU (BC Act; EPBC Act)

The Pilbara Leaf-nosed Bat was originally considered to be the same species as the Orange Leaf-nosed Bat, which occurs in the Kimberley region, Northern Territory, and northwest Queensland. It is now considered to be a separate form based on morphology; however, formal reclassification has not yet been undertaken (Cramer *et al.*, 2016). The taxon is restricted to areas with suitable day roosts, which are typically deep caves that retain humidity or disused underground mines (Cramer *et al.*, 2016).

The Pilbara Leaf-nosed Bat was recorded within Drainage Line/River/Creek (major) and Plain (sand) habitats within the Survey Area during 2022, 2024, and 2025. All habitats within the Survey Area are considered to be supporting habitat (foraging); however, the Drainage Line/River/Creek (major) and Drainage Line/River/Creek (minor) habitats are most likely to be utilised. Granite Outcrops and Rocky Escarpments/Ridges/Mesa habitats constitute potential roosting habitat; however, no suitable roost caves were recorded within the Survey Area. Call numbers were low, and their timing suggests that the Survey Area is not in close proximity to a roost site (R. Bullen pers. comm. 2022; 2025), therefore, no critical habitat is considered to occur in the Survey Area.

Western Pebble-mound Mouse (*Pseudomys chapmani*) – P4 (DBCA)

The Western Pebble-mound Mouse is endemic to the Pilbara, where it builds pebble mounds from small stones. These pebble mounds typically cover areas from 0.5 – 9.0 m^2 and are characteristic of this species. Pebble mounds are restricted to areas with suitable-class stones and are usually found on gentle slopes and spurs that are often vegetated by hard spinifex (Baker & Gynther, 2023; Ford & Johnson, 2007). Active mounds are characterised by the conical shape of the mound with clear, distinct entrance holes (Anstee, 1996). Pebble mounds constructed by the Western Pebble-mound Mouse are found throughout the Pilbara; however, studies have shown that not all mounds in an area are occupied by a Pebble-mound Mouse at any one time (Anstee, 1996).

Western Pebble-mound Mouse mounds were recorded within Plain (stony/gibber), Plain (sand), and Hills/Ranges/Plateaux habitats within the Survey Area. The Plain (stony/gibber) and Hills/Ranges/Plateaux habitats constitute critical habitat for the Western Pebble-mound Mouse because they provide suitably sized pebbles for the construction of mounds. Of these mounds, four were recorded as active with conical openings and signs of recent activity around the mound. The Western Pebble-mound Mouse is likely to be resident within the Survey Area.

5.2.2 Previously Recorded Within the Survey Area

Bilby (*Macrotis lagotis*) – VU (BC Act; EPBC Act)

The Bilby is a solitary and nocturnal type of bandicoot, characterised by its distinct rabbit-like ears and long face with a pointed snout (DBCA, 2017a). The range of the Bilby has declined northwards, with wild subpopulations now restricted predominantly to the Tanami Desert in the Northern Territory and the Gibson, Little Sandy and Great Sandy Deserts, as well as parts of the Pilbara region in Western Australia (DBCA, 2017a; Southgate, 1990). The Bilby is described as occupying a wide range of vegetation types, including open tussock grassland on upland hills, Mulga woodland/shrubland growing on ridges and rises and

spinifex growing on sandplains and dunes, drainage systems, salt lake systems, and other alluvial areas (DBCA, 2017a; Pavey, 2006).

Although the Bilby was not recorded during the current survey, they have been previously recorded within the Survey Area in 2001 and 2019 (DBCA, 2022). Known Bilby populations occur 2.1 km west of the southern Survey Area polygons at FMG Junction Camp and 2.2 km east of the southern Survey Area polygons at Iron Bridge Airport. The Plain (sand) and Drainage Line/River/Creek (major and minor) habitats constitute critical habitat for the taxon as they provide suitable soils for this species to dig burrows and for foraging.

The Plain (stony/gibber) habitats are likely to be used for foraging and dispersal and constitute supporting habitat. There is habitat connectivity between the Survey Area and these known populations; therefore, it is likely that the taxon is present within the Survey Area.

5.2.3 High Likelihood of Occurrence Within the Survey Area

Ghost Bat (*Macroderma gigas*) – VU (BC Act; EPBC Act)

The Ghost Bat is patchily distributed in small colonies in three areas of northern Australia, including the Pilbara and Kimberley in WA, the Northern Territory, and the northeast of QLD. The species requires undisturbed roost caves or mineshafts, usually complex systems with several openings (Baker & Gynther, 2023). The species eats large insects, geckoes, frogs, small birds, and mammals, including other bats. The kills are made on the ground or in the air and then taken to a feeding perch, which is usually a rocky overhang or small cave (Baker & Gynther, 2023).

Ghost Bats were not recorded during the current survey; however, they have been recorded within the Desktop Study Area and are likely to occur within the Survey Area. This species can be difficult to detect as it does not call when hunting; therefore, ARUs typically need to be deployed within close proximity to roost sites to detect this species (Bat Call WA, 2015). All habitats within the Survey Area can be considered supporting habitat as they may be used for hunting. Granite Outcrops and Rocky Escarpments/Ridges/mesas constitute potential roosting habitat; however, no suitable roost caves were recorded within the Survey Area.

Pilbara Olive Python (*Liasis olivaceus barroni*) – VU (BC Act; EPBC Act)

The Pilbara Olive Python occurs in the ranges of the Pilbara, typically in escarpments and gorges where water is present. It generally shelters under rock piles or under spinifex and often basks on top of rocks (Wilson and Swan, 2023). This large python is threatened due to its relatively small distribution, low population densities and may be affected by habitat disturbance such as grazing and fire. This species is known to frequent water bodies where it ambushes prey (Pearson, 1993). During a systematic survey of a large series of quadrats in the Pilbara, the Pilbara Olive Python was only recorded in one quadrat (Doughty *et al*., 2011). This species is extremely cryptic given its method of hunting and nocturnality.

Pilbara Olive Python was recorded 260 m east of the Survey Area in 2022 in a rocky pool within Drainage Line/River/Creek (major) habitat that continues into the Survey Area. Within the Survey Area, the Drainage Line/River/Creek (major and minor) and Granite Outcrop habitats constitute supporting habitat for the Pilbara Olive Python as they provide opportunities for shelter and hunting while moving between critical habitats when the weather allows.

Oriental Plover (*Anarhynchus veredus*) – MI (BC Act); MI, MA (EPBC Act)

The Oriental Plover typically prefers grasslands and thinly vegetated plains, and open areas such as recently burnt country and heavily grazed pastures. During the hottest times of the day, large flocks can be found in areas of wet ground associated with wetlands (Menkhorst et al., 2019). As this species breeds in China and Mongolia, habitats within the Survey Area would only be used as supporting habitat (foraging)**.**

Oriental Plover has been recorded within the Desktop Study Area and may use the Plain (sand), Plain (stony/gibber), and Drainage Line/River/Creek (major and minor) habitats within the Survey Area. If present, the taxon is likely to be transient and will typically only occur within the Survey Area between September and March.

Pacific Swift (*Apus pacificus*) – MI (BC Act); MI, MA (EPBC Act)

The Pacific Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. The Pacific Swift occupies a large airspace range (i.e. low to very high) over varied habitats, ranging from rainforests to semi-deserts (Morcombe, 2003).

The Pacific Swift has been recorded within the Desktop Study Area and may occur within the Survey Area. The taxon will not be reliant on terrestrial habitats within the Survey Area, though may use airspace above the Survey Area.

Gane's Blind Snake (*Anilios ganei*) – P1 (DBCA)

Gane's Blind Snake, like other blind snakes, is a burrowing, worm-like snake that feeds mostly on the larvae and pupae of ants and termites (Cogger, 2018). It is known from widely separated areas between Newman and Pannawonica, WA and is possibly associated with moist gorges and gullies (Wilson and Swan, 2023) .

Gane's Blind Snake has been recorded within the Desktop Study Area and is likely to occur within the Survey Area; however, no individuals were recorded with certainty during the field surveys. During the 2024 survey, an *Anilios* sp. individual was recorded with scale counts (midbody scales = 24) that matched *A. ganei*; however, its nasal cleft and body colouration was a closer match to *A. ammodytes*. The individual also had white banding along the body (**table 7**) which was not consistent with either species and therefore could not be identified to species level. Within the Survey Area Gane's Blind Snake is likely to inhabit Drainage Line/River/Creek (major and minor). It may also occur in areas of Plain (sand) habitat, particularly near Drainage Line/River/Creek areas where the sand will retain high moisture content.

Long-tailed Dunnart (*Antechinomys longicaudatus*) – P4 (DBCA)

The Long-tailed Dunnart is a nocturnal marsupial that is endemic to Australia, typically found in rocky areas of central Western Australia and central southern Northern Territory (Burbidge, McKenzie and Fuller, 1983; McKenzie, Woinarski and Burbidge, 2016a). This species favours rocky scree and plateau areas, generally with little vegetation or of spinifex hummock grassland, shrubs, and open woodland (McKenzie, Woinarski and Burbidge, 2016b).

Long-tailed Dunnart has been recorded within the Desktop Study Area and is likely to occur within the Plain (stony/gibber), Hils/Ranges/Plateaux, Rocky Escarpments/Ridges/Mesa, and Granite Outcrop habitats. These constitute suitable habitats for the Long-tailed Dunnart because of their value for shelter, breeding, and foraging.

Brush-tailed Mulgara (*Dasycercus blythi*) – P4 (DBCA)

The Brush-tailed Mulgara is distributed widely across inland Australia with a population that fluctuates somewhat in response to seasonal conditions, although is probably substantially greater than 10,000 individuals even at its lowest point (Woinarski, Burbidge and Harrison, 2012).

Brush-tailed Mulgara habitat is bounded broadly by the Tanami Desert in the north, the Simpson Desert in the east, the Great Victoria Desert in the south and the Carnarvon, Murchison and Pilbara IBRA regions in the west (Woinarski, Burbidge and Harrison, 2012). It is associated with hummock spinifex grasslands, but also uses other vegetation types (often sandplains, grasslands and woodlands) when mixed with or adjacent to hummock grassland (Baker & Gynther, 2023). It is mainly nocturnal and shelters during the day in burrow systems. Brush-tailed Mulgara burrows typically contain between two and nine entrances, tunnels are mostly on a single level and to a depth of about 300 mm (Thompson and Thompson, 2007). The diet of the Brush-tailed Mulgara comprises a broad range of invertebrates and small vertebrates (Baker & Gynther, 2023).

The Brush-tailed Mulgara was recorded with a Plain (sand) habitat by Spectrum (2024) 900 m from the southernmost Survey Area polygon and is likely to occur within the Plain (sand) habitat, which constitutes suitable habitat for this species.

Spectacled Hare-wallaby (*Lagorchestes conspicillatus*) – P4 (DBCA)

The Spectacled Hare-wallaby primarily inhabits tussock and hummock grasslands, where it spends the daytime in tunnels below hummocks (Menkhorst and Knight, 2010). In the Pilbara region, the taxon has declined dramatically. This may be due to a combination of fox predation and the loss of large spinifex hummocks due to frequent burning (Baker & Gynther, 2023).

The Spectacled Hare-wallaby has been recorded within the Desktop Study Area and is likely to occur within unburnt areas of the Survey Area. Within the Survey Area, the Plain (stony/gibber) and Plain (sand) habitats constitute suitable habitat for the Spectacled Hare-Wallaby.

5.2.4 Medium Likelihood of Occurrence Within the Survey Area

Peregrine Falcon (*Falco peregrinus*) – OS (DBCA)

The Peregrine Falcon is an uncommon but wide-ranging bird across Australia (Barrett *et al.*, 2003). It occurs mainly along rivers and ranges as well as wooded watercourses and lakes. It nests primarily on cliffs, granite outcrops and quarries, although it is also known to occupy existing raptor and corvid stick nests (Menkhorst et al., 2019). The diet of the Peregrine Falcon has been well studied and primarily includes flocking species such as parrots, pigeons and on the east coast, European Starlings (Olsen and Fuentes, 2008).

The Peregrine Falcon has been recorded within the Desktop Study Area and may use all habitats within the Survey Area for hunting (supporting habitat). The Drainage Line/River/Creek (major) and Rocky Escarpments/Ridges/Mesa habitats have the potential to be used for nesting (critical habitat).

Common Sandpiper (*Actitis hypoleucos*) – MI (BC Act); MI, MA (EPBC Act)

The Common Sandpiper is typically carnivorous, feeding on molluscs, crustaceans, and a variety of insects. It is a migratory species that uses varied coastal and interior wetlands, including narrow muddy edges of billabongs, river pools, mangroves, among rocks and snags, reefs, or rocky beaches (Morcombe, 2003). It migrates from the mid-northern

latitudes of Asia (Menkhorst et al., 2019) and has a broad breeding distribution from western Europe to eastern Russia (Pizzey and Knight, 2001; Bamford *et al.*, 2008).

Common Sandpiper has been recorded within the Desktop Study Area and may utilise the Drainage Line/River/Creek (major and minor) habitat within the Survey Area for foraging. If present, this species is likely to be transient and will typically only occur within the Survey Area between September and March.

6.0 Conclusion

Seven fauna habitats (excluding highly modified habitats, including cleared areas and regrowth) were mapped within the Survey Area:

- Plain (sand)
- Plain (stony/gibber)
- Drainage Line/River/Creek (major)
- Drainage Line/River/Creek (minor)
- Hills/Ranges/Plateaux
- Rocky Escarpments/Ridges/Mesa
- Granite Outcrop

These habitats are consistent with habitats and assemblages identified by previous studies in the region. Most habitats identified within the Survey Area extend outside the Survey Area to form larger ecosystems; however, Granite Outcrops and Rocky Escarpments/Ridges/ Mesa habitats are patchy and lack connectivity to similar habitats outside the Survey Area. The Drainage Line/River/Creek (major and minor) habitats are likely to provide important dispersal corridors across the landscape.

A total of 175 fauna taxa from 60 families were recorded, comprising five amphibian taxa, 68 bird taxa, 25 mammal taxa, and 77 reptile taxa. Four significant fauna taxa were recorded within the Survey Area during the current surveys, with a potential fifth taxon that could not be identified to species level:

- Northern Quoll (*Dasyurus hallucatus*), listed as Endangered under the BC Act and EPBC Act.
- Grey Falcon (*Falco hypoleucos*), listed as Vulnerable under the BC Act and EPBC Act.
- Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia* Pilbara form), listed as Vulnerable under the BC Act and EPBC Act.
- Western Pebble-mound Mouse (*Pseudomys chapmani*), listed as Priority 4 by DBCA.
- An *Anilios* sp. individual with scale counts that match *A.*ganei, listed as Priority 1 by DBCA, was recorded during the 2024 survey, however its appearance was not consistent with *A. ganei* therefore it could not be identified to species level.

One significant fauna taxon has been previously recorded within the Survey Area but was not recorded during the current survey, Bilby (*Macrotis lagotis*), listed as Vulnerable under the BC Act and EPBC Act.

Eight significant fauna taxa were assessed as having a high likelihood of occurring within the Survey Area:

- Ghost Bat (*Macroderma gigas*), listed as Vulnerable under the BC Act and EPBC Act.

- Pilbara Olive Python (*Liasis olivaceus barroni*), listed as Vulnerable under the BC Act and EPBC Act.

- Oriental Plover (*Anarhynchus veredus*), listed as Migratory under the BC Act and Migratory and Marine under the EPBC Act.

- Pacific Swift (*Apus pacificus*), listed as Migratory under the BC Act and Migratory and Marine under the EPBC Act.

- Gane's Blind Snake (*Anilios ganei*), listed as Priority 1 by DBCA.

- Long-tailed Dunnart (*Antechinomys longicaudatus*), listed as Priority 4 by DBCA.

- Brush-tailed Mulgara (*Dasycercus blythi*), listed as Priority 4 by DBCA.

- Spectacled Hare-wallaby (*Lagorchestes conspicillatus*), listed as Priority 4 by DBCA.

Two significant fauna taxa were assessed as having a medium likelihood of occurring within the Survey Area, Peregrine Falcon (*Falco peregrinus*), listed as Other Specially protected under the BC Act and Common Sandpiper (*Actitis hypoleucos*), listed as Migratory under the BC Act and Migratory and Marine under the EPBC Act. The remaining 28 significant fauna taxa were assessed as having a low likelihood of occurring within the Survey Area.

Five introduced taxa were recorded during the survey, European Cattle (*Bos primigenius taurus*), Dog/Dingo (*Canis familiaris*), Cat (*Felis catus*), Horse (*Equus caballus*) and House Mouse (*Mus musculus*).

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