



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 4067/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Hamersley Iron Pty Ltd

1.3. Property details

Property: Iron Ore (Hamersley Range) Agreement Act 1963;
Mineral Lease 246SA (AML 70/246)

Local Government Area: Shire of Ashburton

Colloquial name: Paraburdoo Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
2.3		Mechanical Removal	Mineral Production and Associated Activities

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 23 December 2010

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description	Clearing Description	Vegetation Condition	Comment
Beard vegetation associations have been mapped at a 250,000 scale for the whole of Western Australia. Two beard vegetation associations' have been mapped within the application area (Shepherd 2007; GIS Database): 181: Shrublands; mulga and snakewood shrub.	Hamersley Iron Pty Ltd has applied to clear up to 2.3 hectares of native vegetation. The proposal is situated at the Paraburdoo mine site, located approximately 10 kilometres west south-west of the township of Paraburdoo (Rio Tinto, 2010a). Clearing will be required for topsoil stockpiles.	Degraded: Structure severely disturbed; regeneration to good condition requires intensive management (Keighery, 1994).	The vegetation description for the application area was derived from description by Rio Tinto (2010c). The vegetation condition was described using a scale based on Trudgen (1988) and has been converted to the corresponding condition from the Keighery (1994) scale.
Flora and vegetation surveys for the Paraburdoo Mine project have been undertaken by Biota Environmental Services (2009) (between 19 and 25 June 2009, 2 and 6 September 2009, 6 and 8 October 2009) and Rio Tinto (2010a) (between 11 and 16 March, and on the 21 May 2009).	Clearing will be undertaken by bulldozer (Rio Tinto, 2010a).		
One vegetation community has been identified within the application area (Biota Environmental Services, 2009; Rio Tinto, 2010b); EvAcMgCE <i>Eucalyptus victrix</i> woodland to scattered trees over <i>Acacia coriacea</i> subsp. <i>pendens</i> , <i>Melaleuca glomerata</i> tall shrubland over <i>Cenchrus</i> spp. open tussock grassland.			

3. Assessment of application against clearing principles

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Comments **Proposal is not likely to be at variance to this Principle**
The application area is located within the Hamersley subregion of the Pilbara Interim Biogeographic Regionalisation for Australia (IBRA) bioregion (GIS Database). This subregion is characterised by sedimentary ranges and plateaux, dissected by gorges (basalt, shale and dolerite), with Mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils

of the ranges (Kendrick, 2001).

A flora and vegetation survey conducted by Biota Environmental Services (2009) and Rio Tinto (2010a) was conducted over the application area and surrounding areas. One vegetation community was recorded within the application area itself, this being **EvAcMgCE** *Eucalyptus victrix* woodland to scattered trees over *Acacia coriacea* subsp. *pendens*, *Melaleuca glomerata* tall shrubland over *Cenchrus* spp. open tussock grassland (Biota Environmental Services, 2009).

The survey undertaken by Rio Tinto (2010a) was over a large proportion of the Paraburdoo Mine Project and is adjacent to the application area. Rio Tinto (2010a) recorded a total of 136 native species and introduced vascular flora species from 74 genera representing 38 families from the 21 vegetation types within the survey area. The survey undertaken by Biota Environmental Services (2009) (included most of the application area) and an earlier rare flora search recorded a total of 249 taxa of native vascular flora belonging to 109 genera from 45 families. The dominant plant families and genera recorded are typical of those most represented in the Pilbara (Biota Environmental Services, 2009). Of the 2.3 hectares of the application area approximately 1.9 hectares is disturbed or cleared (Rio Tinto, 2010b).

The average rainfall (Paraburdoo Airport weather station) is 316 millimetres with most rainfall occurring between December and June. However the rainfall for the 2008-2009 period, from June to March was approximately 280 millimetres. While this was a reduced summer rainfall season Rio Tinto (2010a) consider that high rainfall in February still provided for a favourable botanical survey season.

Eleven introduced flora species have been identified within the Paraburdoo project area. These are; Buffel Grass (*Cenchrus ciliaris*), Mimosa Bush (*Vachellia farnesiana*), Ruby Dock (*Acetosa vesicaria*), Kapok Bush (*Aerva javanica*), Mexican Poppy (*Argemone ochroleuca*), Pie Melon (*Citrullus lanatus*), Flaxleaf Fleabane (*Conyza bonariensis*) Couch (*Cynodon dactylon*), Prickly Lettuce (*Lactuca serriola*), Stinking Passionflower (*Passiflora foetida*), Indian Hedge Mustard (*Sisymbrium orientale*) and Black Berry Nighshade (*Solanum nigrum*) (Biota Environmental Services, 2009; Rio Tinto, 2010a). None of these plant species are listed as Declared Plants under the *Agriculture and Related Resources Protection Act 1976* (Rio Tinto, 2010a). Care must be taken to ensure that the proposed clearing activities do not spread or introduce any weed species to non infested areas. Potential impacts to biodiversity as a result of the proposed clearing may be minimised by the implementation of a weed control condition.

No Declared Rare Flora or Threatened Ecological Communities have been recorded within the application area (GIS Database; Rio Tinto, 2010a). One priority species *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P1) was recorded during the survey (Biota Environmental Services, 2009; Rio Tinto, 2010a) approximately 50 metres from the application area where it is heavily degraded and devoid of native vegetation and topsoil (Rio Tinto, 2010a). This species typically occupies on red-brown clay soil and calcrete pebbles in low undulating plain and swampy plains (Rio Tinto, 2010a; Western Australian Herbarium, 2010), therefore it is not expected that this species would typically inhabit the application area given the lack of suitable habitat.

The assessing officer conducted a search of the Western Australian Museum's online fauna database, centered on the coordinates 23 23 08'S, 117 58 36'E with a radius of 40 kilometres. One amphibian, 74 avian, 10 mammalian and 56 reptilian species have been identified as potentially occurring in the search area (Western Australian Museum, 2010). These results indicate that the vegetation within the application area and the surrounding lease area may comprise suitable habitat for avian and reptilian species.

The vegetation and fauna habitat within the application area is relatively common throughout the local area and much of the application is in a disturbed condition. Therefore, it is not likely to comprise a higher level of floral or faunal diversity than undisturbed areas within the surrounding areas. The proposed clearing may have a small localised impact on biological diversity, however the application area does not appear to comprise a high level of biological diversity at either a regional or local scale.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology Kendrick (2001)
Biota Environmental Services (2009)
Rio Tinto (2010a)
Rio Tinto (2010b)
Western Australian Herbarium (2010)
Western Australian Museum (2010)
GIS Database:
- Declared Rare and Priority Flora List
- IBRA WA (Regions - Sub Regions)
- Threatened Ecological Sites Buffered

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments Proposal is not likely to be at variance to this Principle

The assessing officer conducted a search of the Western Australian Museum's online fauna database, centred on the coordinates 23 23 08'S, 117 58 36'E with a radius of 40 kilometres. One amphibian, 74 avian, 10 mammalian and 56 reptilian species have been identified as potentially occurring in the search area (Western Australian Museum, 2010).

No targeted fauna surveys have been undertaken within the application area (Rio Tinto, 2010a). Rio Tinto (2010a) undertook a desktop search of the Department of Environment and Conservation's (DEC) Threatened Fauna Database within a 50 kilometre radius of the Paraburdoo mine project area to identify species of conservation significance. A total of one Schedule 1 and one Schedule 4 taxa, along with four Priority taxa were listed.

The desktop study conducted by Rio Tinto utilised the: Western Australian Museum's online fauna database; Department of Environment and Conservation's (DEC) Threatened Fauna Database; the Protected Matters Search Tool under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* and Rio Tinto databases. After consideration of the results of these above-mentioned databases, the following species of conservation significance could potentially occur within the application area:

- *Apus pacificus* (Fork-tailed Swift) listed Migratory EPBC Act;
- *Ardea alba* (Great Egret, White Egret) listed Migratory EPBC Act;
- *Ardea ibis* (Cattle Egret) listed Migratory EPBC Act;
- *Charadrius veredus* (Oriental Plover, Oriental Dotterel) listed Migratory EPBC Act;
- *Merops ornatus* (Rainbow Bee-eater) listed Migratory EPBC Act;
- *Liasis olivaceus barroni* (Pilbara Olive Python) listed Schedule 1;
- *Dasyurus hallucatus* (Northern Quoll) listed Schedule 1;
- *Rhinonicteris aurantius* (Orange leaf-nosed Bat) listed Schedule 1;
- *Falco peregrinus* (Peregrine Falcon) listed Schedule 4;
- *Ardeotis australis* (Australian Bustard) listed DEC Priority Four;
- *Burhinus grallarius* (Bush Stone - curlew) listed DEC Priority Four;
- *Leggadina lakedownensis* (Lakeland Down's short-tailed mouse) listed DEC Priority Four; and
- *Pseudomys chapmani* (Western Pebble-mound Mouse) listed DEC Priority Four.

Based on information provided by Rio Tinto (2010a), as well as the assessment of aerial imagery and topographic information, impacts associated with historical mining activities have resulted in a significant proportion of the application area being mapped as disturbed ground. Given the degraded condition of the application area and the lack of logs, tree hollows, rocky slopes, or caves (Rio Tinto, 2010a; 2010b), the application area is unlikely to support significant habitat for many of the abovementioned species.

Suitable habitat for *A. alba* (Great Egret, White Egret) and *A. ibis* (Cattle Egret) may occur subsequent to heavy periods of rainfall when the 7 Mile Creek (approximately 200 metres east of the application area) is flooded, however at these times habitat for these species would be considered widespread across the Ashburton River Catchment (Rio Tinto, 2010a). Furthermore, the size of the application area (2.3 hectares) to be cleared is unlikely to have a significant impact on these two migratory species (Rio Tinto, 2010a).

It is likely that higher quality vegetation and fauna habitats exist throughout the immediate surrounding area given the Pilbara region remains relatively uncleared (Kendrick, 2001). Aerial imagery demonstrates that part of the application area is situated adjacent to highly degraded areas which are being utilised for mining related purposes (ie.waste dump and access tracks) (Rio Tinto, 2010a). The proximity of the application area to existing mine infrastructure could be considered to act as a deterrent to many native fauna species, thereby minimising the potential for these species to frequent the area. The application area is unlikely to function as a significant habitat corridor for fauna movement (Rio Tinto, 2010a; GIS Database).

The vegetation and fauna habitat within the application area is relatively common throughout the local area and much of the application area is in a disturbed condition, it is not likely that the vegetation within the application area comprises a higher level of faunal diversity than undisturbed surrounding areas. The proposed clearing may have a small localised impact on biological diversity, however the application area appears not to provide significant fauna habitat.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

- Methodology**
- Kendrick (2001)
 - Rio Tinto (2010a)
 - Rio Tinto (2010b)
 - Western Australian Museum (2010)
 - GIS Database:
 - IBRA WA (Regions - Sub Regions)
 - Paraburdoo 50cm Orthomosaic - Landgate 2004

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Comments Proposal is not likely to be at variance to this Principle

According to available datasets, there are no known records of Declared Rare Flora (DRF) within the application area (GIS Database).

A flora and vegetation survey was undertaken by botanists from Rio Tinto (2010a) and Biota Environmental Services (2009) across the application area and surrounding areas. No species of DRF were recorded within the application area (Rio Tinto, 2010a).

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology Biota Environmental Services (2009)
Rio Tinto (2010a)
GIS Database
- Declared Rare and Priority Flora List

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

Comments Proposal is not likely to be at variance to this Principle

There are no known Threatened Ecological Communities (TEC's) within the application area (Rio Tinto, 2010a; GIS Database). The nearest known TEC, the 'Themeda Grasslands' is located approximately 100 kilometres north of the application area (GIS Database). Given the distance between the application area and the nearest known TEC, the proposed clearing is not likely to impact on the conservation of that TEC.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology Rio Tinto (2010a)
GIS Database:
- Threatened Ecological Sites Buffered

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Comments Proposal is not at variance to this Principle

The application area falls within the Pilbara IBRA bioregion (GIS Database). Shepherd (2007) reports that approximately 99.95% of the pre-European vegetation remains in this bioregion.

The vegetation in the application area has been mapped as Beard vegetation association 181: Shrublands; mulga and snakewood shrub (GIS Database). According to Shepherd (2007) approximately 100% of these Beard vegetation associations remains at both a state and bioregional level. Therefore the area proposed to be cleared does not represent a significant remnant of native vegetation within an area that has been extensively cleared.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in IUCN Class I-IV Reserves
IBRA Bioregion – Pilbara	17,804, 188	17,794, 647	99.95	Least Concern	6.3
Beard veg assoc. – State					
181	1,697,291	1,697,291	~100	Least Concern	2.4
Beard veg assoc. – Bioregion					
181	65,091	65,091	~100	Least Concern	4.9

* Shepherd (2007)

** Department of Natural Resources and Environment (2002).

Based on the above, the proposed clearing is not at variance to this Principle.

Methodology Department of Natural Resources and Environment (2002)
Shepherd (2007)
GIS Database:
- IBRA WA (Regions - Sub Regions)

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Comments Proposal is not likely to be at variance to this Principle

There are no permanent wetlands or water courses within the application area (GIS Database).

The vegetation association **EvAcMgCE** is representative of an 'ecosystem at risk' as defined by Kendrick (2001). This definition includes all major ephemeral watercourses, however, Biota Environmental Services (2009) consider this vegetation association to be of moderate conservation significance as it has suffered previous disturbance and weed invasion. Furthermore, as this unit is associated with the drier areas of the watercourses along Seven Mile Creek and occupies only 0.4 hectares it is unlikely to be more diverse than similar areas in both a local and regional context.

These watercourses are minor natural drainage channels that are widespread across the Pilbara landscape (Kendrick, 2001) which are responsible for quickly dispersing floodwaters after significant rainfall events. The vegetation communities that typically grow in association with such watercourses in the Pilbara bioregion are not unique and are considered to be common and widespread (Shepherd, 2007; GIS Database).

The proposed clearing is unlikely to significantly impact on vegetation communities growing in association with the minor ephemeral creek systems within the application area.

Based on the above, the proposed clearing is at not likely to be at variance to this Principle.

Methodology Biota Environmental Sciences (2009)
Kendrick (2001)
Rio Tinto (2010a)
Shepherd (2007)
GIS Database:
- Hydrography, linear_1
- Hydrography, rivers
- Paraburdoo 50cm Orthomosaic - Landgate 2004

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Comments Proposal is not likely to be at variance to this Principle

According to Geographic Information Systems rangeland mapping, the application area is comprised of the River Land System (Van Vreeswyk et al., 2004; GIS Database). The River Land System consists of active flood plains, major rivers and banks supporting eucalypt woodlands, tussock grasslands and soft spinifex grasslands (GIS Database). This system is largely stabilised by buffel grass and spinifex. Accelerated erosion is uncommon however, erosion potential is high if vegetative cover is removed (Van Vreeswyk et al., 2004). According to Van Vreeswyk et al. (2004), approximately 94% of The River Land System is not affected by soil erosion.

Exposure to surface mantles from clearing within the application area may increase surface water run-off and subsequently erosion, however this may be limited as approximately 82% of the application area has been subject to past disturbance (Rio Tinto, 2010b). Large rainfall events associated with cyclonic activity can result in flash flooding and overland sheetflow in this region and flush silt loads during this time (Rio Tinto, 2010a). As natural minor drainage channels occur within the application area (GIS Database), it is not likely that clearing within the application area will increase the impacts of flooding following large seasonal rainfall events.

Groundwater salinities within the application area have been recorded in the range of 1,000 - 3,000 milligrams/Litre Total Dissolved Solids (GIS Database). The average annual evaporation rate is over eight times the average annual rainfall, so it is unlikely that the proposed clearing will result in increased groundwater recharge causing raised saline water tables (GIS Database).

Given the application area has been subject to past disturbance (Rio Tinto, 2010b) and the small scale of the proposal (2.3 hectares), it is not expected that clearing will result in appreciable land degradation.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology Rio Tinto (2010a)
Rio Tinto (2010b)
Van Vreeswyk et al., (2004)
GIS Database:
- Evaporation Isopleths
- Groundwater Salinity, Statewide

- Rainfall, Mean Annual
- Rangeland Land System Mapping

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Comments Proposal is not likely to be at variance to this Principle

The application area is not situated within a conservation area (GIS Database). The nearest conservation estate is the Karijini National Park which is located approximately 45 kilometres east of the application area (Rio Tinto, 2010a; GIS Database). Given the distance between the application area and the nearest conservation area, the proposed clearing is not likely to impact on the conservation values of the Karijini National Park.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology Rio Tinto (2010a)
GIS Database:
- DEC Tenure (Category)

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

Comments Proposal is not likely to be at variance to this Principle

The application area is not located within a Public Drinking Water Sources Area (PDWSA) (GIS Database). There are no permanent watercourses, drainage systems or wetlands within the application area (GIS Database). Several ephemeral creek systems and flow lines traverse the application area (GIS Database). These watercourses are minor natural drainage channels that are widespread across the Pilbara landscape and are responsible for quickly dispersing floodwaters after significant rainfall events (Kendrick, 2001). While sediment loads in these flowlines would be typically higher during periods of significant rainfall (Rio Tinto, 2010b), the proposed clearing is unlikely to increase the sediment load than otherwise would be expected or impact on the quality of water within these watercourses.

The annual average rainfall for the application area is 316 millimetres (Bureau of Meteorology, 2010) and the average annual evaporation rate is 3,600 millimetres (Rio Tinto, 2010a). Therefore, during normal rainfall events surface water within the application area is likely to evaporate quickly.

Groundwater salinities within the application area have been recorded in the range of 1,000 - 3,000 milligrams/Litre Total Dissolved Solids (GIS Database). The average annual evaporation rate is over eight times the average annual rainfall, so it is unlikely that the proposed clearing will result in increased groundwater recharge causing raised saline water tables (GIS Database).

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology Bureau of Meteorology (2010)
Kendrick (2001)
Rio Tinto (2010a)
Rio Tinto (2010b)
GIS Database:
- Groundwater Salinity, Statewide
- Hydrography, linear_1
- Public Drinking Water Source Area (PDWSA's)

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Comments Proposal is not likely to be at variance to this Principle

The application area is located in the Hamersley bioregion and is characterised by a climate that is semi-arid to semi-tropical with a summer rainfall season and a dry winter season (Rio Tinto, 2010a). The annual average evaporation rate for the application area is 3,600 millimetres per annum (Rio Tinto, 2010a). The application area experiences an average annual rainfall (determined from the Tom Price weather station) of 316 millimetres with most rainfall occurring between December and June (Bureau of Meteorology, 2010).

There are no permanent water courses or wetlands within the application areas (Rio Tinto, 2010a; GIS Database) although large rainfall events can be associated with cyclonic activity resulting in flash flooding and overland sheetflow (Rio Tinto, 2010a). Numerous ephemeral watercourses are located across the landscape, and these are responsible for quickly dispersing floodwaters after significant rainfall events, thereby reducing peak flood heights (GIS database). While a small proportion of the application area is associated with the ephemeral creek system Seven Mile Creek (Rio Tinto, 2010b; GIS Database), it is not likely that clearing of the application area would increase the level of these flooding events.

The application area is within the Ashburton River catchment area which covers 78,777,743 hectares (GIS

Database). Given the size of the area to be cleared (2.3 hectares) in relation to the size of the catchment area, the proposed clearing is not likely to increase the incidence or intensity of flooding.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology Bureau of Meteorology (2010)
Rio Tinto (2010a)
Rio Tinto (2010b)
GIS Database:
- Evaporation Isopleths
- Hydrography, linear_1
- Hydrography, catchments

Planning instrument, Native Title, Previous EPA decision or other matter.

Comments

There are two native title claims over the area under application: WC97/043 and WC98/069. These claims have been registered with the National Native Title Tribunal on behalf of the claimant group. However, the mining tenure has been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (ie. the proposed clearing activity) has been provided for in that process, therefore the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There are no registered Aboriginal Sites of Significance within the application area (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Aboriginal sites of significance are damaged through the clearing process.

It is the proponent's responsibility to liaise with the Department of Environment and Conservation and the Department of Water, to determine whether a Works Approval, Water licence, Bed and Banks Permit, or any other licences or approvals are required for the proposed works.

The clearing permit application was advertised on 15 November 2010 by the Department of Mines and Petroleum inviting submissions from the public. No submissions were received.

Methodology GIS Database:
- Aboriginal Sites of Significance
- Native Title Determined
- Native Title Federal
- Native Title NNT

4. References

- Biota Environmental Sciences (2009) Western Range Phase 1: Vegetation and Flora Summary Report. Unpublished report prepared for Rio Tinto Iron Ore December 2009.
- Bureau of Meteorology (2010) BOM Website - Climate Averages by Number, Averages for Tom Price. Available online at http://www.bom.gov.au/jsp/ncc/cdio/weatherData/avp_nccObsCode=139&p_display_type=dataFile&p_startYear=&p_stn_num=005072 accessed 22 November 2010.
- Department of Natural Resources and Environment (2002) Biodiversity Action Planning. Action planning for native biodiversity at multiple scales; catchment bioregional, landscape, local. Department of Natural Resources and Environment, Victoria.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Kendrick (2001) A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions. Pilbara 3 (PIL3 - Hamersley subregion) Department of Conservation and Land management, Western Australia.
- Rio Tinto (2010a) Flora and Vegetation Survey of the Paraburdoo Mine Development and Supporting Documentation for a Native Vegetation Clearing Permit Application. Prepared by Rio Tinto Iron Ore.
- Rio Tinto (2010b) CPS 4067/1 - Clearing Principles. Email dated 2 December 2010 3.37pm from Julie Neilson (Rio Tinto).
- Rio Tinto (2010c) NVCP application - CPS 4067/1. Email dated 16 December 2010 12.49pm from Julie Neilson (Rio Tinto).
- Shepherd, D.P. (2007) Adapted from: Shepherd, D.P., Beeston, G.R., and Hopkins, A.J.M. (2001), Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture Western Australia, South Perth.
- Trudgen, M.E. (1998) A Report on Flora and Vegetation of the Port Kennedy Area. Unpublished report prepared for Bowman Bishaw and Associates, West Perth.
- Van Vreeswyk A.M.E., Payne A.L., Leighton K.A. and Hennig P. (2004) Technical Bulletin - An inventory and condition survey of rangelands in Pilbara Region, Western Australia, No 92, Department of Agriculture, Government of Western Australia, Perth, Western Australia.
- Western Australian Herbarium (2010) FloraBase - The Western Australian Flora. Western Australian Herbarium - Department of Environment and Conservation. Available online from: <http://florabase.dec.wa.gov.au/> Accessed 22 November 2010.
- Western Australian Museum (2010) NatureMap - Mapping Western Australia's Biodiversity - Department of Environment and Conservation. Available online from: <http://naturemap.dec.wa.gov.au/default.aspx>. Accessed 22 November 2010.

5. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government
CALM	Department of Conservation and Land Management (now DEC), Western Australia
DAFWA	Department of Agriculture and Food, Western Australia
DEC	Department of Environment and Conservation, Western Australia
DEH	Department of Environment and Heritage (federal based in Canberra) previously Environment Australia
DEP	Department of Environment Protection (now DEC), Western Australia
DIA	Department of Indigenous Affairs
DLI	Department of Land Information, Western Australia
DMP	Department of Mines and Petroleum, Western Australia
DoE	Department of Environment (now DEC), Western Australia
DoIR	Department of Industry and Resources (now DMP), Western Australia
DOLA	Department of Land Administration, Western Australia
DoW	Department of Water
EP Act	Environmental Protection Act 1986, Western Australia
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Federal Act)
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union
RIWI Act	Rights in Water and Irrigation Act 1914, Western Australia
s.17	Section 17 of the Environment Protection Act 1986, Western Australia
TEC	Threatened Ecological Community

Definitions:

{Atkins, K (2005). *Declared rare and priority flora list for Western Australia, 22 February 2005. Department of Conservation and Land Management, Como, Western Australia*} :-

- P1** **Priority One - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P2** **Priority Two - Poorly Known taxa:** taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- P3** **Priority Three - Poorly Known taxa:** taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.
- P4** **Priority Four – Rare taxa:** taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years.
- R** **Declared Rare Flora – Extant taxa (= Threatened Flora = Endangered + Vulnerable):** taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.
- X** **Declared Rare Flora - Presumed Extinct taxa:** taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

{Wildlife Conservation (Specially Protected Fauna) Notice 2005} [Wildlife Conservation Act 1950] :-

- Schedule 1** **Schedule 1 – Fauna that is rare or likely to become extinct:** being fauna that is rare or likely to become extinct, are declared to be fauna that is need of special protection.
- Schedule 2** **Schedule 2 – Fauna that is presumed to be extinct:** being fauna that is presumed to be extinct, are declared to be fauna that is need of special protection.
- Schedule 3** **Schedule 3 – Birds protected under an international agreement:** being birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, are declared to be fauna that is need of special protection.
- Schedule 4** **Schedule 4 – Other specially protected fauna:** being fauna that is declared to be fauna that is in need of special protection, otherwise than for the reasons mentioned in Schedules 1, 2 or 3.

{CALM (2005). *Priority Codes for Fauna*. Department of Conservation and Land Management, Como, Western Australia} :-

- P1** **Priority One: Taxa with few, poorly known populations on threatened lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P2** **Priority Two: Taxa with few, poorly known populations on conservation lands:** Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P3** **Priority Three: Taxa with several, poorly known populations, some on conservation lands:** Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
- P4** **Priority Four: Taxa in need of monitoring:** Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.
- P5** **Priority Five: Taxa in need of monitoring:** Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Categories of threatened species (*Environment Protection and Biodiversity Conservation Act 1999*)

- EX** **Extinct:** A native species for which there is no reasonable doubt that the last member of the species has died.
- EX(W)** **Extinct in the wild:** A native species which:
(a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
(b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
- CR** **Critically Endangered:** A native species which is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
- EN** **Endangered:** A native species which:
(a) is not critically endangered; and
(b) is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
- VU** **Vulnerable:** A native species which:
(a) is not critically endangered or endangered; and
(b) is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
- CD** **Conservation Dependent:** A native species which is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.