



Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 8170/1
Permit type: Purpose Permit

1.2. Proponent details

Proponent's name: Roy Hill Iron Ore Pty Ltd

1.3. Property details

Property: Miscellaneous Licence 47/642
Miscellaneous Licence 47/735
Local Government Area: Shire of East Pilbara
Colloquial name: Roy Hill Mine

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
75		Mechanical Removal	Hydrogeological investigation and associated activities.

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 20 December 2018

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description The vegetation of the application area is broadly mapped as the following Beard vegetation associations:

29: Sparse low woodland; mulga, discontinuous in scattered groups;
111: Hummock grasslands, shrub steppe; *Eucalyptus gamophylla* over hard spinifex;
197: Sedgeland; sedges with scattered medium trees; coolabah over various sedges & forbes; and
676: Succulent steppe; samphire (GIS Database).

Flora and vegetation surveys were conducted over the application area by Maia Environmental Consultancy (Maia) during October 2017 and April 2018; and by Biologic Environmental Survey (Biologic) during July 2018, to include both the southern and northern portions of the application area.

- Southern portion (3,683 hectares) – This portion of the application area lies mostly within L47/735 with a small portion in L47/642 (approximately 226 hectares). The southern portion of the application area was surveyed by Maia during October 2017 and April 2018 (Maia, 2018). The study also includes the original survey conducted by G&G Environmental in July-August 2009, which overlaps with majority of the Maia (2018) study area.
- Northern portion (16,840 hectares) – This portion of the application area is situated entirely within L47/642. A reconnaissance flora and vegetation survey over the northern portion was conducted by Biologic in July 2018 (Biologic, 2018a). Approximately 2,787 hectares of the northern extent was not included in the field survey component. A portion of this (approximately 1,349 hectares) was assessed by extrapolating aerial imagery and the existing fauna habitat mapping from the field survey. The remaining 1,438 hectares was not surveyed by Biologic, however based on aerial imagery and vegetation mapping, this additional area is not likely to represent any new vegetation associations or fauna habitats that are different to the surveyed area (GIS Database).

The following twenty vegetation associations were recorded within the application area (Biologic, 2018a; Maia, 2018):

Maia (2018) – Southern Portion:

1. **ASL-1:** Open Tall *Acacia* Shrubland (*Acacia macraneura*, *Acacia tetragonophylla*, *Acacia ancistrocarpa*) with an Open mixed Tussock Grassland (commonly *Chrysopogon fallax*, *Aristida latifolia* and *Eulalia aurea*) and Isolated Low Trees of *Corymbia hamersleyana*, *Corymbia aspera* and/or *Acacia pruinocarpa*;
2. **ASL-3:** Open mixed *Acacia* Tall Shrubland (commonly *Acacia incurvaneura*, *Acacia tetragonophylla* and *Acacia aptaneura*) with an Open mixed Mid Shrubland (*Eremophila forrestii* subsp. *forrestii*, *Senna artemisioides* subsp. *oligophylla*, *Senna ? sericea x symonii*) over a Sparse Tussock Grassland of *Aristida latifolia* and *Aristida contorta*;

3. **ASL-4:** Open Tall Shrubland of *Acacia xiphophylla* +/- *Acacia aptaneura* over an Open Low Shrubland of *Ptilotus obovatus* var. *obovatus*, *Solanum lasiophyllum* and *Senna artemisioides* subsp. *oligophylla* over a Low Sparse Chenopod Shrubland of *Sclerolaena cornishiana*;
4. **ATG:** Open Tussock Grassland of *Aristida contorta* and *Aristida latifolia* with a Sparse Mid Shrubland of *Senna glaucifolia*, *Senna artemisioides* subsp. *helmsii* and *Acacia synchronicia* and Isolated Tall Shrubs of *Acacia synchronicia* and *Acacia tetragonophylla*;
5. **AWL/ ASL-5 Mosaic:** AWL: Low Woodland of *Acacia aptaneura* and *Acacia macraneura* with a mixed Tussock Grassland (*Aristida latifolia*, *Aristida contorta* and *Enneapogon caerulescens*) and an Open Low Shrubland of *Eremophila forrestii* subsp. *forrestii*, *Dodonaea petiolaris* and/or *Ptilotus obovatus* var. *obovatus*. ASL-5: Sparse to Open Tall Shrubland of *Acacia aptaneura*, *Acacia tetragonophylla* +/- *Acacia paraneura* with a Sparse Tussock Grassland of *Aristida contorta* and *Astrida latifolia* and Isolated Low Trees of *Acacia pruinocarpa*;
6. **MTG:** Closed Tussock Grassland of *Eragrostis xerophila* and *Aristida latifolia* with an Open Low Shrubland of *Senna symonii* and *Senna artemisioides* subsp. *helmsii*;
7. **THG:** Hummock Grassland of *Triodia basedowii* / or *Triodia schinzii* with a Sparse mixed Tall Shrubland of (*Acacia ancistrocarpa*, *Acacia pachyacra* and *Acacia melleodora*) with Isolated Low Trees of *Acacia pruinocarpa*;

Biologic (2018b) – Northern Portion:

8. **AaAFLIT:** *Acacia* ? *aptaneura* and/ or *Acacia* ? *fuscanera* low isolated trees over *Acacia synchronicia*, *Acacia sclerosperma* subsp. *sclerosperma* and *Eremophila cuneifolia* mid to tall sparse shrubland over *Triodia angusta* and *Triodia pungens* mid sparse hummock grassland with pockets of bare areas dominated by tussock grasses and herbs;
9. **AaLIT:** *Acacia aptaneura* with occasional *Eucalyptus gamophylla* and *Acacia pruinocarpa* low isolated to isolated patches of trees over *Acacia sclerosperma* subsp. *sclerosperma* and other *Acacia* and *Eremophila* species mid to tall isolated shrubs over *Triodia angusta* and occasional *Triodia pungens* mid open hummock grassland;
10. **AaLSW:** *Acacia aptaneura* low sparse woodland to isolated patches of trees over *Acacia tetragonophylla*, *Acacia sclerosperma* subsp. *sclerosperma* and *Acacia synchronicia* mid to tall isolated shrubs over **Cenchrus ciliaris* and **Cenchrus setiger* low open to sparse tussock grassland;
11. **AaLW:** *Acacia aptaneura* with occasional *Eucalyptus victrix* low woodland to open woodland over *Acacia sclerosperma* subsp. *sclerosperma*, *Psyrax latifolia* and *Acacia tetragonophylla* mid to tall isolated shrubs over *Triodia angusta* patches of mid hummock grasses over open tussock grassland and herbland;
12. **AsTSS:** *Acacia synchronicia* tall to mid sparse shrubland, with occasional **Vachellia farnesiana* over *Eragrostis xerophila*, **Cenchrus ciliaris* and *Dactyloctenium radulans* isolated patches of low tussock grasses and isolated patches of *Sclerolaena cuneata*, *Sclerolaena costata* and *Sclerolaena diacantha* low chenopod shrubs;
13. **AxTOS:** *Acacia xiphophylla* (and occasional *Acacia synchronicia*) tall open shrubland over *Eremophila youngii* subsp. *lepidota*, *Senna* sp. Meekatharra (E. Bailey 1-26) and *Eremophila cuneata* mid to low sparse shrubland over isolated tussock grasses and herbs;
14. **CP:** Bare, open claypans, with occasional tussock grasses and shrubs, dominated by *Eragrostis australasica*, *Diplachne fusca* subsp. *fusca* and *Sesbania cannabina*;
15. **EcoMIT:** *Eucalyptus camaldulensis* subsp. *obtusata* mid isolated trees over *Eucalyptus victrix*, *Atalaya hemiglaucata* and *Acacia coriacea* subsp. *pendens* low isolated trees over disturbed understorey dominated by **Vachellia farnesiana*;
16. **EvAaLIT:** Occasional *Eucalyptus victrix* low isolated trees over *Acacia aptaneura* low isolated trees over *Acacia sclerosperma* subsp. *sclerosperma*, *Acacia pyrifolia* var. *pyrifolia* and *Senna glutinosa* subsp. x *luerssenii* mid to tall isolated shrubs over *Triodia angusta* mid sparse hummock grassland;
17. **EvAaLSW:** *Eucalyptus victrix* and occasionally *Acacia aptaneura* low sparse woodland over mid to tall shrubland dominated by *Acacia* (*Acacia ancistrocarpa*, *Acacia tetragonophylla* and *Acacia sclerosperma* subsp. *sclerosperma*) and *Eremophila* (*Eremophila longifolia*) species over *Eulalia aurea*, *Chrysopogon fallax* and *Eriachne* spp. mid to low open tussock grassland;
18. **EvAaLSWIT:** *Eucalyptus victrix* and *Acacia aptaneura* low sparse woodland to isolated trees over *Acacia sclerosperma* subsp. *sclerosperma*, *Acacia tetragonophylla* and *Eremophila youngii* subsp. *lepidota* mid to tall isolated shrubs over **Malvastrum americanum* low isolated patches of herbs and occasional patches of *Triodia angusta* mid hummock grasses;
19. **EvLIT:** *Eucalyptus victrix* and occasional patches of *Acacia aptaneura* low isolated trees over *Acacia sclerosperma* subsp. *sclerosperma*, **Vachellia farnesiana* and *Acacia tetragonophylla* mid to tall isolated shrubs over disturbed understorey dominated by **Malvastrum americanum* and **Cenchrus ciliaris*; and
20. **TaTpTsMOHG:** *Triodia angusta* and/ or *Triodia pungens* and/ or *Triodia schinzii* mid open hummock grassland with isolated mid to tall shrubs dominated by *Stylobasium spathulatum*, *Acacia sclerosperma* subsp. *sclerosperma* and *Acacia synchronicia*.

* denotes a weed species.

Clearing Description	Roy Hill Mine. Roy Hill Iron Ore Pty Ltd proposes to clear up to 75 hectares of native vegetation within a boundary of approximately 20,474 hectares, for the purposes of hydrogeological investigation and associated activities. The project is located approximately 115 kilometres north of Newman, within the Shire of East Pilbara.
Vegetation Condition	Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery, 1994). To Completely Degraded: No longer intact; completely/almost completely without native species (Keighery, 1994).
Comment	The vegetation condition was derived from vegetation surveys conducted by Biologic (2018a) and Maia (2018). Majority of the application area was considered to be in Very Good condition on the Keighery scale (Biologic, 2018a; Maia, 2018). Up to 55 hectares of native vegetation clearing is proposed within L47/642 and 20 hectares within L47/735. The proposed clearing is for access tracks and drill pads to undertake hydrogeological investigations that is required to determine the feasibility for the proposed Stage 2 Managed Aquifer Recharge (MAR) Scheme. The Roy Hill Iron Ore Project is approved under Ministerial Statement 824 and 829, however L47/642 and L47/735 are located outside of the area approved under Ministerial Statement 824 and 829. Following the completion of the hydrogeological investigative activities, it is noted that a Section 38 referral under the <i>Environmental Protection Act 1986</i> is planned to be submitted to the Environmental Protection Authority for the full Stage 2 MAR scheme.

3. Assessment of application against Clearing Principles

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

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

The clearing permit application area is located within the Fortescue subregion of the Interim Biogeographic Regionalisation for Australia (IBRA) Pilbara Bioregion (GIS Database). The Fortescue Plains subregion is alluvial and has river frontages, with extensive salt marsh, mulga-bunch grass, and short grass communities on the plains in the east. River gum woodlands fringe the drainage lines. An extensive calcrete aquifer (originating within a palaeodrainage valley) feeds numerous permanent springs in the central part of the Fortescue region, supporting large permanent wetlands with extensive stands of river gum and cajuput (CALM, 2002).

No Threatened Ecological Communities (TECs) or Threatened Flora were recorded from within the application area (Biologic, 2018a; Maia, 2018; GIS Database). Three Priority Ecological Communities (PECs) occur in the vicinity of the application area (Biologic, 2018a; Maia, 2018; Roy Hill, 2018; GIS Database). The northern portion of the application area intersects the Priority 3 'Narbung Land System' PEC, and the buffer of the Priority 1 'Fortescue Marsh (Marsh Land System)' PEC (GIS Database). The Priority 3 'Vegetation of sand dunes of the Hamersley Range/Fortescue Valley' PEC, occurs outside of the area proposed to clear, approximately 2 kilometres southwest of the application area (GIS Database).

Although the potential clearing of drill pads, access track and drilling to investigate groundwater is unlikely to directly impact the Priority 1 'Fortescue Marsh (Marsh Land System)' PEC, there is potential for indirect impacts as a result of hydrological change (DBCA, 2018). For example, changes to sub surface flow or increased surface water run-off. Although the Marsh is episodically inundated, predominately as a result of rainfall, it is reliant on surface runoff from the Upper Fortescue catchment and on groundwater sources, and therefore these sources are essential for maintenance of the specific hydrological regime (DBCA, 2018). Any alteration to natural surface water flows within the catchment and upstream of the Marsh have potential for significant impact on the Priority 1 'Fortescue Marsh (Marsh Land System)' PEC (DBCA, 2018). The vegetation association along the Fortescue River, EcoMIT, is considered to be a potential groundwater dependent ecosystem (GDE) as it supports facultative phreatophyte *Eucalyptus camaldulensis* subsp. *obtusa* and potential phreatophyte, *Eucalyptus victrix* and *Atalaya hemiglauc*a (Biologic, 2018a; Maia, 2018). Potential impacts to this PEC and GDE may be minimised by the implementation of a watercourse management condition, a staged clearing condition, and a restricted clearing condition.

The Priority 3 'Narbung Land System' PEC is described as 'Alluvial washplain with prominent internal drainage foci supporting snakewood (*Acacia xiphophylla*) and mulga (*Acacia aneura* and close relatives) shrublands with halophytic (members of the Chenopodiaceae family as an example) low shrubs'. The vegetation association AxTOS is likely to be the most consistent with the description of this PEC, and therefore is considered to be of local significance (Biologic, 2018a). Although the amount of clearing proposed within the PEC appears insignificant, due to the lack of information in relation to the vegetation condition of the PEC, a restricted clearing condition should be implemented to ensure avoidance to those areas considered most significant (DBCA, 2018).

The Priority 3 'Vegetation of sand dunes of the Hamersley Range/Fortescue Valley' will not directly be impacted by the proposed clearing of native vegetation as it occurs outside of the application area. Furthermore, no vegetation associations mapped in the application area matched the description of this PEC

(Biologic, 2018a; Maia, 2018).

The field survey over the southern portion recorded 253 taxa from 34 families and 106 genera (Maia, 2018). The flora composition was generally similar in the northern portion, which recorded 199 species from 38 families and 94 genera (Biologic, 2018a). The most represented genera for both surveys were *Acacia*, *Ptilotus* and *Senna* (Biologic, 2018a; Maia, 2018). According to the desktop surveys, eighteen Priority flora species are likely to occur or have previously been recorded, within the entire application area (Biologic, 2018a; Maia, 2018). These Priority species are comprised of six Priority 1, one Priority 2, nine Priority 3 and two Priority 4 species (Biologic, 2018a; Maia, 2018). The field survey identified three of these Priority species to occur within the application area, including *Eremophila pilosa* (Priority 1), *Eremophila youngii* subsp. *lepidota* (Priority 4) and *Goodenia nuda* (Priority 4) (Biologic, 2018a; Maia, 2018).

Eremophila pilosa (P1) is only known from multiple locations within the Fortescue subregion of the Pilbara (Western Australian Herbarium, 2018). It is noted to be very restricted, with large populations occurring at known sites. The number of individuals and the extent of the population within the application area was not determined due to the uncertainty of the collection made during the survey, but it is noted as being common in the location of collection (Biologic, 2018a). It is understood that the *Eremophila pilosa* found during the survey is a continuation of the population located south of the application area, along Marble Bar Road, where two populations of several hundred individuals were recorded (Ecoscape, 2012 as referenced by Biologic, 2018a). *Eremophila pilosa* is currently only known from pastoral leases and mining tenements and therefore clearing of this species should be avoided where possible. Potential impacts to *Eremophila pilosa* from the proposed clearing of native vegetation may be minimised by the implementation of a flora management condition.

The two Priority 4 species *Eremophila youngii* subsp. *lepidota* and *Goodenia nuda* are not as restricted as *Eremophila pilosa* and are known from multiple regions including the Gascoyne, Little Sandy Desert and the Pilbara (Western Australian Herbarium, 2018). *Eremophila youngii* subsp. *lepidota* has also previously been recorded in the Carnarvon region (Western Australian Herbarium, 2018). *Eremophila youngii* subsp. *lepidota* was recorded from 19 locations within the application area, comprising between 530 to 950 individuals (Biologic, 2018a). *Goodenia nuda* was recorded from 7 locations, comprising 60-110 individuals (Biologic, 2018a; Maia, 2018). It is noted that Roy Hill Iron Ore Pty Ltd will undertake a targeted assessment for Priority flora species prior to clearing, once the specific areas to be cleared for bores and access tracks have been finalised, to ensure avoidance during clearing (Roy Hill, 2018). The proposed clearing of up to 75 hectares within a boundary of 20,474 hectares may impact the species on a local level however it is not likely to significantly impact these species at a regional level.

The vegetation association TaTpTsMOHG supports populations of all three Priority species identified during the survey, and therefore is considered to be of high local significance (Biologic, 2018a). Potential impacts to this vegetation association may be minimised by the implementation of a restricted clearing condition.

Thirteen species with range extensions were recorded within the application area based on publically available biodiversity databases, however none of these species are listed as species of conservation significance (Maia, 2018). It is possible that four of these species, *Acacia glaucocaesia*, *Boerhavia paludosa*, *Euphorbia drummondii* and *Ipomoea polymorpha* may not actually be range extensions based on previous surveys of the Roy Hill mining tenements, which recorded these species (Ecologia, 2009c as referenced by Maia, 2018).

Twelve weed species were recorded from within the study areas including *Aerva javanica* (Kapok), *Bidens bipinnata* (Bipinnate Beggartick), *Cenchrus ciliaris* (Buffel Grass), *Cenchrus setiger* (Birdwood Grass), *Chloris virgata* (Feathertop Rhodes Grass), *Echinochloa colona* (Barnyard grass), *Malvastrum americanum* (Spiked Malvastrum), *Portulaca pilosa* (Djanggarara), *Senna occidentalis* (Coffee Senna), *Setaria verticillata* (Hooked Bristlegrass), *Tribulus terrestris* (Bindii), *Vachellia farnesiana* (Mimosa Bush). Furthermore, the northern portion of the application area is within known areas of *Parkinsonia aculeata*, which is a priority weed for control for the Fortescue Marsh, a Weed of National Significance, and declared pest species because it can rapidly spread to an extent that will modify the landscape of the surrounding area (DBCA, 2018). Stringent hygiene management must be implemented to ensure that the proposed clearing activities do not spread or introduce weed species to non-infested areas. Potential impacts to biodiversity as a result of the proposed clearing may be minimised by the implementation of a weed management condition.

Nine broad fauna habitat types were identified from within the application area (Biologic, 2018b). The Spinifex Sandplain fauna habitat type is considered to be of high significance, as it supports conservation significant fauna and is moderately uncommon in the Pilbara region. The Mulga Woodlands, Major Drainage Line and Claypan fauna habitats are considered to be of moderate significance as it may support small and sparse populations of conservation significant fauna, but is common throughout the Pilbara (Biologic, 2018b). The remaining fauna habitats were deemed to be of low significance (Biologic, 2018b).

The study area is not considered to contain higher biological diversity than the surrounding environment, and the floristic assemblage recorded from the application area is consistent with expected assemblage from the Fortescue subregion (Biologic, 2018a; Maia, 2018).

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

Methodology Biologic (2018a)
Biologic (2018b)
CALM (2002)
DBCA (2018)
Maia (2018)
Roy Hill (2018)
Western Australian Herbarium (2018)

GIS Database:
- Beards Vegetation
- IBRA Australia
- Pre-European Vegetation
- Threatened and Priority Flora
- Threatened and Priority Ecological Communities Boundaries
- Threatened and Priority Ecological Communities Buffers
- Threatened Fauna

(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**

The Fortescue Marsh plays an important ecological role by providing habitat for animal taxa at a vulnerable stage in their life cycles, or providing refuge when adverse condition such as drought prevail (Environment Australia, 2001). No clearing of native vegetation within the Marsh itself is proposed, however the application intersects the buffer zone of the Priority 1 'Fortescue Marsh (Marsh Land System)' PEC (GIS Database). Thirteen broad fauna habitats were recorded during the Level 1 and targeted fauna survey undertaken by Biologic in August 2017 and July 2018, which covered a total area of approximately 110,292 hectares ('survey area'). Similar to the flora and vegetation survey conducted by Biologic, approximately 2,787 hectares in the northern portion of the application area was not included in the fauna field survey extent, however based on aerial imagery this additional area does not appear to be significantly different to the surrounding surveyed area (Biologic, 2018b; GIS Database). Of the thirteen broad fauna habitats recorded, the following nine are within the application area (Biologic, 2018b):

1. Spinifex Sandplain (high significance);
2. Claypans (moderate significance);
3. Major Drainage Line (moderate significance);
4. Mulga Woodland (moderate significance);
5. Eucalypt Woodland (low significance);
6. Mulga Spinifex (low significance);
7. Open Tussock Grassland (low significance);
8. Snakewood Shrubland (low significance); and
9. Spinifex Stonyplain (low significance).

Two significant habitat features, caves and waterbodies (semi-permanent water pools and claypans) were recorded during the survey (Biologic, 2018b). However, only three out of the six claypans are located within the proposed area to clear and all caves and semi-permanent water pools will not directly be impacted by the proposed clearing of native vegetation (GIS Database).

The desktop survey identified 327 native fauna species to potentially occur within the survey area, comprising 35 mammals, 184 birds, 99 reptiles and nine amphibians. Of these species, 33 species of conservation significance were identified as previously recorded and/or having the potential to occur within the survey area (Biologic, 2018b). Targeted searches were undertaken to identify the occurrence of conservation significant fauna in important habitat features such as water pools and caves. The field survey recorded the following conservation significant species (Biologic, 2018b):

- Northern Quoll (*Dasyurus hallucatus*) (Endangered) - outside the application area;
- Ghost Bats (*Macroderma gigas*) (Vulnerable) - outside the application area;
- Greater Bilby (*Macrotis lagotis*) (Vulnerable) - within the application area;
- Northern Brushtail Possum (*Trichosurus vulpecula* subsp. *arnhemensis*)* (Vulnerable) - within the application area;
- Brush-tailed Mulgara (*Dasyercus blythi*) (Priority 4) - within the application area;
- Western Pebble-mound mouse (*Pseudomys chapmani*) (Priority 4) - outside the application area;
- Grey Falcon (*Falco hypoleucos*) (Schedule 3) - within the application area;
- Peregrine Falcon (*Falco peregrinus*) (Schedule 7) - outside the application area; and

* denotes potential record only.

The Greater Bilby was recorded in the Spinifex Sandplain and Mulga Woodlands habitat. The Spinifex Sandplain habitat type is considered to be of high significance as it is moderately uncommon within the Pilbara

region, and supports conservation significant species (Biologic, 2018b). The sandy soil substrate of this fauna habitat type provides adequate level of cover and deep sandy soils, therefore is suitable habitat for burrowing species such as the Greater Bilby and the Brush-tailed Mulgara, which was also recorded from within this fauna habitat type during the field survey (Biologic 2018b). Avoidance of extant burrows of such species and minimising clearing of native vegetation where critical habitat has been identified, is important in maintaining these populations (EPA, 2013). Potential impacts to the Greater Bilby and the Brush-tailed Mulgara from the proposed clearing of native vegetation may be minimised by the implementation of a fauna management condition.

Three claypans (characterised as the Claypan fauna habitat type) were recorded within the application area (GIS Database). Ephemeral claypans occur where sheet runoff collect following significant rainfall events. Water sources are a limiting factor in the Pilbara region and as such, claypans area considered to be an important habitat feature for fauna within the broader landscape (Biologic, 2018b). These claypans were recorded typically within the Mulga Woodland habitat type (Biologic, 2018b; GIS Database). The Mulga Woodlands is the most dominant fauna habitat type within the application area and is a common habitat throughout the Fortescue and Hamersley subregions (Biologic, 2018b; GIS Database). It is considered to be of moderate significance, as it may support small and sparse population of conservation significant species if there are enough resources available (Biologic, 2018b). The potential record of the Northern Brushtail Possum within the application area was from the Mulga Woodlands habitat type, adjacent to the Major Drainage Line fauna habitat type of the Fortescue River (Biologic, 2018b; GIS Database). Multiple scratching's that are characteristic of the species, were recorded on the trunks of large hollow-bearing eucalypts during both the August 2017 and July 2018 surveys (Biologic, 2018b). These scratching's are the only evidence of this species recorded during the survey, therefore the presence of the Northern Brushtail Possums cannot be entirely confirmed (Biologic, 2018b). According to available biodiversity databases, the nearest record of the species is located approximately 60 kilometres west of the application area (Biologic, 2018b). The species is infrequently recorded within the Pilbara, with less than 20 records existing on NatureMap (Biologic, 2018b). The potential impacts to the claypans fauna habitat type from the proposed clearing of native vegetation may be minimised by the implementation of a restricted clearing condition.

The nearby Major Drainage Line contains a high density of suitable hollows, as well as high vegetation cover, woody debris and leaf litter (Biologic, 2018b). The Eucalypt Woodland fauna habitat types also contains trees with small hollows. The Grey Falcon and Peregrine Falcon are likely to utilise these fauna habitat types for hunting (Biologic, 2018b). These habitat types are considered to be of low significance, as it is common throughout the Pilbara region and well represented within the regions' conservation estate (Biologic, 2018b). However, the characteristics of this fauna habitat type may positively influence the maintenance of species biodiversity within the local area. Potential impacts to habitat trees from the proposed clearing of native vegetation may be minimised by the implementation of a restricted clearing condition.

Other species of conservation significance recorded during the field survey but outside of the application area include the Western Pebble-mound mouse (*Pseudomys chapmani*), Northern Quoll (*Dasyurus hallucatus*) and Ghost Bat (*Macroderma gigas*). The Spinifex Stonyplain habitat type is considered to be suitable for the Western Pebble-mound mouse, along with the Low Rocky Hills habitat type which is found outside the application area. The preferred fauna habitat types and features for the Northern Quoll and Ghost Bats are outside of the application area (Biologic, 2018b; GIS Database). These conservation significant species may potentially use the application area for dispersal and foraging, however the suitability of these fauna habitat types is unknown (Biologic, 2018b). The proposed clearing will not directly impact fauna habitat types that are known to be suitable for the Western Pebble-mound mouse, Northern Quoll and Ghost Bat, such as the Low Rocky Hills, therefore it is unlikely that the proposed clearing will significantly impact these conservation significant fauna (GIS Database).

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

Methodology Biologic (2018b)
Environment Australia (2001)

GIS Database:
- Beards Vegetation
- Imagery
- Pre-European Vegetation
- Threatened and Priority Ecological Communities Boundaries
- Threatened and Priority Ecological Communities Buffers
- Threatened Fauna

(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**

There are no known records of Threatened flora within the application area (GIS Database). Flora surveys of the application area did not record any species of Threatened flora (Biologic, 2018a; Maia, 2018).

The vegetation proposed to be cleared is unlikely to be necessary for the continued existence of any species of Threatened (rare) flora (Biologic, 2018a; Maia, 2018; GIS Database),

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

Methodology Biologic (2018a)
Maia (2018)

GIS Database:
- Pre-European Vegetation
- Threatened and Priority Flora

(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) located within or in close proximity to the application area (GIS Database).

A flora and vegetation survey of the application area did not identify any TECs (Biologic 2018a; Maia, 2018).

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

Methodology Biologic (2018a)
Maia (2018)

GIS Database:
- Threatened and Priority Ecological Communities Boundaries
- Threatened and Priority Ecological Communities Buffers

(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 Pilbara Bioregion of the Interim Biogeographic Regionalisation for Australia (IBRA) (GIS Database). Approximately 99.6% of the pre-European vegetation still exists in the IBRA Pilbara Bioregion (Government of Western Australia, 2018). The application area is broadly mapped as Beard vegetation associations 29: Sparse low woodland; mulga, discontinuous in scattered groups; 111: Hummock grasslands, shrub steppe; *Eucalyptus gamophylla* over hard spinifex; 197: Sedgeland; sedges with scattered medium trees; coolabah over various sedges & forbes; and 676: Succulent steppe; samphire (GIS Database). Approximately 95-100% of the pre-European extent of each of these vegetation associations remains uncleared at both the state and bioregional level (see table below) (Government of Western Australia, 2018).

Therefore, the application area does not represent a significant remnant of native vegetation in an area that has been extensively cleared.

	Pre-European area (ha)*	Current extent (ha)*	Remaining %*	Conservation Status**	Pre-European % in DBCA managed lands
IBRA Bioregion – Pilbara	17,808,657	17,733,583	~99.6	Least Concern	10.12
Beard vegetation associations – WA					
29	7,903,991	7,900,200	~99.9	Least Concern	6.28
111	762,963	762,326	~99.9	Least Concern	9.55
197	56,489	56,469	~99.9	Least Concern	-
676	2,063,413	1,963,881	~95	Least Concern	14.72
Beard vegetation associations – Pilbara Bioregion					
29	1,133,219	1,132,939	~99.9	Least Concern	9.38
111	550,287	550,232	~99.9	Least Concern	6.95

197	47,420	47,400	~99.9	Least Concern	-
676	92,363	92,303	~99.9	Least Concern	71.36

* Government of Western Australia (2018)

** 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)
Government of Western Australia (2018)

GIS Database:

- IBRA 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

The northern portion of the application area traverses the Fortescue River, Kondy Creek, several unnamed minor creeks, and intersects the buffer of the Fortescue Marsh (Marsh Land System) PEC. The Fortescue Marsh is a Priority 1 Ecological Community and is listed on the Directory of Important Wetlands of Australia as a wetland of national significance (GIS Database). The Marsh itself extends over approximately 104,800 hectares within a management area of 583,600 hectares (EPA, 2013). The Fortescue Marsh management area is zoned according to key environmental values, with the application area intersecting four of these zones, including the Fortescue River Coolibah (2C), Calcrete Flats (2A), Marillana Plain (3B) and Kulbee Alluvial Flank (3A) zones (EPA, 2013; GIS Database). The Fortescue River Coolibah and Calcrete Flats zones are considered to be of medium environmental significance, and the Marillana Plain and Kulbee Alluvial Flank zones are low in environmental significance (EPA, 2013).

The majority of the application area is located within the Marillana Plain zone, and to a lesser extent within the Fortescue River Coolibah and Calcrete Flats zones. Only a small portion of the application area (approximately 3%) is located within the Kulbee Alluvial Flank zone. Of these zoned management areas, only the Fortescue River Coolibah zone is characterised as supporting riparian vegetation (EPA, 2013). Vegetation association EcoMIT occurs along the incised channels of the Fortescue River, and is considered to be a Groundwater Dependent Ecosystem (GDE) supporting phreatophytic flora, namely *Eucalyptus camaldulensis* subsp. *obtusa*, and potentially other potential phreatophytic flora including *Eucalyptus victrix* and *Atalaya hemiglauca* (Biologic, 2018a). The clearing of riparian vegetation has the potential to cause localised erosion and degrade faunal habitats. It may also have indirect impact on the Marsh as this area is a significant contributor of freshwater inflow to the Marsh during high rainfall events (DBCA, 2018b). Impacts to riparian vegetation within the Fortescue River Coolibah zone from the proposed clearing of native vegetation may be minimised by the implementation of a watercourse management condition and a restricted clearing condition.

Provided disturbance to riparian habitats is avoided or minimised where possible, and strict weed hygiene procedures are followed, the proposed clearing is unlikely to have a significant impact on riparian habitats. Furthermore, given the relatively small and localised clearing area for each drill pad and access track, clearing of riparian vegetation is unlikely to significantly impact local drainage patterns (GIS Database). Potential impacts to riparian vegetation may be minimised through the implementation of a watercourse management, a staged clearing condition and a restricted clearing condition.

There are some minor non-perennial waterlines in the southern portion of the application area however no vegetation associations were considered to be growing in, or in association with these waterlines (Maia, 2018; GIS Database). Two small drainage foci with potential groundwater dependent vegetation was recorded within the survey area, however they are located outside the application area and therefore will not be directly impacted by the proposed clearing of native vegetation (Maia, 2018; GIS Database).

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

Methodology Biologic (2018a)
DBCA (2018b)
EPA (2013)
Maia (2018)

GIS Database:

- Fortescue Marsh Management Zones
- Hydrography, Lakes
- Hydrography, linear

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

Comments Proposal may be at variance to this Principle

The application area lies mostly within the Coolibah, Divide, Fan and Narbung land systems, and at a lesser extent within the Calcrete, Brockman, Turee and Warri land systems (GIS Database). These land systems have been mapped and described in technical bulletins produced by the former Department of Agriculture (now the Department of Primary Industries and Regional Development).

The Coolibah land system is described as flood plains with weakly gilgaied clay soils supporting coolibah woodlands with tussock grass understorey. The flood plains of this land system are generally not susceptible to erosion however, the alluvial plains are highly susceptible to erosion (Van Vreeswyk et al., 2004).

The Divide land system is described as sandplains and occasional dunes supporting shrubby hard spinifex grasslands. This land system may be susceptible to wind erosion immediately following the removal of vegetation cover, but stabilisation occurs rapidly after rain (Van Vreeswyk et al., 2004).

The Fan land system is described as washplains and gilgai plains supporting groved mulga shrublands and minor tussock grasslands. This land system is moderately susceptible to erosion if vegetation cover is depleted (Van Vreeswyk et al., 2004).

The Narbung land system is described as alluvial washplains with prominent internal drainage foci supporting snakewood and mulga shrublands with halophytic low shrubs. The alluvial plains of this land system is moderately susceptible to erosion (Van Vreeswyk et al., 2004).

The Calcrete land system is described as low calcrete platforms and plains supporting shrubby hard spinifex grasslands. This land system may be susceptible to erosion if vegetation cover is removed (Van Vreeswyk et al., 2004).

The Brockman land system is described as alluvial plains with cracking clay soils supporting tussock grasslands. This land system may be susceptible to erosion if vegetation cover is removed (Van Vreeswyk et al., 2004).

The Turee land system is described as stony alluvial plains with gilgaied and non-gilgaied surfaces supporting tussock grasslands and grassy shrublands. Much of the system is protected from erosion by stone surface mantles, however the less stony parts are slightly to moderately susceptible to erosion (Van Vreeswyk et al., 2004).

The Warri land system is described as low calcrete platforms and plains supporting mulga and cassia shrublands. This land system is not generally susceptible to erosion (Van Vreeswyk et al., 2004).

The proposed clearing of up to 75 hectares of native vegetation within a boundary of approximately 20,474 hectares, for the purpose of hydrogeological investigation and associated activities is unlikely to cause significant land degradation. The impacts of erosion that may be caused by the proposed native vegetation clearing on land systems susceptible to erosion may be minimised by the implementation of a staged clearing condition.

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

Methodology Van Vreeswyk et al. (2004)

GIS Database:
- Landsystem Rangelands

(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

There are no conservation areas in the vicinity of the application area. The nearest DBCA (formerly DPaW) managed land is the former Roy Hill Station Pastoral Lease which is located approximately 8.8 kilometres west of the application area (GIS Database). The proposed clearing is unlikely to impact on 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:
- DPaW 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 may be at variance to this Principle

There are no Public Drinking Water Source Areas within the application area (GIS Database). The nearest Public Drinking Water Source Area is approximately 26 kilometres south of the application area (GIS Database).

The application area crosses a major non-perennial river, the Fortescue River, and several minor non-perennial watercourses including Kondy Creek (GIS Database). The Fortescue River and majority of the minor watercourses are intersected by the north-eastern extent of the application area, which is also defined as land subject to inundation (GIS Database). There are ten tentative drill hole locations within the north-eastern extent of the application area, which may involve the clearing of riparian vegetation for drill pads and access tracks. This is likely to cause localised short term sedimentation during the clearing process, however this is not likely to be an ongoing issue if rehabilitation is undertaken immediately after the drill pad and access tracks are no longer required. Potential impacts to surface water quality as a result of the proposed clearing may be minimised by the implementation of a watercourse management condition.

The groundwater in the application area ranges from brackish to hypersaline (500 – 3000 milligrams/Litre Total Dissolved Solids) (Roy Hill, 2018; GIS Database). The proposed clearing of 75 hectares of native vegetation (at various locations) within a permit boundary of 20,474 hectares, is unlikely to result in any significant impacts to groundwater quality.

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

Methodology GIS Database:
- Hydrography, Linear
- Public Drinking Water Source Areas

(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 climate of the region is semi-arid, with a low average rainfall of approximately 317.8 millimetres per year and average pan evaporation rates of 3,200 millimetres annually (BOM, 2018). There are no permanent water courses or waterbodies within the application area (GIS Database). Drainage lines in the area are seasonal, and are dry for most of the year, only flowing after significant rainfall. Temporary localised flooding may also occur within the application area following heavy rainfall events. (Van Vreeswyk et al., 2004).

The Fortescue Marsh Management Areas zoned as Marillana Plain and Kulbee Alluvial Flank support Mulga woodlands (EPA, 2013). The banded Mulga dominated vegetation communities (e.g. the mosaics of vegetation association AWL/ASL-5) are highly dependent on surface sheet flows (Maia, 2018). Mulga groves (e.g. vegetation association AaAfLIT) may also depend on sheet flow (Biologic, 2018a). Any clearing of native vegetation that causes disruption to the natural surface sheet flows and exacerbate flooding may impact these vegetation communities (EPA, 2013; Van Vreeswyk et al., 2004). This application proposes to clear up to 75 hectares of native vegetation within the Upper Fortescue River catchment that covers a total area of approximately 2,979,139 hectares. Given that only a small portion of the catchment area is proposed to be cleared, and the relatively small and localised clearing area for each drill pad and access track, it is unlikely that the proposed clearing will significantly increase the incidence or intensity of natural flooding events.

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

Methodology Biologic (2018a)
BOM (2018)
EPA (2013)
Maia (2018)
Van Vreeswyk et al. (2004)

GIS Database:
- Hydrographic Catchments - Catchments
- Hydrography, linear

Planning Instrument, Native Title, previous EPA decision or other matter.

Comments

The clearing permit application was advertised on 10 September 2018 by the Department of Mines, Industry Regulation and Safety (DMIRS), inviting submissions from the public. No submissions were received in relation to this application.

There is one native title determination (WC2005/006) over the area under application (DPLH, 2018). This was determined on 26 October 2018. However, the mining tenure 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 are several registered Aboriginal Sites of Significance within the application area (DPLH, 2018). 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 Water and Environmental Regulation and the Department of Biodiversity Conservation and Attractions, 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 DPLH (2018)

4. References

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- Western Australian Herbarium (2018) FloraBase - the Western Australian Flora. Department of Biodiversity, Conservation and Attractions. <https://florabase.dpaw.wa.gov.au/> (Accessed 2 December 2018).

5. Glossary

Acronyms:

BoM	Bureau of Meteorology, Australian Government
DAA	Department of Aboriginal Affairs, Western Australia (now DPLH)
DAFWA	Department of Agriculture and Food, Western Australia (now DPIRD)
DBCA	Department of Biodiversity Conservation and Attractions, Western Australia
DEC	Department of Environment and Conservation, Western Australia (now DBCA and DWER)
DEE	Department of the Environment and Energy, Australian Government
DER	Department of Environment Regulation, Western Australia (now DWER)
DMIRS	Department of Mines, Industry Regulation and Safety, Western Australia

DMP	Department of Mines and Petroleum, Western Australia (now DMIRS)
DPIRD	Department of Primary Industries and Regional Development, Western Australia
DPLH	Department of Planning, Lands and Heritage, Western Australia
DRF	Declared Rare Flora
DoE	Department of the Environment, Australian Government (now DEE)
DoW	Department of Water, Western Australia (now DWER)
DPaW	Department of Parks and Wildlife, Western Australia (now DBCA)
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DEE)
DWER	Department of Water and Environmental Regulation, Western Australia
EPA	Environmental Protection Authority, Western Australia
EP Act	<i>Environmental Protection Act 1986</i> , Western Australia
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Federal Act)
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union
PEC	Priority Ecological Community, Western Australia
RIWI Act	<i>Rights in Water and Irrigation Act 1914</i> , Western Australia
TEC	Threatened Ecological Community

Definitions:

{DPaW (2017) Conservation Codes for Western Australian Flora and Fauna. Department of Parks and Wildlife, Western Australia}:-

T	<p>Threatened species: Published as Specially Protected under the <i>Wildlife Conservation Act 1950</i>, listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).</p> <p>Threatened fauna is that subset of ‘Specially Protected Fauna’ declared to be ‘likely to become extinct’ pursuant to section 14(4) of the <i>Wildlife Conservation Act 1950</i>.</p> <p>Threatened flora is flora that has been declared to be ‘likely to become extinct or is rare, or otherwise in need of special protection’, pursuant to section 23F(2) of the <i>Wildlife Conservation Act 1950</i>.</p> <p>The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.</p>
CR	<p>Critically endangered species Threatened species considered to be facing an extremely high risk of extinction in the wild. Published as Specially Protected under the <i>Wildlife Conservation Act 1950</i>, in Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.</p>
EN	<p>Endangered species Threatened species considered to be facing a very high risk of extinction in the wild. Published as Specially Protected under the <i>Wildlife Conservation Act 1950</i>, in Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.</p>
VU	<p>Vulnerable species Threatened species considered to be facing a high risk of extinction in the wild. Published as Specially Protected under the <i>Wildlife Conservation Act 1950</i>, in Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.</p>
EX	<p>Presumed extinct species Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the <i>Wildlife Conservation Act 1950</i>, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.</p>
IA	<p>Migratory birds protected under an international agreement Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds. Published as Specially Protected under the <i>Wildlife Conservation Act 1950</i>, in Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice.</p>

- CD Conservation dependent fauna**
Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice.
- OS Other specially protected fauna**
Fauna otherwise in need of special protection to ensure their conservation. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.
- P Priority species**
Species which are poorly known; or
Species that are adequately known, are rare but not threatened, and require regular monitoring. Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.
- P1 Priority One - Poorly-known species:**
Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
- P2 Priority Two - Poorly-known species:**
Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
- P3 Priority Three - Poorly-known species:**
Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
- P4 Priority Four - Rare, Near Threatened and other species in need of monitoring:**
(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.
(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable, but are not listed as Conservation Dependent.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.