



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 2890/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Hamersley Iron Pty Ltd

1.3. Property details

Property: Iron Ore (Hamersley Range) Agreement Act 1963, Mineral Lease 4SA (AML 70/4)
Local Government Area: Shire Of Ashburton
Colloquial name: Mt Tom Price Iron Ore Mine – North Deposit 5 Waste Dump

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
7.3		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 1:250,000 scale for the whole of Western Australia and are useful to look at vegetation extent in a regional context. Two Beard vegetation associations are located within the application area (GIS Database):

82 - Hummock Grasslands, low tree steppe; snappy gum over *Triodia wiseana*. According to the Shared Land Information Platform (SLIP, 2008), Beard vegetation association 82 is a grassland dominated by *Triodia wiseana*, with emergent trees of *Eucalyptus leucophloia* and *E. gamophylla*, with various emergent shrubs including *Senna artemisioides ssp. sturtii*, *Dodonaea viscosa*, *Grevillea wickhamii*, *Hakea lorea* and *Senna pleurocarpa var. pleurocarpa*.

567 - Hummock grasslands, shrub steppe; mulga & kanji over soft spinifex & *T. basedowii*. According to the Shared Land Information Platform (SLIP, 2008), Beard vegetation association 567 is a shrubland dominated by *Acacia aneura*, with sub-dominants of *Senna sp.*, *A. pruinocarpa*, *A. xiphophylla* and *Eremophila sp.*

Keith Lindbeck and Associates conducted a vegetation survey over the application area and surrounding vegetation between November 2006 and March 2007. As a result, two vegetation types were identified as occurring within the application areas (Keith Lindbeck and Associates, 2007). These were:

H5 - *Eucalyptus leucophloia* and *Corymbia hamersleyana* low open woodland over high shrubland over *Triodia wiseana* hummock grassland with open tussock grassland. Located on smooth rocky slopes.

H12 - *Eucalyptus leucophloia* scattered low trees over high open shrubland over *Triodia wiseana* hummock grassland. Located in broad sub-valleys with moderate slopes.

Clearing Description Hamersley Iron Pty Ltd has applied to clear 7.3 ha of native vegetation for the purpose of creating and extending a waste dump. Vegetation will be cleared via mechanical means.

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

Comment Vegetation condition is based on description provided by Keith Lindbeck and Associates (2007). The vegetation was described as being in a regrowth stage following a fire between two and five years ago.

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 may be at variance to this Principle**
The application area occurs within the Hamersley (PIL3) Interim Biogeographic Regionalisation of Australia (IBRA) sub-bioregion (GIS Database). This sub-bioregion is characterised by Mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges (CALM, 2002). The vegetation described within the application area (Keith Lindbeck and Associates, 2007) is typical of the bioregion.

A vegetation survey of the application area and surrounding vegetation (total area surveyed - 17.2 km²) identified 295 flora species from 49 Families (Keith Lindbeck and Associates, 2007). This is considered to be biologically diverse. It was noted during the flora survey that approximately 35% of the area surveyed was cleared. Poaceae, Malvaceae, Mimosaceae, Asteraceae, Papilionaceae, Amaranthaceae, and Myoporaceae families are particularly diverse within the application area (Keith Lindbeck and Associates, 2007). This is typical of the floristics of the Pilbara IBRA Region.

An area search of the Western Australian Museum's Faunabase conducted by the assessing officer suggests that the application area is diverse in reptile species, particularly Skinks and Geckos (Western Australian Museum, 2008). The database search found 63 reptile species from 9 Families as potentially occurring within the application area, or within 50 km of the application area. 53 avian fauna species from 23 Families have also been recorded within 50 km of the application area, reflecting the diverse range of habitats available.

Five alien weed species were recorded within the vegetation survey area (Keith Lindbeck and Associates, 2007). Weeds have the potential to alter the biodiversity of an area, competing with native vegetation for available resources and making areas more fire prone. This in turn can lead to greater rates of infestation and further loss of biodiversity if the area is subject to repeated fires. No major infestations were observed. It is not expected that the clearing of vegetation will lead to an infestation of weeds within the application area or surrounding vegetation if adequate weed management is implemented.

Although the application area is high in floral and faunal diversity, it is not likely to have greater diversity than similar areas within the region.

Based on the above, the proposed clearing may be at variance to this Principle. It is recommended that should a permit be granted, a condition be imposed on the permit with regards to weed management.

Methodology CALM (2002)
Keith Lindbeck and Associates (2007)
Western Australian Museum (2008)
GIS Database:
- Interim Biogeographic Regionalisation of Australia (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 is not likely to be at variance to this Principle

The assessing officer has conducted a search of the Western Australian Museum's online fauna database between the coordinates 117.5°E, 22.5°S and 118.1°E, 23.1°S, representing a 50 km search area around the application area.

This search identified 6 Amphibian, 53 Avian, 21 Mammalian and 63 Reptilian species that may occur within the application areas (Western Australian Museum, 2008). Of these, the following species of conservation significance have previously been recorded within the search area: Striated Grass-wren (*Amytornis striatus striatus*), Night Parrot (*Pezoporus occidentalis*), Long-tailed Dunnart (*Sminthopsis longicaudata*), Orange Leaf-nosed Bat (*Rhinonictis aurantius*), Lakeland Downs Mouse (*Leggadina lakedownensis*), Western Pebble-mound Mouse (*Pseudomys chapmani*) and Pilbara Olive Python (*Liasis olivaceus barroni*).

Keith Lindbeck and Associates conducted a desktop search of the DEC's Threatened Fauna Database and the Department of Environment and Water Resources "Protected Matters Search Tool". In addition to those species of conservation significance listed above, this search identified the following conservation significant species that have previously been recorded within the search area (Keith Lindbeck and Associates, 2007): Peregrine Falcon (*Falco peregrinus*), Australian Bustard (*Ardeotis australis*), Northern Quoll (*Dasyurus hallucatus*) and Rainbow Bee-eater (*Merops ornatus*). The search also identified a range of migratory marine and wetland bird species. However, it is unlikely that the proposed clearing will impact on these migratory species due to their transitory presence within the application area and the lack of wetland habitat within the application area.

The Orange Leaf-nosed Bat (Schedule 1 - Fauna that is rare or likely to become extinct, *Wildlife Conservation (Specially Protected Fauna) Notice, 2008*) is described as preferring warm humid caves for roosting, although some have been found in tree hollows (Australian Museum Online, 2007a). They are known to hunt flying prey close to roosts, and glean from foliage and the ground in riparian vegetation in gorges, and in open hummock grasslands and sparse tree and shrub savannah (Department of Environment and Water Resources, 2007a). Known colonies in the Pilbara occupy abandoned, deep and partially flooded mines that trap pockets of warm, humid air in the mine's constant temperature zone. For at least part of the year, the species is thought to also occupy smaller, less complex mines nearby. There are no known natural roosting sites in the Pilbara (Department of Environment and Water Resources, 2007a). There are no abandoned mine shafts or substantial caves within the application area. Therefore, the vegetation within the application area is not significant habitat for this species.

The Northern Quoll (Schedule 1 - Fauna that is rare or likely to become extinct, *Wildlife Conservation (Specially Protected Fauna) Notice, 2008*) is known to occur in a range of habitats, including *Eucalyptus* open forest, monsoon rainforest and savannah woodland, but is most abundant (and apparently present with less fluctuation in population number) in rocky environments close to free water in creekline areas (Braithwaite et al,

1994). It has undergone substantial decline in the Pilbara and is now known to occur in geographically isolated populations (Firestone, 1999). Whilst rocky areas exist within the application areas, the absence of available water suggests that the vegetation within the application area is not significant habitat for this species.

The Night Parrot (Schedule 1 - Fauna that is rare or likely to become extinct, *Wildlife Conservation (Specially Protected Fauna) Notice, 2008*) is a very seldom seen bird that occupies dense, low vegetation, which provides them shelter during the day (Australian Museum Online, 2007b). Most records come from hummock grasslands with spinifex (porcupine grass, *Triodia spp.*), or from areas dominated by samphire. It has been suggested that birds move into the grasslands when *Triodia* is seeding. They have also been reported in low chenopod shrublands comprising saltbush and bluebush, and from areas of Mitchell grass (*Astrelba spp.*) with scattered chenopods. Many records have come from waterholes, and almost all reports from areas of *Triodia* have noted the presence of nearby water. As this species is very rare, and little is known of its distribution, it is difficult for the assessing officer to determine what impact, if any, the proposed clearing will have on this species. However, given the lack of permanent water in the application area, it is unlikely that the vegetation to be cleared represents significant habitat for this species.

The Pilbara Olive Python (Schedule 1 - Fauna that is rare or likely to become extinct, *Wildlife Conservation (Specially Protected Fauna) Notice, 2008*) prefers deep gorges and water holes in the ranges of the Pilbara region (Pearson, 1993 as cited in Department of Environment and Water Resources, 2007b). Radio-telemetry has shown that individuals are usually in close proximity to water and rock outcrops (Pearson, 2001, in Department of Environment and Water Resources, 2007b). The application area does not provide habitat for this species.

The Rainbow Bee-eater (Migratory species under the *Environmental Protection and Biodiversity Conservation Act, 1996*) is able to utilise a wide range of habitat types and nests in sandy soils. It is likely to utilise the application areas for feeding, but is unlikely to utilise the area for nesting due to the absence of sandy soils. Given the vast area of the Pilbara IBRA Bioregion and the species ability to utilise a wide range of habitats, it is unlikely that the vegetation within the application area is significant habitat for this species.

The Peregrine Falcon (Schedule 4 - Other specially protected fauna, *Wildlife Conservation (Specially Protected Fauna) Notice, 2008*) is known to inhabit most areas in Australia and utilise cliffs, tall trees and granite outcrops for nesting (Australian Museum Online, 2007c). The Peregrine Falcon is likely to occur sporadically within the application areas, but is not known to nest in the area. Given the vast amounts of available habitat within the Pilbara region that this species can utilise, it is unlikely that the vegetation within the application area is significant habitat for this species.

The Western Pebble-mound Mouse (DEC - Priority 4) is described as constructing pebble mounds on slopes composed of stony soils, near sharply incised drainage lines (Start et al, 2000). Mounds are built in vegetation dominated by hard spinifex (*Triodia basedowii*) or *T. wiseana*. Pebble mounds were observed at several locations but not in dense colonies (Hamersley Iron, 2008). The Western Pebble-mound mouse is found across much of the Hamersley Ranges in suitable habitat including Karijini National Park. The application area is not likely to represent significant habitat for this species.

The Lakeland Downs Mouse (DEC - Priority 4) is known to occur on sandy soils and cracking clays that support native grasses (DEC, 2006). It is known that this species experiences great fluctuations in population size depending on seasonal factors, reaching plague proportions in good years (DEC, 2006). The soil types of the application area appear to be gravelly stony skeletal soils and are not likely to provide habitat for this species. Therefore, it is unlikely that the vegetation to be cleared is significant habitat for this species.

The Long-tailed Dunnart (DEC Priority 4) occurs in rugged rocky landscapes that support low open woodland or shrubland of Acacia's (especially Mulga) with an understorey of spinifex hummocks, and (occasionally) also perennial grasses and Cassias from the Pilbara and upper Gascoyne region in the West (DNREA, 2007). They have also more recently been recorded from plateaus near breakaways and screes and rugged boulder strewn screes in the Goldfields region. The habitat types found within the application area may support populations of Long-tailed Dunnart. However, it is unlikely that the vegetation to be cleared represents significant habitat for this species, given its widespread distribution.

The Australian Bustard (DEC Priority 4) prefers tussock grassland, *Triodia* hummock grassland, grassy woodland and low shrublands (Garnett et al, 2000). This species may occur within the application area, however, given the widespread distribution of this species, the habitat within the application area is not likely to be significant habitat for this species.

Striated Grass-wrens (DEC Priority 4) live on sandplains dominated by mature *Triodia* hummock grassland with an over-storey of shrubs, usually mallee eucalypts (Garnett et al, 2000). Currently the major threat throughout the subspecies' range is fire, especially extensive fires that destroy mature hummock grassland over large areas. There are vast amounts of *Triodia* hummock grassland within the Pilbara IBRA region that this species can utilise. It is not likely that the vegetation within the application area is significant habitat for this species.

The assessing officer conducted a site visit of the application area in January 2008. During this visit the assessing officer noted that vegetation condition ranged from 'excellent' to 'degraded' depending on its distance from mining activities. Vegetation rated as excellent had been burnt in the previous 2-3 years. None of the fauna habitat present within the application area could be considered to be unique, restricted or fauna specific.

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

Methodology Australian Museum Online (2007a)
Australian Museum Online (2007b)
Australian Museum Online (2007c)
Braithwaite et al (1994)
DEC (2006)
Department of Environment and Water Resources (2007a)
Department of Environment and Water Resources (2007b)
DNREA (2007)
Firestone (1999)
Garnett et al (2000)
Hamersley Iron (2008)
Keith Lindbeck and Associates (2007)
Start et al (2000)
Western Australian Museum (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, no Declared Rare or Priority flora species occur within the application area (GIS Database).

The application area was subject to a flora survey between November 2006 and March 2007 (Keith Lindbeck and Associates, 2007). The survey involved a desktop search of available databases to identify conservation significant flora species that may occur in the area to be surveyed, and a field based component to identify vegetation types, flora species present as well as to search for conservation significant flora species.

As a result of this survey, no Declared Rare or Priority Flora species were identified within the application area.

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

Methodology Keith Lindbeck and Associates (2007)
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) located within the application area (GIS Database). The nearest TEC is located approximately 40 km to the east. At this remote distance there is little likelihood of any impact to this TEC from the proposed clearing.

None of the vegetation types identified during a flora survey over the application area are considered to be threatened ecological communities, or ecological communities at risk (Keith Lindbeck and Associates, 2007).

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

Methodology Keith Lindbeck and Associates (2007)
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

According to available databases, the application area falls within the Pilbara IBRA Bioregion (GIS Database). This bioregion's vegetation extent remains at approximately 100% of its Pre-European extent (see table). Beard vegetation association's 82 and 567 occur within the application area (GIS Database). These vegetation associations remain at approximately 100% of their Pre-European extent. Both Beard vegetation associations are well represented in conservation estate.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in IUCN Class I-IV Reserves*
IBRA Bioregion – Pilbara	17,804,164	17,794,651	~100	Least Concern	6.3
Beard veg assoc. – State					
82	2,565,929	2,565,929	~100	Least Concern	10.2
567	777,517	777,517	~100	Least Concern	22.3
Beard veg assoc. - bioregion					
82	2,563,609	2,563,609	~100	Least Concern	10.2
567	776,833	776,833	~100	Least Concern	22.3

* Shepherd et al. (2001) updated 2005

** Department of Natural Resources and Environment (2002)

Options to select from: Bioregional Conservation Status of Ecological Vegetation Classes (Department of Natural Resources and Environment 2002)

Presumed extinct+ Probably no longer present in the bioregion

Endangered+ <10% of pre-European extent remains

Vulnerable+ 10-30% of pre-European extent exists

Depleted+ >30% and up to 50% of pre-European extent exists

Least concern+ >50% pre-European extent exists and subject to little or no degradation over a majority of this area

+ or a combination of depletion, loss of quality, current threats and rarity gives a comparable status

Therefore, the application area is not part of a remnant of native vegetation in an area that has been extensively cleared.

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 Databases:
- Interim Biogeographic Regionalisation of Australia
- 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

According to available databases there is one minor, non-perennial drainage line within the application area (GIS Database).

The landscape unit recorded within the application area during the flora survey is not described as a watercourse, but as a 'Broad Sub-valley with Moderate Slopes'. The vegetation description for this landscape unit is not descriptive of a watercourse. This area is likely to be a capture point for surface run-off during times of intense rainfall, whereupon water would flow to the valley floor below.

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

Methodology Keith Lindbeck and Associates (2007)
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 area has been surveyed by the Department of Agriculture and Food (Van Vreeswyk et al 2004). The application area is composed of the Newman Land System (GIS Database).

The Newman Land System is described as rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands (Van Vreeswyk et al, 2004). An analysis of aerial photography for the application area

reveals the application area is most likely to fall within the 'Plateau, ridge mountain and hill' and the 'Lower slope' land units. The soil types within these land units (stony soils, red shallow loams, red loamy earths and red shallow sands) are not susceptible to erosion (Van Vreeswyk et al, 2004). The vegetation described by Van Vreeswyk et al (2004) accurately reflects the vegetation types described in a vegetation survey conducted over the area (Keith Lindbeck and Associates, 2007).

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

Methodology Keith Lindbeck and Associates (2007)
Van Vreeswyk et al (2004)
GIS Databases:
- Rangeland Land System Mapping

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

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

The application area is located approximately 14 km to the west of Karijini National Park (GIS Database). At this distance it is not likely that the vegetation within the application area provides a buffer to a conservation area, or is important as an ecological link to a conservation area. The vegetation types within the application area are well replicated in other land systems within the Pilbara region. Subsequently, their conservation status is under no threat.

It is noted by the assessing officer that large areas of vegetation between the application area and Karijini National Park were burnt around late December 2007 to early January 2008.

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

(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

According to available databases, the application area is not located within a Public Drinking Water Source Area (PDWSA) (GIS Database).

The area is located within a *Rights in Water and Irrigation Act, 1914* (RIWI Act) Surface Water Management Area (DoW, 2008). The proponent is required to obtain a Beds and Banks Permit in order to disturb any water course.

There are no permanent waterbodies or watercourses within, or in association with the application area (GIS Database). Rainfall in this area is mainly restricted to a wet summer season, where precipitation can be variable. Rain can be either intense falls associated with cyclonic events, or scattered falls associated with local thunderstorms. The application area receives average annual rainfall of 311 mm (BoM, 2008), and experiences a pan evaporation rate of approximately 3400 mm/yr (Luke et al, 1987). Therefore, during normal rainfall events, surface water within the application area is likely to evaporate or be utilised by vegetation quickly. However, substantial rainfall events create surface sheet flow which is likely to be high in sediments.

During normal rainfall events, the proposed clearing would not likely lead to an increase in sedimentation of waterbodies on or off site.

The application area is located within the Pilbara Groundwater Area (DoW, 2008). Any extraction of groundwater in this area will require a groundwater license. The groundwater salinity within the application area is approximately 500 - 1000 mg/L Total Dissolved Solids (TDS) (GIS Database). This is considered to be potable water. Given the size of the area to be cleared (228 ha) compared to the size of the Hamersley groundwater province (101,668 km²) (GIS Database), the proposed clearing is not likely to cause salinity levels within the application area to alter significantly.

There are no known Groundwater Dependant Ecosystems within the application area (GIS Database).

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

Methodology BoM (2008)
DoW (2008)
Luke et al (1987)
GIS Databases:
- Groundwater, Statewide
- Public Drinking Water Source Areas (PDWSA's)
- Hydrography, Linear
- Potential Groundwater Dependent Ecosystems

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

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

The application area experiences an arid, tropical climate with a wet summer season and a dry winter season (BoM, 2008). Most rainfall is received during the wet season, but falls can be variable (BoM, 2008). Rain can either be sporadic (local thunderstorms) or heavy and intense (cyclonic events). It is likely that during times of intense rainfall there may be some localised flooding in adjacent areas. However, the small area to be cleared (7.3 ha) in relation to the size of the Ashburton River catchment area (7,877,743 ha; GIS Database) is not likely to lead to an increase in flood height or duration. Flooding is not expected within the application area as it is located higher in the landscape.

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

Methodology BoM (2008)
GIS Database:
- Hydrographic Catchments - Catchments

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

Comments

There is a native title claim over the area under application: WC97/089 (GIS Database). The claim has been registered with the National Native Title Tribunal. However, the mining tenement has 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*.

There is one Aboriginal site of significance within the application area, Site ID 7151 (GIS Database). Hamersley Iron have advised that they will be applying for a Section 18 approval under the Aboriginal Heritage Act, 1972 (Hamersley Iron, 2009). The assessing officer does not consider it necessary to refer the application to the Environmental Protection Authority on heritage issues, as the disturbance to Aboriginal sites of significance will be assessed under the Section 18 process.

The application area is located within a *Rights in Water Irrigation Act, 1914* (RIWI Act) Surface Water Management Area (GIS Database). The proponent is required to obtain a Beds and Banks Permit in order to disturb any water course (DoW, 2008). The application area is located in a RIWI Act Groundwater area. The proponent is required to obtain permits to extract groundwater in this area.

No submissions were received during the advertised public comments period.

Methodology DoW (2008)
Hamersley Iron (2009)
GIS Database:
- Native Title Claims
- Aboriginal Sites of Significance

4. Assessor's comments

Comment

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

It is recommended that should a permit be granted, conditions be endorsed on the permit with regard to weed management, record keeping and permit reporting.

5. References

- Australian Museum Online (2007a). Bats in Australia, Orange Leaf-nosed Bat. <http://www.amonline.net.au/bats/records/bat22.htm> Accessed 8/6/07.
- Australian Museum Online (2007b). Night Parrot. http://www.austmus.gov.au/birds/research/night_parrot.htm Accessed 9/8/07.
- Australian Museum Online (2007c). Birds, Peregrine Falcon. http://www.austmus.gov.au/wild_kids/birds/perigrine_falcon.htm Accessed 9/8/07.
- BoM (2008). Climate Averages - Paraburdoo. http://www.bom.gov.au/climate/averages/tables/cw_007185.shtml Accessed 28/1/08. Bureau of Meteorology.
- Braithwaite RW and Griffiths AD (1994). Demographic variation and range contraction in the Northern Quoll, *Dasyurus hallucatus* (Marsupalia: Dasyuridae). *Wildlife Research* 21, 203-217.
- CALM (2002). A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions. Department of Conservation and Land Management.
- DEC (2006). Lakeland Downs Short-tailed Mouse, *Leggadina lakedownensis* (Watts, 1976).

http://www.naturebase.net/component/option,com_docman/task,doc_download/gid,145/Itemid,1288/mode,view/
Accessed 9/8/07

- Department of Environment and Water Resources (2007a). The Action Plan for Australian Bats, Orange Leaf-nosed Bat. <http://www.environment.gov.au/biodiversity/threatened/publications/action/bats/14.html> Accessed 8/6/07
- Department of Environment and Water Resources (2007b). Olive Python (Pilbara subspecies). http://eied.deh.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66699 Accessed 9/8/07.
- 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.
- DNREA (2007). Threatened Species Of The Northern Territory - Long-Tailed Dunnart (*Sminthopsis longicaudata*). http://nt.gov.au/nreta/wildlife/animals/threatened/pdf/mammals/longtailed_dunnart_vu.pdf Accessed 16/10/07. Department of Natural Resources, Environment and the Arts, Northern Territory.
- DoW (2008). Advice for land clearing application 2235/1. Advice to Assessing Officer, Native Vegetation Assessment Branch, Department of Industry and Resources (DoIR), received 21/1/08. Department of Water, Western Australia.
- Firestone KB (1999). The Application of Molecular Genetics to the Conservation Management of Quolls, *Dasyurus* Species (*Dasyuridae*: *Marsupialia*), December 1999. <http://www.library.unsw.edu.au/~thesis/adt-NUN/public/adt-NUN20010105.095232> Accessed 8/1/08.
- Garnett ST & Crowley GM (2000). Action Plan for Australian Birds 2000. Environment Australia, Canberra.
- Hamersley Iron (2008). Supporting documentation supplied within clearing permit application for Mt Tom Price Iron Ore Mine Henry Walker Dump Extension, Dowd LG Stockpile/Dump, North Deposit Waste Dump and Topsoil Stockpile, Mining of NTD5 Cutback. Hamersley Iron Pty Ltd.
- Keighery BJ (1994). Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Keith Lindbeck and Associates (2007). Vegetation Survey and Land Clearing Information for Proposed Mining Areas; East, West and Central Pits, Tom Price Minesite. Unpublished report prepared for Hamersley Iron Pty Ltd by Keith Lindbeck and Associates, Western Australia.
- Luke GJ, Burke KL and O'Brien TM (1987). Evaporation Data for Western Australia. Resource Management Technical Report No. 65. Department of Agriculture, Western Australia
- Shepherd DP, Beeston GR and Hopkins AJM (2001). Native Vegetation in Western Australia, Extent, Type and Status. Resource Management Technical Report 249. Department of Agriculture, Western Australia.
- SLIP (2008). Shared Land Information Platform <http://spatial.agric.wa.gov.au/slip/home.htm> Accessed 29/3/08
- Start AN, Anstee SD & Endersby M, (2000). A review of the biology and conservation status of the Ngadji, *Pseudomys chapmani* Kitchener 1980 (Rodentia: Muridae). CALMScience, Vol 2, No 2, p 125-147.
- Van Vreeswyk AME, Payne AL, Leighton KA & Hennig P, (2004). Technical Bulletin No. 92: An inventory and condition survey of the Pilbara region, Western Australia. Department of Agriculture, Western Australia.
- Western Australian Museum (2008). Faunabase - Western Australian Museum, Queensland Museum and Museum & Art Gallery of NT Collections Databases. <http://www.museum.wa.gov.au/faunabase/prod/index.htm> Accessed 21/2/08. Western Australian Museum.

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
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.