MULGA DOWNS

HIBISCUS SP. MULGA DOWNS (S. HITCHCOCK SH 638) TARGETED FLORA SURVEY

PREPARED FOR: HANROY IRON ORE PROJECTS PTY LTD

Spectrum ECOLOGY & SPATIAL

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Report Details			
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Prepared For:	HanRoy Iron Ore Projects Pty Ltd		
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Version History	Author	Reviewer	Date of Issue
V1 Draft	Eva Karikis Emma Marsh	Scott Hitchcock Zane Gates	25-08-2025
V2	Eva Karikis Emma Marsh	Scott Hitchcock	27-08-2025

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EXECUTIVE SUMMARY

Hancock Prospecting Pty Ltd proposes to develop the Mulga Downs Iron Ore Mine located 210 kilometres (km) south of Port Hedland and 180 km north-west of Newman in the Pilbara Region of Western Australia. Approvals for the Proposal are being managed by HanRoy Iron Ore Pty Ltd (HanRoy). During flora and vegetation surveys carried out to support environmental assessments for the project, an undescribed flora species, *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1), was recorded amongst Mulga vegetation types on the stony plains of the project area within the Jamindie land system. This species is only known from the Jamindie land system at Mulga Downs. Thus, HanRoy approached Spectrum Ecology and Spatial to undertake a targeted survey for the Priority 1 (P1) flora taxon, *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638), over mapped occurrences of the Jamindie land system to mitigate the potential removal of plants as part of the project.

The targeted flora survey was undertaken by four botanists for a total of 40 person-days between 15 to 24 July 2025 after a period of sub-optimal (dry) rainfall conditions. A total of 5.7 mm of rainfall was recorded in the three months prior to the survey (15 April to 15 July 2025), 33.3 mm lower than the median of the long-term total rainfall (39.0 mm) for the same period. The field survey, comprised of 529.38 km of traverses in regions considered most likely to contain populations *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) in Survey Area, based on background information provided in a desktop assessment undertaken prior to the survey.

Hibiscus sp. Mulga Downs (S. Hitchcock SH 638; P1) was recorded on flat hardpan plains, with red clay-loam over ironstone within Banded Mulga formations in the Survey Area. Based on guidelines for determining discrete populations, there were six separate populations recorded within the Survey Area, with two of these populations considered 'new'. In addition, there are four known populations outside of the Survey Area. A total of 2,485 individuals of *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) were recorded during the survey from 524 locations. A grand total of 3,912 individuals of *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) have now been recorded with 1,427 individuals recorded previously outside of the current Survey Area. *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) appears to be restricted to the Jamindie land system within sheet flow dependent vegetation.

1. INTRODUCTION

1.1. Project Background

Hancock Prospecting Pty Ltd (HPPL) proposes to develop the Mulga Downs Iron Ore Mine (project area) located 210 kilometres (km) south of Port Hedland and 180 km north-west of Newman in the Pilbara Region of Western Australia (WA). The Proposal is currently being assessed by the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986* (EP Act) and Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Approvals for the Proposal are being managed by HanRoy Iron Ore Pty Ltd (HanRoy).

During flora and vegetation surveys carried out to support environmental assessments for the project, an undescribed flora species, *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1), was recorded from Mulga vegetation types (VTs) on the stony plains of the project area. To date, 1,427 individuals have been recorded from within the development envelope and 622 of these occur in the Indicative Footprint and could potentially be removed. This species is only known from the Jamindie land system at Mulga Downs.

1.2. Project Scope

HanRoy approached Spectrum Ecology and Spatial (Spectrum) to undertake a targeted *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) survey over mapped occurrences of the Jamindie land system, away from the project area (hereby known as the Survey Area), to mitigate the potential removal of plants as part of the project. The Survey Area covers 41,601.95 hectares (ha) of the Jamindie land system and is presented in Map 1.1.

1.3. Legislation & Guidelines

The assessment was carried out in accordance with relevant legislative requirements as well as any procedures or guides provided by HanRoy.

Flora in Western Australia are protected by various legislation, including:

- *Biodiversity Conservation Act 2016*;
- *Environmental Protection Act 1986*; and
- *Environment Protection and Biodiversity Conservation Act 1999*.

The assessment is compliant with guidelines, as outlined in:

- EPA Environmental Factor Guideline: Flora and Vegetation (EPA, 2016a);
- EPA Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b);
- Department of Biodiversity Conservation, and Attractions (DBCA) Threatened and Priority Flora Report Form – Field Manual (DBCA, 2021);
- National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual (ESCAVI, 2003).

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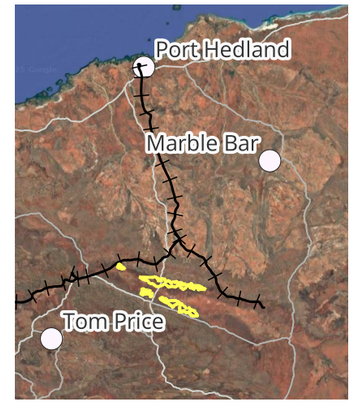
Legend

- Survey Area
- Main Pilbara Towns
- Roads



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Scale 1:409,469 @ A3

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Units: Metre

Spectrum ECOLOGY • SPATIAL

Author: EM

Date: 27-08-2025

Survey Area Overview

Hibiscus sp. Mulga Downs (S. Hitchcock SH 638) Targeted Flora Survey

MAP

Prepared for
Hanroy Iron Ore

1.1

1.4. Bioregion

The Interim Biogeographic Regionalisation for Australia (IBRA) classified Australia into regions based on the dominant landscape, climate, lithology, geology, landform, and vegetation (Thackway and Cresswell, 1995b).

The Survey Area is located in the Pilbara IBRA bioregion which is divided into four subregions: Chichester, Fortescue Plains, Hamersley, and Roebourne. The Survey Area is located in the Fortescue Plains subregion (Figure 1.1).

The Fortescue subregion is between the Chichester and the southern section of the Pilbara Craton, a mountainous area of sedimentary ranges and plateaus dissected by gorges. The Fortescue subregion is defined as areas of alluvial plains and river frontage with extensive salt marshes, mulga-bunch grass, and short grass communities on alluvial plains in the east. Deeply incised gorge systems in the western (lower) part of the drainage with river gum woodlands fringing the drainage lines. An extensive calcrete aquifer (originating within a paleo-drainage valley) feeds numerous permanent springs in the central Fortescue, supporting large permanent wetlands with extensive stands of river gum and cadjeput Melaleuca woodlands (Kendrick, 2001).

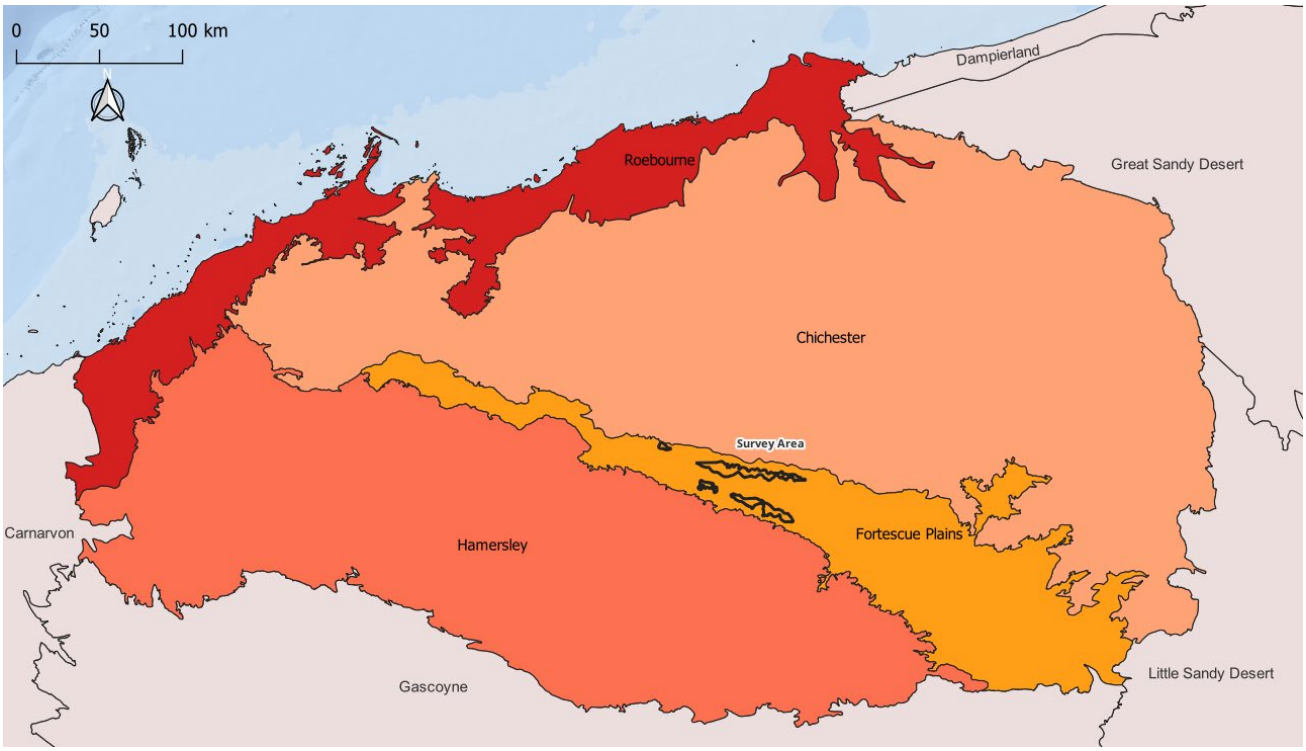

Figure 1.1: IBRA Classification

1.5. Climate

The climate of the Pilbara bioregion is classified as tropical, arid to semi-arid, with a median annual rainfall of 300 millimetres (mm). Rainfall for the region can be variable, falling mainly in summer cyclonic events from December to February (Thackway and Cresswell, 1995b).

Two broad climatic zones occur across the Pilbara region. Semi-desert tropical climatic conditions occur in coastal areas, as well as some higher-rainfall inland areas, which experience 9-11 months of dry weather, with hot humid summers and warm winters. Dry desert climatic conditions occur across the remaining inland areas, which typically experience higher temperatures and lower rainfall, with hot dry summers and mild winters with up to 12 months of dry weather (Leighton, 2004).

Annual rainfall is highly variable but generally follows an inland to coastal and southern to northern increasing trend (Leighton, 2004). The driest months are in spring (September to October) with tropical cyclones and local thunderstorms producing much of the summer and early autumn rainfall (Mckenzie, Van Leeuwen and Pinder, 2009). Winter rainfall is also highly variable, generally decreasing from the coast through to inland areas (Leighton, 2004).

Monthly maximum temperatures in the Pilbara region range from an average of 25°C in July to 37°C in January, while minimum temperatures range between 12°C in July and 25°C in January (Mckenzie, Van Leeuwen and Pinder, 2009). According to the Köppen-Geiger climate classification, the Survey Area has a hot desert climate (Peel, Finlayson and McMahon, 2007). This classification includes arid regions where annual evaporation exceeds annual precipitation and has a mean annual temperature ≥18°C.

1.6. Surface Geology

The surface geology of WA has been mapped at a scale of 1:50,000, 1:100,000, 1:250,000, and 1:500,000. The Survey Area occurs in the central west of the 1:500,000 scale geological mapping (DMIRS, 2020).

At the 1:500,000 scale, nine geological units were mapped in the Survey Area. Sheetwash unit, W-PIP covers the majority of the Survey Area at 84.21%. Units A-PIP (7.34%), Rr-fh-PIP (2.85%), Ac-PIP (2.48%), C-PIP (1.75%), C-f-PIP (0.80%), X-PIP (0.57%), R-f-PIP (<0.01%), and Rr-z-PIP (0.01%) made up the remainder of the Survey Area.

Units Rr-fh-PIP (4.62%) and W-PIP (2.92%) have the highest portion of their total extent within the Survey Area, with the remaining units having less than 0.6% of their total extent in the Survey Area. However, none of the units appear restricted in extent within the Survey Area. These units are listed in Table 1.1 and mapped on Map 1.2.

Table 1.1: Surface Geology

Unit Code	Landform	Description	Area in Survey Area (ha)	% of Survey Area	Total WA Extent (ha)	Total Pilbara Extent (ha)	% of Pilbara Extent in Survey Area
1:500,000 scale geological mapping							
A-PIP	Alluvial/fluvial unit	Clay, silt, sand, and gravel in channels and on floodplains.	3,051.64	7.34	2,147,172.46	689,834.70	0.44
Ac-PIP	Alluvial/fluvial unit	Clay, silt, sand, and gravel in fluvial channels.	1,032.38	2.48	798,803.74	646,611.45	0.16
C-PIP	Colluvial unit	Colluvium derived from different rock types; includes gravel, sand, silt and clay.	728.97	1.75	2,737,565.18	1,218,679.94	0.06
C-f-PIP	Colluvial unit	Ferruginous clay, silt, sand and gravel in colluvial deposits; locally reworked ferruginous duricrust.	332.67	0.80	602,168.26	149,610.89	0.22
R-f-PIP	Residual or relict unit	Residual or relict ferruginous materials; ferruginous and ferruginized saprolite; ferruginous duricrust; also includes transported material; cemented or uncemented ferruginous gravel.	1.92	<0.01	303,897.23	45,936.06	<0.01
Rr-fh-PIP	Residual or relict unit	Hematitic duricrust, massive to rubbly; includes iron-cemented reworked products.	1,186.38	2.85	25,693.56	25,693.56	4.62
Rr-z-PIP	Residual or relict unit	Silcrete duricrust (residual or relict).	0.52	<0.01	33,589.49	8,155.64	<0.01
W-PIP	Sheetwash unit	Clay, silt and sand in distal sheetwash fan and slope deposits; local ferruginous pisoliths and gravel.	3,5031.52	84.21	3,809,877.81	1,200,065.67	2.92
X-PIP	Exposed unit	Exposed bedrock.	235.95	0.57	143,51,073.69	8,412,613.32	<0.01

650000
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725000
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7530000
7515000

Legend

Survey Area

500k Surface Geology Units

- A-PIP
- Ac-PIP
- C-f-PIP
- C-PIP
- R-f-PIP
- Rr-fh-PIP
- Rr-z-PIP
- W-PIP
- X-PIP

N

0 2 4 6 8 10 km

Scale 1:250,000 @ A3

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Units: Metre

Spectrum ECOLOGY + SPATIAL

Author: EM

Date: 25-08-2025

Surface Geology (1:500,000)

Hibiscus sp. Mulga Downs (S. Hitchcock SH 638) Targeted Flora Survey

MAP 1.2

Prepared for Hanroy Iron Ore

1.7. Beard Vegetation Association Mapping

Pre-European vegetation mapping was originally undertaken by Beard (1975) at various scales across the state and has since been updated to be consistent with the NVIS descriptions at a scale of 1:250,000 (DPIRD, 2019). State-wide vegetation statistics are available from 2018 for these associations which lists pre-European extent, current extent, area in DBCA managed lands and is a useful tool to determine if a vegetation association is rare or otherwise significant (DBCA, 2019).

Six Beard Vegetation Associations (BVAs), comprising six vegetation sub-associations (SAs), have been mapped in the Survey Area (Table 1.2; Map 1.3). BVA29 was mapped as 81.4% of the Survey Area, with BVA111 the covering the next highest area at 14.84%. 100% of the pre-European vegetation extent remains for BVA29. None of the BVAs or SAs appear restricted in the Pilbara region or in Western Australia.

Table 1.2: Beard Vegetation Associations

BVA	SA	NVIS Level V Description	Area in Survey Area (ha)	% of Survey Area	Pre-European Extent WA (ha)	Current Extent WA (ha)	Current Pilbara Extent WA (ha)	% Remaining	% of Current WA Extent in Survey Area	% Current Pilbara Extent in Survey Area
29	29	Mid isolated clumps of shrubs of *Acacia aneura*.	33,868.42	81.41	3,530,311.54	3,529,439.85	902,864.44	99.98	0.96	3.75
111	111.1	Low open woodland of *Eucalyptus gamophylla* and *Corymbia dichromophloia* over, tall sparse shrubland of *Acacia pachycarpa*, *Acacia pyrifolia* and *Senna* sp. over, low open hummock grassland and forbland of *Triodia basedowii*, *Triodia pungens* and *Ptilotus axillaris*.	6,171.73	14.84	430,979.79	430,925.25	430,906.09	99.99	1.43	1.43
	111.1	Low open woodland of *Acacia aneura*, *Corymbia dichromophloia* and *Eucalyptus* sp. aff. aspera.								
	111.1	Low open woodland of *Eucalyptus gamophylla* and *Hakea lorea* over, tall sparse shrubland of *Acacia pyrifolia* over, mid open hummock grassland of *Triodia basedowii*.								
157	157	Low hummock grassland of *Triodia wiseana*.	0.03	0.00	414,399.34	412,421.51	111,528.02	99.52	<0.01	<0.01
175	175.3	Low tussock grassland of *Aristida latifolia*, *Eragrostis setifolia*, *Panicum laevinode*, *Eriachne* sp..	300.82	0.72	68,175.03	68,175.03	68,175.03	100.00	0.44	0.44
562	562	Low open woodland of *Acacia aneura*	1,243.92	2.99	103,606.82	103,606.82	103,606.82	100.00	1.20	1.20
	562	Low open woodland of *Eucalyptus brevifolia* over low open hummock grassland of *Triodia wiseana*.								

BVA	SA	NVIS Level V Description	Area in Survey Area (ha)	% of Survey Area	Pre-European Extent WA (ha)	Current Extent WA (ha)	Current Pilbara Extent WA (ha)	% Remaining	% of Current WA Extent in Survey Area	% Current Pilbara Extent in Survey Area
676	676.17	Mid sparse shrubland of *Eremophila* sp. over low sparse chenopod shrubland of *Atriplex cinerea* subsp. *rhagodioides* and *Enchylaena* tomentosa over low sparse forbland of *Calotis multicaulis* and *Ptilotus clementii*.	16.33	0.04	81,984.10	81,976.21	81,976.21	99.99	0.02	0.02
	676.17	Low open woodland of *Melaleuca lasiandra* over low open chenopod shrubland of *Atriplex cinerea* subsp. *rhagodioides* and *Enchylaena tomentosa* over low sparse forbland of *Calotis multicaulis* and *Ptilotus clementii*.								
	676.17	Low open woodland of *Melaleuca pauperiflora* over low sparse chenopod shrubland of *Atriplex cardleyae*, *Maireana luehmannii* over low samphire shrubland of *Pachycornia triandra* and *Halosarcia halocnemoides*.								

1.8. Land Systems

The land systems of Western Australia have been mapped at a scale of 1:250,000 (DPIRD, 2016). One land system was mapped across the Survey Area. The Jamindie land system is described as stony hardpan plains and rises supporting groved Mulga shrublands, occasionally with spinifex understorey. The Jamindie land system is well represented in the region with the Survey Areas containing 3.5% of the total extent in WA (Table 1.3, Map 1.4).

Table 1.3: Land Systems

Name & Description	Area in Survey Area (ha)	% of Survey Area	Total WA Extent (ha)	% of Total Extent in Survey Area
Jamindie land system: Stony hardpan plains and rises supporting groved Mulga shrublands, occasionally with spinifex understorey.	41,600.82	100	1,188,877.37	3.5

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Legend

Survey Area

Beard Vegetation Units

- 29
- 111
- 157
- 175
- 562
- 676
- Units not in Survey Area

N

0 2 4 6 8 10 km

Scale 1:250,000 @ A3

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Units: Metre

Spectrum ECOLOGY • SPATIAL

Author: EM

Date: 22-08-2025

Beard Vegetation Associations

Hibiscus sp. Mulga Downs (S. Hitchcock SH 638) Targeted Flora Survey

MAP 1.3

Prepared for
Hanroy Iron Ore

650000
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7515000
7500000

Legend

- Survey Area
- Jamindie Land System
- Newman Land System
- Coolibah Land System

N

0 2 4 6 8 10 km

Scale 1:312,332 @ A3

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Units: Metre

Spectrum ECOLOGY • SPATIAL

Author: ZG

Date: 25-08-2025

Land Systems

Hibiscus sp. Mulga Downs (S. Hitchcock SH 638)

MAP

Prepared for
HanRoy Iron Ore

1.4

2. METHODS

2.1. Desktop Assessment

2.1.1. Previous surveys

Maia Environmental Consultancy Pty Ltd (Maia) initially recorded *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) as an undescribed *Hibiscus* sp. ?nov in 2012 and it was listed on Florabase as *Hibiscus* sp. The area was searched by botanists during subsequent years and was not recorded again until 2021 during multiple targeted flora surveys in May, July and September 2021 (Maia, 2019). Specimens were submitted to the WA Herbarium (WAH) and were identified as a new species and given the phrase name *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638) and was listed as a P1 flora species in 2024 (WAH, 2025).

2.1.2. Background Information

The surface geology, BVA and land systems on which *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) has been recorded is presented in Table 2.1. This information determined the search areas for *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) as the Priority flora taxon has only been recorded in the Jamindie land system between the Coolibah and Newman land systems (Map 2.1).

Table 2.1: Background Information

Environment	Details
Bioregion	*Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) occurs within the Pilbara bioregion and Fortescue Plains subregion.
Surface geology	*Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) Is recorded in two surface geology units: Ac-PIP and W-PIP. A majority of the records are recorded within the sheetwash unit (W-PIP): clay, silt and sand in distal sheetwash fan and slope deposits; local ferruginous pisoliths and gravel.
BVA Mapping	*Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) has only been recorded from BVA29.0.
Land Systems	*Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) has only been recorded on the Jamindie land system between the Newman and Coolibah land systems.

2.1.3. Vegetation Units and Mapping

Hibiscus sp. Mulga Downs (S. Hitchcock SH 638; P1) has been previously recorded within three VTs: AWL (1), AWL (2), and ASL (1; Table 2.2; Maia, 2019). AWL (1) and AWL (2) are associated with Mulga species (*Acacia aneura*, *Acacia aptaneura* and *Acacia pteraneura)* and occur on hardpan plains near or upslope from the Fortescue River. These two VTs are considered to be Sheet Flow Dependent Vegetation (SFDV). The majority of *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) records are recorded from AWL (1; Table 2.2). The number of known *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) records within the VTs are those from the Mine and Borefield Study Area (MBSA), surveyed by Maia in 2019 (Maia, 2019). The vegetation within the Survey Area has not been mapped for this report.

Table 2.2: Vegetation Types (Maia, 2019)

Vegetation Type / Description	Associated Species	Landform	*Hibiscus* sp. Mulga Downs records
AWL (1): *Acacia* Low Woodland or Tall Shrubland Low Woodland / Tall Shrubland to Low Isolated Trees/Shrubs of *Acacia aneura* (complex) with a mixed Low Sparse Shrubland mainly of *Dodonaea petiolaris, Eremophila forrestii* and *Abutilon otocarpum* and Isolated Low Trees of *Acacia pruinocarpa.*	*Acacia aptaneura, Eremophila cuneifolia, Ptilotus exaltatus, Salsola australis*	Hardpan plains mostly upslope of the Fortescue River.	229
AWL (2): *Acacia* Low Woodland or Tall Shrubland Low Woodland / Tall Shrubland to Low Isolated Trees / Tall Shrubs of *Acacia aneura* (complex) *Acacia synchronicia* and *Acacia tetragonophylla* with a mixed Low Sparse Shrubland of *Solanum lasiophyllum, Abutilon otocarpum* and *Sida platycalyx* and a Sparse to Isolated Tussock Grassland of *Sporobolus australasicus, Enneapogon cylindricus* and *Aristida contorta.*	*Acacia aptaneura, A. pteraneura, Cheilanthes sieberi* subsp. *sieberi, Dodonaea petiolaris, Eremophila forrestii* subsp. *forrestii, Eremophila lanceolata, Eremophila latrobei* subsp. *filiformis, Grevillea berryana, Hakea lorea* subsp. *lorea, Maireana villosa, Psydrax latifolia, Sclerolaena cornishiana, Sclerolaena. costata, Trianthema triquetrum*	Hardpan and stony plains close to the Fortescue River and can occur in groves.	77
ASL (1): *Acacia* Tall Shrubland Tall Sparse to Open mixed Shrubland mainly of *Acacia synchronicia, Acacia tetragonophylla, Acacia xiphophylla* with a mixed Sparse Chenopod Shrubland mainly of *Sclerolaena densiflora, Sclerolaena cuneata* and *Sclerolaena costata* and Isolated mixed Tussock Grasses mainly of *Sporobolus australasicus, Enneapogon polyphyllus* and *Dactyloctenium radulans*.	*Acacia aptaneura, Eremophila cuneifolia, Ptilotus exaltatus, Salsola australis*	Hardpan plains mostly upslope of the Fortescue River	5

2.1.4. *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1)

Hibiscus sp. Mulga Downs (S. Hitchcock SH 638; P1) is a small sub-shrub growing 12-20 centimetres (cm) high with purple flowers and has been recorded flowering and in fruit between May and September (Plate 2.1). This taxon has been recorded growing on stony plains with red clay-loam over ironstone. *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) is a regional endemic species, geographically restricted to the Pilbara bioregion and has only been found within Fortescue subregion (WAH, 2025). There a currently four records of *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) on Florabase and 1,427 individuals have been recorded from Mulga Downs Station (Maia, 2019; WAH, 2025; Map 2.1).

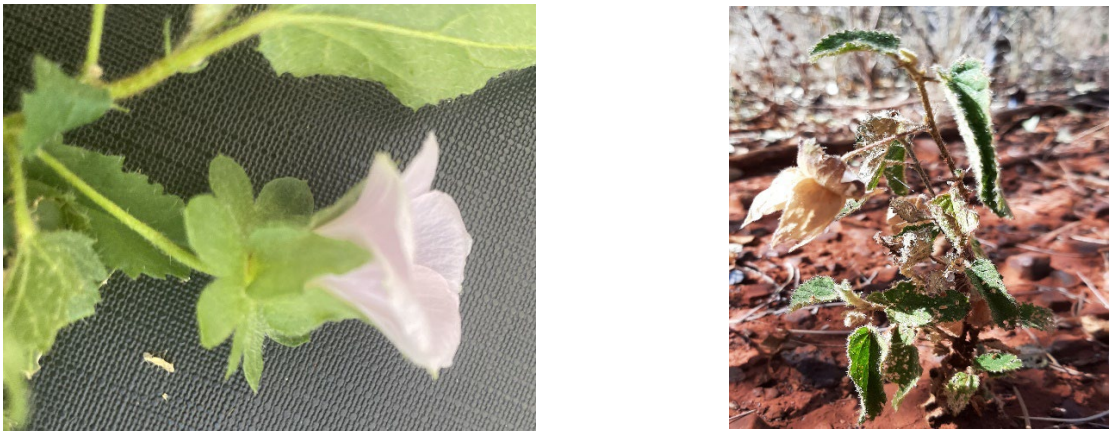

Plate 2.1: *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) flowering (left) and habit (right; Maia, 2019)

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Legend

Survey Area

Maia (2022) survey records

Hibiscus sp. Mulga Downs (S. Hitchcock SH 638; P1)

Land Systems

Coolibah Land System

Jamindie Land System

Newman Land System

N

0 2 4 6 8 10 km

Scale 1:251,538 @ A3

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Units: Metre

Spectrum ECOLOGY • SPATIAL

Author: EK

Date: 25-08-2025

Desktop *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638) records

Hibiscus sp. Mulga Downs (S. Hitchcock SH 638) Targeted Flora Survey

MAP

Prepared for
Hanroy Iron Ore

2.1

2.2. Survey Timing

A targeted flora survey was undertaken between 15 to 24 July 2025. Monthly climate data was sourced from the nearest Bureau of Meteorology (BOM) station with complete data (Newman #007176), located approximately 115 km southeast of the Survey Area (BOM 2025b). Rainfall recorded 12 months prior to the survey, median monthly rainfall, and temperature are presented in Figure 2.1. This figure represents the monthly total rainfall (mm) and monthly mean maximum and minimum temperatures (°C) prior to the assessment and the Climate Reference Period (1961 - 1990).

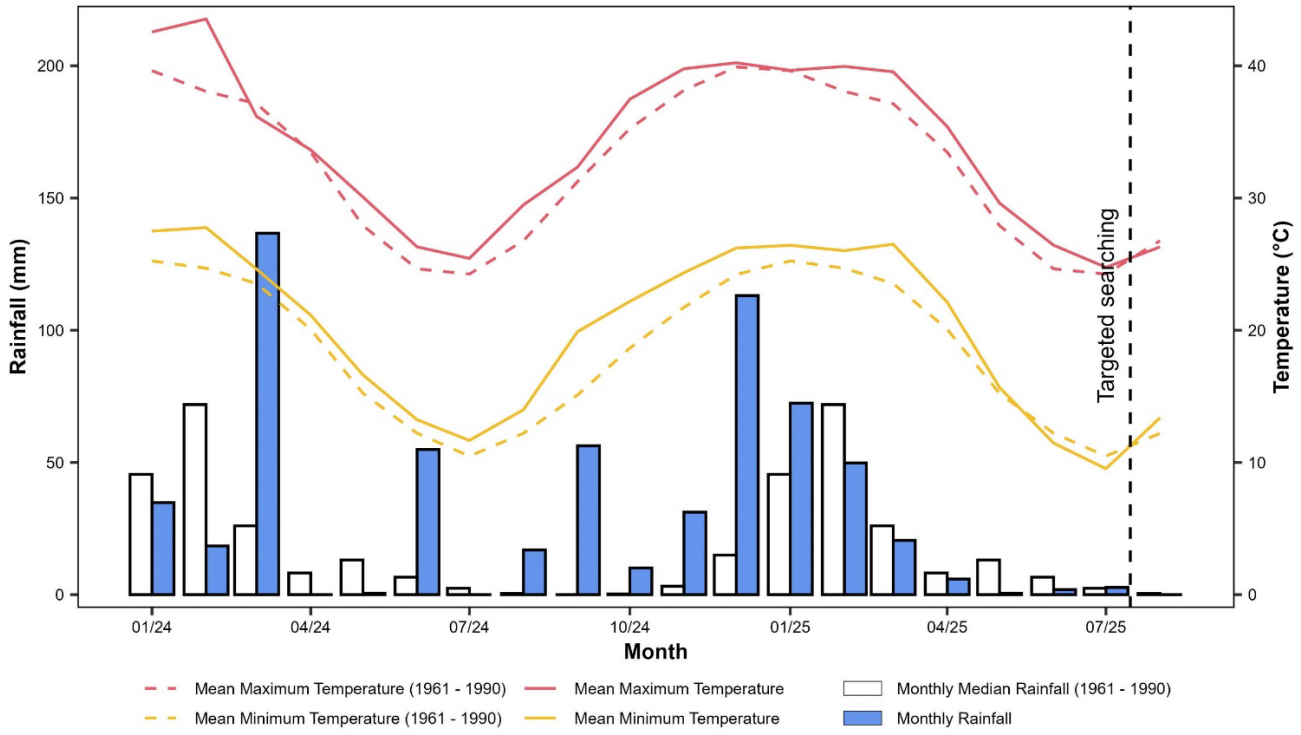

Figure 2.1: Rainfall & Temperature Data at SILO Request Location (-22.268792, 118.797701).

Rainfall data was extracted from the Scientific Information for Land Owners (SILO) database (Queensland Government, 2025) from the centre of the Survey Area (-22.2688, 118.7977). SILO sources climatic data from the BOM and interpolates data between weather stations to provide a complete data set for any location. Figure 2.1 represents the total monthly rainfall for 2024 and 2025 with the long-term monthly median rainfall and mean minimum and maximum temperature. The BOM reference climate normal period of January 1961 to December 1990 was used for calculating climate statistics and evaluating rainfall conditions recorded prior to the survey (BOM 2025a). Rainfall conditions were considered 'typical' if the total rainfall recorded over a period was between the 25th and 75th percentiles, for annual rainfall this range was 214.4 mm to 405.8 mm. Rainfall totals outside of the typical range were considered 'dry' or 'wet', and 'very dry' or 'very wet' if they were below the 10th or above the 90th percentiles, respectively (BOM 2025a).The following data was recorded:

- In the year preceding the targeted searching survey, 379.0 mm of rainfall was recorded at the site, 85.4 mm higher than the median of the long-term total annual rainfall (293.6 mm).
- A total of 5.7 mm of rainfall was recorded in the three months prior to the survey (15 April to 15 July 2025), 33.3 mm lower than the median of the long-term total rainfall (39.0 mm) for the same period.

- The rainfall conditions were seasonally very dry for the three months preceding the targeted survey and typical compared to the annual conditions of the climate reference period.

Ideal timing for undertaking a flora survey in the Pilbara IBRA region is six to eight weeks following summer rainfall (March to May). The field survey therefore wasn't carried out at an optimal time for plant growth and flowering times for the region, however as the assessment was a targeted survey, appropriate survey timing is associated with being able to detect and identify the target species. *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) has been recorded from Mulga Downs flowering and in fruit between May and September and was identifiable at the timing of the survey.

2.3. Field Methods & Sampling Effort

The field assessment comprised of walking traverses across the Survey Area. The field survey was completed by four botanists over a total of 40 person days between 15 and 24 July 2025. Previous records of *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) were used to determine the search area, targeting areas within the Jamindie land system and in close vicinity to the Newman and Coolibah land systems and focusing on Mulga habitat. A total of 529.38 km of traverses were undertaken in the Survey Area (Map 2.2).

Traverses were walked with a spacing between 25 m to 100 m. This spacing was sufficient to cover the targeted areas with a high confidence level for *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1). When a population of *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) species was encountered, botanists walked traverses of 10-20 m spacing, and the boundary of the population was marked with a GPS and plant abundance within each population was estimated. Populations were considered distinct if the records were separated by more than 500 m or a significant landscape feature (EPA, 2016a).

Abundances were estimated using methods consistent with the Threatened and Priority flora Report Form – Field Manual (DBCA, 2017). When the target species were encountered, sufficient information was collected to be compliant with the requirements of the Threatened and Priority flora Report Form, and included:

- Observation date;
- Observer, role, organisation;
- Description of location, land tenure;
- GPS coordinates;
- Abundance count; count method;
- Reproductive state (of collected specimens);
- Condition of population;
- Habitat information;
- Vegetation classification; and
- Condition of habitat, fire history etc.

Specimens were submitted to the WAH for formal identification as required. For example:

- If the species occurs outside of known population areas.
- If the species may be significant and additional taxonomic expertise is required to identify to species level.
- Specimens of potentially new species or specimens that vary from the typical form of a taxon.

2.4. Project Team & Licenses

Spectrum personnel involved with this assessment are listed in Table 2.3, along with their role and years of experience.

Table 2.3: Project Team & Licenses

Staff	Qualification	Role	Project Tasks	Years of Experience	Flora Licence
Scott Hitchcock	BSc	Principal Botanist	Project management, field survey lead, report review	20	FB62000561
Raimond Orifici	BSc (Hons)	Taxonomist	Taxonomic identifications	26+	FB62000158-2
Eva Karikis	BSc	Senior Botanist	Reporting, data management	6	FB62000324-2b
Emma Marsh	BSc	Senior Botanist	Reporting	5.5	FB62000233-5
Jarrad Long	BSc	Botanist	Field survey	1	FB62000771
Ben Hetherington	BSc	Botanist	Field survey	2	FB62000727
Regan Kelly	BSc (Hons)	Spatial Ecologist	Field survey	1	FB62000814

650000
675000
700000
725000
7560000
7545000
7530000
7515000

Legend

- Survey Area
- Traverses

N

0 2 4 6 8 10 km

Scale 1:250,000 @ A3

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Units: Metre

Spectrum ECOLOGY + SPATIAL

Author: EK

Date: 25-08-2025

Survey Effort

Hibiscus sp. Mulga Downs (S. Hitchcock SH 638) Targeted Flora Survey

MAP

Prepared for
Hanroy Iron Ore

2.2

2.5. Reporting & Data Analysis

Flora nomenclature used in this report is consistent with the Western Australian Herbarium's plant census, provided on FloraBase (WAH, 2025) and is current at the time of report preparation.

2.5.1. Significant Flora & Vegetation Definitions

As defined by the (EPA, 2016) Environmental Factor Guideline, flora and vegetation can be considered significant for a range of reasons (Table 2.4; Appendix A). Significant flora and vegetation recorded during the assessment are then further considered at a local and regional scale in order to conduct an adequate assessment of impacts. Considerations used to determine the local and regional significance of flora and vegetation recorded at the Survey Area are listed in Table 2.4.

Table 2.4: Flora & Vegetation Significance Definitions

Significant Definitions (EPA 2016a)		Local & Regional Significance
Flora	• Being identified as Threatened (state listed WC Act and/or nationally listed EPBC Act). • Being identified as Priority species: Priority 1 to 4, (Department of Biodiversity Conservation and Attractions, 2019). • Locally endemic or association with a restricted habitat type (e.g. surface water or groundwater dependant ecosystems). • New species or anomalous features that indicate a potential new species. • Representative of the range of a species (particularly, at the extremes of range recently discovered range extensions, or isolated outliers of the main range). • Unusual species, including restricted subspecies, varieties or naturally occurring hybrids. • Relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.	**Local** • Flora taxon well known from the local area. • Landforms/habitat the flora taxon occurs on are widespread through the local area. • Flora taxon occurs across multiple landforms and habitats.
		• Flora taxon not well known from the local area. • Landforms/habitat the flora taxon occurs are restricted through the local area. • Flora taxon only occurs on one habitat type that is restricted.
		Regional • Flora taxon's known distribution extends over the IBRA region or sub-region. • Flora taxon's known distribution may span over multiple IBRA regions.
		• Flora taxon's known distribution is only known from few locations across the IBRA region. • May be common in the local area but only known from this area within the region or sub-region.
Vegetation	• Identified as TEC (state listed WC Act and/or nationally listed EPBC Act). • Identified as PEC (Department of Biodiversity Conservation and Attractions, 2017). • Restricted distribution. • Degree of historical impact from threatening processes. • A role as a refuge. • Providing an important function required to maintain ecological integrity of a significant ecosystem. • Vegetation that is highly disturbed can reduce the significance.	**Local** • Vegetation type's mapped extent is widespread across the Survey Area or local area. • Landforms/habitat the vegetation type occurs on are widespread in the local area.
		• Vegetation type's mapped extent is restricted in the Survey Area. • Landforms/habitat the vegetation type occurs on are restricted in the local area. • Vegetation type provides habitat for locally significant flora taxa.
		Regional • Determined by comparing vegetation types to the best available data source. This can include state-wide vegetation mapping (Beard), region specific (if available), land system and/or geology mapping. • Vegetation types are matched with regional mapping units that are widespread throughout the region.
		• Vegetation types are matched with mapping that is restricted throughout the region. • Vegetation type provides habitat for regionally significant flora taxa.

2.6. Limitations and Constraints

Survey specific limitations and constraints for the flora assessment at the Survey Area are discussed in Table 2.5.

Table 2.5: Survey Limitations & Constraints

Limitation	Constraint	Comment
Availability of the contextual information at a regional and local scale.	No	Beard vegetation, geology and land system mapping provided detailed information, adequate to guide field survey design and effort for the flora survey.
Competency/experience of the consultant carrying out the survey including experience in bioregion surveyed.	No	The field team lead, Principal Botanist Scott Hitchcock has extensive experience in Pilbara botanical assessments and is well suited to lead the survey. All remaining botanists had suitable knowledge and experience conducting botanical surveys in the Pilbara region of Western Australia or were paired with an experienced botanist.
Timing/weather/season/cycle.	No	The field survey timing was outside the appropriate timing for a survey conducted in the Pilbara bioregion and occurred in less optimal conditions for plant growth. However, *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) has been recorded from Mulga Downs flowering and in fruit between May and September and was fruiting at the time of the survey.
Disturbances (e.g., fire, flood, accidental human intervention) which affected results of survey.	No	No disturbances were recorded at the Survey Area that have affected the results of the targeted flora assessment.
Remoteness and/or access problems.	Yes	Access to some Fortescue work areas and Rio Tinto Iron Ore rail access tracks were restricted limiting access to some of the Survey Area.
Survey effort and extent.	No	A total of 529.38 km of traverses were walked in the Survey Area ranging in width from 10 m to 100 m in potential habitat for *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1).
Proportion of flora recorded and/or collected, any identification issues.	No	Specimens were identified by taxonomist Raimond Orifici who has botanical and taxonomic experience throughout Western Australia and is particularly experienced around the Pilbara area.

3. RESULTS & DISCUSSION

3.1. *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1)

Targeted searches were conducted in optimal habitat for *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1). Known populations outside of the Development Envelope were targeted and detailed counts were carried out in these areas to get a better understanding of the species' distribution and population density across the broader landscape. A total of 2,485 individuals of *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) were recorded during the survey from 524 locations (Map 3.1). When combined with previous Maia records, a total of 3,912 individuals of *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) have been recorded from Mulga Downs Station.

Based on guidelines for determining discrete populations i.e., plants separated by 500 m (EPA, 2016b), there are six separate populations within the Survey Area, two locations are new populations. In addition, there are four populations outside of the Survey Area. The taxon occurred as scattered individuals or in clumps on flat hardpan plains, on red clay-loam over ironstone within Banded Mulga (Plate 3.1). Individuals were either sterile or had fruiting material. No individuals of *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) were found flowering during this survey. Conditions were dry and it was late in the season, and as such individuals were found in poor to good conditions across the Survey Area.

Populations of *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) appear to be restricted to the Jamindie land system between the Newman and Coolibah land systems on Mulga Downs Station (Section 2.1.2). *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) has only been recorded within two geology units (W-PIP and Ac-PIP), and the Fortescue Valley system BVA29 (Section 2.1.2). This taxon also appears to be restricted to SFDV (Section 2.1.3).

Plate 3.1: *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) Plants Photographs & Habitat Preferences During Field Assessment

650000
675000
700000
725000
7560000
7545000
7530000
7515000
7500000

Legend

Survey Area

***Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) Records**

Spectrum Survey

Previous Surveys

N

0 2 4 6 8 10 km

Scale 1:250,000 @ A3

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Units: Metre

Spectrum ECOLOGY • SPATIAL

Author: EK

Date: 25-08-2025

Hibiscus sp. Mulga Downs (S. Hitchcock SH 638; P1) Records

Hibiscus sp. Mulga Downs (S. Hitchcock SH 638) Targeted Flora Survey

MAP

Prepared for
Hanroy Iron Ore

3.1

4. CONCLUSION

Six separate populations were recorded within the Survey Area, two of which are considered new populations. In addition, there are four populations outside of the Survey Area. A total of 2,485 individuals of *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) were recorded during the survey from 524 locations.

Hibiscus sp. Mulga Downs (S. Hitchcock SH 638; P1) occurs on flat hardpan plains, on red clay-loam over ironstone within Banded Mulga formations in the Survey Area. *Hibiscus* sp. Mulga Downs (S. Hitchcock SH 638; P1) appears to be restricted to the Jamindie land system within SFDV.

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Appendix A: Conservation Codes

Appendix A1: Definitions of Conservation Categories under the EPBC Act

Category	Definition
Extinct	A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
Extinct in the Wild	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time: (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered	A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	A native species is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	A native species is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.
Conservation Dependent	A native species is eligible to be included in the conservation dependent category at a particular time if, at that time: (a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered, or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Appendix A2: Definitions of Conservation Categories Under the BC Act

Code	Definition (BC Act)
Threatened Species (T) Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act). Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna. Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora. The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.	
Critically Endangered (CR)	Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.
Endangered (EN)	Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.
Vulnerable (VU)	Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.
Extinct species Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.	
Extinct species (EX)	Species where "there is no reasonable doubt that the last member of the species has died", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for extinct fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora.
Extinct in the wild species (EW)	Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Code	Definition (BC Act)
Specially protected species Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection. Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.	
Migratory species (MI)	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
Conservation Dependent (CD)	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018
Other specially protected fauna (OS)	Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018
Priority species (P) Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of Priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.	
Priority 1: Poorly known species (P1)	Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

Code	Definition (BC Act)
Priority 2: Poorly known species (P2)	Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3: Poorly known species (P3)	Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4: Rare, Near Threatened and other species in need of monitoring (P4)	(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Appendix A3: Legal Status Definition of Listed Plants in Western Australia

Legal Status	Definition
Declared Pest, Prohibited – s12	Prohibited organisms are declared pests by virtue of section 22(1) and may only be imported and kept subject to permits.
Declared Pest – s22(2)	Declared pests must satisfy any applicable import requirements when imported and may be subject to control keeping requirements.
Permitted – s11	Permitted organisms must satisfy applicable import requirements and import permits (where required).
Permitted, Requires Permit – r73	Regulation 73 permitted organisms may be subject to restriction under legislation other than the BAM Act (2007).
Unlisted	Unlisted organisms are prohibited in WA.
Control Categories	**Definition**
C1 Exclusion	Organisms should be excluded from parts or all of WA.
C2 Eradication	Organisms should be eradicated from all or parts of WA.
C3 Management	Organisms should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers or distribution of the organism or prevent or contain the spread of the organism.
Unassigned	Declared pest that are recognised as having a harmful impact under certain circumstances where their subsequent control requirements are determined by a plan or other legislative arrangements under the Act.
Keeping Categories	**Definition**
Prohibited keeping	Can only be kept under a permit for public display, education or scientific purposes.
Restricted keeping	Kept under a permit by private individuals due to a low risk of becoming a problem for the environment.
Exempt keeping	No permit or conditions are required for keeping. Organism may be subject to restrictions under the Wildlife Conservation Act (WCA, 1950).