



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 2266/2
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: **BHP Billiton Iron Ore Pty Ltd**

1.3. Property details

Property: *Iron Ore (Mt Newman) Agreement Act 1964* :
Special Lease 3116/3687 (Lot 19 on Deposited Plan 48921, Lot 65 on Deposited Plan 48920);
Special Lease 3116/6300 (Lot 143 on Deposited Plan 48927).
Local Government Area: Shire of Ashburton & Shire of East Pilbara
Colloquial name: Cowra Siding railway upgrade and construction camp

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
72		Mechanical Removal	Railway construction or maintenance

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description The vegetation of the application area is broadly mapped as Beard Vegetation Associations 29: Sparse low woodland; mulga, discontinuous in scattered groups; and 157: Hummock grasslands, grass steppe; hard spinifex *Triodia wiseana* (GIS Database; Shepherd et al., 2001).

Ecologia Environment (Ecologia) conducted a flora survey of the application area, in October 2007 (Ecologia, 2007a). The survey included 21 vegetation quadrats and 13 transects, representing all the main vegetation associations within the application area (Ecologia, 2007a).

The following five vegetation types were identified within the application area, broadly associated with topographic features:

- 1) Plains: 1a: Moderately dense mixed *Triodia* spp. hummock grassland, with mixed *Acacia* spp. medium shrubs. 1b: Open to moderately dense *Acacia aneura* low woodland, over mixed *Acacia* spp. and mixed tussock and hummock grasses. 1c: Moderately dense *Triodia longiceps* hummock grassland. 1d: Disturbed vegetation: Mixed, occasionally moderately dense, *Acacia* spp., over mixed *Cenchrus ciliaris* and hummock grasses;
- 2) Salt plains: Moderately dense mixed low *Halosarcia* spp. shrubland;
- 3) Drainage channels: Moderately dense *Acacia monticola* tall shrubland;
- 4) Hill slopes: 4a: Open *Acacia rhodophloia* woodland, on a quartz outcrop. 4b: Moderately dense *Triodia basedowii* hummock grassland, with mixed *Acacia* spp. / *Eucalyptus* spp. shrubs; and
- 5) Low lying drainage areas: Open to moderately dense *Acacia xiphophylla* low woodland (Ecologia, 2007a).

Three weed species were recorded within the application area: Buffel Grass, *Cenchrus ciliaris*; Spiked Malvastrum, *Malvastrum americanum*; and Athel Pine, *Tamarix aphylla* (a Declared Weed) (Ecologia, 2007a).

Clearing Description

BHP Billiton Iron Ore Pty Ltd (BHP Billiton) have applied to clear up to 72 hectares (ha) of native vegetation within a total application area of approximately 184 ha, for the purposes of the duplication of a 4.4 km section of the Newman to Port Hedland railway line near Cowra Siding (approximately 100 km north of Newman), and the establishment of a 300 person construction camp and associated infrastructure. The areas cleared will include construction sites, access tracks, laydown areas, topsoil stockpiles, and borrow pits to source construction materials (BHP Billiton, 2007).

The application area is immediately adjacent to the existing railway line and road. The duplication of the railway line will occur within the existing 80m wide rail corridor, and the construction camp will be located on the same site as the previous Cowra rail camp which was used during the construction of the Newman to Port Hedland railway line in the 1970s (BHP Billiton, 2007). The construction camp will be decommissioned and the site rehabilitated, following the completion of the Newman to Port Hedland railway line duplication project (BHP Billiton, 2007).

Vegetation Condition Very Good: Vegetation structure altered; obvious signs of disturbance;
to
Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994).

Comment The vegetation condition was derived from a vegetation survey conducted by Ecologia Environment (2007a).

Clearing permit CPS 2266/1 was granted by the Department of Industry and Resources (now Department of Mines and Petroleum) on 29 May 2008 and was valid from 28 June 2008 to 1 September 2009. The clearing permit authorised the clearing of 72 hectares of native vegetation. An application for an amendment to clearing permit CPS 2266/1 was submitted by BHP Billiton Iron Ore Pty Ltd on 26 June 2009. The proponent has requested an 11 metre extension of the application area CPS 2266/1 to join up with the boundary of clearing permit CPS 2952/1 and to extend the duration of the permit to 1 September 2014. The size of the area that was approved to clear under clearing permit CPS 2266/1 will remain unchanged.

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 Fortescue sub-region of the Pilbara Bioregion of the Interim Biogeographic Regionalisation for Australia (IBRA) (GIS Database).

The application area is located immediately adjacent to an existing railway line, and the vegetation within the application area has suffered varying degrees of disturbance from access tracks, and railway construction and maintenance activities (BHP Billiton, 2007).

Flora and fauna surveys of the application area were conducted by Ecologia in 2007. The flora survey recorded 144 plant taxa from 69 genera and 33 families (Ecologia, 2007a). Two fauna surveys, (which covered the application area and an adjacent area), recorded a total of 28 fauna species, including three native and one introduced mammal species, 22 bird species, and two reptiles species (Ecologia, 2007b, 2007c).

Ecologia (2007a) considered the vegetation of the application area to represent a moderate level of diversity, compared to other recent surveys in surrounding areas. No vegetation communities of conservation significance were recorded during the survey and all the vegetation types found within the application area are well represented in the Pilbara Region (Ecologia, 2007a; GIS Database).

The application area is surrounded by the Mulga Downs and Marillana Pastoral Leases (GIS Database) and some parts of the application area have suffered disturbance from cattle grazing and weed invasion (Ecologia, 2007a).

Three weed species were recorded during the survey, including *Tamarix aphylla*, which is listed as a Declared Weed by the Department of Agriculture and Food (DAFWA) (Ecologia, 2007a). This weed species was recorded at one site in the proposed camp area (Ecologia, 2007a). The presence of introduced flora species is likely to reduce the biological diversity of the proposed clearing area. Should a clearing permit be granted, it is recommended that a condition be imposed for the purposes of weed management.

A fauna survey of the application area concluded that the habitat types occurring within the application area were well represented in the Pilbara Region, and were not of specific conservation significance (Ecologia, 2007b; 2007c). None of the fauna species recorded during the surveys were expected to be restricted to the application area (Ecologia, 2007b; 2007c).

The landforms, vegetation types and fauna habitats in the application area are well represented in the Pilbara Region, including within the Karijini National Park (BHP Billiton, 2007; Ecologia, 2007a; GIS Database). Some fauna species of conservation significance are known to occur within the application area, however these species are not expected to be significantly impacted as a consequence of the proposed clearing. The proposed clearing is unlikely to have any significant impact on the biological diversity of the region.

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

Methodology BHP Billiton (2007).
Ecologia (2007a).
Ecologia (2007b).
Ecologia (2007c).
GIS Database:
- Pre-European Vegetation
- Interim Biogeographic Regionalisation of Australia

(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

Two Level 1 fauna surveys were conducted by Ecologia over different parts of the application area, during August 2007 (Ecologia, 2007c), and September-October 2007 (Ecologia, 2007b). The first survey focused on the proposed construction camp area while the second survey covered the rail line corridor immediately to the south of the camp area (Ecologia, 2007b; 2007c). The two surveys recorded a total of 28 fauna species within the application area, including three native and one introduced mammal species, 22 bird species, and two reptiles species (Ecologia, 2007b; 2007c).

One fauna species of conservation significance was recorded within the application area (Ecologia, 2007c). The Australian Bustard, *Ardeotis australis* (P4) is listed on the Department of Environment and Conservation (DEC) Priority Fauna list of poorly known fauna. The Australian Bustard is relatively widespread in the Pilbara region and the proposed clearing is unlikely to have any significant impact on the habitat for this species.

Several other fauna species of conservation significance have the potential to occur within the project area, based on known ranges, habitat preferences, and previous sightings in surrounding areas (Ecologia, 2007b; 2007c). The following species are listed on the Wildlife Conservation (Specially Protected Fauna) Notice, 2008 and are protected under the *Wildlife Conservation Act 1950*: Night Parrot, *Pezoporus occidentalis*; and Greater Bilby, *Macrotis lagotis*. A skink, *Ctenotus uber johnstonei* (P2); and Western Pebble-mound Mouse, *Pseudomys chapmani* (P4) are listed on the DEC Priority Fauna list (Ecologia, 2007b; 2007c). Great Egret, *Ardea alba*; Cattle Egret, *Ardea ibis*; Oriental Plover, *Chadradrius veredus*; Fork-tailed swift, *Apus pacificus*; and Rainbow Bee-eater, *Merops ornatus* are migratory birds listed under the JAMBA and CAMBA international agreements (Ecologia, 2007b; 2007c).

None of the abovementioned fauna species are likely to be specifically dependant on habitats found within the application area, although they may use the project area as part of a foraging ground (Ecologia, 2007c). The fauna habitats occurring within the application area are well represented within the Karijini National Park, and in the Pilbara region generally (Ecologia, 2007c). The area proposed to clear is immediately adjacent to an existing railway line and road. The application area has suffered previous disturbance from railway construction and maintenance activities, grazing, and weed invasion, and is unlikely to represent an area of significant fauna habitat in comparison to other undisturbed areas in the region.

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

Methodology Ecologia (2007b).
Ecologia (2007c).

(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

The nearest known Declared Rare Flora are six populations of *Lepidium catapycnon* which occur approximately 46km south-east of the application area (GIS Database). Department of Environment and Conservation (DEC) databases have no records of any other populations of Declared Rare or Priority flora within a 50km radius of the areas applied to clear (GIS Database).

Based on known distributions and habitat preferences Ecologia (2007a) considered that one species of Declared Rare Flora (*Lepidium catapycnon*) and twenty one species of Priority Flora had the potential to occur within the application area.

Ecologia conducted a flora survey of the application area in October 2007 (Ecologia, 2007a). No species of Declared Rare or Priority Flora were recorded during the flora survey. Two species previously listed as Priority Flora were recorded within or in the vicinity of the application area. *Abutilon trudgenii* was recorded within the application area (Ecologia, 2007a). This species was previously listed as a Priority 3 species, however it is now classified on the DEC Florabase database as 'not threatened' (Western Australian Herbarium, 1998-2008). *Sida* sp. Wittenoom was recorded in a previous survey to the north of the application area (BHP Billiton, 2007). This species was previously listed as a Priority 3 species. However, the taxonomy of this species has been reviewed and it has now been incorporated into *Sida arsinjata*, which is classified as 'not threatened' (Western Australian Herbarium, 1998-2008).

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

Methodology BHP Billiton (2007).
Ecologia (2007a).
Western Australian Herbarium (1998-2008).
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 area applied to clear (GIS Database). The nearest known TECs are the *Themeda* grassland communities located approximately 100 km west of the application area (GIS Database). Due to the distance from the application area, these ecosystems are unlikely to be affected by the proposed clearing.

Ecologia (2007a) reported that no threatened ecological communities were identified during the flora survey of the application area.

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

Methodology Ecologia (2007a).

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 area falls within the IBRA Pilbara Bioregion. Shepherd et al. (2001) report that approximately 99.9% of the pre-European vegetation still exists in this Bioregion. The vegetation in the application area is recorded as Beard Vegetation Associations 29: Sparse low woodland; mulga, discontinuous in scattered groups; and 157: Hummock grasslands, grass steppe; hard spinifex *Triodia wiseana* (GIS Database; Shepherd et al.). According to Shepherd et al., (2001) there is approximately 100% of each of these vegetation types remaining (see table below).

Therefore the vegetation within the application area 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**	% of Pre-European area in IUCN Class I-IV Reserves
IBRA Bioregion - Pilbara	17,804,164	17,794,651	~99.9	Least Concern	6.3
Beard vegetation associations - WA					
29	7,904,064	7,904,064	~100	Least Concern	0.3
157	502,737	501,522	~99.8	Least Concern	17.2
Beard vegetation associations - Pilbara Bioregion					
29	1,133,228	1,133,228	~100	Least Concern	1.9
157	198,636	198,522	~99.9	Least Concern	5.7

* Shepherd et al. (2001) updated 2005.

** 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 et al. (2001).

GIS Database:

- Pre-European Vegetation

(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 at variance to this Principle

There are no permanent watercourses or wetlands within the area proposed to clear (GIS Database). A few minor ephemeral drainage lines run through this area. These drainage lines are dry for most of the year, only flowing briefly immediately following significant rainfall (BHP Billiton, 2007).

The Fortescue Marshes surround the application area on the northern, eastern and western sides, approximately 500 m away from the boundary of the application area at the nearest point. The Fortescue

Marshes are listed in A Directory of Important Wetlands in Australia (formerly known as ANCA Wetlands) (GIS Database). The wetland area meets the following four criteria (out of a possible six) for inclusion in the Directory of Important Wetlands:

1. It is a good example of a wetland type occurring within a biogeographic region in Australia.
2. It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex.
3. It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail.
6. The wetland is of outstanding historical or cultural significance.

(DEH, 2001)

The defined wetland area covers approximately 100,000 ha and comprises an area of floodplains, lakes, marshes and pools associated with the Fortescue River (DEH, 2001).

The proposed clearing disturbance area is located approximately 500 m away from the Fortescue Marshes (GIS Database), and at this distance the proposed clearing is unlikely to have any significant impact on the conservation values of the Fortescue Marshes.

Based on the above, the proposal is at variance to this Principle. However, the proposed clearing is unlikely to result in any significant impact to any watercourse or wetland.

Methodology BHP Billiton (2007).
DEH (2001).
GIS Database:
- ANCA, Wetlands
- Clearing Regulations - Environmentally Sensitive Areas
- Hydrography, linear
- Geodata, Lakes
- Rivers

(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 area is broadly mapped as falling within the Adrian Land System (GIS Database).

The Adrian Land System consists of stony plains and low silcrete hills supporting hard spinifex grasslands. This land system has a low risk of erosion, and the vegetation on this land system is generally not prone to degradation (Van Vreeswyk et al., 2004).

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

Methodology Van Vreeswyk et al. (2004).
GIS Database:
- 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 nearest DEC managed land is the Karijini National Park, approximately 23 km west of the application area (GIS Database).

When the Newman to Port Hedland railway line was constructed in the 1970s, the rail corridor and associated construction camp areas were excised from the surrounding pastoral stations. The majority of the current clearing permit application area is surrounded by the Mulga Downs pastoral lease, while approximately 400 m of the rail corridor at the southern end of the application area is surrounded by the Marillana pastoral lease (GIS Database). Sections of these two pastoral stations have been selected by DEC for addition to the conservation estate in 2015 when the pastoral leases expire (GIS Database). However, the rail corridor itself will remain separate from the conservation area. The Marillana proposed conservation area is immediately adjacent to the southern end of the clearing permit application area (GIS Database). The Mulga Downs proposed conservation area is located approximately 7.5 km east of the clearing permit application area (GIS Database).

The proposed additional clearing in previously disturbed areas and immediately adjacent to the existing road and rail corridor is unlikely to result in any significant impact to the environmental values of these future conservation areas.

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

Methodology GIS Database:
- CALM Managed Lands and Waters
- Pastoral Leases
- CALM proposed 2015 pastoral lease exclusions

(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 proposed clearing is for the establishment of a railway construction camp, and the duplication of a section of the existing Newman to Port Hedland railway line (BHP Billiton, 2007). The application area has suffered previous disturbance from rail construction and maintenance activities (BHP Billiton, 2007; GIS Database), and the small area of additional clearing within the existing rail corridor and previously disturbed camp area is unlikely to have any impact on ground water level or quality.

The Fortescue Marshes surround the application area on the northern, eastern and western sides, approximately 500 m away from the boundary of the application area at the nearest point (GIS Database). There are no permanent watercourses or wetlands within the area proposed to clear (GIS Database). The proposed camp area is located at the northern end of the application area, on the previous site of a construction camp which was used while the Newman to Port Hedland railway line was being built in the 1970s (BHP Billiton, 2007). The camp area is relatively flat and the proposed clearing is unlikely to result in significant changes to surface water flows. A few minor ephemeral drainage lines run through the application area (GIS Database). These drainage lines only flow briefly immediately following significant rainfall (BHP Billiton, 2007). The application area is located in an arid region, with an average annual rainfall of approximately 300 mm falling mainly during the summer months, and an average annual evaporation rate of approximately 3700 mm (BHP Billiton, 2007; CALM, 2002), hence the presence of surface water resulting from significant rain events is relatively short-lived. The proposed clearing of previously disturbed vegetation is unlikely to have any significant impact on surface water flows or quality.

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

Methodology BHP Billiton (2007).
CALM (2002).
GIS Database:
- Hydrography, linear
- Mount George 50cm Orthomosaic - Landgate04

(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 watercourses within the application area. A few minor ephemeral drainage lines run through the application area. These drainage lines are dry for most of the year, only flowing briefly immediately following significant rainfall (BHP Billiton, 2007).

The application area drains into both the Fortescue River and Fortescue River Upper catchment areas (GIS Database). Natural flooding occurs occasionally within these catchment areas during the wet season (November to March) following significant rainfall (BHP Billiton, 2007). However, the relatively small area to be cleared (72 ha) in relation to the size of the two catchment areas (1,860,784 ha and 2,975,192 ha, respectively) (GIS Database) is unlikely to cause or exacerbate 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 (2007).
GIS Database:
- Hydrographic Catchments - Catchments

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

Comments This clearing permit application was referred to the EPA by DoIR, as the proposed clearing area is in close proximity to the Fortescue Marshes, which are listed in A Directory of Important Wetlands in Australia, and triggered one of the referral criteria in the Memorandum of Understanding between DoIR and the EPA. The EPA determined that the proposed vegetation clearing could be adequately managed by the Clearing Regulations under Part V of the *Environmental Protection Act 1986* (EPA, 2008). However, the EPA advised that a Works Approval and/or Licence under Part V of the *Environmental Protection Act 1986* may be required for the construction project. The proponent is advised to liaise with the Department of Environment and Conservation in this regard. The EPA further advised that if the project included construction of a waste-water treatment plant, approval would need to be obtained from the Executive Director Public Health, via the Local Authority. The EPA advised that construction works cannot commence until all the necessary approvals are obtained (EPA, 2008).

There is one native title claim (WC98-062) over the area under application. This claim has been registered with the National Native Title Tribunal on behalf of the claimant group. However, the tenement 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 known Aboriginal sites of significance within the vicinity of the application area (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Sites of Aboriginal 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.

Clearing permit CPS 2266/1 was granted by the Department of Industry and Resources (now Department of Mines and Petroleum) on 29 May 2008 and was valid from 28 June 2008 to 1 September 2009. The clearing permit authorised the clearing of 72 hectares of native vegetation. An application for an amendment to clearing permit CPS 2266/1 was submitted by BHP Billiton Iron Ore Pty Ltd on 26 June 2009. The proponent has requested an 11 metre extension of the application area CPS 2266/1 to join up with the boundary of clearing permit CPS 2952/1 and to extend the duration of the permit to 1 September 2014. The size of the area that was approved to clear under clearing permit CPS 2266/1 will remain unchanged.

Methodology BHP Billiton (2007).
EPA (2008).
GIS Database:
- Aboriginal Sites of Significance
- Native Title Claims

4. Assessor's comments

Comment

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

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

5. References

- BHP Billiton (2007) Cowra Siding. Rail duplication and Line Camp. Application to Clear Native Vegetation (Purpose Permit). Supporting Documentation. BHP Billiton Iron Ore Pty Ltd, Western Australia.
- CALM (2002) A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002. Department of Conservation and Land Management, Western Australia.
- DEH (2001) A Directory of Important Wetlands in Australia. Third Edition. Environment Australia. Department of the Environment and Heritage, ACT.
- 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.
- Ecologia (2007a) RGP5 - Cowra to Kurrajurra Sidings and Cowra Camp Site Flora and Vegetation Survey. Ecologia Environment, Western Australia.
- Ecologia (2007b) RGP5 - Kurrajurra to Cowra Fauna Survey. Ecologia Environment, Western Australia.
- Ecologia (2007c) RGP5 - Redmont / Cowra Camp and Borrow Areas. Fauna Survey. Ecologia Environment, Western Australia.
- EPA (2008) Clearing of approximately 72 ha of native vegetation for duplication of a section of the Newman to Port Hedland railway line and associated infrastructure. Not Assessed - Managed under Part V of EP Act (Works Approval and Clearing). A letter from EPA to Department of Industry and Resources. Environmental Protection Authority, Western Australia.
- 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., Beeston, G.R. and Hopkins, A.J.M. (2001) Native Vegetation in Western Australia, Extent, Type and Status. Resource Management Technical Report 249. Department of Agriculture, Western Australia.
- Van Vreeswyk, A.M.E., Payne, A.L., Hennig, P., and Leighton, K.A. (2004) An Inventory and Condition Survey of the Pilbara Region, Western Australia. Department of Agriculture, Western Australia.
- Western Australian Herbarium (1998-2008) FloraBase - The Western Australian Flora. Department of Environment and Conservation. <http://florabase.dec.wa.gov.au/>

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	<i>Environment Protection Act 1986</i> , Western Australia.
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (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	<i>Rights in Water and Irrigation Act 1914</i> , Western Australia.
s.17	Section 17 of the <i>Environment Protection Act 1986</i> , 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.