



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 3350/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Crescent Gold Limited

1.3. Property details

Property: Miscellaneous Licence 38/160
Local Government Area: Shire of Laverton
Colloquial name: Mt Weld Parallel Haul Road Project

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
30		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. One Beard Vegetation Association is located within the application area (Shepherd, 2007):

Beard Vegetation Association 18: Low woodland; mulga (*Acacia aneura*).

Goldfields Landcare Services conducted a flora and vegetation survey of the application area in September 2009. Six vegetation units were identified within the application area (Goldfields Landcare Services, 2009):

SIMS: Stony Ironstone Mulga Shrublands

SIMS was the most widely represented vegetation unit within the survey area accounting for approximately 62% of it. Consequently, it exhibited a considerable degree of variation in species diversity and composition. At one location, it was represented as: mulga open scrub, *Acacia aneura* var. *major* (10 – 30% Projected Foliage Cover (PFC) < 5 metres tall) over scrub (10 - 30% PFC 2 – 5 metres) of *A. stowardii* and *A. ramulosa* var. *ramulosa*, with occasional *Santalum spicatum* over low shrubs (10 – 30% PFC 1 – 2 metres) of *Senna artemisioides* subsp. *filifolia*, *A. tetragonophylla*, *Eremophila oldfieldii*, *E. scoparia* and *Scaevola spinescens* over sparse dwarf scrub (10 – 30% PFC <1metre) of *Sida calyxhymenia*, *Ptilotus obovatus*, *P. exaltatus*, *Maireana georgei*, *Solanum lasiophyllum* and *Sclerolaena bicornis* with scattered grasses (2% PFC), *Enneapogon caerulescens* on red loam covered with (mainly) ironstone and quartz pebbles and cobbles.

DRMS: Drainage Tract Mulga Shrublands

Drainage lines account for approximately 10% of the area and although not consistently so, are represented by: *Acacia aneura* thicket (30 – 70% PFC >2metres) with *A. stowardii*, *A. craspedocarpa* and *A. tetragonophylla* over heath (30 – 70% PFC 1 – 2 metres) of *Eremophila latrobei* subsp. *filiformis*, *Scaevola spinescens* and *Sida calyxhymenia* over low heath (30 – 70% PFC <1 metre) of *Atriplex bunburyana*, *Ptilotus obovatus*, *Maireana georgei*, *Solanum lasiophyllum*, *Ptilotus obovatus* and *Eragrostis eriopoda*.

GRMU: Mulga Groves on Hardpan Plains

GRMU is described by Pringle in Technical Journal 87 thus: "mulga groves generally occur as arcuate clumps of considerably denser mulga shrubs than areas around them, and are generally found arranged with their long axes along the contour as a series of bands of vegetation on gently inclined 'wash plans'. They have distinct and abrupt boundaries with sparser intergrove communities..." (Pringle, 1994 as cited in Goldfields Landcare Service, 2009). While these features were not all apparent on the ground during the survey, subsequent detailed examination of aerial photographs and Google Earth images revealed sufficient of them to justify this classification being applied to approximately 10% of the area surveyed, some of which had been largely disturbed by clearing for intensive drilling projects and associated access tracks. The following species were identified within this vegetation unit: *Acacia aneura*, *A. quadrimarginea*, *A. cuthbertsonii*, *Psyrax suevolens*, *Hakea* aff. *recurva*, *Eremophila latrobei* subsp. *filiformis*, *Mirbelia rhagodioides*, *Solanum lasiophyllum*, *Ptilotus obovatus* and *Eragrostis eriopoda*.

LHMS: Lateritic Hardpan Mulga Shrublands

This site was restricted to one location, interspersed by drainage lines, near the middle of the surveyed area and constituted approximately 8% of the total area surveyed. It is described as: mulga scrub (10 – 30% PFC >2metres) of *Acacia aneura* var. *intermedia*, *A. craspedocarpa*, *A. tetragonophylla* and *A. ramulosa* var. *ramulosa* with very occasional *Grevillea berryana* and *Psyrax suevolens*. Although the mid and lower storey shrubs are sparse they have a relatively high degree of diversity: mixed low scrub (10 – 30% PFC 1 – 2 metres) of *Eremophila margarethae*, *E. forrestii* subsp. *forrestii*, *E. latrobei* subsp. *latrobei*, *Spartothamnella teucriflora*, *Dodonaea rigida* and *Sida calyxhymenia* over open dwarf scrub (2 – 10% PFC <1metre) of *Ptilotus obovatus*, *P.*

schwartzii, *Mirbelia rhagodioides*, *Dianella revoluta*, *Eremophila georgei* and *Prostanthera althoferi* with very little *Eragrostis eriopoda* on red loam with a mantle of fine ferruginous gravel.

OLEW: Open Low Eucalypt Woodlands

Occupying just 6% of the survey area OLEW was described as: scattered low trees, *Eucalyptus striatocalyx* (<2% PFC <5 metres) over mixed open low scrub (2 – 10% PFC 1 – 2 metres) of *Eremophila scoparia*, *Acacia erinaceae*, *Senna artemisioides* subsp. *filifolia*, *Scaevola spinescens* and *Maireana sedifolia* over open dwarf scrub (2 – 10% PFC <1 metres) of *Ptilotus obovatus*, *P. aervoides*, *Maireana pentatropis*, *M. triptera* and *Olearia muelleri*.

Dist: Disturbed Areas. Borrow Pit

Areas classified as disturbed accounted for approximately 4% of the surveyed area. The main causes of the disturbance were the removal of gravel from borrow pits for the construction of the Mt Weld to Euro road; concentrated areas of tracks and gridlines created for previous exploration surveys and drilling programs and mining operations, estimated to have occurred 20 – 30 years ago, which involved the removal of vegetation to gain access to topsoil for screening gold.

Clearing Description	<p>Crescent Gold (2009) proposes to clear up to 30 hectares of native vegetation, within a larger area equalling approximately 92 hectares. The proposed clearing is located approximately 2.5 kilometres south of Laverton (GIS Database).</p> <p>The purpose of the proposed clearing is for the construction and maintenance of a haul road (Crescent Gold, 2009). Vegetation will be cleared by bulldozer and other heavy plant machinery and vegetation and topsoil will be stockpiled for rehabilitation purposes (Crescent Gold, 2009).</p>
Vegetation Condition	<p>Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery, 1994).</p>
Comment	<p>The vegetation condition rating is derived from the information provided by Goldfields Landcare Services (2009).</p>

3. Assessment of application against clearing principles

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

Comments	<p>Proposal is not likely to be at variance to this Principle</p> <p>The application area is located within the East Murchison subregion of the Murchison Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). The East Murchison subregion is generally dominated by mulga woodlands, often rich in ephemerals; hummock grasslands, saltbush shrublands and <i>Halosarcia</i> shrublands (CALM, 2002). Vegetation mapping by Shepherd (2007) indicates that vegetation association 18 (low woodland; mulga (<i>Acacia aneura</i>)) is common and widespread with approximately 100% remaining within the state and bioregion.</p> <p>A vegetation and flora survey of the application area was conducted by Goldfields Landcare Services in September 2009. Goldfields Landcare Services (2009) reports that the vegetation units Lateritic Hardpan Mulga Shrublands and Stony Ironstone Mulga Shrublands exhibit a considerable degree of variation in species diversity and composition. MBS Environmental (2009) reports that Mulga Shrublands are one of the main habitat types that will be affected by the proposed clearing and furthermore, Mulga Shrublands in this area are sometimes degraded and often fragmented. Based on this, the proposed clearing has the potential to cause further fragmentation of this vegetation type, however, these impacts are likely to be localised and are not likely to significantly impact the representation of this vegetation unit at a regional level.</p> <p>Goldfields Landcare Services (2009) recorded a total of 138 flora taxa from 32 families and 62 genera within the survey area. The most common families were the Goosefoot family (<i>Chenopodiaceae</i>), <i>Acacia</i> family (<i>Mimosaceae</i>) and the Myoporium family (<i>Myoporaceae</i>) (Goldfields Landcare Services, 2009). In comparison to other flora and vegetation surveys conducted in the area, this species diversity is common for the region (MBS Environmental, 2004).</p> <p>Goldfields Landcare Services (2009) identified three weed species within the application area; Onion Weed (<i>Asphodelus fistulosus</i>), Ruby Dock (<i>Acetosa vesicaria</i>) and Doublegee (<i>Emex australis</i>). The presence of introduced weed species lowers the biodiversity value of the proposed clearing area. Care must be taken to ensure that the proposed clearing activities do not spread or introduce weed species to non-infested areas. Should a permit be granted, it is recommended that a condition be imposed for the purpose of weed management.</p> <p>Fauna database searches were conducted using the Department of Environment and Conservation databases and the Environment Protection and Biodiversity Conservation database as well as other fauna reports and reference books (MBS Environmental, 2009). These searches identified up to 289 native fauna species that could potentially occur within the application area consisting of 36 native and seven introduced mammal species, 157 bird species, 87 reptiles and nine frog species (MBS Environmental, 2009). MBS Environmental (2004) reports that the Murchison IBRA bioregion is noted for its high reptile fauna diversity.</p> <p>Based on the above, the proposed clearing is not likely to be at variance to this Principle.</p>
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Methodology	<p>CALM (2002) Goldfields Landcare Services (2009)</p>
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MBS Environmental (2004)
MBS Environmental (2009)
GIS Database
- Interim Biogeographic Regionalisation for 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

MBS Environmental conducted a desktop fauna survey in September 2009. MBS Environmental (2009) identified three general habitats likely to be impacted by the proposed clearing:

- Drainage Tract Mulga Shrublands;
- Bluebush Shrublands; and
- Mulga Shrublands.

The application area crosses several drainage lines with Drainage Tract Mulga Shrublands which are reported as being the most diverse habitat for fauna within the area (MBS Environmental, 2009). MBS Environmental (2009) reports that this vegetation unit is widely distributed in the region and typically comprises of vegetation representative of surrounding vegetation communities.

MBS Environmental (2009) reports Bluebush Shrublands as being common and widespread across the Laverton region, typically comprising of a scattered tall shrub layer over low chenopod shrub species. Fauna associated with this habitat are expected to be widespread, common species (MBS Environmental, 2009).

Mulga Shrublands are highly variable in their species composition across the region (MBS Environmental, 2009). MBS Environmental (2009) reports that Mulga Shrublands in this area are sometimes degraded and often fragmented and that fauna associated with this habitat are usually widespread common species.

According to available databases there are four Rangeland land systems within the application area (GIS Database):

- Bevon land system;
- Gundockerta land system;
- Jundee land system; and
- Violet land system.

MBS Environmental (2009) report that Mulga Shrublands and Bluebush Shrublands associated with all four land systems in the application area comprise the majority of general fauna habitat to be impacted by development. Furthermore, the Bevon land system as described by MBS Environmental (2009) may have plateaus with small breakaways, low foot slopes and narrow drainage tracts indicating the potential for unusual topographical features providing habitat for fauna within the application area. However, according to MBS Environmental (2009) the proposed road does not traverse any breakaways.

MBS Environmental (2009) reports that localised habitat fragmentation is likely, specifically in areas where dense clumps of vegetation and drainage tracts are dissected by the road. This has the potential to impact species travelling between home ranges, especially kangaroos and other nocturnal species (MBS Environmental, 2009).

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

Methodology MBS Environmental (2009)
GIS Database
- Rangeland land system mapping

(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

Goldfields Landcare Services (2009) conducted a field based flora and vegetation survey of the application area in September 2009, in addition to a desktop study of the Department of Environment and Conservation's Threatened Flora database for plant species of conservation significance that could potentially occur within the application area.

The desktop study identified 18 Priority flora species that could potentially occur within the application area (Goldfields Landcare Services, 2009). None of these Priority flora species and no Declared Rare Flora species were identified within the application area during the field based flora and vegetation survey (Goldfields Landcare Services, 2009).

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

Methodology Goldfields Landcare Services (2009)

(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 area applied to clear (GIS Database). The closest known TEC is located approximately 240 kilometres west of the application area (GIS Database).

Goldfields Landcare Services (2009) reports that no TECs were identified during the flora and vegetation survey of the application area.

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

Methodology Goldfields Landcare Services (2009)
 GIS Database
 - Threatened Ecological Communities

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

Comments **Proposal is not at variance to this Principle**
 The application area falls within the Murchison Interim Biogeographic Regionalisation of Australia (IBRA) bioregion (GIS Database). Shepherd (2007) report that approximately 100% of the pre-European vegetation still exists in this Bioregion (see table below). The vegetation within the application area is recorded as the following Beard Vegetation Association (Shepherd, 2007):

- Beard Vegetation Association 18: low woodland; mulga (*Acacia aneura*).

According to Shepherd (2007) approximately 100% of this vegetation association remains within the bioregion (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**	Pre-European % in IUCN Class I-IV Reserves
IBRA Bioregion - Murchison	28,120,590	28,120,590	~100	Least Concern	~1.1
Beard vegetation associations - State					
18	19,892,305	19,890,195	~100	Least Concern	~2.1
Beard vegetation associations - Bioregion					
18	12,403,172	12,403,172	~100	Least Concern	~0.4

* Shepherd (2007)

** Department of Natural Resources and Environment (2002)

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

Methodology Department of Natural Resources and Environment (2002)
 Shepherd (2007)
 GIS Database
 - Interim Biogeographic Regionalisation of Australia

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

Comments **Proposal is at variance to this Principle**
 According to available databases there are numerous minor, ephemeral watercourses that transect the application area (GIS Database).

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

The application area is located in an arid region where the average annual evaporation rate of approximately 3,200 millimetres (Luke et al., 1987) greatly exceeds the annual average rainfall of approximately 232.6

millimetres (BoM, 2009). Based on this, the watercourses within the application area are expected to be dry except following significant rain events which are typically associated with cyclonic activity. The Department of Water (DoW) in 2009 has provided the following advice regarding the minor, ephemeral watercourses within the application area:

- Any significant waterway (flowing or not), wetland or its fringing vegetation that may exist onsite should not be disturbed or removed without prior written approval from the DoW;
- Unless permission is first obtained from the DoW, ground breaking activities are prohibited within the floodway and within a lateral distance of:
 - 50 metres from a perennial waterway;
 - 30 metres from a seasonal waterway.
- Exploration activities or mining operations that may disrupt the natural flow of any watercourse or hydrology of a wetland is prohibited unless written approval is obtained from the DoW.

The application area crosses several drainage lines with Drainage Tract Mulga vegetation (MBS Environmental, 2009). MBS Environmental (2009) reports that this vegetation unit is widely distributed in the region and typically comprises of vegetation representative of surrounding vegetation communities. Consequently, the proposed clearing of vegetation associated with watercourses, is unlikely to have a significant impact at a regional scale given the widespread distribution of this vegetation unit.

It is the proponent's responsibility to liaise with the DoW to determine whether a Bed and Banks permit or any other licences or approvals are required for the proposed works.

Methodology BoM (2009)
DoW (2009)
Luke et al., 1987
MBS Environmental (2009)
GIS Database
- Hydrography, linear

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

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

The application area has been mapped as occurring within the Bevon, Gundockerta, Jundee and Violet land systems (GIS Database).

The Bevon land system is described by Pringle et al. (1994) as consisting of irregular low ironstone hills with stony lower slopes supporting Mulga shrublands. The majority of the land system is not susceptible to soil erosion, however, minor areas with texture contrast soils on breakaway footslopes and narrow drainage tracts are susceptible to erosion, particularly if perennial shrub cover is substantially reduced (Pringle et al., 1994).

The Gundockerta land system consists of extensive, gently undulating, calcareous, stony plains, supporting bluebush shrublands (Pringle et al., 1994). Pringle et al. (1994) report that where not protected by a stony mantle, saline plains and adjacent lower alluvial tracts are susceptible to water erosion, particularly in areas where perennial shrub cover is substantially reduced and / or the soil surface is disturbed.

The Jundee land system consists of hardpan wash plains with variable dark gravelly mantling and weakly groved vegetation; minor sandy banks and supports scattered Mulga shrublands (Pringle et al., 1994). Pringle et al. (1994) reports that concentrated drainage zones are mildly susceptible to accelerated erosion when degraded and hardpan plains are not normally susceptible to erosion unless severely degraded.

The Violet land system is described as consisting of undulating stony and gravelly plains and low rises, supporting Mulga shrublands (Pringle et al., 1994). Pringle et al. (1994) report that abundant mantles provide effective protection against soil erosion over most of this land system, except where the soil surface has been disturbed as in these circumstances the soil becomes moderately susceptible to water erosion. The narrow drainage tracts of this landform are reported by Pringle et al. (1994) to be mildly susceptible to water erosion.

Crescent Gold (2009) reports that clearing is likely to have little impact on soil erosion locally due to the low rainfall and gentle topography of the area. In addition, the proponent has stated that clearing and topsoil stripping will not be undertaken during periods of heavy rainfall or high winds (Crescent Gold, 2009).

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

Methodology Crescent Gold (2009)
Pringle et al. (1994)
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 proposed clearing is not located within any conservation areas (GIS Database). The nearest Department of Environment and Conservation managed land is the De La Poer Range Nature Reserve located approximately 130 kilometres north of the application area (GIS Database).

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

Methodology GIS Database
- DEC Managed Land 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

There are numerous ephemeral watercourses within the application area (GIS Database). With an average rainfall of approximately 232.6 millimetres (BoM, 2009) and an average annual evaporation rate of approximately 3,200 millimetres (Luke et al., 1987) there is little surface flow during normal seasonal rains. Based on the low rainfall and flat topography of the application area, the proposed clearing is unlikely to have a significant impact on surface water quality.

The Department of Water (DoW) has advised that the application area is located within the Goldfields Groundwater area proclaimed under the *Rights in Water and Irrigation Act 1914*, where there may be a requirement to obtain a licence for the use of groundwater (DoW, 2009).

DoW (2009) has provided the following advice in regards to groundwater that is in association with the proposed clearing area:

- Activities requiring the abstraction of groundwater are prohibited unless a bore construction and abstraction licence has been granted by the DoW.

The groundwater within the area is approximately 40 to 50 metres below the ground surface (Crescent Gold, 2009) and therefore, the proposed clearing is not likely to have any significant impact upon groundwater quality or quantity.

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

Methodology BoM (2009)
Crescent Gold (2009)
DoW (2009)
Luke et al. (1987)
GIS Database
- Hydrography, linear

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

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

The application area is located in an arid region where the average annual evaporation rate greatly exceeds the average annual rainfall (BoM, 2009). There are no permanent watercourses within the application area, however, there are numerous ephemeral drainage lines that transect the application area (GIS Database). These drainage lines are expected to be dry for most of the year, and would likely only flow immediately following significant rainfall.

The Department of Water (DoW, 2009) has provided the following advice in relation to floodways:

- Unless permission is first obtained from the DoW, ground breaking activities are prohibited within the floodway and within a lateral distance of:
 - 50 metres from a perennial waterway; and
 - 30 metres from a seasonal waterway.

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

Methodology BoM (2009)
DoW (2009)
GIS Database
- Hydrography, linear

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

Comments

There is one Native Title claim (WC99/001) over the area under application (GIS Database). This claim has been registered with the 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 (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 no known Aboriginal Sites of Significance within the application area (GIS Database). It is the proponent's responsibility to comply with the *Aboriginal Heritage Act 1972* and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

Advice was received from the Department of Water (DoW) in regards to the proposal which has been addressed under Principles (f), (i) and (j). In addition, the following recommendations have also been received from DoW (2009):

- Written notification where practicable, of the time frame, type and extent of proposed ground disturbing activities should be forwarded to the DoW seven days prior to the commencement of those activities;
- The rights of ingress to and egress from the licence/lease should, at all reasonable times, be preserved to officers of the DoW for inspection and investigation purposes; and
- The storage and disposal of hydrocarbons, chemicals and potentially hazardous substances should be in accordance with the DoW's Guidelines and Water Quality Protection Notes.

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

Methodology DoW (2009)
GIS Database
- Aboriginal Sites of Significance
- Native Title Claims

4. Assessor's comments

Comment

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

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

5. References

- BoM (2009) BoM Website - Climate Averages by Number, Averages for LAVERTON. Bureau of Meteorology. www.bom.gov.au/climate/averages/tables/cw_012045.shtml (Accessed 15 October 2009).
- CALM (2002) A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002. Department of Conservation and Land Management, Western Australia. MBS Environmental (2004) Vegetation and Habitat Assessment of the Euro, Sickle and Admiral Hill Project Areas, Laverton. Martinick Bosch Sell, Western Australia.
- Crescent Gold (2009) Clearing Permit Application Supporting Documentation, October 2009.
- 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.
- DoW (2009) Advice to assessing officer. Department of Water, Western Australia.
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- Luke, G.J., Burke, K.L. and O'Brien, T.M. (1987) Evaporation Data for Western Australia. Resource Management Technical Report No. 65. Department of Agriculture, Western Australia
- MBS Environmental (2004) Vegetation and Habitat Assessment of the Euro, Sickle and Admiral Hill Project Areas, Laverton. Martinick Bosch Sell, Western Australia.
- MBS Environmental (2009) Laverton Gold Project: Desktop Fauna Report for Mount Weld Parallel Haul Road (L38/160). Unpublished report. Martinick Bosch Limited, Western Australia.
- Pringle, H., Van Vreeswyk, A. and Gilligan, S. (1994) An Inventory and condition survey of the north-eastern Goldfields, Western Australia. Technical Bulletin 87. Department of Agriculture, Western Australia.
- Shepherd, D.P. (2007). Adapted from: Shepherd, D.P., Beeston, G.R., and Hopkins, A.J.M. (2001), Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture Western Australia, South Perth. Includes subsequent updates for 2006 from Vegetation Extent dataset ANZWA1050000124.

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.