



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 3827/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: BC Iron Limited

1.3. Property details

Property: Miscellaneous Licence 46/79
Miscellaneous Licence 46/83

Local Government Area: Shire of East Pilbara

Colloquial name: Nullagine Project

1.4. Application

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

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. The following Beard Vegetation Association has been mapped over the application areas (GIS Database):

Beard Vegetation Association 173: hummock grasslands, shrub steppe, Kanji over soft Spinifex and *Triodia wiseana* on basalt.

Flora and vegetation surveys of an area that included the application areas were conducted by Astron Environmental Services in June, July, August and September 2008. The following vegetation communities were identified within the application areas (Astron Environmental Services, 2008):

Hills and Ridges

H1a
Corymbia hamersleyana scattered low trees over mixed *Acacia* spp. scattered shrubs to shrubland over *Triodia epactia* hummock grassland.

H3a
Eucalyptus leucophloia scattered low trees over mixed *Acacia* spp. scattered shrubs to shrubland over *Triodia epactia* hummock grassland.

H3e
Eucalyptus leucophloia scattered low trees over mixed *Senna* spp. scattered shrubs over *Triodia brizoides* hummock grassland.

H8a
Acacia aneura and *Acacia pruinocarpa* low woodland over mixed *Eremophila* shrubland over *Triodia pungens* hummock grassland.

H9a
Mixed *Acacia* spp. scattered shrubs to shrubland over *Triodia epactia* hummock grassland.

H9c
Mixed *Acacia* spp. scattered shrubs to shrubland over *Triodia brizoides* hummock grassland.

H10a
Mixed *Senna* spp. scattered shrubs over *Triodia epactia* hummock grassland.

H13a
Mixed scattered shrubs to shrubland over mixed *Cymbopogon ambiguus* open tussock grassland / hermland.

Creeklines (major and minor) and floodplains

D1a
Corymbia hamersleyana scattered trees over mixed *Acacia* spp. scattered shrubs to shrubland over *Triodia epactia* hummock grassland.

D2a
Corymbia hamersleyana scattered low trees to low woodland over mixed *Acacia* spp. scattered shrubs to shrubland over mixed *Triodia epactia* hummock / *Cenchrus* spp. tussock grassland.

D3a

Corymbia hamersleyana scattered trees over scattered mixed shrubs over mixed *Cymbopogon ambiguus* tussock grassland / *Cyperus vaginatus* sedgeland.

D5a

Eucalyptus leucophloia scattered trees over mixed *Acacia* spp. shrubland over *Triodia epactia* hummock grassland.

D6a

Eucalyptus victrix woodland over *Melaleuca* spp. high shrubland over mixed *Triodia epactia* hummock / *Cenchrus* spp. tussock grassland / *Cyperus vaginatus* sedgeland.

D6b

Eucalyptus victrix woodland over *Melaleuca* spp. high shrubland over mixed *Triodia longiceps* hummock / *Cenchrus* spp. tussock grassland / *Cyperus vaginatus* sedgeland.

D6c

Eucalyptus victrix woodland over mixed *Acacia* spp. shrubland over mixed *Triodia longiceps* hummock / *Cenchrus* spp. tussock grassland.

D7b

Eucalyptus victrix woodland over *Melaleuca* spp. high shrubland over *Cenchrus* spp. tussock grassland.

D8a

Mixed *Acacia* spp. shrubland over *Triodia epactia* hummock grassland.

D9a

Mixed *Acacia* spp. shrubland over mixed *Triodia epactia* hummock / *Cenchrus ciliaris* tussock grassland / herbland.

D13a

Mixed *Grevillea pyramidalis* subsp. *leucadendron* shrubland over *Cenchrus ciliaris* tussock grassland / herbland.

D16a

Mixed *Cenchrus* spp. tussock grassland.

Plains – cracking clay**PC1a**

Mixed scattered shrubs over mixed herbland and mixed *Dichanthium sericeum* subsp. *humilius* tussock grassland.

PC1b

Mixed low shrubs over *Ptilotus gomphrenoides* herbland and mixed *Panicum laevinode* open tussock grassland.

Plains – clay**P_c3a**

Acacia synchronicia scattered shrubs over mixed *Aristida contorta* tussock grassland / scattered *Triodia epactia* / herbland.

Clearing Description

BC Iron (2010) has applied to clear up to 52.1 hectares of native vegetation within an area totalling approximately 270 hectares (GIS Database). The application areas are located approximately 20 kilometres south-east of Nullagine.

The application is for the construction of a haul road and associated infrastructure (BC Iron, 2010). Clearing will be by mechanical means.

Vegetation Condition

Degraded: Structure severely disturbed; regeneration to good condition requires intensive management (Keighery, 1994);

To

Pristine: No obvious signs of disturbance (Keighery, 1994).

Comment

The vegetation condition was assessed by botanists from Astron Environmental Services in 2008. The vegetation within the application areas has been impacted by grazing, fire and weed infestations (Astron Environmental Services, 2008).

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 at variance to this Principle**

The application areas are located within the Chichester subregion of the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). CALM (2002) reports that high species and ecosystem diversity is focussed around hummock grasslands, which host reptile and small mammal communities, and around the cracking clay communities of the Chichester Range and Mungaroona Range.

Four flora and vegetation surveys of an area that included the application areas were conducted by Astron Environmental Services across five months from June to September 2008. Astron Environmental Services (2008) identified a total of 462 native vascular flora species representing 172 genera from 58 families. The

dominant families were represented by the Grass family (*Poaceae*), Hibiscus family (*Malvaceae*), Pea family (*Papilionaceae*) and the *Acacia* family (*Mimosaceae*) (Astron Environmental Services, 2008).

Astron Environmental Services (2008) reports that the area is floristically diverse with over 50% of the species recorded being present in only one or two of the surveyed 71 quadrats. The quadrats displaying the highest species richness (and containing infrequently present species) were generally associated with recently burnt areas (Astron Environmental Services, 2008). No Declared Rare Flora or Threatened Ecological Communities have been recorded within the application areas (Astron Environmental Services, 2008).

A flora survey conducted by Astron Environmental Services (2008) has identified the Priority Flora species *Iotasperma sessilifolius* (P3) and *Swainsona* sp. Hamersley Station (P3) within the application areas. Furthermore, the regionally significant species *Vigna* sp. Hamersley Clay was recorded within the application areas. The Western Australian Herbarium's FloraBase indicates that *Vigna* sp. Hamersley Clay and *Iotasperma sessilifolius*, whilst uncommon, have quite widespread populations across the north of Western Australia (Western Australian Herbarium, 1998-). *Swainsona* sp. Hamersley Station is reported by Astron Environmental Services (2008) as representing a significant range extension on previous recordings. Four locations of *Swainsona* sp. Hamersley Station were recorded within the Nullagine Project area, one of which occurs within the application areas (Astron Environmental Services, 2008). The co-ordinates of significant flora species provided by Astron Environmental Services (2008) indicates that none of the Priority species listed above are restricted to the application areas. Given this, it is considered unlikely that the proposed clearing will affect the conservation status of any Priority Flora species.

Astron Environmental Services (2008) reports that one Priority Ecological Community (PEC), 'Plant Assemblages of the Wona System' (Priority 3), occurs within the application areas. The vegetation unit that corresponds to this PEC is PC1b ('Plains – cracking clay: mixed low shrubs over *Ptilotus gomphrenoides* herbland and open tussock grassland') (Astron Environmental Services, 2008). This PEC is threatened by preferential grazing from cattle and kangaroos (Astron Environmental Services, 2008). Straten (2010) reports that a small section of this PEC is intersected by the southern end of the proposed haul road. Astron Environmental Services (2008) states that the impact of the proposed haul road on the area of Wona land system it passes through is mitigated by the fact that it is close to the western edge of what is quite a large area of the unit. Given the small area of PEC to be affected by the proposed clearing, the proposed clearing is unlikely to affect the conservation status of this PEC.

The Mulga woodland vegetation (vegetation association H8a) was identified by Astron Environmental Services (2008) as being significant. This woodland has been classed as significant as it is an isolated substantial occurrence at the northern limit of its known range (Astron Environmental Services, 2008). Approximately 7.32 hectares of the total 120 hectares (6.1% of the total vegetation unit) mapped for this area will be disturbed by the proposal (Astron Environmental Services, 2008). Given the amount of this vegetation association that will remain undisturbed within the general area, the proposed clearing is unlikely to have a significant impact upon this vegetation type.

Numerous weed species were identified within the application areas (Astron Environmental Services, 2008). 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. The risk of spreading weed species can be mitigated by imposing a condition for the purpose of weed management.

Bamford Consulting Ecologists (Bamford) conducted fauna surveys of an area that included the application areas in June/July 2008 and October 2008. Bamford (2009) recorded a total of 115 fauna species during the field surveys, including one fish, three frogs, 35 reptiles, 62 birds and 14 mammal species. Bamford (2009) reports that this fauna assemblage is typical of the northern Pilbara region, with many species being widespread. However, eight fauna species of conservation significance have been recorded within the survey area (Bamford, 2009).

Based on the above, the proposed clearing is at variance to this Principle.

Methodology Astron Environmental Services (2008)
Bamford (2009)
CALM (2002)
Western Australian Herbarium (1998-)
GIS Database
- IBRA WA (Regions - Subregions)

(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 may be at variance to this Principle**

Bamford Consulting Ecologists conducted fauna surveys of an area that included the application areas in June/July 2008 and October 2008. These surveys consisted of a desktop survey in addition to field based surveys (Bamford, 2009).

These field surveys identified the following conservation significant fauna within the survey area (Bamford,

2009):

- Pilbara Olive Python (*Liasis olivaceus barroni*) – Vulnerable;
- Australian Bustard (*Ardeotis australis*) – Priority 4;
- Bush Stone-curlew (*Burhinus grallarius*) – Priority 4;
- Rainbow Bee-eater (*Merops ornatus*) – Migratory;
- Star Finch (*Neochima ruficauda subclarescens*) – Priority 4;
- Striated Grasswren (*Amytornis striatus striatus*) – Priority 4;
- Northern Quoll (*Dasyurus hallucatus*) – Endangered; and
- Western Pebble-mound Mouse (*Pseudomys chapmani*) – Priority 4.

Strategen (2010) reports that Bamford (2009) has mapped the following habitats within the application areas:

Spinifex and grassland plains

Spinifex plains on loam soils support a rich reptile fauna and may have populations of a number of significant mammal species (Bamford, 2009). Within the project area this landform / vegetation type is associated with broad, shallow valleys and can be directly impacted by mining operations and the construction of access roads (Bamford, 2009).

Rocky Hills

The Chichester Ranges and surrounding areas are comprised of undulating rocky hills which are dissected by small gorges and gullies (Bamford, 2009). These hills are generally vegetated by low grasslands and sparse shrublands. Soils are a thin gravely-loam with a lot of exposed rock (Bamford, 2009). Undulating hills are widespread in the project area and in the general region (Bamford, 2009). Strategen (2010) reports that this habitat makes up most of the areas targeted for mining. Bamford (2009) states that impacts to this habitat may be high at a local level, however, on a regional scale this habitat is well represented.

Ephemeral drainage lines

These drainage systems occur on upland areas and across the plains, where they channel water into the major watercourses. Ephemeral drainage lines are often more densely vegetated and therefore, act as refugia for some animals that may forage in surrounding habitats (e.g. many species of birds). Bamford (2009) reports that the significance of impacts to ephemeral drainage lines is moderate to high based on the possibility of conservation significant fauna species being present within this habitat. Bamford (2009) reports that this habitat is well represented on a regional scale.

Strategen (2010) states that the principle habitats to be affected by the proposed clearing are Spinifex and grassland plains and rocky hills.

The Northern Quoll is often associated with rocky areas along watercourses in the Pilbara (Bamford, 2009). Within the Nullagine project area it has been found within gorges and gullies habitat. This habitat is not present in the application areas and furthermore, Strategen (2010) reports that no Northern Quoll dens were found within the application areas.

The Pilbara Olive Python is often found near waterholes (Bamford, 2009). Although the Pilbara Olive Python may pass through the application areas, the vegetation associations of the application areas do not represent significant habitat for this species (Bamford, 2009).

The Western Pebble-mound Mouse mounds were recorded during the fauna surveys (Bamford, 2009). Within the Nullagine project area, 72 mounds of this species were found, of which 51 (71%) were active (Bamford, 2009). The majority of Western Pebble-mound Mouse mounds fall outside of the proposed haul road route (Strategen, 2010). The Western Pebble-mound Mouse is a fairly widespread species (Van Dyck and Strahan, 2008), and the preferred habitat of this species is widespread locally and regionally (Bamford, 2009). Given the number of mounds located outside of the application areas, the proposed clearing is not likely to affect the conservation status of this species.

Strategen (2010) reports that linear infrastructure, such as roads and access tracks may fragment habitats and present a barrier to the movement of small species. The areas of disturbance are likely to be small within the overall landscape however, where disturbance intersects linear habitats (such as ephemeral watercourses), it is possible that habitats may be separated. Strategen (2010) states that the impact to these habitats is likely to be minimal given the dimensions of the clearing proposal and quite widespread occurrence of ephemeral watercourses in the area.

BC Iron (2010) has a flora, vegetation and habitat management plan and a terrestrial fauna management plan in place to manage impacts to fauna species and significant fauna habitat.

Based on the above, the proposed clearing may be at variance to this Principle.

Methodology Bamford (2009)
BC Iron (2010)
Strategen (2010)
Van Dyck and Strahan (2008)

(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 databases there are no records of Declared Rare Flora (DRF) within the application areas (GIS Database).

Astron Environmental Services (2008) conducted flora surveys over the application areas on four separate occasions between May and September 2008. No DRF were recorded during the surveys (Astron Environmental Services, 2008).

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

Methodology Astron Environmental Services (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 (TECs) within the areas applied to clear (GIS Database). There are no known TECs within 100 kilometres of the application areas (GIS Database).

Astron Environmental Services (2008) reports that no TECs were identified within the application areas during the flora and vegetation survey.

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

Methodology Astron Environmental Services (2008)
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 areas fall within the Pilbara Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). Shepherd (2007) reports that approximately 99.9% of the pre-European vegetation remains within this bioregion (see table below). The vegetation within the application areas has been mapped as the following Beard Vegetation Association (Shepherd, 2007):

- 173: hummock grasslands, shrub steppe; Kanji over soft Spinifex and *Triodia wiseana* on basalt.

According to Shepherd (2007) approximately 100% of this Beard Vegetation Association remains at both the state and regional level. Therefore, the area proposed to be cleared is not a 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	17,804,187	17,794,646	~99.9	Least Concern	~6.3
Beard veg assoc. – State					
173	1,421,376	1,421,376	~100	Least Concern	~4.8
Beard veg assoc. – Bioregion					
173	1,420,793	1,420,793	~100	Least Concern	~4.8

* 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 - Subregions)

(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

According to available databases there are numerous minor ephemeral watercourses and one major ephemeral watercourse transecting the application areas (GIS Database). Astron Environmental Services (2008) has recorded 12 vegetation associations within the application areas that are associated with minor creeklines and floodplains.

Based on the above, the proposed clearing is at variance to this Principle.

Strategen (2010) states that where haul roads and access tracks cross minor ephemeral lines, water can potentially pond. The ponding of water behind roads and track crossings has the potential to increase the length of time the water remains in that section of the creek which may affect the vegetation community and subsequently the fauna habitat (Strategen, 2010).

Strategen (2010) states that as all the ephemeral watercourses that will need to be crossed are small in size and are fed by a very small catchment, the likelihood of ponding is very low. Furthermore, Strategen (2010) claims that local hydrogeological conditions are not expected to significantly alter any vegetation communities or associated fauna habitats as a result of the project.

Methodology Astron Environmental Services (2008)
Strategen (2010)
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 have been mapped as occurring within the Bonney, McKay, Rocklea and Wona land systems (GIS Database). Van Vreeswyk et al. (2004) reports that these land systems are not generally susceptible to erosion.

Strategen (2010) reports that changes to the flow paths or any modification or interruption to the existing hydrological regime have the potential to increase or decrease the volume of water being transported. Changes to the flow volumes have the potential to increase erosion and sedimentation, ponding or the development of water shadows (Strategen, 2010). Strategen (2010) states that the haul road route avoids the majority of the only vegetation community (H8a) that relies on overland flow. Strategen (2010) states that as all the ephemeral creeks that will need to be crossed are small in size and are fed by a very small catchment, the likelihood of ponding occurring is minor. It is reported by Strategen (2010) that the haul roads are not expected to significantly affect surface water flow or volume.

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

Methodology Strategen (2010)
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

According to available databases, the application areas are not located within a conservation area or any DEC managed lands (GIS Database). The nearest conservation reserve is Meentheena Station which is a former leasehold land (GIS Database). Meentheena Station is located approximately 67 kilometres north-east of the application areas (GIS Database). Given this distance, the proposed clearing is unlikely to impact the environmental values of any conservation area.

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

Methodology GIS Database
- DEC Tenure

(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

Strategen (2010) reports that changes to the flow paths or any modification or interruption to the existing hydrological regime have the potential to increase or decrease the volume of water transported. Changes to the flow volumes have the potential to increase erosion and sedimentation, ponding or the development of

water shadows.

Strategen (2010) reports that drainage works such as waterway crossings, floodways, bunds, culverts and diversions will be required to enable continuous use of the road but will be designed in accordance with standard practice to minimise disruption to surface flows. Strategen (2010) states that the haul road route avoids the majority of the only vegetation community (H8a) that relies on overland flow. Strategen (2010) states that as all the ephemeral creeks that will need to be crossed are small in size and are fed by a very small catchment, the likelihood of ponding occurring is minor. Strategen (2010) will implement a Surface Water Management Plan to manage impacts to surface water quality. It is reported by Strategen (2010) that the haul roads are not expected to significantly affect surface water flow or volume.

Astron Environmental Services (2008) reports that the groundwater is contained within fractures in the basaltic rocks, shales and iron formations and may be deep below the surface. Recharge is episodic and resultant of direct rainfall infiltration over areas where rocks are fractured, jointed and weathered (Astron Environmental Services, 2008). The groundwater is generally fresh but may be brackish in parts (Astron Environmental Services, 2008).

The proposed clearing of 52.1 hectares, for a linear haul road, is unlikely to cause a significant deterioration in the quality of surface or underground water.

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

Methodology Astron Environmental Services (2008)
Strategen (2010)

(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 numerous non-perennial watercourses within the application areas (GIS Database).

Natural flooding occurs seasonally in the Pilbara region as a result of cyclonic activity and sporadic thunderstorm activity (Strategen, 2010). The non-perennial watercourses within the application areas would experience natural seasonal flooding from the runoff of surface water during and following significant rainfall events (Strategen, 2010).

Strategen (2010) reports that the proposed clearing will not affect water levels or drainage.

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

Methodology Strategen (2010)
GIS Database
- Hydrography, linear

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

Comments
There is one Native Title claim (WC99/016) 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 are numerous Aboriginal Sites of Significance 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.

It is noted that the proposed clearing may impact on a protected matter under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*. The proponent may be required to refer the project to the (Federal) Department of the Environment, Water, Heritage and the Arts (DEWHA) for environmental impact assessment under the *EPBC Act*. The proponent is advised to contact the DEWHA for further information regarding notification and referral responsibilities under the *EPBC Act*.

The clearing permit application was advertised 26 July 2010 by the Department of Mines and Petroleum, inviting submissions from the public. No submissions were received.

Methodology GIS Database
- Aboriginal Sites of Significance

4. Assessor's comments

Comment

This application has been assessed against the clearing principles, planning instruments and other matters in accordance with s.51O of the *Environmental Protection Act 1986*, and the proposed clearing is at variance to Principles (a) and (f), may be at variance to Principle (b), is not likely to be at variance to Principles (c), (d), (g), (h), (i) and (j) and is not at variance to Principle (e).

5. References

- Astron Environmental Services (2008) Nullagine Project: Flora and Vegetation Survey: May - September 2008. Unpublished report. Astron Environmental Services, Western Australia.
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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.
- 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.
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- Van Dyck, S. and Strahan, R. (eds.) (2008) The Mammals of Australia. Third Edition. New Holland Publisher (Australia) Pty Ltd, 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) 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	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.