



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 3357/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: BHP Billiton Minerals Exploration

1.3. Property details

Property: Mining Lease 69/74
Mining Lease 69/75
Exploration Licence 69/2201
Local Government Area: Shire of Ngaanyatjaraku
Colloquial name: West Musgraves Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
50		Mechanical Removal	Mineral Exploration

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description Beard Vegetation Associations have been mapped at a scale of 1:250,000 for the whole of Western Australia. Three Beard Vegetation Associations are located within the application areas (Shepherd, 2007):

- Beard Vegetation Association 18: low woodland; Mulga (*Acacia aneura*);
- Beard Vegetation Association 19: low woodland; Mulga between sandridges; and
- Beard Vegetation Association 236: hummock grasslands, shrub steppe; Mulga and Mallee (Marble Gum) over hard Spinifex.

Coffey Environments conducted a flora and vegetation assessment of the application areas in July 2009. Nineteen vegetation units were identified within the application areas (Coffey Environments, 2009):

1. Calcrete

Scattered shrubs of *Acacia ligulata* to 1.5 metres over low open shrubland of *Petalostylis cassioides* with mixed hummock / tussock grasses.

This vegetation type was found on calcrete outcrops which ranged in height from 0.5 metres to 2 metres. Most of the calcrete outcrops and associated vegetation were located in the southern end of the western half of the study area and were also scattered throughout the entire eastern section of the study area.

2. Dune

Shrubland of *Acacia ligulata*, *Grevillea stenobotrya*, *Gyrostemon ramulosus*, *Aluta maisonneuvei* subsp. *maisonneuvei* and *Acacia melleodora* to 2 metres over low open shrubland of *Bonamia rosea* and *Solanum coactiliferum* to 0.3 metres over scattered tussock grasses of *Aristida contorta* to 0.2 metres with a lower slope component of low shrubland of *Aluta maisonneuvei* subsp. *maisonneuvei* and *Acacia maitlandii* to 1.4 metres over hummock grassland of *Triodia basedowii* and *Triodia schinzii* to 1.1 metres on larger dunes.

Red aeolian sand dunes and associated vegetation were recorded in high frequency in the southern portion of the western half and in the eastern half of the study area. The western half of the study area had large sand dunes which were recorded in low frequency.

3. LOWCo

Low open woodland of *Corymbia opaca*, *Eucalyptus oxymitra* and *Eucalyptus concinna* to 7 metres over open shrubland of *Melaleuca glomerata* and *Acacia ligulata* to 2 metres over mid-dense hummock grassland of *Triodia basedowii* to 1.1 metre.

4. LOWEc

Low open woodland of *Eucalyptus concinna* and *Eucalyptus oxymitra* to 7 metres over open shrubland of *Melaleuca glomerata* and *Acacia ligulata* to 2 metres over mid-dense hummock grassland of *Triodia basedowii* to 1.1 metre.

5. **LOWEg**
Low open woodland of *Eucalyptus gamophylla* and *Eucalyptus oxymitra* to 3 metres over scattered shrubs of *Acacia ligulata* to 2 metres over mid-dense hummock grassland of *Triodia basedowii* to 1.2 metres.
6. **LOWEo**
Low open woodland of *Eucalyptus oxymitra* and *Corymbia opaca* to 8 metres over scattered tall shrubs of *Hakea lorea* subsp. *lorea* to 4 metres over open shrubland of *Melaleuca glomerata* and *Acacia ligulata* to 2 metres over mid-dense hummock grassland of *Triodia basedowii* to 1.1 metre.
7. **LOWEgSS**
Low open woodland of *Eucalyptus gamophylla* to 3 metres over scattered shrubs of *Acacia ligulata* to 1.4 metres over mid-dense hummock grassland of *Triodia schinzii* to 1.3 metres.
8. **LWEg**
Low woodland of *Eucalyptus gamophylla* and *Eucalyptus oxymitra* to 3 metres over scattered shrubs of *Acacia maitlandii* to 1.5 metres over hummock grassland of *Triodia epactia* and *Triodia schinzii* to 1.2 metres.
9. **MCHTG**
Mixed closed hummock / tussock grassland with scattered *Acacia* spp. over scattered low shrubs of *Rulingia loxophylla* to 0.4 metres.
10. **SLT**
Scattered low trees of *Corymbia opaca* to 8 metres over scattered tall shrubs of *Acacia aneura* to 4 metres over scattered shrubs of *Acacia pachyacra* to 1.5 metres over scattered low shrubs of *Ptilotus obovatus* to 0.4 metres.
11. **SLTCo**
Scattered low trees of *Corymbia opaca* to 8 metres over scattered tall shrubs of *Hakea lorea* subsp. *lorea* to 4 metres over scattered shrubs of *Acacia ligulata* to 2 metres over mid-dense hummock grassland of *Triodia basedowii* to 1.1 metre.
12. **STSA_n**
Scattered tall shrubs of *Acacia aneura* to 5 metres over low open woodland of *Eucalyptus socialis* subsp. *eucentrica* to 3 metres over scattered shrubs of *Acacia ramulosa* var. *ramulosa* to 2 metres over very open hummock grassland of *Triodia epactia* to 1.2 metres over scattered low shrubs of *Rulingia loxophylla* to 0.3 metres.
13. **STSA_nLOW**
Scattered tall shrubs of *Acacia aneura* to 5 metres over shrubland of *Melaleuca glomerata* to 1.4 metres over hummock grassland of *Triodia epactia* to 1.2 metres.
14. **STS**
Scattered tall shrubs of *Acacia aneura* and *Hakea lorea* subsp. *lorea* to 5 metres over mixed hummock / tussock grassland with occasional *Acacia* spp.
15. **STSHI**
Scattered tall shrubs of *Hakea lorea* subsp. *lorea* over scattered hummock / tussock grassland with occasional *Acacia* spp.
16. **STSA_p**
Scattered tall shrubs of *Acacia pruinocarpa* to 5 metres over scattered low trees of *Eucalyptus gamophylla* to 2.5 metres over open shrubland of *Acacia ligulata* to 2 metres over open hummock grassland of *Triodia basedowii* to 1 metre with occasional *Brachychiton gregorii*.
17. **TOSA_n**
Tall open scrub of *Acacia aneura* and *Hakea lorea* subsp. *lorea* to 8 metres over open tussock grassland.
18. **TOSA_nSS**
Tall open shrubland of *Acacia aneura* to 10 metres over scattered shrubs of *Eremophila latrobei* subsp. *filiformis* to 1.6 metres over mid-dense hummock grassland of *Triodia basedowii* to 0.6 metres.
19. **TOSA_nOsSa**
Tall open shrubland of *Acacia aneura* to 8 metres over open shrubland of *Senna artemisioides* subsp. *petiolaris* and *Acacia pachyacra* to 1.5 metres over scattered low shrubs of *Ptilotus obovatus* to 0.4 metres over very open tussock grassland of *Aristida contorta* and *Aristida laniflora* to 0.4 metres.

Clearing Description

BHP Billiton Minerals Exploration (BHP Billiton) has applied to clear up to 50 hectares of native vegetation within application areas that equal approximately 15,435 hectares (GIS Database). The proposed clearing is located approximately 75 kilometres south-east of Warburton (GIS Database).

The purpose of the proposed clearing is mineral exploration (BHP Billiton, 2009). BHP Billiton (2009) proposes to clear for the construction of drill holes, drill pads and sumps and access tracks. Vegetation will be cleared by mechanical means and vegetation and topsoil will be stockpiled for rehabilitation purposes (BHP Billiton, 2009).

Vegetation Condition

Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994).

To

Very Good: Vegetation structure altered; obvious signs of disturbance (Keighery, 1994).

Comment The vegetation condition rating is derived from information provided by Coffey Environments (2009). Coffey Environments (2009) report that the application areas have a very low weed density, however there is a medium level of human and camel disturbance.

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 proposed clearing areas are located within the Ranges of the Western Desert Register of National Estate and the Ranges of the Western Desert Redbook Area (GIS Database). The Ranges of the Western Desert are a series of mountain ranges that are the western extension of the central Australian range complex (EPA, 1974). The ranges have varied topography and geology and are therefore often high in flora diversity (EPA, 1974).

A flora and vegetation assessment of the application areas was conducted by Coffey Environments in July 2009. Coffey Environments (2009) identified a total of 186 flora species within the survey area. The most common families were the Grass family (*Poaceae*), Acacia family (*Mimosaceae*), Eucalypt family (*Myrtaceae*) and the Hibiscus family (*Malvaceae*) (Coffey Environments, 2009). Vegetation mapping by Shepherd (2007) indicates that vegetation associations 18, 19 and 236 are common and widespread with approximately 100% remaining within the state and bioregion.

Coffey Environments (2009) identified two weed species within the application areas; Buffel Grass (*Cenchrus ciliaris*) and Wild Sage (*Salvia verbenaca*). The presence of introduced weed species lowers the biodiversity value of the proposed clearing areas. Care must be taken to ensure that the proposed clearing activities do not spread or introduce weed species to non-infested areas. Should a permit be granted, it is recommended that a condition be imposed for the purpose of weed management.

A search was conducted by the assessing officer of the Department of Environment and Conservation's NatureMap database for fauna species that could potentially occur within the application areas. This search identified a total of 36 animal species that could potentially occur within the application areas, which represents a relatively low fauna diversity (DEC, 2007a). The majority of these species consisted of reptile species (DEC, 2007a).

The landforms, vegetation and habitat types occurring within the application areas are well represented within the surrounding region (Coffey Environments, 2009). The clearing of 50 hectares of native vegetation within areas that equal approximately 15,435 hectares, is unlikely to have a significant impact upon biodiversity within the region.

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

Methodology Coffey Environments (2009)
DEC (2007a)
EPA (1974)
Shepherd (2007)

(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**

A search of the Department of Environment and Conservation (DEC) databases was conducted by DEC on behalf of the proponent. This search revealed ten species of conservation significance that have previously been recorded within a 100 kilometre radius of the application areas, however, some of these species have not been officially recorded since 1873 (DEC, 2007b). The vegetation descriptions provided by Coffey Environments (2009) indicate that no rare or unusual vegetation units or landforms such as watercourses or breakaways that would be likely to represent significant fauna habitat, occur within the application areas.

Based on the moderate amount of clearing (50 hectares within approximately 15,435 hectares), and the dispersed and temporary nature of clearing (all exploration works will be rehabilitated following completion of the drilling program), it is unlikely that the proposed clearing would have a significant impact on the habitat of any fauna species.

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

Methodology Coffey Environments (2009)
DEC (2007b)

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

Comments **Proposal may be at variance to this Principle**

Coffey Environments conducted a flora and vegetation assessment of the application areas in July 2009. This

survey included a desktop survey of the Department of Environment and Conservation's (DEC's) Threatened (Declared Rare) Flora database and the DEC's Declared Rare and Priority Flora list to identify what Declared Rare Flora (DRF) species and Priority flora species could potentially occur within the survey area. Following this, a field survey was conducted between 19 July and 29 July 2009 with the aim of providing a description of the dominant vegetation communities, vegetation condition and flora species present, in addition to determining if any of the conservation significant flora identified during the desktop survey are present within the search area (Coffey Environments, 2009). The methods employed by Coffey Environments to search the survey area consisted of the following:

- Identification and delineation of major vegetation types using a combination of colour aerial photography and ground truthing;
- Sampling using relevés (plotless assessment sites) within representative vegetation types;
- Broad scale traversing throughout the study area; and
- Intensive traversing in areas which were identified as potential habitats suitable for the location of Priority flora.

Coffey Environments (2009) identified four Priority flora species within the application areas:

- *Acacia calcicola* (Priority 4) – four plants were identified;
- *Calotis latiuscula* (Priority 3) – 1,292 plants were identified;
- *Menkea lutea* (Priority 1) – one plant was identified; and
- *Microcorys macredieana* (Priority 3) – 826 plants were identified.

Acacia calcicola is a large shrub or straggly tree with yellow flowers which grows up to 5 metres in height (Coffey Environments, 2009). This species was recorded in association with calcrete (Coffey Environments, 2009). Records held by the Western Australian Herbarium (1998) indicate that this species is locally common where it occurs, however, the majority of records come from the Northern Territory which is located approximately 100 kilometres east of the application area. The Central Ranges and Great Victoria Desert regions are vast, remote areas which have been largely unsurveyed and as a result it likely that there are more populations of *Acacia calcicola* within Western Australia than have previously been identified.

Calotis latiuscula is a small erect herb with yellow flowers which grows up to 5 metres in height (Coffey Environments, 2009). Western Australian Herbarium (1998), reports that this species is generally found in sand and loam, on rocky hillsides, floodplains rocky creeks and riverbeds. Within the application areas, this species was recorded within flat clay pan habitats containing scattered Mulga over Wanderrrie grasses, particularly *Cymbopogon obtectus* (Coffey Environments, 2009). Based on the number of specimens identified (1,292 plants), the proposed clearing of 50 hectares is unlikely to affect the conservation status of this species.

Menkea lutea is a small, erect / prostrate herb with yellow flowers (Coffey Environments, 2009). This species was recorded in flat, clay pan habitat (Coffey Environments, 2009). As only one specimen of this species was identified, it is recommended that should a permit be granted, a condition be imposed for the purpose of Priority Flora management for this species.

Microcorys macredieana is a broom like shrub with white flowers which grows up to 1.5 metres in height (Coffey Environments, 2009). *Microcorys macredieana* was recorded in association with red sand dunes (Coffey Environments, 2009). Based on the number of specimens identified (826 plants), the proposed clearing of 50 hectares is unlikely to affect the conservation status of this species. Furthermore, Coffey Environments (2009) reports that sand dunes will be avoided within the application areas due to their inaccessibility.

BHP Billiton (2009) report that new tracks and drill pads will be located to avoid disturbance to the above species.

Based on the above, the proposed clearing may be at variance to this Principle. It is recommended that should a clearing permit be granted, a condition be imposed regarding Priority Flora management for *Menkea lutea*.

Methodology BHP Billiton (2009)
Coffey Environments (2009)
Western Australian Herbarium (1998)

(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 (TECs) within the areas applied to clear (GIS Database). The closest known TEC is located approximately 750 kilometres west of the application areas (GIS Database).

Coffey Environments (2009) reports that no TECs were identified during the flora and vegetation assessment of the application areas.

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

Methodology Coffey Environments (2009)
GIS Database
- Threatened Ecological Communities

(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 areas fall within the Central Ranges and Great Victoria Desert Interim Biogeographic Regionalisation of Australia (IBRA) bioregions (GIS Database). Shepherd (2007) report that approximately 100% of the pre-European vegetation still exists within these Bioregions (see table below). The vegetation within the application areas is recorded as the following Beard Vegetation Associations (Shepherd, 2007):

- Beard Vegetation Association 18: low woodland; Mulga (*Acacia aneura*);
- Beard Vegetation Association 19: low woodland; Mulga between sandridges; and
- Beard Vegetation Association 236: hummock grasslands, shrub steppe; Mulga and Mallee (Marble Gum) over hard Spinifex.

According to Shepherd (2007) approximately 100% of these vegetation associations remains within the bioregions (see table below).

Therefore, the vegetation within the application areas is not 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 - Central Ranges	4,701,520	4,700,180	~99.9	Least Concern	0.0
IBRA Bioregion - Great Victoria Desert	21,794,205	21,784,757	~99.9	Least Concern	~8.5
Beard vegetation associations - State					
18	19,892,305	19,890,195	~100	Least Concern	~2.1
19	4,385,295	4,384,243	~100	Least Concern	~0.1
236	1,626,899	1,617,261	~99.4	Least Concern	
Beard vegetation associations - Central Ranges Bioregion					
18	1,075,927	1,075,151	~99.9	Least Concern	
19	902,251	902,166	~100	Least Concern	
236	2,244	2,244	~100	Least Concern	
Beard vegetation associations - Great Victoria Desert Bioregion					
18	1,954,625	1,954,625	~100	Least Concern	~9.2
19	2,866,597	2,866,296	~100	Least Concern	
236	1,619,192	1,612,226	~99.6	Least Concern	

* 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
- Interim Biogeographic Regionalisation for Australia

(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

According to available GIS Databases there are no permanent or ephemeral watercourses within the proposed clearing areas. In addition, the vegetation units identified by Coffey Environments (2009) are not associated with watercourses. The closest minor, non-perennial watercourses are located approximately 5 kilometres east of the application areas (GIS Database).

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

Methodology Coffey Environments (2009)
GIS Database
- Hydrography, linear

(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

The application areas are reported as being within the Mann Musgrave Block subregion of the Central Ranges Interim Biogeographic Regionalisation of Australia (IBRA) bioregion and within the Central subregion of the Great Victoria Desert IBRA bioregion (GIS Database).

Within Western Australian the Mann Musgrave Block subregion is described by CALM (2002) as consisting of a high proportion of Proterozoic ranges including both volcanic and quartzites and derived soil plains, interspersed with red Quaternary sandplains with some Permian exposure.

The Central subregion is described by CALM (2002) as being an arid active sand-ridge desert with extensive dune fields of deep Quaternary aeolian sands overlying Permian strata of the Gunbarrel Basin. Landforms consist of salt lakes and major valley floors with lake derived dunes (CALM, 2002). Sand plains with extensive self dunes running east west, occasional outcroppings (breakaways) and quartzite hills provide minor relief (CALM, 2002).

Based on the sandy composition of many areas within this region, the proposed clearing may exacerbate erosion in some areas. BHP Billiton (2009) will avoid dune systems as these are untrafficable and are particularly prone to land degradation when the vegetation cover is removed. In addition, land disturbance will be limited to approximately 50 widely spaced drill holes, with minimal track clearance which will be rehabilitated within six months of the drilling programs completion (BHP Billiton, 2009).

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

Methodology BHP Billiton (2009)
CALM (2002)
GIS Database
- Interim Biogeographic Regionalisation for Australia

(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 proposed clearing areas are located within the Ranges of the Western Desert Register of National Estate (RNE) and the Ranges of the Western Desert Redbook area (GIS Database). The Ranges of the Western Desert are a series of mountain ranges that are the western extension of the central Australian range complex (EPA, 1974). The ranges have varied topography and geology and are therefore often high in flora diversity (EPA, 1974).

The proposed clearing of 50 hectares of native vegetation, in comparison to the size of the Ranges of the Western Desert RNE area and Redbook area (approximately 8,016,568 hectares; GIS Database), is unlikely to affect the conservation values of these reserves.

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

Methodology EPA (1974)
GIS Database
- Register of National Estate
- Systems 1 to 5 and 7 to 12

(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

There are no permanent or ephemeral water features in the proposed clearing areas (GIS Database). The

proposal will consist of 50 hectares of clearing scattered over a much larger area (15,435 hectares) and therefore, the proposed clearing will not have an impact upon surface water quality.

Mallee scrub land calcrete habitat is present within the survey area, which is an indication of shallow groundwater aquifers, however, the majority of the application areas comprise of Spinifex grasslands, Wanderie grassland and Mulga-Wanderie grasslands (Coffey Environments, 2009). Calcrete aquifers have the potential to be habitat for stygofauna (South Australian Museum, 2009), however, the proposed clearing of 50 hectares of native vegetation, scattered over areas that equal approximately 15,435 hectares, is unlikely to alter groundwater levels, and thereby impact stygofauna habitat. In addition, the proposed clearing is unlikely to impact groundwater quality.

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

Methodology Coffey Environments (2009)
South Australian Museum (2009)
GIS Database
- Hydrography, linear

(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

There are no permanent or ephemeral surface water features within the proposed clearing areas (GIS Database). The application areas are located within a region that has an arid climate with variable rainfall (Coffey Environments, 2009). Given the high average annual rates of evaporation (3,400 millimetres) compared to the average annual rainfall (200 - 250 millimetres), any surface water resulting from rainfall is likely to be short lived (BHP Billiton, 2009).

In consideration of the above, the clearing of 50 hectares of native vegetation in comparison to the size of the Warburton catchment area (approximately 17,195,990 hectares) (GIS Database), is not likely to lead to an increase in the incidence or intensity of flooding.

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

Methodology BHP Billiton (2009)
Coffey Environments (2009)
GIS Database
- Hydrography, linear
- Hydrographic catchments - catchments

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

Comments

There is one Native Title claim (WC04/003) over the areas under application (GIS Database). This claim has been registered with the Native Title Tribunal on behalf of the claimant group. However, the tenements have been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. 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*.

According to available databases there is one Aboriginal Site of Significance (site ID: 2888) within the application areas (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.

There were no public submissions received during the public comments period.

Methodology GIS Database
- Aboriginal Sites of Significance
- Native Title Claims

4. Assessor's comments

Comment

The proposal has been assessed against the Clearing Principles and the proposed clearing may be at variance to Principle (c), is not likely to be at variance to Principles (a), (b), (d), (f), (g), (h), (i) and (j) and is not at variance to Principle (e).

Should the permit be granted it is recommended that conditions be imposed for the purposes of weed management, rehabilitation, Priority flora management, record keeping and permit reporting.

5. References

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- CALM (2002) A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002. Department of Conservation and Land Management, Western Australia.
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- DEC (2007a) Nature Map: Mapping Western Australia's Biodiversity. Department of Environment and Conservation. Available from <http://naturemap.dec.gov.au/>. Accessed 5 November 2009.
- DEC (2007b) Threatened and Priority Fauna Database. Department of Environment and Conservation, Western Australia.
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- EPA (1974) Conservation Reserves in Western Australia - Report of the Conservation Through Reserves Committee to the Environmental Protection Authority: Section 1, Systems 1-5 "CTRC Green Book". Environmental Protection Authority, Perth.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- 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. Includes subsequent updates for 2006 from Vegetation Extent dataset ANZWA1050000124.
- South Australian Museum (2008) Underground Animals: Stygofauna. Available online from: <http://www.samuseum.sa.gov.au>. Accessed 5 November, 2009.
- Western Australian Herbarium (1998) Florabase - The Western Australian Flora. Department of Environment and Conservation. Available online from: <http://florabase.dec.wa.gov.au>. Accessed 5 November 2009.

6. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government.
CALM	Department of Conservation and Land Management, Western Australia.
DAFWA	Department of Agriculture and Food, Western Australia.
DA	Department of Agriculture, Western Australia.
DEC	Department of Environment and Conservation
DEH	Department of Environment and Heritage (federal based in Canberra) previously Environment Australia
DEP	Department of Environment Protection (now DoE), 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, Western Australia.
DoIR	Department of Industry and Resources, Western Australia.
DOLA	Department of Land Administration, Western Australia.
DoW	Department of Water
EP Act	Environment Protection Act 1986, Western Australia.
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Federal Act)
GIS	Geographical Information System.
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	Rights in Water and Irrigation Act 1914, Western Australia.
s.17	Section 17 of the Environment Protection Act 1986, Western Australia.
TECs	Threatened Ecological Communities.

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.