# APPENDIX 4: LEVEL 1 FAUNA ASSESSMENT

# Fauna Assessment

# Yalyalup Project Area

## Doral Mineral Sands Pty Ltd

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*V1*

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**Acronyms/Abbreviations:**

**ALA**: Atlas of Living Australia www.ala.org.au

**BA**: Birdlife Australia (Formerly RAOU, Birds Australia).

**BC Bill**: Biodiversity Conservation Bill (2015). WA Government.

**°C**: Degrees Celsius.

**CALM**: Department of Conservation and Land Management (now DBCA), WA Government.

**CAMBA**: China Australia Migratory Bird Agreement 1998.

**CBD**: Central Business District.

**DBCA**: Department of Biodiversity, Conservation and Attractions (formerly DPaW, DEC, CALM, DoE), WA Government

**DBH:** Diametre at Breast Height – tree measurement.

**DEC**: Department of Environment and Conservation (now DBCA), WA Government.

**DEH**: Department of Environment and Heritage (now DotEE), Australian Government.

**DEP**: Department of Environment Protection (now DER), WA Government.

**DER**: Department of Environment Regulation (formerly DEC, DoE), WA Government.

**DEWHA**: Department of the Environment, Water, Heritage and the Arts (now DotEE), Australian Government

**DMP**: Department of Mines and Petroleum (formerly DoIR), WA Government.

**DoE**: Department of Environment (now DER/DBCA), WA Government.

**DoP**: Department of Planning, WA Government.

**DotE**: Department of the Environment (now DotEE), Australian Government.

**DotEE**: Department of the Environment and Energy (formerly SEWPaC, DWEHA, DEH & DotE), Australian Government.

**DoIR**: Department of Industry and Resources (now DMP), WA Government.

**DPaW**: Department of Parks and Wildlife (now DBCA), WA Government.

**EP Act**: *Environmental Protection Act 1986*, WA Government.

**EPA**: Environmental Protection Authority, WA Government.

**EPBC Act**: *Environment Protection and Biodiversity Conservation Act 1999,* Australian Government.

**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.

**JAMBA**: Japan Australia Migratory Bird Agreement 1981.

**km**: Kilometre.

**m**: Metre.

**mm**: Millimetre.

**P:** Priority - DBCA fauna conservation ranking.

**POS:** Public Open Space.

**RAOU**: Royal Australia Ornithologist Union.

**ROKAMBA**: Republic of Korea-Australia Migratory Bird Agreement 2007.

**S:** Schedule - Western Australian *Wildlife Conservation Act (1950)* Threatened Fauna Category.

**SEWPaC**: Department of Sustainability, Environment, Water, Population and Communities (now DotEE), Australian Government.

**SRE:** Short Range Endemic.

**SSC**: Species Survival Commission, International.

**WA**: Western Australia.

**WAM**: Western Australian Museum, WA Government.

**WAPC**: Western Australian Planning Commission, WA Government.

**WC Act**: *Wildlife Conservation Act 1950*, WA Government.

**WRP**: Western Ringtail Possum

# SUMMARY

This report details the results of a fauna assessment of Doral Mineral Sands Pty Ltd's (Doral) Yalyalup Project area (the subject site). The Yalyalup Project area covers approximately 894 ha and is largely cleared farmland. (Figures 1 and 2).

The subject site contains an identified mineral sand resource which Doral are proposing to mine. The fauna assessment reported on here represents one of several technical reports that will be used to provide an understanding of the suite of environmental values present within the subject site.

The scope of works was to conduct a Level 1 fauna survey as defined by the EPA (EPA 2004). Because the general area is known to be utilised by western ringtail possums and black cockatoos the scope of the survey work was expanded to include a baseline assessment of the sites significance to these species as well. The assessment has included a literature review ("desktop study"), a day time survey and one nocturnal survey carried out in June/August 2017.

With respect to native fauna, the desktop study identified 11 mammal (including eight bat species), 77 bird, 13 reptile and eight frog species as having previously being recorded in the general area, some of which have the potential to occur in or utilise sections of the subject site at times, a conclusion largely based on the presence of apparently suitable habitat.

Descriptions and example images of the main fauna habitats/dominant vegetation present within the subject site are provided in Table 1, with the location and extent of each unit being depicted in Figure 3.

Almost all the subject site (~95%) has been totally cleared or almost totally cleared of native vegetation for livestock grazing. These areas contain only pasture grasses with the occasional widely spaced, scattered tree remaining. Parts of the subject site have been planted with non-endemic/exotic tree species to act as wind breaks. Native remnant vegetation is mostly confined to road verges and along a small seasonally inundated tributary of the Sabina River. Most of this vegetation is dominated by woodlands containing various densities of marri, jarrah and/or flooded gum with or without midstorey species such as peppermint, paperbark or banksia. Almost all the native vegetation present is in a completely degraded condition (Ecoedge 2016).

Overall fauna habitat values within the subject site have been severely compromised by historical clearing. Most areas lack any natural attributes and are now only likely to be utilised by generally common and widespread fauna species with non-specific requirements which allow them to persist in highly disturbed habitats. As a consequence, the fauna biodiversity of the subject site is well below levels present prior to historical disturbance having occurred.

Opportunistic fauna observations are listed in Appendix B. A total of 26 native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) within the subject site during the day and night time surveys. Three introduced/domestic species were also recorded.

The western ringtail possum survey results are shown in Figure 4. In total six dreys were observed during the day survey. Five WRPs were recorded during the night survey. These observations were all made within vegetation bordering the McGibbon Track. This area is characterised by having good midstorey canopy connectivity and a range of plant species known to be fed upon by WRPs (e.g. jarrah, marri, peppermint, Christmas tree, *Acacia saligna*).

The majority of the vegetation bordering the creek line in the west of the property was not examined for WRPs due to access restrictions but given the prevalence of peppermint in this area it is also likely to be in use by the species, though its value is compromised to a certain extent by discontinuous canopy connectivity along its length.

Other areas of vegetation which lack a strong midstorey component, including areas of planted non-endemic/exotic species can be regarded as being marginal/unsuitable for use by WRPs on a permanent basis, though some sections would represent dispersal habitat, albeit of a generally poor quality.

The black cockatoo habitat assessment undertaken was limited to opportunistic observations of the extent and quality of potential habitat across the subject site made during other survey work. The majority of the subject site is cleared (~95%) and so the extent of potential black cockatoo habitat is relatively small when also considering that not all the vegetation in remaining areas represents what can be regarded as quality habitat due to a lack of favoured plant species. The best areas are those dominated by marri and jarrah which cover about 14 ha though this is supplemented by the presence of some scattered individual trees in other areas.

No actual evidence of black cockatoos breeding, foraging or roosting within the subject site was observed during the field survey, though it should be noted some areas were not examined in detail.

It is understood that any future development at the subject site will be largely confined to existing cleared areas with the only possible clearing required being a small number of scattered paddock trees. Based on this information, no direct, substantial impacts on any fauna species or existing biodiversity values are anticipated. In cases where some impact does occur it is only expected to be very low/negligible. This coupled with the fact that most of the species known to or likely to occur are common and widespread, no overall change in their conservation status is considered likely.

A review of the state government clearing permit principles relating to fauna suggest that the anticipated low degree of clearing is highly unlikely to compromise the published guidelines and therefore the DMP are considered unlikely to classify any as being in variance to approval criteria.

At the federal level, an assessment using published DotEE criteria suggests that “significant impact” is not likely to any of the four species of listed *EPBC Act* species known to or likely to utilise the area, primarily given the small area of degraded vegetation likely to be affected. Based on this conclusion it is the Authors opinion that, if the proponent were to refer the proposed development to the DotEE for review, anticipated clearing of vegetation needed for

the project to proceed would be assessed as “not a controlled action” and therefore would not require further assessment and approval under the *EPBC Act* before it could proceed.

It is however recommended that once mine planning has advanced and areas of direct and indirect impact identified with more certainty, a review of potential impacts on listed threatened fauna species should be carried out to determine if referral is required, so as to ensure compliance with the *EPBC Act*. The need for other referrals or approvals as required from State agencies will also need to be re-considered at this point.

# 1. INTRODUCTION

This report details the results of a fauna assessment of Doral Mineral Sands Pty Ltd's (Doral) Yalyalup Project area (the subject site). The subject site is situated about 12 km south east of Busselton in south west Western Australia (Figure 1).

The Yalyalup Project area covers approximately 894 ha and is largely cleared farmland. The native vegetation which remains is mainly located along road reserves and drainage lines or is represented by widely scattered trees in cleared paddock areas (Figure 2).

The subject site contains an identified mineral sand resource which Doral are proposing to mine. The fauna assessment reported on here represents one of several technical reports that will be used to provide an understanding of the suite of environmental values present within the subject site. The information presented will be used to guide ongoing planning and to facilitate state and federal government approvals when and if required.

# 2. SCOPE OF WORKS

The scope of works was to conduct a Level 1 fauna survey as defined by the EPA (EPA 2004). Because the general area is known to be utilised by western ringtail possums and black cockatoos the scope of the survey work was expanded to include a baseline assessment of the sites significance to these species as well. The fauna assessment has therefore included:

1. Level 1 fauna assessment (in accordance with EPA (2004) guidelines);
2. Targeted day and night searches for western ringtail possum habitat/site use (foraging, refuge and dispersal habitat and individuals);
3. Preliminary black cockatoo habitat/site use assessment (opportunistic observations on potential habitat trees, foraging and roosting habitat);
4. Identify and discuss any other potentially occurring significant fauna species and their habitat; and
5. Report summarising results, methods and conclusions.

Note: For the purposes of this report the term black cockatoo is in reference to Baudin's black cockatoo *Calyptorhynchus baudinii*, Carnaby's black cockatoo *Calyptorhynchus latirostris* and the forest red-tailed black cockatoo *Calyptorhynchus banksii naso*.

# 3. METHODS

## 3.1 POTENTIAL FAUNA INVENTORY - LITERATURE REVIEW

### 3.1.1 Database Searches

Searches of the following databases were undertaken to aid in the compilation of a list of vertebrate fauna potentially occurring within the subject site:

- DBCA's NatureMap database search (combined data from DBCA's, WAM, BA, ALA and consultant's reports) (DBCA 2017); and
- Protected matters search tool (DotEE 2017b).

It should be noted that lists produced during the abovementioned database searches contain observations/inferred distributions from a broader area than the subject site and therefore may include species that would only ever occur as vagrants due to a lack of suitable habitat or the presence of only marginal habitat within the subject site itself. The databases also often include or are based on very old records and in some cases certain fauna species have become locally or regionally extinct.

Information from these sources should therefore be taken as indicative only and local knowledge and information needs to be taken into consideration when determining what actual species may be present within the specific area being investigated. Fauna considered unlikely to be present even if appearing in these database searches are not shown in the potential species list.

### 3.1.2 Previous Fauna Surveys in the Area

Fauna surveys, assessments and reviews have been undertaken in nearby areas in the past, though not all are publicly available and could not be referenced. The most significant of those available have been used as the primary reference material for compiling the potential fauna assemblage for the general area.

Those reports referred to included, but were not limited to:

- Bamford, M.J and A.R. (2000). Proposed Gwindinup Mineral Sands Mine. Fauna Surveys; August and December 1999. Unpublished report for Cable Sands WA. January 2000.
- Bamford, M. and A. (2001). Fauna Survey of the Ludlow Mining Lease. Final Report. Unpublished report for Cable Sands (WA) Pty Ltd. November 2001.
- Bancroft, W. and Bamford, M. (2008). Fauna values of Bemax's Happy Valley mineral sands deposit. Unpublished report for Bemax Resources Limited. January 2008.

- Biologic (2014). Wonnerup North Vertebrate Fauna Assessment. Unpublished report for Cristal Mining Australia Ltd. April 2014.
- Biota (2009). Tutunup Fauna Assemblage and Fauna Habitat Seasonal Survey. Unpublished report for Iluka Resources. March 2009.
- Biota (2007a). Yoganup 215 Strand Fauna and Faunal Assemblage Survey. Unpublished report for Iluka Resources. February 2007.
- Biota (2007b). Tutunup South Fauna Habitat and Fauna Assemblage Seasonal Survey. Unpublished report for Iluka Resources. December 2007.
- Harewood, G. (2009). Western Ringtail Possum Baseline Assessment. Tutunup. Unpublished report for Iluka Resources. August 2009.
- Harewood, G. (2012). Phase 1 and 2 Seasonal Fauna Surveys (Level 2). Yoongarillup Mineral Sands Project. Unpublished report for Doral Mineral Sands Pty Ltd.
- Harewood, G. (2013). Fauna Assessment of Yoganup Extended. Unpublished report for Iluka Resources Ltd.
- Hart, Simpson and Assoc. (1997). Wonnerup -Tutunup Road - Vertebrate Fauna. Unpublished report for Westralian Sands Ltd.
- Ninox (2006). A Vertebrate Fauna Assessment of the Yoganup Mineral Sands Project Area. Unpublished report for Iluka Resources. March 2006.

As with the database searches some reports refer to species that would not occur in the subject site due to a lack of suitable habitat (extent and/or quality) and this fact was taken into consideration when compiling the potential fauna species list. It should also be noted that the NatureMap database is likely to include some records from previous fauna surveys in the area including some of those listed above.

### 3.1.3 Existing Publications

The following represent the main publications used to identify and refine the potential fauna species list for the subject site:

- Anstis, M. (2013). Tadpoles and Frogs of Australia. New Holland Publishers, Sydney.
- Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulter, R. (2003). The New Atlas of Australian Birds. Royal Australasian Ornithologists Union, Victoria.
- Bush, B., Maryan, B., Browne-Cooper, R. & Robinson, D. (2007). Reptiles and Frogs in the Bush: Southwestern Australia. UWA Press, Nedlands.

- Bush, B., Maryan, B., Browne-Cooper, R. & Robinson, D. (2010). Field Guide to Reptiles and Frogs of the Perth Region. UWA Press, Nedlands.
- Churchill, S. (2008). Australian Bats. Second Edition, Allen & Unwin.
- Cogger, H.G. (2014). Reptiles and Amphibians of Australia. 7th Edition. CSIRO Publishing.
- Johnstone, R.E. and Storr, G.M. (1998). Handbook of Western Australian Birds: Volume 1 – Non-passerines (Emu to Dollarbird). Western Australian Museum, Perth Western Australia.
- Johnstone, R.E. and Storr, G.M. (2004). Handbook of Western Australian Birds: Volume 2 – Passerines (Blue-winged Pitta to Goldfinch). Western Australian Museum, Perth Western Australia.
- Menkhorst, P. and Knight, F. (2011). A Field Guide to the Mammals of Australia. Oxford University Press, Melbourne.
- Morgan, D.L., Beatty, S.J., Klunzinger, M.W, Allen, M.G. and Burnham, Q.E (2011). Field Guide to the Freshwater Fishes, Crayfishes and Mussels of South Western Australia. Published by SERCUL.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1983). Lizards of Western Australia II: Dragons and Monitors. WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1990). Lizards of Western Australia III: Geckos and Pygopods. WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1999). Lizards of Western Australia I: Skinks. Revised Edition, WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (2002). Snakes of Western Australia. Revised Edition, WA Museum, Perth.
- Tyler M.J. & Doughty P. (2009). Field Guide to Frogs of Western Australia, Fourth Edition, WA Museum, Perth.
- Van Dyck, S., Gynther, I. & Baker, A. Eds (2013). Field Companion to The Mammals of Australia. Queensland Museum.
- Wilson, S. and Swan, G. (2013). A Complete Guide to Reptiles of Australia. Reed, New Holland, Sydney.
- Woinarski, J., Burbidge, A. & Harrison, P. (2014). The Action Plan for Australian Mammals 2012. CSIRO Publishing.

### 3.1.4 Fauna of Conservation Significance

The conservation significance of fauna species has been assessed using data from the following sources:

- *EPBC Ac*t. Administered by the Australian Government DotEE;
- *WC Act.* Administered by the Western Australian DBCA (Govt. of WA 2017). It should be noted that the *Wildlife Conservation Act (1950)* is soon to be repealed and replaced by the *Biodiversity Conservation Bill (2015)* currently before Parliament.
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List - the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and the
- DBCA Priority Fauna list. A non-statutory list maintained by the DBCA for management purposes (DBCA 2017).

The *EPBC Act* also requires the compilation of a list of migratory species that are recognised under international treaties including the:

- Japan Australia Migratory Bird Agreement 1981 (JAMBA);
- China Australia Migratory Bird Agreement 1998 (CAMBA);
- Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA); and
- Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals).

(Note - Species listed under JAMBA are also protected under Schedule 5 of the *WC Act*.)

All migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as matters of national environmental significance (NES) under the *EPBC Act*.

The conservation status of all vertebrate fauna species listed as occurring or possibly occurring in the vicinity of the subject site has been assessed using the most recent lists published in accordance with the above-mentioned instruments and is indicated as such in the fauna listings of this report. A full listing of conservation codes is provided in Appendix A.

A number of other species not listed in official lists can also be considered of local or regional conservation significance. These include species that have a restricted range, those that occur in breeding colonies and those at the limit of their range.

While not classified as rare, threatened or vulnerable under any State or Commonwealth legislation, a number of birds have been listed as species of significance on the Swan Coastal portion of the Perth Metropolitan Region (Bush Forever - Government of Western Australia 1998 and 2000). The bird species are often referred to as "Bush Forever Decreaser Species".

The three categories used for birds within the Bush Forever documents are:

- Habitat specialists with reduced distribution on the Swan Coastal Plain (code Bh)
- Wide ranging Species with reduced populations on the Swan Coastal Plain. (code Bp)
- Extinct in the Perth region (code Be)

The presence of Bush Forever species should be taken into some consideration when determining the fauna values of an area. Bush Forever decreaser species are indicated as such within the species list held in Appendix B.

### 3.1.5 Invertebrate Fauna of Conservation Significance

For this assessment, the review of potential conservation significant invertebrates has been limited to those listed by the DBCA and *EPBC Act* database searches (which rely on distribution records and known habitat preferences).

No assessment of the potential for SREs to be present has been made as it can be difficult to identify significant invertebrate species due to uncertainties in determining the range-restrictions of many species due to lack of surveys, lack of taxonomic resolutions within target taxa and problems in identifying certain life stages. Where invertebrates are collected during surveys, a high percentage are likely to be unknown, or for known species there can be limited knowledge or information on their distribution (Harvey 2002).

### 3.1.6 Likelihood of Occurrence – Fauna of Conservation Significance

Fauna of conservation significance identified during the literature review as previously being recorded in the general area were assessed and ranked for their likelihood of occurrence within the subject site itself. The rankings and criteria used were:

- Would Not Occur: There is no suitable habitat for the species in the subject site and/or there is no documented record of the species in the general area since records have been kept and/or the species is generally accepted as being locally/regionally extinct (supported by a lack of recent records).
    - Locally Extinct: Populations no longer occur within a small part of the species natural range, in this case within 10 or 20km of the subject site. Populations do however persist outside of this area.

  - Regionally Extinct: Populations no longer occur in a large part of the species natural range, in this case within the southern forest regions. Populations do however persist outside of this area.

- Unlikely to Occur: The subject site is outside of the currently documented distribution for the species in question, or no suitable habitat (type, quality and extent) was identified as being present during the field assessment. Individuals of some species may occur occasionally as vagrants/transients especially if suitable habitat is located nearby but the subject site itself would not support a population or part population of the species.

- Possibly Occurs: The subject site is within the known distribution of the species in question and habitat of at least marginal quality was identified as being present during the field assessment, supported in some cases by recent records being documented in literature from within or near the subject site. In some cases, while a species may be classified as possibly being present at times, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

- Known to Occur: The species in question was positively identified as being present (for sedentary species) or as using the subject site as habitat for some other purpose (for non-sedentary/mobile species) during the field survey. This information may have been obtained by direct observation of individuals or by way of secondary evidence (e.g. foraging debris, tracks and scats). In some cases, while a species may be classified as known to occur, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

### 3.1.7 Taxonomy and Nomenclature

Taxonomy and nomenclature for fauna species used in this report is generally taken from the DBCA's WA Fauna Census Database which is assumed to follow Aplin and Smith (2001) for amphibians and reptiles and Johnstone (2001) for birds. Jackson and Groves (2015) has been used for mammals.

Common names are taken from the Western Australia Museum (WAM) recognised primary common name listings when specified, though where common names are not provided they have been acquired from other publications. Sources include Cogger (2014), Wilson and Swan (2013), Van Dyck & Strahan (2013), Christidis and Boles (2008), Bush *et al.* (2010), Bush *et al.* (2007), Tyler *et al*. (2009), and Glauret (1961). Not all common names are generally accepted.

## 3.2 SITE SURVEYS

Daytime field survey work at the subject site was carried out on the 28 June and the 17 August 2017. A nocturnal survey was completed on the 29 June 2017. All survey work

was done by Greg Harewood (Zoologist). The field survey was confined to accessible road verges due to access restrictions to some private properties.

### 3.2.1 Fauna Habitat Assessment

Vegetation units identified during the flora and vegetation survey, carried out by Ecoedge (Ecoedge 2016), have been used to define broad fauna habitat types across the subject site. This information has been supplemented with observations made during the fauna survey.

The main aim of this facet of the assessment was to determine if it was likely that any species of conservation significance would be utilising the subject site based on the presence of suitable habitat. The habitat information obtained was also used to aid in finalising the overall potential fauna list.

As part of the literature review, available information on the habitat requirements of the species of conservation significance listed as possibly occurring in the area was researched. During the field survey the habitats within the subject site were assessed and specific elements identified, if present, to determine the likelihood of listed threatened species utilising the area and its significance to them.

### 3.2.2 Opportunistic Fauna Observations

Opportunistic observations of fauna species were made during all field survey work which primarily involved a series of transects across accessible sections of the subject site during the day while searching microhabitats such as logs, rocks, leaf litter and observations of bird species with binoculars. Secondary evidence of a species presence such as tracks, scats, skeletal remains, foraging evidence or calls were also noted if observed/heard.

### 3.2.3 Western Ringtail Possum Assessment

#### 3.2.3.1 Daytime Survey

Day time surveys to locate and record dreys, obvious tree hollows, scats and individual WRPs were carried concurrent with the general fauna assessment and involved the examination of potential habitat along road verges within the subject site.

#### 3.2.3.2 Night Time Survey

A nocturnal survey was carried out to provide an estimate of the distribution and abundance of WRPs in areas of potential habitat identified during the day time survey. Survey work was confined to vegetation bordering road verges and was carried out on foot using a LED head torch.

#### 3.2.3.3 Habitat Assessment

Description and comments on the amount and quality of WRP habitat within the subject site are provided based on observations made during the site surveys.

### 3.2.4 Black Cockatoo Habitat Assessment

The black cockatoo habitat assessment undertaken was limited to opportunistic observations of the extent and quality of potential habitat across the subject site made during other survey work. This approach was taken due to access restrictions to private property at the time (where most of mine activities will be located) and the fact that almost all of this area lacks native vegetation.

The location and nature of black cockatoo foraging evidence (e.g. chewed fruits around the base of trees) observed during the field survey (if any) was recorded. The nature and extent of potential foraging habitat present was also documented irrespective of the presence of any actual foraging evidence.

Direct and indirect evidence of black cockatoos roosting within trees within the subject site was noted if observed (e.g. branch clippings, droppings or moulted feathers).

### 3.2.5 Other Species of Conservation Significance

Evidence of the presence or likely presence of other species of conservation significance (including suitable habitat) was searched for and recorded concurrent with the WRP/black cockatoo assessments. The aim was to obtain sufficient information to make a definitive comment on the likely significance of the subject site to other species of conservation significance which may be present.

# 4. SURVEY CONSTRAINTS

No seasonal sampling has been carried out as part of this fauna assessment. The conclusions presented are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the subject site at the time of the field assessments. It should also be recognised that site conditions can change with time.

Some fauna species are reported as potentially occurring within the subject site based on there being suitable habitat (quality and extent) within the subject site or immediately adjacent. With respect to opportunistic observations, the possibility exists that certain species may not have been detected during field investigations due to:

- seasonal inactivity during the field survey;
- species present within micro habitats not surveyed;
- cryptic species able to avoid detection; and
- transient wide-ranging species not present during the survey period.

Lack of observational data on some species should therefore not necessarily be taken as an indication that a species is absent from the subject site.

The habitat requirements and ecology of many of the species known to occur in the wider area are often not well understood or documented. It can therefore be difficult to exclude species from the potential list based on a lack of a specific habitat or microhabitat within the subject site. As a consequence of this limitation the potential fauna list produced is most likely an overestimation of those species that actually utilise the subject site for some purpose. Some species may be present in the general area but may only use the subject site itself on rare occasions or as vagrants/transients.

At the time of the survey work access to the majority of private properties within the subject site was restricted. Because of this all survey work was therefore carried out along road verges in the area. The vast majority of native vegetation is located in road reserves and therefore this was not, for the purpose of this assessment, seen as a major limitation.

In recognition of survey limitations, a precautionary approach has been adopted for this assessment. Any fauna species that would possibly occur within the subject site (or immediately adjacent), as identified through ecological databases, publications, discussions with local experts/residents and the habitat knowledge of the Author, has been assumed to potentially occur in the subject site.

# 5. RESULTS

## 5.1 POTENTIAL FAUNA INVENTORY – LITERATURE REVIEW

A list of fauna species considered most likely to occur in the subject site has been compiled from information obtained during the literature review and is presented in Appendix B. This listing was refined after information gathered during the site reconnaissance survey was assessed.

The results of some previous fauna surveys carried out in the general area are summarised in this species listing as are the DBCA NatureMap database search results. Species considered unlikely to occur with the subject site but previously recorded in other surveys and/or which appear in the DBCA database search have been excluded from the list. The raw database search results from NatureMap (DBCA 2017) and the Protected Matters Search Tool (DotEE 2017b) are contained within Appendix C.

The list of potential fauna takes into consideration that firstly the species in question is not known to be locally/regionally extinct and secondly that suitable habitat for each species, as identified during the habitat assessment, is present within the subject site. Compiling an accurate fauna list has limitations (see Section 4 above) and therefore the listing is likely to be an overestimation of the fauna species actually present within the subject site at any one time.

With respect to native vertebrate fauna, 11 mammals (includes eight bat species), 77 bird, 13 reptile and eight frog species have previously been recorded in the general area, some of which have the potential to occur in or utilise sections of the subject area at times. Nine species of introduced/domestic animals may also frequent the area.

Of the 109 native animals that are listed as potentially occurring in the area, five are considered to be endangered/vulnerable or in need of special protection under State and/or Federal law. In addition, two migratory birds have also been listed as potential species.

## 5.2 SITE SURVEYS

### 5.2.1 Fauna Habitat Assessment

The subject site is located in the southern section of the Swan Coastal Plain. The Swan Coastal Plain (SWA) was classified as part of the Interim Biogeographical Regionalisation for Australia and is in broad terms described as a:

*"Low lying coastal plain mainly covered with Woodlands. It is dominated by Banksia or Tuart on sandy soils, Allocasuarina obesa on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah Woodland. Warm Mediterranean. Three phases of marine sand dune development provide relief. The outwash plains, once dominated by A. obesa – Marri Woodlands and Melaleuca shrublands, are extensive only in the south.*" (Thackway and Cresswell, 1996; IBRA, 2000).

The subject site itself is within a further defined subregion of the SWA referred to as the Swan Coastal Plain subregion or the Perth subregion (SWA2). This is defined as:

*"Colluvial and aeolian sands, alluvial river flats, coastal limestone. Heath and/or Tuart woodlands on limestone, Banksia and Jarrah - Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials. Includes a complex series of*

*seasonal wetlands and also includes Rottnest, Carnac and Garden Islands etc. Rainfall ranges between 600 and 1000 mm annually and the climate is Mediterranean*". The subregion has an area of about 1, 333,900 ha (Mitchell *et al.* 2002).

Almost all the subject site (~95%) has been totally cleared or almost totally cleared of native vegetation for livestock grazing. These areas contain only pasture grasses with the occasional widely spaced, scattered trees remaining. Parts of the subject site have been planted with non-endemic/exotic tree species to act as wind breaks. Native remnant vegetation is mostly confined to road verges and along a small seasonally inundated tributary of the Sabina River. Most of this vegetation is dominated by woodlands containing various densities of marri, jarrah and/or flooded gum with or without midstorey species such as peppermint, paperbark or banksia. Almost all the native vegetation present is in a completely degraded condition (Ecoedge 2016).

The subject site is almost flat with little topographical expression. Soils onsite vary from a coarse grey sand (thin layer of Bassendean Sand) on slightly raised areas to grey-brown loamy sand/sandy clay (Guildford Formation) on flats. An area of ironstone (formed by the cementation of soil) occurs in the eastern section of the subject site. Because of the loamy/clayey nature of the soils, low lying areas become waterlogged/partially inundated during the wetter months of the year.

Descriptions and example images of the main fauna habitats/dominant vegetation present within the subject site are provided in Table 1. The location and extent of each of the identified habitat/vegetation units is shown in Figure 3 (data courtesy EcoEdge 2016).

**Table 1: Main Fauna Habitats within the Subject Site**

| Unit | Fauna Habitat Description | Example Image |
|---|---|---|
| A1 | Woodland of *Corymbia calophylla* and *Eucalyptus marginata*, with scattered *Agonis flexuosa*, *Banksia attenuata*, *B. grandis*, *Melaleuca preissiana*, *Nuytsia floribunda*, *Persoonia longifolia* or *Xylomelum occidentale* over *Xanthorrhoea preissii* over weeds on grey-brown or grey loamy sand or sand (on farmland usually only *C. calophylla* and *E. marginata* are present).<br><br>Total Area = ~10.4 ha (1.16%) |  |

| Unit | Fauna Habitat Description | Example Image |
|---|---|---|
| A2 | Woodland of *C. calophylla* (sometimes with *E. marginata* or *E. rudis*) with scattered *M. preissiana* or *B. littoralis* over open shrubland that may include *Acacia extensa*, *A. saligna*, *Hakea ceratophylla*, *H. lissocarpha*, *H. prostrata*, *H. varia*, *Kingia australis*, *M. viminea* and *X. preissii* over weeds on seasonally wet grey loamy sand.<br><br>Total Area = ~4.0 ha (0.45%) |  |
| B1 | Tall shrubland of *A. saligna*, *B. squarrosa* subsp. *argillacea*, *Calothamnus quadrifidus* subsp. *teretifolius*, *H. oldfieldii* and *Kunzea micrantha* (with scattered emergent *E. rudis*) over scattered native herbs including *Drosera glanduligera* and *Sowerbaea laxiflora*, the sedge *Loxocarya magna*, and weeds on shallow red sandy clay on massive ironstone.<br><br>Total Area = ~0.5 ha (0.06%) |  |
| B2 | Woodland of *E. rudis* and (in some areas) *M. rhaphiophylla* over weeds on massive ironstone.<br><br>Total Area = ~2.9 ha (0.33%) |  |

| Unit | Fauna Habitat Description | Example Image |
|---|---|---|
| C1 | Woodland of *E. rudis* (and sometimes *C. calophylla*) over scattered *A. flexuosa* and *M. rhaphiophylla* over weeds on grey-brown clayey loams in drainage lines.<br><br>Total Area = ~18.0 ha (2.01%) |  |
| C3 | Tall Open Shrubland that may include *Acacia saligna*, *Jacksonia furcellata*, *Kingia australis*, *Melaleuca osullivanii*, *M. preissiana*, *M. viminea* and *Xanthorrhoea preissii* on seasonally wet grey-brown sandy loam.<br><br>Total Area = ~0.55 ha (0.06%) |  |
| Planted | Planted non-endemic and exotic trees.<br><br>Total Area = ~4.9 ha (0.55%) |  |

| Unit | Fauna Habitat Description | Example Image |
|---|---|---|
| N/A | Existing cleared/highly degraded areas (e.g. paddocks/road verges) with scattered trees/shrubs. Some areas seasonally inundated / waterlogged.<br><br>Total Area = ~852.9 ha (95.38%) |  |
| N/A | Seasonal creek and drains (minor tributaries of the Sabina River) |  |

Overall fauna habitat values within the subject site have been severely compromised by the almost total removal (~95%) of native vegetation. Most areas lack any natural attributes and are now only likely to be utilised by generally common and widespread fauna species with non-specific requirements which allow them to persist in highly disturbed habitats. As a consequence, the fauna biodiversity of the subject site is well below levels present prior to historical disturbance having occurred.

Despite this, the vegetation remaining still represents habitat for some species of conservation significance. Vegetation bordering the main creek line in the west has also been identified as a regional ecological linkage which provides a corridor for wildlife movement (albeit tenuous) to areas either side of the subject site.

### 5.2.2 Opportunistic Fauna Observations

Opportunistic fauna observations are listed in Appendix B. A total of 26 native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) within the subject site during the day and night time surveys. Three introduced/domestic species were also recorded.

### 5.2.3 Western Ringtail Possum Assessment

#### 5.2.3.1 Daytime Survey

The daytime survey observations are shown in Figure 4. In total six WRP dreys were observed during the day survey. Tree hollows, forks in trees branches, subtle cavities in tree trunks, fallen hollow logs, rabbit burrows and dense ground cover are also used (to varying degrees) by WRPs for daytime refuge and therefore observations of dreys only provide a guide to WRP habitat use/quality as other opportunities for daytime refuge may exist. A small number of WRPs scats were also observed in close proximity to some dreys.

#### 5.2.3.2 Night Time Survey

The nocturnal survey observations are also shown in Figure 4. Five WRPs and six common brushtail possums were recorded. As with the day survey all these observations were made along the McGibbon Track.

#### 5.2.3.3 Habitat Assessment

WRP observations made during the survey period were all recorded within vegetation bordering the McGibbon Track. This area is characterised by having good midstorey canopy connectivity and a range of plant species known to be fed upon by WRPs (e.g. jarrah, marri, peppermint, Christmas tree, *Acacia saligna*).

The majority of the vegetation bordering the creekline in the west of the property was not examined for WRPs due to access restrictions but given the prevalence of peppermint in this area it is also likely to be in use by the species, though its value is compromised to a certain extent by discontinuous canopy connectivity along its length. Some sections of other road reserve vegetation, in particular those areas which contain some midstorey vegetation (mainly in the vicinity of the creek crossings), also appears to be potentially suitable habitat for WRPs despite no evidence of their presence being seen.

Other areas of vegetation which lack a strong midstorey component, including areas of planted non-endemic/exotic species can be regarded as being marginal/unsuitable for use by WRPs on a permanent basis, though some sections would represent dispersal habitat, albeit of a generally poor quality.

### 5.2.4 Black Cockatoo Habitat Assessment

The subject site contains a range of vegetation which falls into the category of potential breeding and/or foraging habitat for black cockatoos including, but not limited to areas containing:

- Jarrah - *Eucalyptus marginata* (breeding/foraging)*;*
- Marri – *Corymbia calophylla*(breeding/foraging);

- Flooded Gum *E. rudis* (breeding);
- *Banksia* sp. (foraging);
- *Hakea* sp. (foraging); and
- Balga *Xanthorrhoea preissii* (foraging).

As previously indicated the majority of the subject site is cleared (~95%) and so the extent of potential habitat is relatively small when also considering that not all the vegetation remaining represents what can be regarded as quality habitat due to a lack of favoured plant species. The best areas are those dominated by marri and jarrah which cover about 14 ha though this is supplemented by the presence of some scattered individual trees in other areas.

No actual evidence of black cockatoos breeding, foraging or roosting within the subject site was observed during the field survey, though it should be noted that this assessment was purely opportunistic and some areas were not examined.

### 5.2.5 Other Species of Conservation Significance

Besides the WRPs recorded, no direct evidence of any other species of conservation significance being present was found however based on the habitats present an additional six species are considered as potentially present though their actual status/frequency of occurrence in the subject site is uncertain. These species are discussed in more detail in the following sections.

## 5.3 FAUNA INVENTORY – SUMMARY

### 5.3.1 Vertebrate Fauna

Table 2 summarises the number of vertebrate fauna species potentially occurring within or utilising at times the subject site, based on results from the literature review and observations made during the field assessment. A complete list of vertebrate fauna possibly inhabiting or frequenting the subject site is located in Appendix B.

As previously discussed, despite the omission of some species it should be noted that the list provided is still very likely an over estimation of the fauna species utilising the subject site (either on a regular or infrequent basis) as a result of the precautionary approach adopted for the assessment. At any one time only a subset of the listed potential species are likely to be present within the bounds of the subject site.

**Table 2: Summary of Potential Vertebrate Fauna Species (as listed in Appendix B)**

| Group | Total number of Potential species | Potential number of Specially Protected species | Potential number of Migratory species | Potential number of Priority species | Number of species recorded during field survey |
|---|---|---|---|---|---|
| Amphibians | 8 | 0 | 0 | 0 | 1 |
| Reptiles | 13 | 0 | 0 | 0 | 0 |
| Birds | 78[1] | 4 | 2 | 0 | 23 |
| Non-Volant Mammals | 11[8] | 1 | 0 | 0 | 5[3] |
| Volant Mammals (Bats) | 8 | 0 | 0 | 0 | 0 |
| **Total** | **118[9]** | **5** | **2** | **0** | **29[3]** |

Superscript = number of introduced species included in total.

### 5.3.2 Vertebrate Fauna of Conservation Significance

A review of the *EPBC Act* threatened fauna list, DBCA's threatened fauna database and priority list, unpublished reports and scientific publications identified a number of specially protected, priority or migratory vertebrate fauna species as potentially occurring in the general vicinity of the subject site. Of these species, most that have no potential whatsoever to utilise the subject site for any purpose have been omitted from the potential list (Appendix B), principally due to lack of suitable habitat (including extent and/or quality) or known local extinction.

In summary, one vertebrate fauna species of conservation significance was positively identified as utilising the subject site for some purpose during the current survey period this being:

- Western Ringtail Possum *Pseudocheirus occidentalis* – S1 (*WC Act*), Vulnerable (*EPBC Act*)
  Five individuals recorded along McGibbon Track during the night survey. Also potentially present in other sections of the subject site which were not examined.

Based on the habitats present and current documented distributions it is considered possible that the following additional species of conservation significance may use the subject site for some purpose at times, though, as no evidence of any using the subject site at the time of the field survey was found, the status of some in the area remains uncertain.

These species are:

- Eastern Great Egret *Ardea alba (modesta)* – S5 (*WC Act*), Migratory (EPBC Act)
  This species potentially utilises creek lines, drains and paddocks when inundated during the wetter months of the year in small numbers. Unlikely to breed onsite.

- Peregrine Falcon *Falco peregrinus* – S7 (*WC Act*)
  This species potentially utilises some sections of the subject site as part of a much larger home range. No evidence of nesting seen and the probability of this species breeding within the subject site can be considered to be very low.

- Rainbow Bee-eater *Merops ornatus* – S5 (*WC Act*), Migratory (*EPBC Act*)
  This species is a common seasonal visitor to south west. Possibly breeds in some sections of the subject site where ground conditions permit (e.g. sandy areas) though population levels would not be significant as it usually breeds in pairs, rarely in small colonies (Johnstone and Storr 1998).

- Carnaby`s Black-Cockatoo *Calyptorhynchus latirostris* – S2 (*WC Act*), Endangered (*EPBC Act*)
  Not observed during the survey period but known to frequent the general area. Small areas of favoured foraging habitat (i.e. marri, jarrah and banksia) present. Larger trees (≥50cm DBH) can be considered potential breeding habitat. No roosting sites identified.

- Forest Red-tailed Black-Cockatoo *Calyptorhynchus banksii naso* – S3 (*WC Act*), Vulnerable (*EPBC Act*)
  Not observed during the survey period but known to frequent the general area. Small areas of favoured foraging habitat (i.e. marri, jarrah and banksia) present. Larger trees (≥50cm DBH) can be considered potential breeding habitat. No roosting sites identified.

- Baudin's Black-Cockatoo *Calyptorhynchus baudinii* – S2 (*WC Act*), Vulnerable (*EPBC Act*)
  Not observed during the survey period but known to frequent the general area. Small areas of favoured foraging habitat (i.e. marri and banksia) present. Larger trees (≥50cm DBH) can be considered potential breeding habitat. No roosting sites identified.

As indicated for some species habitat for within the subject site, while considered possibly suitable, may be marginal in extent/quality and species listed may only visit the area for short periods, or as rare/uncommon vagrants/transients.

A number of other species of conservation significance, while possibly present in the wider area (e.g. Whicher Range), are not listed as potential species due to known localised extinction (and no subsequent recruitment from adjoining areas), lack of suitable habitat and/or the presence of feral predators. Details on conservation significant species and

reasons for the omission of some from the potential listing are provided in Appendix D and Table 3.

### 5.3.3 Invertebrate Fauna of Conservation Significance

Three conservation significant invertebrate species appeared in the DBCA NatureMap database search (DBCA 2017). None are however considered likely to frequent the subject site primarily due to a lack of suitable (type, quality and/or extent) habitat. Details on each species and reasons for their omission from the likely species listing are provided in Appendix D and Table 3.

# 6. FAUNA VALUES

## 6.1 CONSERVATION SIGNIFICANCE OF THE SUBJECT SITE

The conservation significance of vegetation within the subject site has been determined by applying site specific criteria such as:

- Fauna species and/or habitat present that is poorly represented in the general vicinity (<10km) of the subject site;
- Fauna habitat in better condition than other similar locations in the general vicinity (<10km) of subject site; and
- Fauna habitat within the subject site supporting species of conservation or other significance.

Natural areas within the south west of Western Australia have been significantly altered since European settlement in the 1830's and a variety of environmental factors, in particular habitat fragmentation and fire, will continue to threaten many species of fauna with local extinction. As the local development of land progresses the significance of any remnant vegetation increases.

The extent of natural fauna habitat within the subject site is relatively small and the remnants present are generally highly degraded and fragmented. Because of these facts the overall value to fauna can be regarded as low when compared to other nearby areas such as the Whicher Range and the Ludlow Tuart Forest. The vegetation does however have significant value to at least one conservation significant fauna species, the western ringtail possum which is persisting in the area despite the large degree of historical clearing/fragmentation.

### 6.2 VALUE OF THE SUBJECT SITE AS AN ECOLOGICAL LINKAGE/WILDLIFE CORRIDOR

Linkage with adjacent bushland areas has been identified as a natural attribute of high priority in the assessment of a sites regional significance (EPA 2002a). Detailed analyses of potential ecological linkages completed for the south west (Molloy *et al.* 2009) shows the subject site as containing a regional ecological linkage. This linkage follows the remnant vegetation bordering the creek line in the western section of the subject site.

Molloy *et al.* (2009) states that vegetation making up the linkages facilitate the maintenance of ecological processes and the movement of organisms within and across a landscape and these should, if possible be maintained in the long term.

# 7. POTENTIAL IMPACTS OF DEVELOPMENT

In general, the most significant potential impacts to fauna of any development include:

- Loss of vegetation/fauna habitat that may be used for foraging, breeding, roosting, or dispersal (includes loss of hollow bearing trees);
- Fragmentation of vegetation/fauna habitat which may restrict the movement of some fauna species;
- Modifications to surface hydrology, siltation of creek lines;
- Changes to fire regimes;
- Pollution (e.g. oil spills);
- Noise/Light/Dust;
- Spread of plant pathogens (e.g. dieback) and weeds;
- Potential increase in the number of predatory introduced species (e.g. cats);
- Death or injury of fauna during clearing and construction; and
- An increase in fauna road kills subsequent to development.

Planning for the proposes mineral sand mine within the Yalyalup Project area is yet to be finalised. It is however understood that the clearing of vegetation will very likely be limited to a few paddock trees, with the main remnants in the Project area remaining unaffected. Other potential impacts (e.g. noise, dust light etc) will be managed under existing, well proven management practices and therefore it is anticipated that impacts on fauna and fauna habitat will be negligible.

Based on the limited extent of proposed clearing, and other factors such as habitat quality/value and existing degree of fragmentation, the likely impacts on species of conservation significance

previously recorded in the general area has been assessed, a summary of which is provided in Table 3 below. Additional information on specific fauna species is provided in Appendix D.

**Table 3: Likelihood of Occurrence and Possible Impacts – Fauna Species of Conservation Significance (continues on following pages).**

| Common Name | Genus & Species | Conservation Status (See Appendix A for codes) | Habitat Present | Likelihood of Occurrence | Possible Impacts/ Significance of Possible Impacts |
|---|---|---|---|---|---|
| Unnamed land snail | *Bothriembryon irvineanus* | P2 | No | Would Not Occur | No impact. |
| Unnamed scorpionfly | *Austromerope poultoni* | P2 | No | Would Not Occur | No impact. |
| Carter's Freshwater Mussel | *Westralunio carteri* | S3 | No/Very Marginal | Would Not Occur | No impact. |
| Pouched Lamprey | *Geotria australis* | P1 | No/Very Marginal | Would Not Occur | No impact. |
| Perth Lined Lerista | *Lerista lineata* | P3 | No | Would Not Occur | No impact. |
| Coastal Plains Skink | *Ctenotus ora* | P3 | No/Marginal | Unlikely to Occur | No impact/Negligible. |
| Australasian Bittern | *Botaurus poiciloptilus* | S2, EN | No | Would Not Occur | No impact. |
| Eastern Great Egret | *Ardea alba (modesta)* | S5, Mig | Yes | Possibly Occurs | Temporary loss/modification of highly degraded areas of foraging habitat/Negligible. |
| Cattle Egret | *Ardea ibis* | S5, Mig | Yes | Unlikely to Occur | No impact/Negligible. |
| Blue-billed Duck | *Oxyura australis* | P4 | No/Very Marginal | Would Not Occur | No impact. |
| Glossy Ibis | *Plegadis falcinellus* | S3 | Yes/Marginal | Unlikely to Occur | No impact/Negligible. |
| Migratory Shorebirds/Wetland Species/Marine Vertebrates | Various | Mig, Various | No | Would Not Occur | No impact. |
| White-bellied Sea Eagle | *Haliaeetus leucogaster* | Ma | No | Would Not Occur | No impact. |
| Eastern Osprey | *Pandion haliaetus* | S5, Mig | No | Would Not Occur | No impact. |
| Peregrine Falcon | *Falco peregrinus* | S6 | Yes | Possibly Occurs but only rarely. | No impact/Negligible. |
| Masked Owl | *Tyto novaehollandae novaehollandae* | P3 | Yes/Marginal | Unlikely to Occur | No impact/Negligible. |
| Fork-tailed Swift | *Apus pacificus* | S5, Mig | Yes | Unlikely to Occur, Flyover only on very rare occasions. | No impact. |

| Common Name | Genus & Species | Conservation Status (See Appendix A for codes) | Habitat Present | Likelihood of Occurrence | Possible Impacts/ Significance of Possible Impacts |
|---|---|---|---|---|---|
| Rainbow Bee-eater | *Merops ornatus* | S5, Mig | Yes | Possibly Occurs | Temporary loss/modification of highly degraded areas of foraging habitat/Negligible. |
| Grey Wagtail | *Motacilla cinerea* | S5, Mig | No | Would Not Occur | No impact. |
| Carnaby`s Black Cockatoo | *Calyptorhynchus latirostris* | S2, EN | Yes | Possibly Occurs | Loss of very small number of isolated trees/Negligible. |
| Baudin`s Black Cockatoo | *Calyptorhynchus baudinii* | S3, VU | Yes | Possibly Occurs | Loss of very small number of isolated trees/Negligible. |
| Forest Red-tailed Black Cockatoo | *Calyptorhynchus banksii naso* | S3, VU | Yes | Possibly Occurs | Loss of very small number of isolated trees/Negligible. |
| Chuditch | *Dasyurus geoffroii* | S3, VU | No | Unlikely to Occur | No impact/Negligible. |
| South-western Brush-tailed Phascogale | *Phascogale tapoatafa wambenger* | S6 | No | Unlikely to Occur | No impact/Negligible. |
| Southern Brown Bandicoot | *Isoodon obesulus fusciventer* | P4 | No | Unlikely to Occur | No impact/Negligible. |
| Bilby | *Macrotis lagotis* | S3, VU | No | Would Not Occur | No impact. |
| Western Ringtail Possum | *Pseudocheirus occidentalis* | S2, VU | Yes | Known to Occur | No impact/Negligible |
| Quokka | *Setonix brachyurus* | S3, VU | No | Would Not Occur | No impact. |
| Western Brush Wallaby | *Macropus irma* | P4 | No | Would Not Occur | No impact. |
| Woylie | *Bettongia penicillata ogibyi* | S1 | No | Would Not Occur | No impact. |
| Western False Pipistrelle | *Falsistrellus mackenziei* | P4 | No/Marginal | Unlikely to Occur | No impact/Negligible. |
| Water Rat | *Hydromys chrysogaster* | P4 | No/Marginal | Unlikely to Occur | No impact/Negligible. |
| Western Mouse | *Pseudomys occidentalis* | P4 | No | Would Not Occur | No impact. |

Based on available information no substantial impacts on any fauna species or overall biodiversity values are anticipated as a consequence of development at the site occurring. In cases where some impact is anticipated, the degree of the impact is only expected to be very low and relates to the loss of very small areas of habitat, primarily in the form of a small number of scattered, isolated paddock trees. This coupled with the fact that most of the species known to or likely to occur are common and widespread, no overall change in their conservation status is anticipated, despite a possible, very localised/small reduction in habitat extent.

# 8. LEGISLATIVE IMPLICATIONS

## 8.1 ENVIRONMENTAL PROTECTION ACT 1986

The purpose of the Environmental Protection Act (1986) (*EP Act*) is "...*to provide for an Environmental Protection Authority, for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection enhancement and management of the environment and for matters incidental to or connected with the foregoing*".

The powers of the Environmental Protection Act 1986 are administered by the DBCA, which in relevant cases advises to the DMP and EPA.

Legislation proclaimed on 8 July 2004 protects all native vegetation in Western Australia. Under the law, clearing native vegetation for mining is prohibited, unless a clearing permit is granted by the DMP, or the clearing is for an exempt purpose. These exemptions ensure that low impact day to day activities involving clearing can be undertaken. People that wish to clear are required to submit an application if an exemption does not apply.

Any future clearing at the subject site, not covered by an exemption, will require a clearing permit, approval of which includes an assessment against the ten clearing principles related to native vegetation in the *EP Act*. These principles provide a guide for when native vegetation should not be cleared. The DMP must consider these principles in making a decision on whether or not to issue a clearing permit. The DBCA has set out the minimum requirements and standards for addressing each of the ten principles in detail in its assessment methodology:

Native vegetation should not be cleared if

(a) it comprises a high level of biological diversity;

(b) it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia;

(c) it includes, or is necessary for the continued existence of, rare flora;

(d) it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community;

(e) it is significant as a remnant of native vegetation in an area that has been extensively cleared;

(f) it is growing in, or in association with, an environment associated with a watercourse or wetland;

(g) the clearing of the vegetation is likely to cause appreciable land degradation;

(h) the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area;

(i) the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water; or

(j) clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

One purpose of the assessment reported on here is to provide information relevant to principle (a) & (b).

**Native vegetation should not be cleared if it comprises a high level of biological diversity**

The results of the assessment suggest that up to 109 native fauna species have the potential or are likely to utilise the study for some purpose at times. Twenty six (~24%) of the predicted native species were observed within the subject site during the various daytime and night time surveys. It is understood that development will largely be confined to cleared paddock areas and therefore the clearing required will only involve the removal of a very small number of isolated paddock trees.

These areas would only be utilised by a very small percentage of the predicted/known species given their very low habitat values and do not therefore comprise areas of high biological diversity.

Therefore, given the anticipated location and probable extent of development at the subject site, any required native vegetation clearing is extremely unlikely to be classified as being in variance to this principle by the DMP.

**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**

The subject site contains habitat that is used or is potentially used for some purpose by an estimated seven fauna species of conservation significance (State or Federally listed threatened, migratory or DBCA priority species). One species (the western ringtail possum) was confirmed as being present.

It is understood that development will largely be confined to cleared paddock areas and therefore the clearing required will only involve the removal of a very small number of isolated paddock trees.

It is very unlikely that these trees “comprise the whole or a part of, or is necessary for the maintenance of, a significant habitat” any fauna therefore, it is again anticipated that the DMP would be unlikely classify any proposed clearing as being in variance to this principle.

The DMP will need to consider all available information relating to all 10 clearing principles including those relating to fauna. The results of any vegetation and flora surveys and any proposed offsets that may be provided by the proponent are also taken into consideration.

## 8.2 COMMONWEALTH ENVIRONMENT PROTECTION & BIODIVERSITY CONSERVATION ACT 1999

A number of fauna species known to or potentially present within the subject site are listed under the Federal *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. The objective of the *EPBC Act* is to provide for the protection of the environment, especially those aspects that are of national significance, promote ecologically sustainable development, the conservation of biodiversity and a cooperative approach to the protection and management of the environment.

*EPBC Act* listed threatened fauna species (or their habitat) identified as being present in the study area were:

- *Pseudocheirus occidentalis* Western Ringtail Possum - Vulnerable
- *Calyptorhynchus latirostris* Carnaby's Black Cockatoo – Endangered
- *Calyptorhynchus baudinii* Baudin's Black Cockatoo – Vulnerable
- *Calyptorhynchus banksii naso* Forest Red-tailed Black Cockatoo – *Vulnerable*

*EPBC Act* listed migratory fauna species identified as possibly using the study area were:

- *Merops ornatus* Rainbow Bee-eater – Migratory
- *Ardea alba* Great Egret – Migratory

A number of other *EPBC Act* listed threatened/migratory fauna species (or their habitat) were determined during the fauna assessment not to be present in the subject site despite appearing in database/literature searches. Their exclusion from the potential species list is primarily justified by an obvious lack of suitable habitat or known local extinction. It is also very unlikely that vegetation at the site represents habitat critical for the recovery of the respective threatened species in the area. These species are not discussed further.

If an action (i.e. the potential need to clear sections the subject site) is deemed to have a potential "significant impact" on listed species a referral to the DotEE is required to ensure compliance with the *EPBC Act*. Currently, for the species in question, "significant impact" is defined within one or more of the following four documents, these being:

- Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). Background Paper to the *EPBC Act* Policy Statement 3.10 – Nationally Threatened Species and Ecological Communities. "Significant Impact Guidelines

for the vulnerable western ringtail possum (*Pseudocheirus occidentalis*) in the southern Swan Coastal Plain, Western Australia".

- Department of the Environment, Water, Heritage and the Arts (DEWHA) (2009a). *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* Policy Statement 3.10 "Significant Impact Guidelines for the vulnerable western ringtail possum (*Pseudocheirus occidentalis*) in the southern Swan Coastal Plain, Western Australia; and

- Department of the Environment (DotE) (2013). Matters of National Environmental Significance. Significant Impact Guidelines 1.1, *EPBC Act* 1999.

- Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012a). *EPBC Act* referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) *Calyptorhynchus latirostris*, Baudin's cockatoo (vulnerable) *Calyptorhynchus baudinii*, Forest red-tailed black cockatoo (vulnerable) *Calyptorhynchus banksii naso*.

An assessment of significant impact on Federally listed threatened fauna species and the possible need to refer the project to DotEE using criteria within the abovementioned documents are provided below

### 8.2.1 WESTERN RINGTAIL POSSUMS

The DotEE document titled "Significant Impact Guidelines for the vulnerable western ringtail possum (*Pseudocheirus occidentalis*) in the southern Swan Coastal Plain, Western Australia (DEWHA 2009a) summarises what scale of actions would be considered likely to have a significant impact on WRPs in the southern swan coastal plain (the area between Bunbury and Dunsborough from the base of the Whicher Scarp to the coast). This policy statement should be read in conjunction with Impact Guidelines - Matters of National Environmental (DotE 2013).

Within the policy statement an action is deemed likely to have a significant impact on the WRP in the southern Swan Coastal Plain region if it:

- reduces the ability of the region to support the persistence of the western ringtail possum; or

- modifies, destroys, removes or isolates important remnant habitat patches, or decreases the availability or quality of remnant habitat patches; or

- adversely affects connections between important areas; or

- interferes substantially with the ability of the area to effectively contribute to the recovery of the species.

More specifically the guidelines have categorised certain areas between Bunbury and Dunsborough as “Core Habitat”, “Primary Corridors” or “Supporting Habitat”. Due to a lack of understanding of WRP distribution and abundance at the time of publication of the policy statement the current study area was not included in any of these defined areas. However, it is clear the area would qualify as “Supporting Habitat” (also referred to as Area 3) when compared to similar areas in this section of the coastal plain.

Within areas of supporting habitat “significant impact” on WRPs is deemed as “likely” if there is a real chance or possibility that an action will result in:

- any clearing of a remnant habitat patch that is greater than 0.5 hectares in size;
- the clearing of more than 50% of a remnant habitat patch that is between 0.2 and 0.5 hectares in size;
- the fragmentation of any existing habitat linkages.

The survey results carried out with the subject site confirm that WRPs are present and are utilising areas of native remnant vegetation as habitat.

The exact extent and location of required clearing at the subject site has not at this stage been finalised but it is understood that any clearing will be limited to a small number fo scattered trees in paddock areas. This vegetation does not represent WRP habitat and therefore none of DotEE significant impact criteria are likely to be comprised by development at the subject site proceed. This would suggest that referral of the Project (with represent to direct impacts on WRP habitat) is not required.

### 8.2.2 BLACK COCKATOOS

The DotEE’s document titled “EPBC Act referral guidelines for three threatened black cockatoo species” (DSEWPaC 2012a) summarises what scale of actions would be considered likely to have a significant impact on listed black cockatoo species.

The following points provide general guidance on what, in DotEE’s view, may be at high and low risk of requiring a referral to ensure compliance with the *EPBC Act* as well as providing some guidance on uncertainty.

Actions that have a high risk of significant impacts

- Clearing of any known nesting tree.
- Clearing or degradation of any part of a vegetation community known to contain breeding habitat.
- Clearing of more than 1 ha of quality foraging habitat.

- Clearing or degradation (including pruning the top canopy) of a known night roosting site.

- Creating a gap of greater than 4 km between patches of black cockatoo habitat (breeding, foraging or roosting).

Actions that have and uncertain risk of significant impacts

- Degradation (such as through altered hydrology or fire regimes) of more than 1 ha of foraging habitat. Significance will depend on the level and extent of degradation and the quality of the habitat.

- Clearing or disturbance in areas surrounding black cockatoo habitat that has the potential to degrade habitat through introduction of invasive species, edge effects, hydrological changes, increased human visitation or fire.

- Actions that do not directly affect the listed species but that have the potential for indirect impacts such as increasing competitors for nest hollows.

- Actions with the potential to introduce known plant diseases such as Phytophthora spp. to an area where the pathogen was not previously known.

Actions that have a low risk of significant impacts

- Actions that do not affect black cockatoo habitat or individuals.

- Actions whose impacts occur outside the modelled distribution of the three black cockatoos

At this stage, based on available information it is considered unlikely that the prosed development will comprised any of the criteria listed above to the degree that would require referral. This primarily based on the fact that clearing will be confided to the removal of a small number of isolated paddock trees. Not all these trees have been identified/examine but it is unlikely, given their position in the landscape that they represent existing nesting or roosting habitat and the total area would be far less than 1 ha.

Once the exact extent and location of clearing is finalised the conclusions drawn here should be reviewed. If any of the listed criteria are compromised it is recommended that a referral detailing the proposed action (clearing) be submitted to DotEE to ensure compliance with the *EPBC Act* with respect to impacts on black cockatoos.

### 8.2.3 LISTED MIGRATORY SPECIES

The DotEE document titled “Matters of National Environmental Significance. Significant Impact Guidelines 1.1, *EPBC Act* 1999 (DotE 2013) summarises what scale of actions would be considered likely to have a significant impact on listed migratory species.

Within this document an action has, will have, or is likely to have a significant impact on migratory species if it does, will, or is likely to:

- substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat of the migratory species; or
- result in invasive species that is harmful to the migratory species becoming established in an area of important habitat of the migratory species; or
- seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the species.

An area of important habitat is:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species;
- habitat that is of critical importance to the species at particular life-cycle stages;
- habitat utilised by a migratory species which is at the limit of the species range; or
- habitat within an area where the species is declining.

To have a significant impact on a migratory species as defined under the Significant Impact Guidelines (DotE 2013) any proposed development would need to trigger at least one of the abovementioned significant impact criteria thresholds.

It is considered extremely unlikely that any of these thresholds relating to migratory species will be compromised by development at the site at any scale. The habitat within the subject site likely to be used by migratory species does not represent “important habitat” and the number of individuals utilising the study area at any time would not, under any circumstances, represent, for the species in question “an ecologically significant proportion of the population”.

# 9. CONCLUSION

The fauna assessment within the subject site was undertaken for the purposes of delineating and characterising the fauna habitats and faunal assemblages present. Targeted searches for western ringtail possum individuals and their habitat were also

carried out. An opportunist assessment of black cockatoo habit values was also undertaken.

With respect to native vertebrate fauna, 11 mammal (including eight bat species), 77 bird, 13 reptile and eight frog species have previously been recorded in the general area, some of which have the potential to occur in or utilise sections of the subject site at times, a conclusion largely based on the presence of apparently suitable habitat.

One vertebrate fauna species of conservation significance was positively identified as utilising the subject site for some purpose during the survey period, this being the western ringtail possum (Critically Endangered). An additional five species of conservation significance may also utilise the subject site, though, as no evidence of these species presence was identified during the field survey, the status of some in the area remains uncertain. These are Carnaby's black-cockatoo (Endangered), Baudin's black-cockatoo (Endangered), the forest red-tailed black-cockatoo (Vulnerable), the great egret (Migratory), the rainbow bee-eater (Migratory) and the peregrine falcon (Schedule 7).

Overall fauna habitat values within the subject site have been severely compromised by the almost total removal (~95%) of native vegetation. As a consequence, the fauna biodiversity of the subject site is well below levels present prior to historical disturbance having occurred. Most areas lack any natural attributes and are now only likely to be utilised by generally common and widespread fauna species with non-specific requirements which allow them to persist in highly disturbed habitats.

It is understood that any future development at the subject site will be largely confined to existing cleared areas with the only possible clearing required being a small number of scattered paddock trees. Based on this information, no direct, substantial impacts on any fauna species or existing biodiversity values are anticipated. In cases where some impact does occur it is only expected to be very low/negligible. This coupled with the fact that most of the species known to or likely to occur are common and widespread, no overall change in their conservation status is considered likely.

A review of the state government clearing permit principles relating to fauna suggest that the anticipated low degree of clearing is highly unlikely to compromise the published guidelines and therefore the DMP are considered unlikely to classify any as being in variance to approval criteria.

At the federal level, an assessment using published DotEE criteria suggests that "significant impact" is not likely to any of the four species of listed *EPBC Act* species known to or likely to utilise the area, primarily given the small area of degraded vegetation likely to be affected. Based on this conclusion it is the Authors opinion that, if the proponent were to refer the proposed development to the DotEE for review, anticipated clearing of vegetation needed for the project to proceed would be assessed as "not a controlled action" and therefore would not require further assessment and approval under the *EPBC Act* before it could proceed.

It is however recommended that once mine planning has advanced and areas of direct and indirect impact identified with more certainty, a review of potential impacts on listed threatened fauna species should be carried out to determine if referral is required so as to ensure compliance with the *EPBC Act*. The need for other referrals or approvals as required from State agencies will also need to be re-considered at this point.

# 10. REFERENCES

Anstis, M. (2013). Tadpoles and Frogs of Australia. New Holland Publishers, Sydney.

Bamford, M.J and A.R. (2000). Proposed Gwindinup Mineral Sands Mine. Fauna Surveys; August and December 1999. Unpublished report for Cable Sands WA. January 2000.

Bancroft, W. and Bamford, M. (2008). Fauna values of Bemax's Happy Valley mineral sands deposit. Unpublished report for Bemax Resources Limited. January 2008.

Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulter, R. (2003). The New Atlas of Australian Birds. Royal Australasian Ornithologists Union, Victoria.

Biologic (2014). Wonnerup North Vertebrate Fauna Assessment. Unpublished report for Cristal Mining Australia Ltd.

Biota (2009). Tutunup Fauna Assemblage and Fauna Habitat Seasonal Survey. Unpublished report for Iluka Resources. March 2009.

Biota (2007a). Yoganup 215 Strand Fauna and Faunal Assemblage Survey. Unpublished report for Iluka Resources. February 2007.

Biota (2007b). Tutunup South Fauna Habitat and Fauna Assemblage Seasonal Survey. Unpublished report for Iluka Resources. December 2007.

Bush, B., Maryan, B., Browne-Cooper, R. & Robinson, D. (2007). Reptiles and Frogs in the Bush: Southwestern Australia. UWA Press, Nedlands.

Bush, B., Maryan, B., Browne-Cooper, R. & Robinson, D. (2010). Field Guide to Reptiles and Frogs of the Perth Region. UWA Press, Nedlands.

Churchill, S. (2008). Australian Bats. Second Edition, Allen & Unwin.

Cogger, H.G. (2014). Reptiles and Amphibians of Australia. 7th Edition. CSIRO Publishing.

Christidis, L. and Boles, W.E. (2008). Systematics and Taxonomy of Australian Birds. CSIRO Publishing, Melbourne.

Dell, J. (2000). A draft summary assessment of the fauna values of the Kemerton Bushland. Unpublished report for the Conservation Branch, Policy Division, Department of Environmental Protection.

Department of Biodiversity, Conservation and Attractions (DBCA) (2017). NatureMap Database search. "By Circle" 115° 27' 58" E,33° 41' 40" S (plus 20 km buffer). http://naturemap.dec.wa.gov.au. Accessed 17 August 2017.

Department of Parks and Wildlife (DPaW) (2017). Threatened and Priority Fauna Rankings. 6 January 2017.

Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) (2012). *EPBC Act* Referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) *Calyptorhynchus latirostris*, Baudin's cockatoo (vulnerable) *Calyptorhynchus baudinii*, Forest red-tailed black cockatoo (vulnerable) *Calyptorhynchus banksii naso*.

Department of the Environment and Energy (DotEE) (2017a). Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo (Endangered) *Calyptorhynchus latirostris,* Baudin's Cockatoo (Vulnerable) *Calyptorhynchus baudinii,* Forest Red-tailed Black Cockatoo (Vulnerable) *Calyptorhynchus banksii naso*.

Department of the Environment and Energy (DotEE) (2017b). *EPBC Act* Protected Matters Report: Point Search -33.69454 115.46617 (1km Buffer) Available from: http://www.environment.gov.au. Accessed 17 August 2017.

Ecoedge (2016). Report of a Level 1 Flora and Vegetation survey at the Yalyalup Proposed Mine Area. Unpublished report for Doral Mineral Sands Pty Ltd.

Environmental Protection Authority (EPA) (2004). Guidance for the Assessment of Environmental Factors - Terrestrial fauna surveys for environmental impact assessment in Western Australia. Guidance Statement No 56 EPA, Perth.

Environmental Protection Authority (EPA) (2009). Environmental Protection Bulletin No. 6, The Natural Values of the Whicher Scarp. August 2009.

Government of Western Australia (1998). Perth Bushplan.

Government of Western Australia (2000a). Bush Forever Volume 1. Policies, Principles and Processes. Department of Environmental Protection Perth, Western Australia.

Government of Western Australia (2000b). Bush Forever Volume 2. Directory of Bush Forever Sites. Department of Environmental Protection Perth, Western Australia.

Government of Western Australia (2017). Wildlife Conservation Act 1950. Wildlife Conservation (Specially Protected Fauna) Notice 2016. Government Gazette, WA. 6 January 2017.

Harewood, G. (2009). Western Ringtail Possum Baseline Assessment. Tutunup. Unpublished report for Iluka Resources. August 2009.

Harewood, G. (2012). Phase 1 and 2 Seasonal Fauna Surveys (Level 2). Yoongarillup Mineral Sands Project. Unpublished report for Doral Mineral Sands Pty Ltd.

Harewood, G. (2013). Fauna Assessment of Yoganup Extended. Unpublished report for Iluka Resources Ltd.

Hart, Simpson and Assoc. (1997). Wonnerup -Tutunup Road - Vertebrate Fauna. Unpublished report for Westralian Sands Ltd.

Harvey, M. S. (2002). Short-range endemism among the Australian fauna: some examples from non-marine environments. Invertebrate Systematics 16: 555-570.

Johnstone, R.E. and Storr, G.M. (1998). Handbook of Western Australian Birds: Volume 1 – Non-passerines (Emu to Dollarbird). Western Australian Museum, Perth Western Australia.

Johnstone, R.E. and Storr, G.M. (2004). Handbook of Western Australian Birds: Volume 2 – Passerines (Blue-winged Pitta to Goldfinch). Western Australian Museum, Perth Western Australia.

Menkhorst, P. and Knight, F. (2011). A Field Guide to the Mammals of Australia. Oxford University Press, Melbourne.

Molloy, S., Wood, J., Hall, S., Wallrodt, S., and Whisson, G., (2009). South West Regional Ecological Linkages Technical Report, Western Australian Local Government Association and Department of Environment and Conservation Perth.

Morgan, D.L., Beatty, S.J., Klunzinger, M.W, Allen, M.G. and Burnham, Q.E (2011). Field Guide to the Freshwater Fishes, Crayfishes and Mussels of South Western Australia. Published by SERCUL.

Ninox (2006). A Vertebrate Fauna Assessment of the Yoganup Mineral Sands Project Area. Unpublished report for Iluka Resources. March 2006.

Storr, G.M., Smith, L.A. and Johnstone R.E. (1983). Lizards of Western Australia II: Dragons and Monitors. WA Museum, Perth.

Storr, G.M., Smith, L.A. and Johnstone R.E. (1990). Lizards of Western Australia III: Geckos and Pygopods. WA Museum, Perth.

Storr, G.M., Smith, L.A. and Johnstone R.E. (1999). Lizards of Western Australia I: Skinks. Revised Edition, WA Museum, Perth.

Storr, G.M., Smith, L.A. and Johnstone R.E. (2002). Snakes of Western Australia. Revised Edition, WA Museum, Perth.

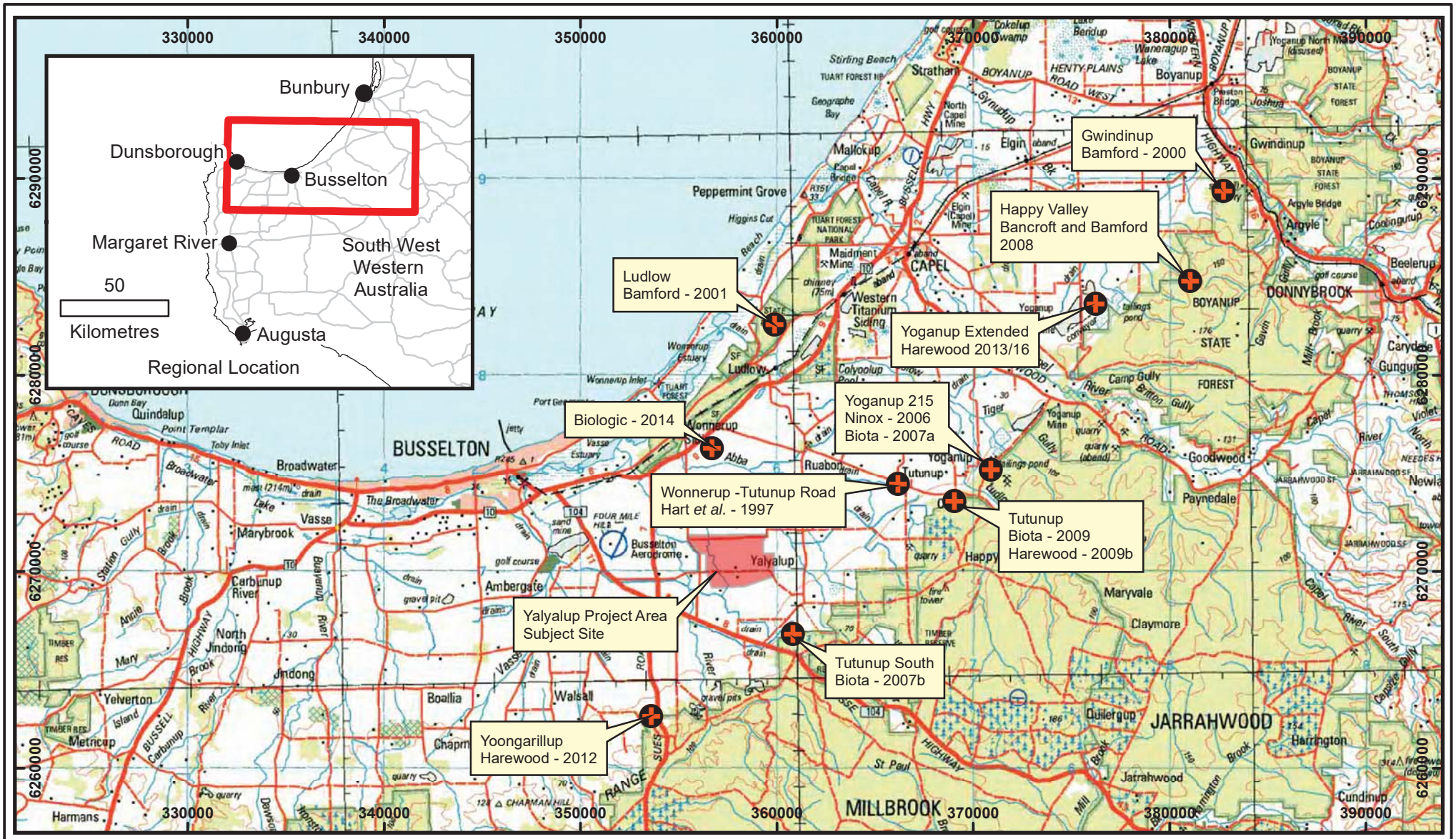
Tyler M.J. & Doughty P. (2009). Field Guide to Frogs of Western Australia, Fourth Edition, WA Museum, Perth.

Van Dyck, S., Gynther, I. & Baker, A. Eds (2013). Field Companion to The Mammals of Australia. Queensland Museum.

Wilson, S. and Swan, G. (2013). A Complete Guide to Reptiles of Australia. Reed, New Holland, Sydney.

Woinarski, J., Burbidge, A. & Harrison, P. (2014). The Action Plan for Australian Mammals 2012. CSIRO Publishing.

# FIGURES




## Legend

- Subject Site
- Previous Nearby Fauna Surveys

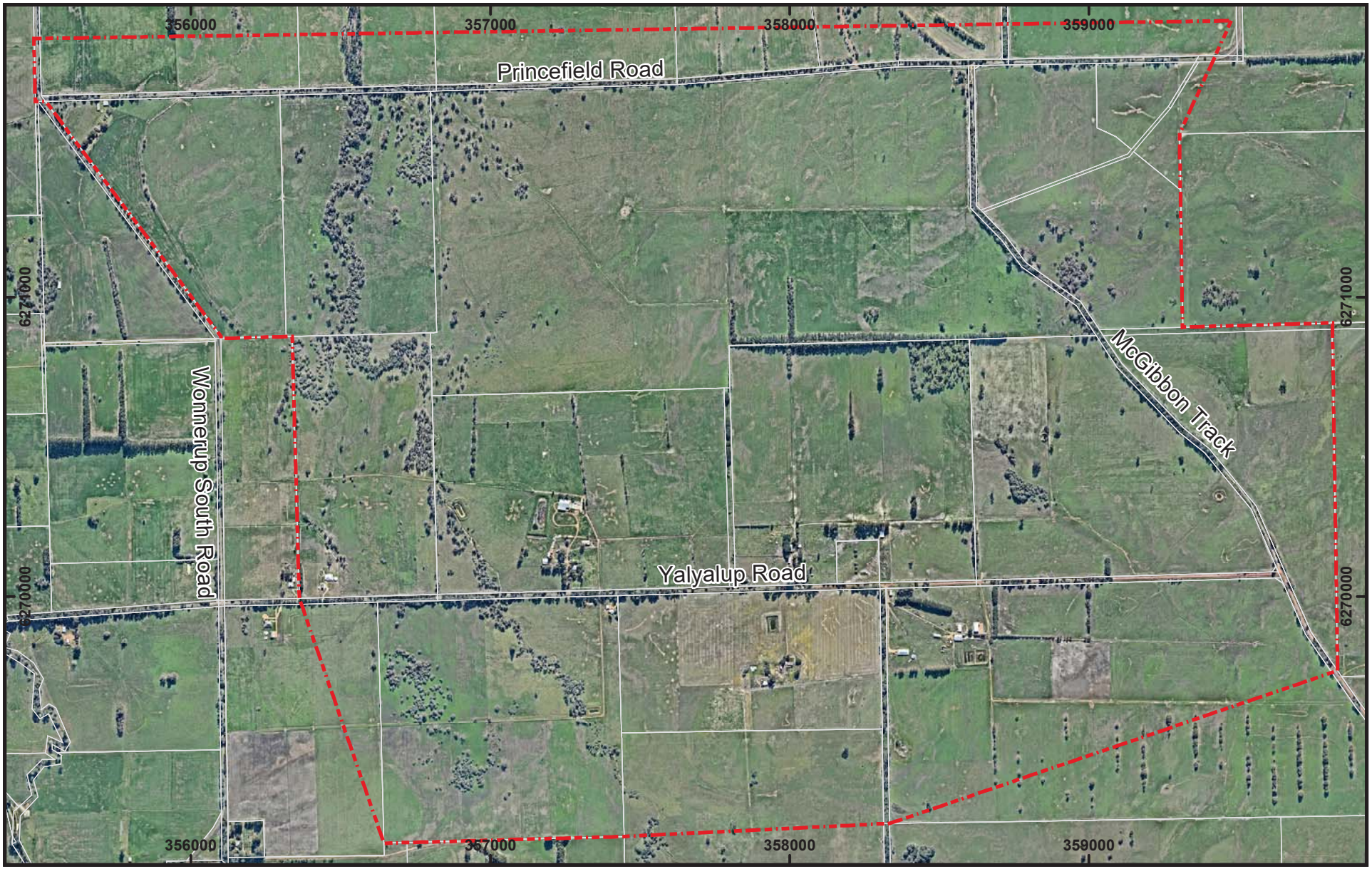
0 5 10 15 20
Kilometres

Fauna Survey

**Yalyalup Project Area**
**Doral Mineral Sands Pty Ltd**

# Subject Site and Surrounds

Drawn: G Harewood
Date: Aug 2017
Scale: 1:275,000
Projection/Coordinate System: UTM/MGA Zone 50
Figure: 1




## Legend

Subject Site

0 200 400 600 800 1,000

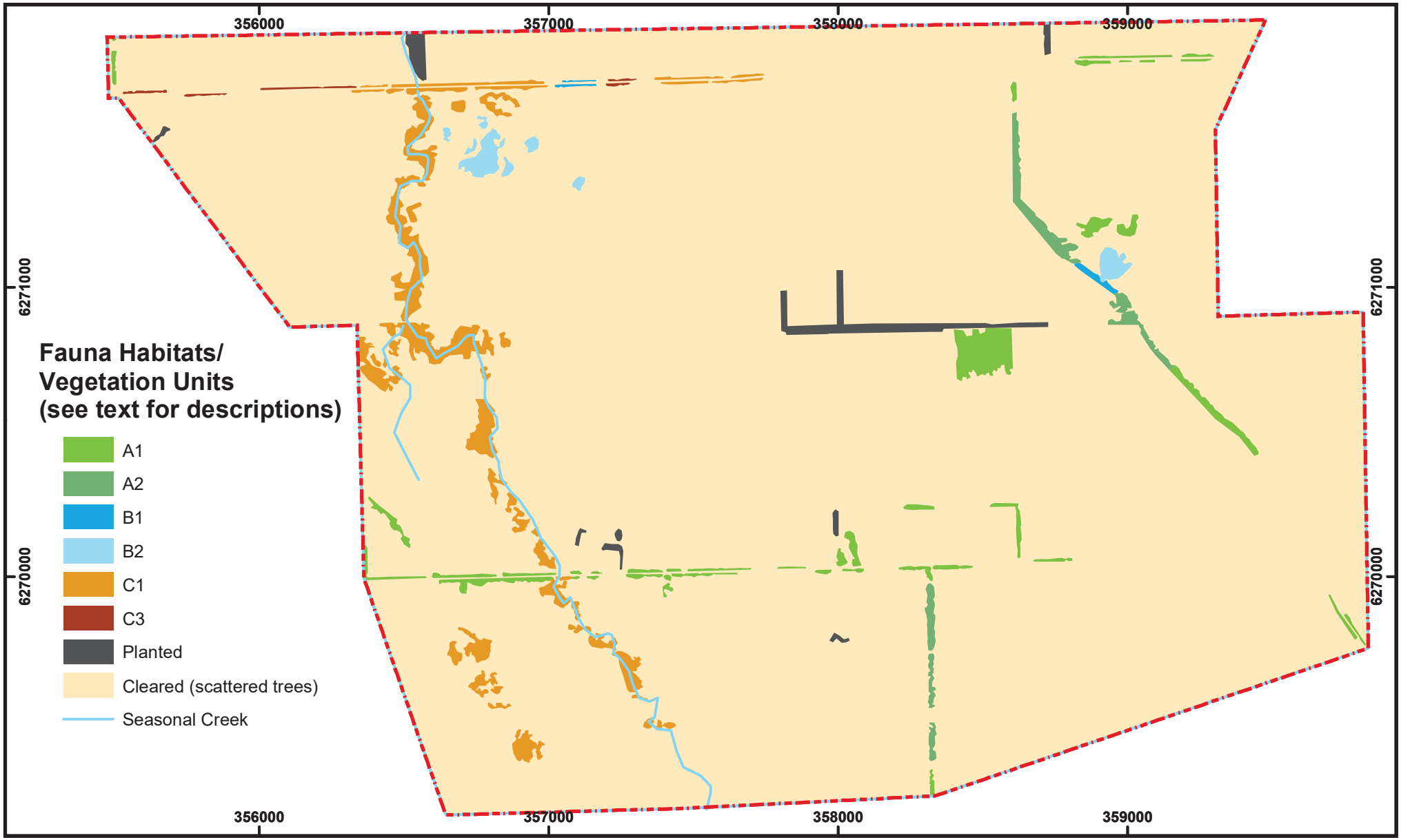
Metres

Fauna Survey

**Yalyalup Project Area**
**Doral Mineral Sands Pty Ltd**

**Subject Site**
**Air Photo**

| | |
|---|---|
| Drawn: G Harewood | |
| Date: Aug 2017 | |
| Scale: 1:18,000 | |
| Projection/Coordinate System: UTM/MGA Zone 50 | Figure: 2 |




## Legend

Subject Site

N

0 200 400 600 800 1,000

Metres

Fauna Survey

Yalyalup Project Area
Doral Mineral Sands Pty Ltd

**Fauna Habitats/ Vegetation Units (Courtesy EcoEdge)**

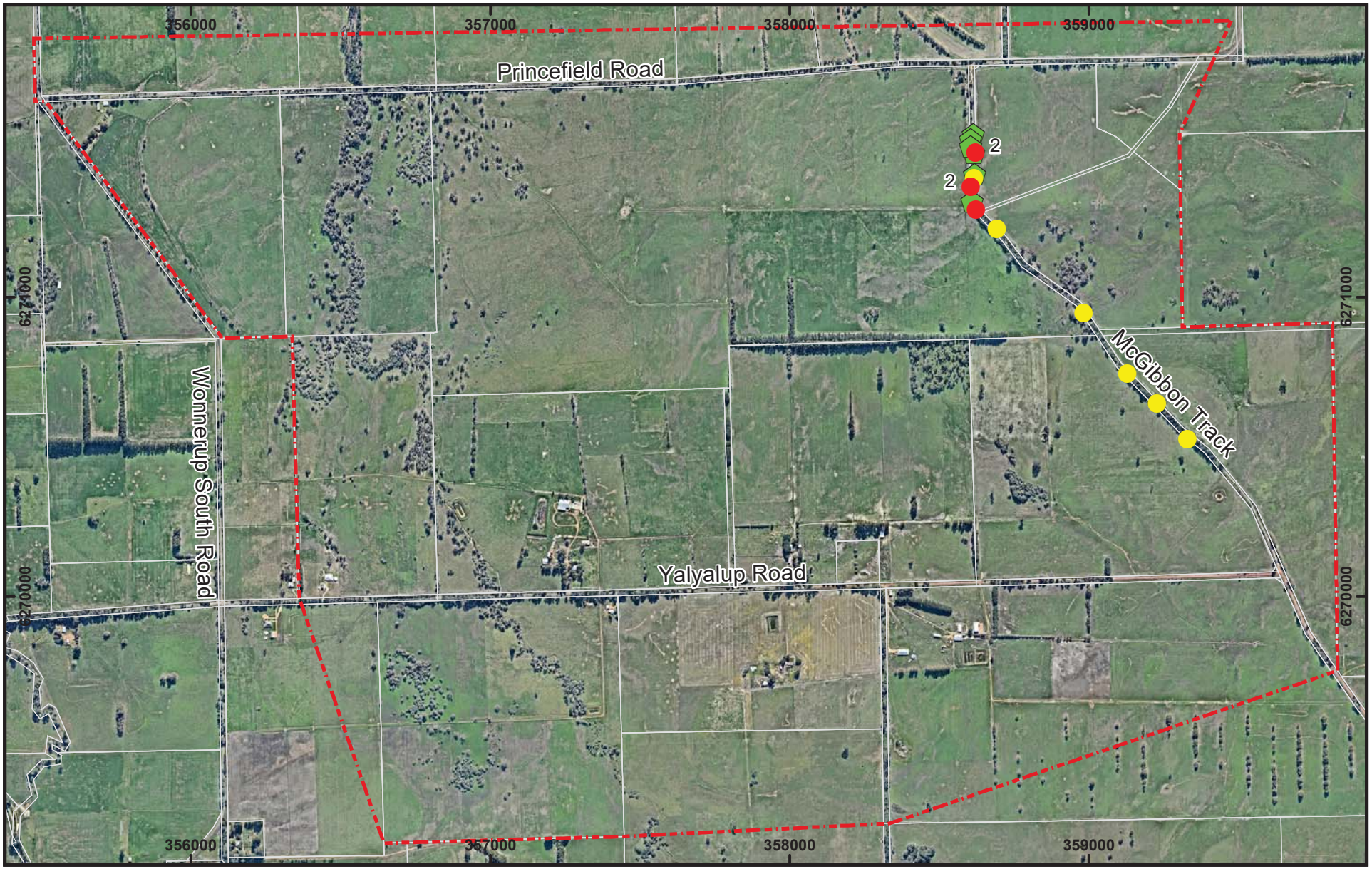
Drawn: G Harewood

Date: Aug 2017

Scale: 1:18,000

Projection/Coordinate System: UTM/MGA Zone 50

Figure: 3




## Legend

Subject Site

**Day Survey**

WRP Drey (6)

**Nocturnal Survey**

Western Ringtail Possum (5)

Common Brushtail Possum (6)

Note: Only suitable habitat along road reserves surveyed.

N

0 200 400 600 800 1,000

Metres

Fauna Survey

**Yalyalup Project Area**
**Doral Mineral Sands Pty Ltd**

**Possum Observations**

Drawn: G Harewood

Date: Aug 2017

Scale: 1:18,000

Projection/Coordinate System: UTM/MGA Zone 50

Figure: 4

# APPENDIX A

## CONSERVATION CATEGORIES

***EPBC Act (1999)* Threatened Fauna Categories**

Threatened fauna may be listed under Section 178 of the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) in any one of the following categories:

| Category | Code | Description |
|---|---|---|
| Extinct | E | There is no reasonable doubt that the last member of the species has died. |
| *Extinct in the wild | EW | A species<br>(a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or<br>(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. |
| *Critically Endangered | CE | A species is facing an extremely high risk of extinction in the wild in the immediate future. |
| *Endangered | EN | A species:<br>(a) is not critically endangered; and<br>(b) is facing a very high risk of extinction in the wild in the near future. |
| *Vulnerable | VU | A species<br>(a) is not critically endangered or endangered; and<br>(b) is facing a high risk of extinction in the wild in the medium-term future. |
| Conservation Dependent | CD | A species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered |
| *Migratory | Migratory | (a) all migratory species that are:<br>(i) native species; and<br>(ii) from time to time included in the appendices to the Bonn Convention; and<br>(b) all migratory species from time to time included in annexes established under JAMBA, CAMBA and ROKAMBA; and<br>(c) all native species from time to time identified in a list established under, or an instrument made under, an international agreement approved by the Minister. |
| Marine | Ma | Species in the list established under s248 of the *EPBC Act* |

Note: Only species in those categories marked with an asterix are matters of national environmental significance (NES) under the *EPBC Act*.

**Wildlife Conservation (Specially Protected Fauna) Notice 2015 Categories**

Published as Specially Protected under the *Wildlife Conservation Act 1950*, and listed under Schedules 1 to 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

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.

| Category | Code | Description |
|---|---|---|
| Schedule 1<br><br>Critically Endangered species | CR | Threatened species considered to be facing an extremely high risk of extinction in the wild. |
| Schedule 2<br><br>Endangered species | EN | Threatened species considered to be facing a very high risk of extinction in the wild. |
| Schedule 3<br><br>Vulnerable species | VU | Threatened species considered to be facing a high risk of extinction in the wild. |
| Schedule 4<br><br>Presumed extinct species | EX | Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. |
| Schedule 5<br><br>Migratory birds protected under an international agreement | IA | 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. |
| Schedule 6<br><br>Fauna that is of special conservation need as conservation dependent fauna | CD | Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. |
| Schedule 7<br><br>Other specially protected fauna. | OS | Fauna otherwise in need of special protection to ensure their conservation. |

## Western Australian DPaW Priority Fauna Categories

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species 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.

| Category | Code | Description |
|---|---|---|
| Priority 1<br><br>Poorly Known Species. | P1 | 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. |
| Priority 2<br><br>Poorly Known Species. | P2 | 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. |
| Priority 3<br><br>Poorly Known Species. | P3 | 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. |
| Priority 4<br><br>Rare, Near Threatened and other species in need of monitoring. | P4 | (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.<br><br>(b) Near Threatened: Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.<br><br>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy. |

*Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

***IUCN Red List* Threatened Species Categories**

The *IUCN Red List of Threatened Species*™ is a checklist of taxa that have undergone an extinction risk assessment using the *IUCN Red List Categories and Criteria*.

Categories are summarized below.

| Category | Code | Description |
|---|---|---|
| Extinct | EX | Taxa for which there is no reasonable doubt that the last individual has died. |
| Extinct in the Wild | EW | Taxa which is known only to survive in cultivation, in captivity or and as a naturalised population well outside its past range and it has not been recorded in known or expected habitat despite exhaustive survey over a time frame appropriate to its life cycle and form. |
| Critically Endangered | CR | Taxa facing an extremely high risk of extinction in the wild. |
| Endangered | EN | Taxa facing a very high risk of extinction in the wild. |
| Vulnerable | VU | Taxa facing a high risk of extinction in the wild. |
| Near Threatened | NT | Taxa which has been evaluated but does not qualify for CR, EN or VU now but is close to qualifying or likely to qualify in the near future. |
| Least Concern | LC | Taxa which has been evaluated but does not qualify for CR, EN, VU, or NT but is likely to qualify for NT in the near future. |
| Data Deficient | DD | Taxa for which there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status. |
| Not Evaluated | NE | Taxa which has not been evaluated. |

A full list of categories and their meanings are available at:

http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria

# APPENDIX B

## FAUNA OBSERVED OR POTENTIALLY PRESENT

# Fauna Observed or Potentially Present

## Yalyalup Project Area

Approx. centroid = 115° 27' 58" E, 33° 41' 40" S
Compiled by Greg Harewood - August 2017
Recorded (Captured/Sighted/Heard/Signs) = X

A = Harewood, G (2017). Fauna Assessment Yalyalup Project Area. Unpublished report for Doral Mineral Sands Pty Ltd. August 2017.
B = Harewood, G (2013). Terrestrial Fauna Assessment (Level 1) Yoganup Extended Mineral Sands Project. Unpublished report for Iluka Resources Limited. March 2013.
C = Harewood, G (2014). Phase 1 and 2 Seasonal Fauna Surveys (Level 2) . Yoongarillup Mineral Sands Project. Unpublished report for Doral Mineral Sands Pty Ltd.
D = Biologic (2014). Wonnerup North Vertebrate Fauna Assessment. Unpublished report for Cristal Mining Australia Ltd.
E = Biota (2009). Tutunup Fauna Assemblage and Fauna Habitat Seasonal Survey. Unpublished report for Iluka Resources. March 2009.
F = Biota (2007a). Yoganup 215 Strand Fauna and Faunal Assemblage Survey. Unpublished report for Iluka Resources. February 2007.
G = Biota (2007b). Tutunup South Fauna Habitat and Fauna Assemblage Seasonal Survey. Unpublished report for Iluka Resources. December 2007.
H = Bamford, M. and A. (2001). Fauna Survey of the Ludlow Mining Lease. Final Report. Unpublished report for Cable Sands (WA) Pty Ltd. November 2001
I = Hart, Simpson and Assoc. (1997). Wonnerup -Tutunup Road - Vertebrate Fauna. Unpublished report for Westralian Sands Ltd.
J = DBCA (2017). NatureMap Database search. “By Circle” 115° 27' 58" E, 33° 41' 40" S (plus 20km buffer). 17 August 2017.

| Class<br>**Family**<br>*Species* | Common Name | Conservation Status | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Amphibia** | | | | | | | | | | | | |
| **Myobatrachidae**<br>Ground or Burrowing Frogs | | | | | | | | | | | | |
| *Crinia georgiana* | Quacking Frog | LC | | | | | X | X | X | | X | X |
| *Crinia glauerti* | Clicking Frog | LC | | X | | X | X | X | | | X | X |
| *Crinia insignifera* | Squelching Froglet | LC | X | | X | X | X | X | X | X | X | X |
| *Geocrinia leai* | Ticking Frog | LC | | | | | | | | | | |
| *Heleioporus eyrei* | Moaning Frog | LC | | | X | X | X | X | X | X | X | X |
| *Limnodynastes dorsalis* | Western Banjo Frog | LC | | | X | X | | | X | X | X | X |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hylidae**<br>Tree or Water-Holding Frogs | | | | | | | | | | | | |
| *Litoria adelaidensis* | Slender Tree Frog | LC | | X | | X | X | X | | | X | X |
| *Litoria moorei* | Motorbike Frog | LC | | X | | X | | | | | | X |
| Reptilia | | | | | | | | | | | | |
| **Gekkonidae**<br>Geckoes | | | | | | | | | | | | |
| *Christinus marmoratus* | Marbled Gecko | | | | X | X | X | X | X | X | X | X |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Scincidae**<br>Skinks | | | | | | | | | | | | |
| *Acritoscincus trilineatum* | Southwestern Cool Skink | | | | X | X | X | X | X | | X | |
| *Cryptoblepharus buchananii* | Fence Skink | | | | X | X | X | X | X | X | | X |
| *Egernia kingii* | King's Skink | | | | X | | X | X | | | X | X |
| *Hemiergis gracilipes* | Southwestern Mulch Skink | | | | | | | X | | | | X |
| *Hemiergis peronii tridactyla* | Three-toed Earless Skink | | | | X | X | X | X | | X | X | X |
| *Hemiergis quadrilineata* | Two-toed Mulch Skink | | | | | | | | | | | X |
| *Lerista elegans* | West Coast Four-toed Lerista | | | | X | X | X | X | X | X | | X |
| *Menetia greyii* | Dwarf Skink | | | | X | | X | X | X | X | X | X |
| *Morethia lineoocellata* | West Coast Pale-flecked Morethia | | | | X | | X | X | X | X | X | X |
| *Tiliqua rugosa* | Bobtail | | | | X | X | X | X | X | X | X | X |
| **Elapidae**<br>Elapid Snakes | | | | | | | | | | | | |
| *Notechis scutatus* | Tiger Snake | | | | | | | X | | | X | X |
| *Pseudonaja affinis* | Dugite | | | | X | X | | | | X | X | X |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Aves** | | | | | | | | | | | | |
| **Phasianidae**<br>Quails, Pheasants | | | | | | | | | | | | |
| *Coturnix pectoralis* | Stubble Quail | LC | | X | X | X | | | | | | X |
| **Anatidae**<br>Geese, Swans, Ducks | | | | | | | | | | | | |
| *Anas gracilis* | Grey Teal | LC | X | X | | X | | X | | | X | X |
| *Anas superciliosa* | Pacific Black Duck | LC | X | X | | X | X | X | | | X | X |
| *Chenonetta jubata* | Australian Wood Duck | LC | | X | X | X | X | X | | | X | X |
| *Tadorna tadornoides* | Australian Shelduck | LC | X | X | X | X | X | | | X | X | X |
| **Phalacrocoracidae**<br>Cormorants | | | | | | | | | | | | |
| *Phalacrocorax melanoleucos* | Little Pied Cormorant | LC | | X | | | | | | | | |
| *Phalacrocorax sulcirostris* | Little Black Cormorant | LC | | | | | X | | | | | X |
| **Ardeidae**<br>Herons, Egrets, Bitterns | | | | | | | | | | | | |
| *Ardea alba* | Great Egret | S5 Mig CA JA | | X | | | | | | | | X |
| *Ardea novaehollandiae* | White-faced Heron | LC | | X | X | X | X | X | | | X | X |
| *Ardea pacifica* | White-necked Heron | LC | | X | | X | | | | | | X |

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| **Threskiornithidae**<br>Ibises, Spoonbills | | | | | | | | | | | | |
| *Platalea flavipes* | Yellow-billed Spoonbill | LC | | X | | X | | | | | | X |
| *Threskiornis molucca* | Australian White Ibis | LC | | X | X | X | | | | | X | |
| *Threskiornis spinicollis* | Straw-necked Ibis | LC | X | X | X | X | X | X | | | X | X |
| **Accipitridae**<br>Kites, Goshawks, Eagles, Harriers | | | | | | | | | | | | |
| *Accipiter cirrocephalus* | Collared Sparrowhawk | Bp LC | | | X | | | | | X | | X |
| *Accipiter fasciatus* | Brown Goshawk | Bp LC | | X | | | | | X | X | | X |
| *Aquila audax* | Wedge-tailed Eagle | Bp LC | | | X | X | X | X | | X | X | X |
| *Aquila morphnoides* | Little Eagle | Bp LC | | X | | | | | | X | | |
| *Circus approximans* | Swamp Harrier | LC | | X | | | | X | | | | X |
| *Elanus caeruleus* | Black-shouldered Kite | LC | | X | | | | | | | | X |
| *Haliastur sphenurus* | Whistling Kite | Bp LC | | X | | X | X | | | X | | X |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Falconidae**<br>Falcons | | | | | | | | | | | | |
| *Falco berigora* | Brown Falcon | Bp LC | | | | | | | | X | | X |
| *Falco cenchroides* | Australian Kestrel | LC | X | X | X | X | | X | | | | X |
| *Falco longipennis* | Australian Hobby | LC | | | | | | X | | | | X |
| *Falco peregrinus* | Peregrine Falcon | S7 Bp LC | | | | | | | | | | X |
| **Charadriidae**<br>Lapwings, Plovers, Dotterels | | | | | | | | | | | | |
| *Vanellus tricolor* | Banded Lapwing | LC | | X | | | | | | | | X |
| **Columbidae**<br>Pigeons, Doves | | | | | | | | | | | | |
| *Ocyphaps lophotes* | Crested Pigeon | LC | X | X | X | X | X | X | | | X | X |
| *Phaps chalcoptera* | Common Bronzewing | Bh LC | X | X | X | X | X | X | X | X | X | X |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Psittacidae**<br>Parrots | | | | | | | | | | | | |
| *Cacatua roseicapilla* | Galah | LC | | X | | | | | | | | X |
| *Cacatua sanguinea* | Little Corella | LC | | X | | | | | | | | X |
| *Calyptorhynchus banksii naso* | Forest Red-tailed Black-Cockatoo | S3 VU Be | | X | X | | X | X | X | | X | X |
| *Calyptorhynchus baudinii* | Baudin's Black Cockatoo | S2 EN Bp VU A3cde | | X | X | X | X | X | | | X | X |
| *Calyptorhynchus latirostris* | Carnaby's Black Cockatoo | S2 EN Bp EN A2bcde | | X | X | X | X | X | X | X | X | X |
| *Glossopsitta porphyrocephala* | Purple-crowned Lorikeet | LC | | | X | | | | X | | | |
| *Neophema elegans* | Elegant Parrot | LC | X | X | X | X | X | X | X | | | X |
| *Platycercus icterotis icterotis* | Western Rosella (western ssp) | Bp LC | | | | | X | X | | X | | X |
| *Platycercus spurius* | Red-capped Parrot | LC | | X | X | X | X | X | X | X | X | X |
| *Platycercus zonarius* | Australian Ringneck | LC | X | X | X | X | X | X | X | X | X | X |
| *Polytelis anthopeplus* | Regent Parrot | LC | | | | X | | X | | X | X | X |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cuculidae**<br>Parasitic Cuckoos | | | | | | | | | | | | |
| *Cacomantis flabelliformis* | Fan-tailed Cuckoo | LC | | | | | X | | | X | X | X |
| *Chrysococcyx basalis* | Horsfield's Bronze Cuckoo | LC | | | | | X | X | | | | X |
| *Chrysococcyx lucidus* | Shining Bronze Cuckoo | LC | | | X | | X | X | | X | X | X |
| *Cuculus pallidus* | Pallid Cuckoo | LC | | | | | X | | | | X | |
| **Strigidae**<br>Hawk Owls | | | | | | | | | | | | |
| *Ninox novaeseelandiae* | Boobook Owl | LC | | X | X | X | X | | | X | | |
| **Tytonidae**<br>Barn Owls | | | | | | | | | | | | |
| *Tyto alba* | Barn Owl | LC | | X | | | | | | | | X |
| **Podargidae**<br>Frogmouths | | | | | | | | | | | | |
| *Podargus strigoides* | Tawny Frogmouth | LC | | X | | | X | | | X | | X |
| **Halcyonidae**<br>Tree Kingfishers | | | | | | | | | | | | |
| *Dacelo novaeguineae* | Laughing Kookaburra | Introduced | | X | X | X | X | X | X | X | X | X |
| *Todiramphus sanctus* | Sacred Kingfisher | LC | | | | | X | | | X | X | X |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Meropidae**<br>Bee-eaters | | | | | | | | | | | | |
| *Merops ornatus* | Rainbow Bee-eater | S5 Mig JA LC | | X | X | X | X | X | X | X | X | X |
| **Maluridae**<br>Fairy Wrens, GrassWrens | | | | | | | | | | | | |
| *Malurus splendens* | Splendid Fairy-wren | Bh LC | | X | X | X | X | X | X | X | X | X |
| **Acanthizidae**<br>Thornbills, Geryones, Fieldwrens & Whitefaces | | | | | | | | | | | | |
| *Acanthiza apicalis* | Broad-tailed Thornbill | Bh LC | X | X | X | | X | X | X | X | X | X |
| *Acanthiza chrysorrhoa* | Yellow-rumped Thornbill | Bh LC | X | X | X | X | X | X | | X | X | X |
| *Gerygone fusca* | Western Gerygone | LC | | X | X | X | X | X | X | X | X | X |
| *Sericornis frontalis* | White-browed Scrubwren | Bh LC | | | X | X | X | X | X | X | | X |
| *Smicrornis brevirostris* | Weebill | Bh LC | | | X | | X | | X | X | | X |
| **Pardalotidae**<br>Pardalotes | | | | | | | | | | | | |
| *Pardalotus striatus* | Striated Pardalote | LC | | X | X | X | X | X | X | X | X | X |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Meliphagidae**<br>Honeyeaters, Chats | | | | | | | | | | | | |
| *Anthochaera carunculata* | Red Wattlebird | LC | X | X | X | X | | X | X | X | X | X |
| *Epthianura albifrons* | White-fronted Chat | LC | | | | | | X | | | | X |
| *Lichenostomus virescens* | Singing Honeyeater | LC | X | | | | X | | X | | | |
| *Lichmera indistincta* | Brown Honeyeater | LC | | X | X | X | X | X | X | X | X | X |
| *Phylidonyris novaehollandiae* | New Holland Honeyeater | Bp LC | | X | X | X | X | X | X | | X | X |
| **Pachycephalidae**<br>Crested Shrike-tit, Crested Bellbird, Shrike Thrushes, Whistlers | | | | | | | | | | | | |
| *Pachycephala pectoralis* | Golden Whistler | Bh LC | | X | X | X | X | X | X | X | | |
| *Pachycephala rufiventris* | Rufous Whistler | LC | | X | X | | X | X | | X | X | X |
| **Dicruridae**<br>Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo | | | | | | | | | | | | |
| *Grallina cyanoleuca* | Magpie-lark | LC | X | X | X | X | | X | | | X | X |
| *Rhipidura fuliginosa* | Grey Fantail | LC | X | X | X | X | X | X | X | X | X | |
| *Rhipidura leucophrys* | Willie Wagtail | LC | X | X | X | X | X | X | X | X | X | X |

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| **Campephagidae**<br>Cuckoo-shrikes, Trillers | | | | | | | | | | | | |
| *Coracina novaehollandiae* | Black-faced Cuckoo-shrike | LC | X | X | X | X | X | X | X | X | X | X |
| *Lalage tricolor* | White-winged Triller | LC | | X | | | | | | | | X |
| **Artamidae**<br>Woodswallows, Butcherbirds, Currawongs | | | | | | | | | | | | |
| *Artamus cinereus* | Black-faced Woodswallow | Bp LC | | X | | | | X | | X | X | X |
| *Artamus cyanopterus* | Dusky Woodswallow | Bp LC | | X | | | X | X | X | | | X |
| **Cracticidae**<br>Currawongs, Magpies & Butcherbirds | | | | | | | | | | | | |
| *Cracticus tibicen* | Australian Magpie | LC | X | X | X | X | X | X | X | X | X | X |
| *Cracticus torquatus* | Grey Butcherbird | LC | X | X | X | X | X | X | | X | X | X |
| **Corvidae**<br>Ravens, Crows | | | | | | | | | | | | |
| *Corvus coronoides* | Australian Raven | LC | X | X | X | X | X | X | X | X | X | X |
| **Motacillidae**<br>Old World Pipits, Wagtails | | | | | | | | | | | | |
| *Anthus australis* | Australian Pipit | LC | X | X | X | X | X | X | | | | X |

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| **Hirundinidae**<br>Swallows, Martins | | | | | | | | | | | | |
| *Hirundo neoxena* | Welcome Swallow | LC | X | X | X | X | | X | X | | X | X |
| *Hirundo nigricans* | Tree Martin | LC | X | X | X | X | X | X | | | X | |
| **Sylviidae**<br>Old World Warblers | | | | | | | | | | | | |
| *Cincloramphus cruralis* | Brown Songlark | LC | | | X | | | | | | | |
| *Cincloramphus mathewsi* | Rufous Songlark | LC | | | | | | | | | X | |
| **Zosteropidae**<br>White-eyes | | | | | | | | | | | | |
| *Zosterops lateralis* | Silvereye | LC | | X | | | X | X | X | X | X | X |
| Mammalia | | | | | | | | | | | | |
| **Phalangeridae**<br>Brushtail Possums, Cuscuses | | | | | | | | | | | | |
| *Trichosurus vulpecula* | Common Brushtail Possum | LC | X | X | X | X | X | X | X | X | X | X |
| **Pseudocheiridae**<br>Ringtail Posssums | | | | | | | | | | | | |
| *Pseudocheirus occidentalis* | Western Ringtail Possum | S1 EN VU A4bce | X | X | | X | X | | | X | | X |
| **Macropodidae**<br>Kangaroos, Wallabies | | | | | | | | | | | | |
| *Macropus fuliginosus* | Western Grey Kangaroo | LC | | X | X | X | X | X | X | X | X | X |

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| **Molossidae**<br>Freetail Bats | | | | | | | | | | | | |
| *Austronomus australis* | White-striped Freetail-bat | LC | | X | X | X | | X | X | X | | |
| *Ozimops kitcheneri* | South-western Freetail-bat | LC | | | X | X | | | | | | |
| **Vespertilionidae**<br>Ordinary Bats | | | | | | | | | | | | |
| *Chalinolobus gouldii* | Gould's Wattled Bat | LC | | | X | X | X | | | | | X |
| *Chalinolobus morio* | Chocolate Wattled Bat | LC | | | X | X | X | | X | | | X |
| *Nyctophilus geoffroyi* | Lesser Long-eared Bat | LC | | | X | X | X | | | | | X |
| *Nyctophilus gouldi* | Gould's Long-eared Bat | LC | | | | X | | | X | X | | |
| *Nyctophilus major* | Western Long-eared Bat | LC | | | | | | | | X | | |
| *Vespadelus regulus* | Southern Forest Bat | LC | | | X | X | X | X | X | | | X |
| **Muridae**<br>Rats, Mice | | | | | | | | | | | | |
| *Mus musculus* | House Mouse | Introduced | | | X | X | X | X | | X | X | X |
| *Rattus rattus* | Black Rat | Introduced | | | X | X | X | | | X | | X |

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

| Class<br>**Family**<br>*Species* | Common Name | Conservation Status | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Canidae**<br>Dogs, Foxes | | | | | | | | | | | | |
| *Canis lupus familiaris* | Dog | Introduced | | | | X | | | | | | X |
| *Vulpes vulpes* | Red Fox | Introduced | | X | X | X | X | | | X | X | X |
| **Felidae**<br>Cats | | | | | | | | | | | | |
| *Felis catus* | Cat | Introduced | | X | | X | X | | | X | | X |
| **Equidae**<br>Horses | | | | | | | | | | | | |
| *Equus caballus* | Horse | Introduced | X | | | X | | | | | | |
| **Bovidae**<br>Horned Ruminants | | | | | | | | | | | | |
| *Bos taurus* | European Cattle | Introduced | X | X | X | X | | | | | | X |
| **Leporidae**<br>Rabbits, Hares | | | | | | | | | | | | |
| *Oryctolagus cuniculus* | Rabbit | Introduced | X | X | X | X | X | X | X | X | X | X |

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region. IUCN Red List Category Definitions LC = Least Concern - see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others.

# APPENDIX C

## DBCA & EPBC DATABASE SEARCH RESULTS

NatureMap
Mapping Western Australia's biodiversity

# NatureMap - Yalyalup Project Area

*Created By Greg Harewood on 17/08/2017*

| | |
|---|---|
| **Kingdom** | Animalia |
| **Current Names Only** | Yes |
| **Core Datasets Only** | Yes |
| **Method** | 'By Circle' |
| **Centre** | 115° 27' 58" E,33° 41' 40" S |
| **Buffer** | 20km |
| **Group By** | Species Group |

| Species Group | Species | Records |
|---|---|---|
| Amphibian | 12 | 291 |
| Bird | 210 | 14072 |
| Fish | 100 | 245 |
| Invertebrate | 113 | 740 |
| Mammal | 43 | 5519 |
| Reptile | 47 | 786 |
| **TOTAL** | **525** | **21653** |

| | Name ID | Species Name | Naturalised | Conservation Code | [1]Endemic To Query Area |
|---|---|---|---|---|---|
| **Amphibian** | | | | | |
| 1. | 25398 | *Crinia georgiana (Quacking Frog)* | | | |
| 2. | 25399 | *Crinia glauerti (Clicking Frog)* | | | |
| 3. | 25400 | *Crinia insignifera (Squelching Froglet)* | | | |
| 4. | 25401 | *Crinia pseudinsignifera (Bleating Froglet)* | | | |
| 5. | 25410 | *Heleioporus eyrei (Moaning Frog)* | | | |
| 6. | 25412 | *Heleioporus psammophilus (Sand Frog)* | | | |
| 7. | 25415 | *Limnodynastes dorsalis (Western Banjo Frog)* | | | |
| 8. | 25378 | *Litoria adelaidensis (Slender Tree Frog)* | | | |
| 9. | 25388 | *Litoria moorei (Motorbike Frog)* | | | |
| 10. | 25419 | *Metacrinia nichollsi (Forest Toadlet)* | | | |
| 11. | 25425 | *Neobatrachus kunapalari (Kunapalari Frog)* | | | |
| 12. | 25433 | *Pseudophryne guentheri (Crawling Toadlet)* | | | |
| **Bird** | | | | | |
| 13. | 24260 | *Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)* | | | |
| 14. | 24261 | *Acanthiza chrysorrhoa (Yellow-rumped Thornbill)* | | | |
| 15. | 24262 | *Acanthiza inornata (Western Thornbill)* | | | |
| 16. | 24560 | *Acanthorhynchus superciliosus (Western Spinebill)* | | | |
| 17. | 25535 | *Accipiter cirrocephalus (Collared Sparrowhawk)* | | | |
| 18. | 24281 | *Accipiter cirrocephalus subsp. cirrocephalus (Collared Sparrowhawk)* | | | |
| 19. | 25536 | *Accipiter fasciatus (Brown Goshawk)* | | | |
| 20. | 25755 | *Acrocephalus australis (Australian Reed Warbler)* | | | |
| 21. | 41323 | *Actitis hypoleucos (Common Sandpiper)* | | IA | |
| 22. | 24310 | *Anas castanea (Chestnut Teal)* | | | |
| 23. | 24312 | *Anas gracilis (Grey Teal)* | | | |
| 24. | 24313 | *Anas platyrhynchos (Mallard)* | | | |
| 25. | 24315 | *Anas rhynchotis (Australasian Shoveler)* | | | |
| 26. | 24316 | *Anas superciliosa (Pacific Black Duck)* | | | |
| 27. | 47414 | *Anhinga novaehollandiae (Australasian Darter)* | | | |
| 28. | 24505 | *Anous stolidus subsp. pileatus (Common Noddy)* | | IA | |
| 29. | 24506 | *Anous tenuirostris subsp. melanops (Australian Lesser Noddy)* | | T | |
| 30. | 24561 | *Anthochaera carunculata (Red Wattlebird)* | | | |
| 31. | 24562 | *Anthochaera lunulata (Western Little Wattlebird)* | | | |
| 32. | 25670 | *Anthus australis (Australian Pipit)* | | | |
| 33. | 24285 | *Aquila audax (Wedge-tailed Eagle)* | | | |
| 34. | 25558 | *Ardea ibis (Cattle Egret)* | | IA | |
| 35. | 41324 | *Ardea modesta (Eastern Great Egret)* | | IA | |
| 36. | 24340 | *Ardea novaehollandiae (White-faced Heron)* | | | |
| 37. | 24341 | *Ardea pacifica (White-necked Heron)* | | | |
| 38. | 25566 | *Artamus cinereus (Black-faced Woodswallow)* | | | |
| 39. | 24353 | *Artamus cyanopterus (Dusky Woodswallow)* | | | |

| | Name ID | Species Name | Naturalised | Conservation Code | [1]Endemic To Query Area |
|---|---|---|---|---|---|
| 40. | 24318 | *Aythya australis (Hardhead)* | | | |
| 41. | | *Barnardius zonarius* | | | |
| 42. | 24319 | *Biziura lobata (Musk Duck)* | | | |
| 43. | 24345 | *Botaurus poiciloptilus (Australasian Bittern)* | | T | |
| 44. | 25714 | *Cacatua pastinator (Western Long-billed Corella)* | | | |
| 45. | 24724 | *Cacatua pastinator subsp. pastinator (Muir's Corella, Muir's Corella (Western Corella SW WA))* | | S | |
| 46. | 25715 | *Cacatua roseicapilla (Galah)* | | | |
| 47. | 25716 | *Cacatua sanguinea (Little Corella)* | | | |
| 48. | 25598 | *Cacomantis flabelliformis (Fan-tailed Cuckoo)* | | | |
| 49. | 42307 | *Cacomantis pallidus (Pallid Cuckoo)* | | | |
| 50. | 24779 | *Calidris acuminata (Sharp-tailed Sandpiper)* | | IA | |
| 51. | 24780 | *Calidris alba (Sanderling)* | | IA | |
| 52. | 24784 | *Calidris ferruginea (Curlew Sandpiper)* | | T | |
| 53. | 24786 | *Calidris melanotos (Pectoral Sandpiper)* | | IA | |
| 54. | 24788 | *Calidris ruficollis (Red-necked Stint)* | | IA | |
| 55. | 24789 | *Calidris subminuta (Long-toed Stint)* | | IA | |
| 56. | 24790 | *Calidris tenuirostris (Great Knot)* | | T | |
| 57. | 25717 | *Calyptorhynchus banksii (Red-tailed Black-Cockatoo)* | | | |
| 58. | 24731 | *Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black-Cockatoo)* | | T | |
| 59. | 24733 | *Calyptorhynchus baudinii (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)* | | T | |
| 60. | 24734 | *Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)* | | T | |
| 61. | 25575 | *Charadrius leschenaultii (Greater Sand Plover)* | | IA | |
| 62. | 24377 | *Charadrius ruficapillus (Red-capped Plover)* | | | |
| 63. | 24321 | *Chenonetta jubata (Australian Wood Duck, Wood Duck)* | | | |
| 64. | 47909 | *Cheramoeca leucosterna (White-backed Swallow)* | | | |
| 65. | | *Chroicocephalus novaehollandiae* | | | |
| 66. | 24431 | *Chrysococcyx basalis (Horsfield's Bronze Cuckoo)* | | | |
| 67. | 25601 | *Chrysococcyx lucidus (Shining Bronze Cuckoo)* | | | |
| 68. | 24432 | *Chrysococcyx lucidus subsp. plagosus (Shining Bronze Cuckoo)* | | | |
| 69. | | *Circus aeruginosus* | | | Y |
| 70. | 24288 | *Circus approximans (Swamp Harrier)* | | | |
| 71. | 24289 | *Circus assimilis (Spotted Harrier)* | | | |
| 72. | 24774 | *Cladorhynchus leucocephalus (Banded Stilt)* | | | |
| 73. | 25675 | *Colluricincla harmonica (Grey Shrike-thrush)* | | | |
| 74. | 24399 | *Columba livia (Domestic Pigeon)* | Y | | |
| 75. | 25568 | *Coracina novaehollandiae (Black-faced Cuckoo-shrike)* | | | |
| 76. | 25592 | *Corvus coronoides (Australian Raven)* | | | |
| 77. | 24417 | *Corvus coronoides subsp. perplexus (Australian Raven)* | | | |
| 78. | 24671 | *Coturnix pectoralis (Stubble Quail)* | | | |
| 79. | 24420 | *Cracticus nigrogularis (Pied Butcherbird)* | | | |
| 80. | 25595 | *Cracticus tibicen (Australian Magpie)* | | | |
| 81. | 25596 | *Cracticus torquatus (Grey Butcherbird)* | | | |
| 82. | 24322 | *Cygnus atratus (Black Swan)* | | | |
| 83. | 30901 | *Dacelo novaeguineae (Laughing Kookaburra)* | Y | | |
| 84. | 30902 | *Dacelo novaeguineae subsp. novaeguineae (Laughing Kookaburra)* | Y | | |
| 85. | 25673 | *Daphoenositta chrysoptera (Varied Sittella)* | | | |
| 86. | 24687 | *Daption capense (Cape Petrel)* | | | |
| 87. | 25607 | *Dicaeum hirundinaceum (Mistletoebird)* | | | |
| 88. | 25618 | *Diomedea exulans (Wandering Albatross)* | | T | |
| 89. | 30836 | *Diomedea exulans subsp. exulans (Snowy Albatross)* | | T | |
| 90. | 24470 | *Dromaius novaehollandiae (Emu)* | | | |
| 91. | | *Egretta garzetta* | | | |
| 92. | | *Egretta novaehollandiae* | | | |
| 93. | | *Elanus axillaris* | | | |
| 94. | 24290 | *Elanus caeruleus subsp. axillaris (Australian Black-shouldered Kite)* | | | |
| 95. | 47937 | *Elseyornis melanops (Black-fronted Dotterel)* | | | |
| 96. | | *Eolophus roseicapillus* | | | |
| 97. | 24651 | *Eopsaltria australis subsp. griseogularis (Western Yellow Robin)* | | | |
| 98. | 24652 | *Eopsaltria georgiana (White-breasted Robin)* | | | |
| 99. | 24567 | *Epthianura albifrons (White-fronted Chat)* | | | |
| 100. | 24379 | *Erythrogonys cinctus (Red-kneed Dotterel)* | | | |
| 101. | 24368 | *Eurostopodus argus (Spotted Nightjar)* | | | |
| 102. | 25621 | *Falco berigora (Brown Falcon)* | | | |
| 103. | 25622 | *Falco cenchroides (Australian Kestrel, Nankeen Kestrel)* | | | |
| 104. | 24472 | *Falco cenchroides subsp. cenchroides (Australian Kestrel, Nankeen Kestrel)* | | | |
| 105. | 25623 | *Falco longipennis (Australian Hobby)* | | | |
| 106. | 24474 | *Falco longipennis subsp. longipennis (Australian Hobby)* | | | |

| | Name ID | Species Name | Naturalised | Conservation Code | [1]Endemic To Query Area |
|---|---|---|---|---|---|
| 107. | 25624 | *Falco peregrinus (Peregrine Falcon)* | | S | |
| 108. | 25727 | *Fulica atra (Eurasian Coot)* | | | |
| 109. | 24688 | *Fulmarus glacialoides (Southern Fulmar)* | | | |
| 110. | 25729 | *Gallinula tenebrosa (Dusky Moorhen)* | | | |
| 111. | 25730 | *Gallirallus philippensis (Buff-banded Rail)* | | | |
| 112. | 24765 | *Gallirallus philippensis subsp. mellori (Buff-banded Rail)* | | | |
| 113. | 42314 | *Gavicalis virescens (Singing Honeyeater)* | | | |
| 114. | 25530 | *Gerygone fusca (Western Gerygone)* | | | |
| 115. | 24271 | *Gerygone fusca subsp. fusca (Western Gerygone)* | | | |
| 116. | 24443 | *Grallina cyanoleuca (Magpie-lark)* | | | |
| 117. | 24487 | *Haematopus longirostris (Pied Oystercatcher)* | | | |
| 118. | 24293 | *Haliaeetus leucogaster (White-bellied Sea-Eagle)* | | | |
| 119. | 24295 | *Haliastur sphenurus (Whistling Kite)* | | | |
| 120. | 47965 | *Hieraaetus morphnoides (Little Eagle)* | | | |
| 121. | 25734 | *Himantopus himantopus (Black-winged Stilt)* | | | |
| 122. | 24775 | *Himantopus himantopus subsp. leucocephalus (Black-winged Stilt)* | | | |
| 123. | 24491 | *Hirundo neoxena (Welcome Swallow)* | | | |
| 124. | | *Hydroprogne caspia* | | | |
| 125. | 24367 | *Lalage tricolor (White-winged Triller)* | | | |
| 126. | 25638 | *Larus pacificus (Pacific Gull)* | | | |
| 127. | 25661 | *Lichmera indistincta (Brown Honeyeater)* | | | |
| 128. | 25741 | *Limosa limosa (Black-tailed Godwit)* | | IA | |
| 129. | | *Lophoictinia isura* | | | |
| 130. | 24690 | *Macronectes giganteus (Southern Giant Petrel)* | | IA | |
| 131. | 24326 | *Malacorhynchus membranaceus (Pink-eared Duck)* | | | |
| 132. | 25650 | *Malurus elegans (Red-winged Fairy-wren)* | | | |
| 133. | 25654 | *Malurus splendens (Splendid Fairy-wren)* | | | |
| 134. | 25758 | *Megalurus gramineus (Little Grassbird)* | | | |
| 135. | 25663 | *Melithreptus brevirostris (Brown-headed Honeyeater)* | | | |
| 136. | 24598 | *Merops ornatus (Rainbow Bee-eater)* | | IA | |
| 137. | | *Microcarbo melanoleucos* | | | |
| 138. | 25542 | *Milvus migrans (Black Kite)* | | | |
| 139. | 25610 | *Myiagra inquieta (Restless Flycatcher)* | | | |
| 140. | 24738 | *Neophema elegans (Elegant Parrot)* | | | |
| 141. | 24739 | *Neophema petrophila (Rock Parrot)* | | | |
| 142. | 25564 | *Nycticorax caledonicus (Rufous Night Heron)* | | | |
| 143. | 24407 | *Ocyphaps lophotes (Crested Pigeon)* | | | |
| 144. | 24328 | *Oxyura australis (Blue-billed Duck)* | | P4 | |
| 145. | 25680 | *Pachycephala rufiventris (Rufous Whistler)* | | | |
| 146. | 24624 | *Pachycephala rufiventris subsp. rufiventris (Rufous Whistler)* | | | |
| 147. | | *Pachycephala sp.* | | | Y |
| 148. | 24692 | *Pachyptila belcheri (Slender-billed Prion)* | | | |
| 149. | 24693 | *Pachyptila desolata (Antarctic Prion)* | | | |
| 150. | 25707 | *Pachyptila salvini (Salvin's Prion)* | | | |
| 151. | 24695 | *Pachyptila salvini subsp. macgillivrayi (Salvin's Prion)* | | | Y |
| 152. | 24696 | *Pachyptila turtur (Fairy Prion)* | | | |
| 153. | 24697 | *Pachyptila vittata (Broad-billed Prion)* | | | |
| 154. | | *Pandion cristatus* | | | |
| 155. | 25681 | *Pardalotus punctatus (Spotted Pardalote)* | | | |
| 156. | 25682 | *Pardalotus striatus (Striated Pardalote)* | | | |
| 157. | 24630 | *Pardalotus striatus subsp. westraliensis (Striated Pardalote)* | | | |
| 158. | 24648 | *Pelecanus conspicillatus (Australian Pelican)* | | | |
| 159. | 48061 | *Petrochelidon nigricans (Tree Martin)* | | | |
| 160. | 48066 | *Petroica boodang (Scarlet Robin)* | | | |
| 161. | 24663 | *Phaethon rubricauda (Red-tailed Tropicbird)* | | P4 | |
| 162. | 25697 | *Phalacrocorax carbo (Great Cormorant)* | | | |
| 163. | 24667 | *Phalacrocorax sulcirostris (Little Black Cormorant)* | | | |
| 164. | 25699 | *Phalacrocorax varius (Pied Cormorant)* | | | |
| 165. | 24668 | *Phalacrocorax varius subsp. hypoleucos (Pied Cormorant)* | | | |
| 166. | 24409 | *Phaps chalcoptera (Common Bronzewing)* | | | |
| 167. | 24462 | *Phoebetria fusca (Sooty Albatross)* | | T | |
| 168. | 24463 | *Phoebetria palpebrata (Light-mantled Sooty Albatross)* | | P4 | |
| 169. | 48071 | *Phylidonyris niger (White-cheeked Honeyeater)* | | | |
| 170. | 24596 | *Phylidonyris novaehollandiae (New Holland Honeyeater)* | | | |
| 171. | 24841 | *Platalea flavipes (Yellow-billed Spoonbill)* | | | |
| 172. | 24842 | *Platalea regia (Royal Spoonbill)* | | | |
| 173. | 25720 | *Platycercus icterotis (Western Rosella)* | | | |
| 174. | 24745 | *Platycercus icterotis subsp. icterotis (Western Rosella)* | | | |
| 175. | 24747 | *Platycercus spurius (Red-capped Parrot)* | | | |
| 176. | 25721 | *Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)* | | | |

| | Name ID | Species Name | Naturalised | Conservation Code | [1]Endemic To Query Area |
|---|---|---|---|---|---|
| 177. | 24750 | *Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)* | | | |
| 178. | 24843 | *Plegadis falcinellus (Glossy Ibis)* | | IA | |
| 179. | 24382 | *Pluvialis fulva (Pacific Golden Plover)* | | IA | |
| 180. | 24383 | *Pluvialis squatarola (Grey Plover)* | | IA | |
| 181. | 25703 | *Podargus strigoides (Tawny Frogmouth)* | | | |
| 182. | 24679 | *Podargus strigoides subsp. brachypterus (Tawny Frogmouth)* | | | |
| 183. | 25704 | *Podiceps cristatus (Great Crested Grebe)* | | | |
| 184. | 24681 | *Poliocephalus poliocephalus (Hoary-headed Grebe)* | | | |
| 185. | 25722 | *Polytelis anthopeplus (Regent Parrot)* | | | |
| 186. | 25731 | *Porphyrio porphyrio (Purple Swamphen)* | | | |
| 187. | 24769 | *Porzana fluminea (Australian Spotted Crake)* | | | |
| 188. | 25732 | *Porzana pusilla (Baillon's Crake)* | | | |
| 189. | 24771 | *Porzana tabuensis (Spotless Crake)* | | | |
| 190. | 24703 | *Pterodroma lessonii (White-headed Petrel)* | | | |
| 191. | 25710 | *Pterodroma macroptera (Great-winged Petrel)* | | | |
| 192. | 24706 | *Pterodroma macroptera subsp. gouldi (Great-winged Petrel)* | | | |
| 193. | | *Pterodroma macroptera subsp. macoptera* | | | |
| 194. | | *Purpureicephalus spurius* | | | |
| 195. | 24776 | *Recurvirostra novaehollandiae (Red-necked Avocet)* | | | |
| 196. | 48096 | *Rhipidura albiscapa (Grey Fantail)* | | | |
| 197. | 25614 | *Rhipidura leucophrys (Willie Wagtail)* | | | |
| 198. | 25534 | *Sericornis frontalis (White-browed Scrubwren)* | | | |
| 199. | 24279 | *Sericornis frontalis subsp. maculatus (White-browed Scrubwren)* | | | |
| 200. | 30948 | *Smicrornis brevirostris (Weebill)* | | | |
| 201. | 48116 | *Stercorarius antarcticus (Brown Skua)* | | | |
| 202. | 24520 | *Sterna anaethetus subsp. anaethetus (Bridled Tern)* | | IA | |
| 203. | 24329 | *Stictonetta naevosa (Freckled Duck)* | | | |
| 204. | 25655 | *Stipiturus malachurus (Southern Emu-wren)* | | | |
| 205. | 24554 | *Stipiturus malachurus subsp. westernensis (Southern Emu-wren)* | | | |
| 206. | 25597 | *Strepera versicolor (Grey Currawong)* | | | |
| 207. | 25590 | *Streptopelia senegalensis (Laughing Turtle-Dove)* | Y | | |
| 208. | 25705 | *Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)* | | | |
| 209. | 24331 | *Tadorna tadornoides (Australian Shelduck, Mountain Duck)* | | | |
| 210. | | *Thalasseus bergii* | | | |
| 211. | 24845 | *Threskiornis spinicollis (Straw-necked Ibis)* | | | |
| 212. | 25549 | *Todiramphus sanctus (Sacred Kingfisher)* | | | |
| 213. | 48141 | *Tribonyx ventralis (Black-tailed Native-hen)* | | | |
| 214. | 24806 | *Tringa glareola (Wood Sandpiper)* | | IA | |
| 215. | 24808 | *Tringa nebularia (Common Greenshank)* | | IA | |
| 216. | 24809 | *Tringa stagnatilis (Marsh Sandpiper)* | | IA | |
| 217. | 48147 | *Turnix varius (Painted Button-quail)* | | | |
| 218. | 24852 | *Tyto alba subsp. delicatula (Barn Owl)* | | | |
| 219. | 24855 | *Tyto novaehollandiae subsp. novaehollandiae (Masked Owl (southern subsp))* | | P3 | |
| 220. | 25577 | *Vanellus miles (Masked Lapwing)* | | | |
| 221. | 24386 | *Vanellus tricolor (Banded Lapwing)* | | | |
| 222. | 25765 | *Zosterops lateralis (Grey-breasted White-eye, Silvereye)* | | | |

## Fish

| | | | | | |
|---|---|---|---|---|---|
| 223. | | *? ?* | | | |
| 224. | | *Acanthaluteres brownii* | | | |
| 225. | | *Acanthaluteres spilomelanurus* | | | |
| 226. | | *Acanthaluteres vittiger* | | | |
| 227. | | *Anoplocapros robustus* | | | |
| 228. | | *Aplodactylus westralis* | | | |
| 229. | | *Apogon rueppellii* | | | |
| 230. | | *Aseraggodes haackeanus* | | | |
| 231. | | *Atherinosoma sp.* | | | |
| 232. | | *Austrolabrus maculatus* | | | |
| 233. | | *Bostockia porosa* | | | |
| 234. | | *Brachaluteres jacksonianus* | | | |
| 235. | | *Brama brama* | | | |
| 236. | | *Caprichthys gymnura* | | | |
| 237. | | *Carassius auratus* | | | |
| 238. | | *Carcharhinus brevipinna* | | | |
| 239. | 34031 | *Carcharodon carcharias (Great White Shark)* | | T | |
| 240. | | *Cetorhinus maximus* | | | |
| 241. | | *Chaetodermis penicilligera* | | | |
| 242. | | *Chelidonichthys kumu* | | | |
| 243. | | *Chelmonops curiosus* | | | |
| 244. | | *Cirrhimuraena calamus* | | | |
| 245. | | *Cleidopus gloriamaris* | | | |

| | Name ID | Species Name | Naturalised | Conservation Code | [1]Endemic To Query Area |
|---|---|---|---|---|---|
| 246. | | *Cochleoceps viridis* | | | |
| 247. | | *Contusus brevicaudus* | | | |
| 248. | | *Coryphaena hippurus* | | | |
| 249. | | *Cristiceps aurantiacus* | | | |
| 250. | | *Cristiceps australis* | | | |
| 251. | | *Diodon nicthemerus* | | | |
| 252. | | *Dotalabrus aurantiacus* | | | |
| 253. | | *Echeneis naucrates* | | | |
| 254. | | *Edelia vittata* | | | |
| 255. | | *Elops hawaiensis* | | | |
| 256. | | *Filicampus tigris* | | | |
| 257. | 34028 | *Galaxias occidentalis (Western Minnow)* | | | |
| 258. | 34026 | *Galaxiella munda (Western Mud Minnow)* | | T | |
| 259. | | *Gambusia affinis* | | | |
| 260. | | *Genypterus blacodes* | | | |
| 261. | | *Genypterus tigerinus* | | | |
| 262. | 34030 | *Geotria australis (Pouched Lamprey)* | | P1 | |
| 263. | | *Gnathanodon speciosus* | | | |
| 264. | | *Gnathophis longicaudatus* | | | |
| 265. | | *Gonorynchus greyi* | | | |
| 266. | | *Gymnapistes marmoratus* | | | |
| 267. | | *Haletta semifasciata* | | | |
| 268. | | *Halichoeres brownfieldi* | | | |
| 269. | | *Helcogramma decurrens* | | | |
| 270. | | *Heteroclinus adelaidae* | | | |
| 271. | | *Heteroclinus sp.* | | | |
| 272. | | *Histiogamphelus cristatus* | | | |
| 273. | | *Hypnos monopterygium* | | | |
| 274. | | *Hypoplectrodes annulata* | | | |
| 275. | | *Ichthyscopus barbatus* | | | |
| 276. | | *Lactoria cornuta* | | | |
| 277. | | *Lagocephalus sceleratus* | | | |
| 278. | 47983 | *Lepidogalaxias salamandroides (Salamanderfish)* | | T | |
| 279. | | *Lepidotrigla papilio* | | | |
| 280. | | *Lotella rhacinus* | | | |
| 281. | | *Meuschenia freycineti* | | | |
| 282. | | *Meuschenia hippocrepis* | | | |
| 283. | | *Nannoperca vittata* | | | |
| 284. | | *Nelusetta ayraudi* | | | |
| 285. | | *Neoodax sp.* | | | |
| 286. | | *Omegophora cyanopunctata* | | | |
| 287. | | *Ophichthus melanochir* | | | |
| 288. | | *Ophisurus serpens* | | | |
| 289. | | *Pagrus auratus* | | | |
| 290. | | *Parablennius postoculomaculatus* | | | |
| 291. | | *Parablennius sp.* | | | |
| 292. | | *Parapercis haackei* | | | |
| 293. | | *Parascyllium variolatum* | | | |
| 294. | | *Parma victoriae* | | | |
| 295. | | *Phyllophryne scortea* | | | |
| 296. | | *Phyllopteryx taeniolatus* | | | |
| 297. | | *Polyspina piosae* | | | |
| 298. | | *Posidonichthys hutchinsi* | | | |
| 299. | | *Pristiophorus cirratus* | | | |
| 300. | | *Pristiophorus nudipinnis* | | | |
| 301. | | *Pseudogobius olorum* | | | |
| 302. | | *Pseudolabrus sp.* | | | |
| 303. | | *Pterygotrigla polyommata* | | | |
| 304. | | *Rachycentron canadum* | | | |
| 305. | | *Ranzania laevis* | | | |
| 306. | | *Regalecus glesne* | | | |
| 307. | | *Sarda orientalis* | | | |
| 308. | | *Scobinichthys granulatus* | | | |
| 309. | | *Sillaginodes punctata* | | | |
| 310. | | *Sillago bassensis* | | | |
| 311. | | *Siphamia cephalotes* | | | |
| 312. | | *Siphonognathus argyrophanes* | | | |
| 313. | | *Siphonognathus radiatus* | | | |
| 314. | | *Squatina australis* | | | |
| 315. | | *Stigmatopora argus* | | | |

| | Name ID | Species Name | Naturalised | Conservation Code | [1]Endemic To Query Area |
|---|---|---|---|---|---|
| 316. | | *Tetrapturus audax* | | | Y |
| 317. | | *Thunnus alalunga* | | | |
| 318. | | *Thunnus maccoyii* | | | |
| 319. | | *Trachinops noarlungae* | | | |
| 320. | | *Vanacampus phillipi* | | | |
| 321. | | *Vanacampus poecilolaemus* | | | |
| 322. | | *Vincentia punctata* | | | |

## Invertebrate

| | | | | | |
|---|---|---|---|---|---|
| 323. | | *Acariformes sp.* | | | |
| 324. | | *Acarina sp.* | | | |
| 325. | | *Aeshnidae sp.* | | | |
| 326. | | *Amblyomma albolimbatum* | | | |
| 327. | | *Aname mainae* | | | |
| 328. | | *Aname tepperi* | | | |
| 329. | | *Ancylidae sp.* | | | |
| 330. | | *Arachnura higginsi* | | | |
| 331. | | *Araneus cyphoxis* | | | |
| 332. | | *Araneus eburneiventris* | | | |
| 333. | | *Araneus recherchensis* | | | |
| 334. | | *Araneus senicaudatus* | | | |
| 335. | | *Argiope protensa* | | | |
| 336. | | *Argiope trifasciata* | | | |
| 337. | | *Arkys alticephala* | | | |
| 338. | | *Arkys walckenaeri* | | | |
| 339. | | *Artoria flavimana* | | | |
| 340. | | *Austracantha minax* | | | |
| 341. | | *Austrochthonius strigosus* | | | Y |
| 342. | 33972 | *Austromerope poultoni (scorpionfly)* | | P2 | |
| 343. | | *Backobourkia brounii* | | | |
| 344. | | *Badumna insignis* | | | |
| 345. | | *Baetidae sp.* | | | |
| 346. | | *Baiami volucripes* | | | |
| 347. | 34056 | *Bothriembryon irvineanus (land snail)* | | P2 | Y |
| 348. | | *Caenidae sp.* | | | |
| 349. | | *Ceinidae sp.* | | | |
| 350. | | *Ceratopogonidae sp.* | | | |
| 351. | | *Cercophonius sulcatus* | | | |
| 352. | | *Cherax destructor* | | | |
| 353. | | *Cherax preissii* | | | |
| 354. | | *Cherax quinquecarinatus* | | | |
| 355. | | *Chironominae sp.* | | | |
| 356. | | *Chrysomelidae sp.* | | | |
| 357. | | *Clynotis severus* | | | |
| 358. | | *Coenagrionidae sp.* | | | |
| 359. | | *Corduliidae sp.* | | | |
| 360. | | *Corixidae sp.* | | | |
| 361. | | *Cormocephalus aurantiipes* | | | |
| 362. | | *Culicidae sp.* | | | |
| 363. | | *Cyclosa trilobata* | | | |
| 364. | | *Cyrtophora parnasia* | | | |
| 365. | | *Cytostethum tasmaniense* | | | Y |
| 366. | | *Dytiscidae sp.* | | | |
| 367. | | *Ecnomidae sp.* | | | |
| 368. | | *Empididae sp.* | | | |
| 369. | | *Eriophora biapicata* | | | |
| 370. | | *Eriophora pustulosa* | | | |
| 371. | | *Gelastocoridae sp.* | | | |
| 372. | | *Geogarypus taylori* | | | |
| 373. | | *Gomphidae sp.* | | | |
| 374. | | *Gripopterygidae sp.* | | | |
| 375. | | *Gyrinidae sp.* | | | |
| 376. | 34115 | *Helicarion castanea (Albany land snail)* | | X | |
| 377. | | *Helpis minitabunda* | | | |
| 378. | | *Hemicorduliidae sp.* | | | |
| 379. | | *Henicops dentatus* | | | |
| 380. | | *Heurodes turritus* | | | |
| 381. | | *Hydraenidae sp.* | | | |
| 382. | | *Hydrobiosidae sp.* | | | |
| 383. | | *Hydrophilidae sp.* | | | |
| 384. | | *Hydroptilidae sp.* | | | |

| | Name ID | Species Name | Naturalised | Conservation Code | [1]Endemic To Query Area |
|---|---|---|---|---|---|
| 385. | | *Hyriidae sp.* | | | |
| 386. | | *Isopeda leishmanni* | | | |
| 387. | | *Isopedella cana* | | | |
| 388. | | *Lampona cylindrata* | | | |
| 389. | | *Lampona punctigera* | | | |
| 390. | | *Latrodectus hasseltii* | | | |
| 391. | | *Leptoceridae sp.* | | | |
| 392. | | *Leptophlebiidae sp.* | | | |
| 393. | | *Lestidae sp.* | | | |
| 394. | | *Libellulidae sp.* | | | |
| 395. | | *Lycidas michaelseni* | | | |
| 396. | | *Maratus pavonis* | | | |
| 397. | | *Megapodagrionidae sp.* | | | |
| 398. | | *Missulena granulosa* | | | |
| 399. | | *Missulena occatoria* | | | |
| 400. | | *Mituliodon tarantulinus* | | | |
| 401. | | *Neoniphargidae sp.* | | | |
| 402. | | *Nephila edulis* | | | |
| 403. | | *Notonectidae sp.* | | | |
| 404. | | *Nunciella aspera* | | | |
| 405. | | *Ocrisiona parmeliae* | | | |
| 406. | | *Oligochaeta sp.* | | | |
| 407. | | *Oratemnus curtus* | | | |
| 408. | | *Orthocladiinae sp.* | | | |
| 409. | | *Oxidus gracilis* | | | |
| 410. | | *Palaemonidae sp.* | | | |
| 411. | | *Parastacidae sp.* | | | |
| 412. | | *Perthiidae sp.* | | | |
| 413. | | *Philopotamidae sp.* | | | |
| 414. | | *Planorbidae sp.* | | | |
| 415. | | *Protoneuridae sp.* | | | |
| 416. | | *Raveniella peckorum* | | | |
| 417. | | *Richardsonianidae sp.* | | | |
| 418. | | *Scirtidae sp.* | | | |
| 419. | | *Simuliidae sp.* | | | |
| 420. | | *Synsphyronus magnus* | | | |
| 421. | | *Synthemistidae sp.* | | | |
| 422. | | *Tabanidae sp.* | | | |
| 423. | | *Tamopsis distinguenda* | | | |
| 424. | | *Tamopsis perthensis* | | | |
| 425. | | *Tanypodinae sp.* | | | |
| 426. | | *Tasmanicosa leuckartii* | | | |
| 427. | | *Telephlebiidae sp.* | | | |
| 428. | | *Temnocephalidea sp.* | | | |
| 429. | | *Tetragnatha demissa* | | | |
| 430. | | *Tipulidae sp.* | | | |
| 431. | | *Urodacus novaehollandiae* | | | |
| 432. | | *Venator immansueta* | | | |
| 433. | | *Venatrix pullastra* | | | |
| 434. | 34113 | *Westralunio carteri (Carter's Freshwater Mussel)* | | T | |
| 435. | | *Zachria flavicoma* | | | |
| **Mammal** | | | | | |
| 436. | 24088 | *Antechinus flavipes subsp. leucogaster (Yellow-footed Antechinus, Mardo)* | | | |
| 437. | 24046 | *Balaenoptera borealis (Sei Whale)* | | T | |
| 438. | 24049 | *Balaenoptera musculus subsp. intermedia (Antarctic Blue Whale)* | | T | |
| 439. | 24251 | *Bos taurus (European Cattle)* | Y | | |
| 440. | 30883 | *Canis lupus subsp. familiaris (Dog)* | Y | | |
| 441. | 24072 | *Caperea marginata (Pygmy Right Whale)* | | | |
| 442. | 24086 | *Cercartetus concinnus (Western Pygmy-possum, Mundarda)* | | | |
| 443. | 24186 | *Chalinolobus gouldii (Gould's Wattled Bat)* | | | |
| 444. | 24187 | *Chalinolobus morio (Chocolate Wattled Bat)* | | | |
| 445. | 24092 | *Dasyurus geoffroii (Chuditch, Western Quoll)* | | T | |
| 446. | 24052 | *Delphinus delphis (Common Dolphin)* | | | |
| 447. | 24189 | *Falsistrellus mackenziei (Western False Pipistrelle, Western Falsistrelle)* | | P4 | |
| 448. | 24041 | *Felis catus (Cat)* | Y | | |
| 449. | 24055 | *Globicephala melas (Long-finned Pilot Whale)* | | | |
| 450. | 24056 | *Grampus griseus (Risso's Dolphin)* | | | |
| 451. | 24215 | *Hydromys chrysogaster (Water-rat, Rakali)* | | P4 | |
| 452. | 25478 | *Isoodon obesulus (Southern Brown Bandicoot)* | | P4 | |
| 453. | 24153 | *Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)* | | | |

| | Name ID | Species Name | Naturalised | Conservation Code | [1]Endemic To Query Area |
|---|---|---|---|---|---|
| | | | | P4 | |
| 454. | 24132 | *Macropus fuliginosus (Western Grey Kangaroo)* | | | |
| 455. | 24133 | *Macropus irma (Western Brush Wallaby)* | | P4 | |
| 456. | 24168 | *Macrotis lagotis (Bilby, Dalgyte)* | | T | |
| 457. | 24076 | *Mesoplodon bowdoini (Andrew's Beaked Whale)* | | | |
| 458. | 24078 | *Mesoplodon grayi (Gray's Beaked Whale)* | | | |
| 459. | 24223 | *Mus musculus (House Mouse)* | Y | | |
| 460. | 24194 | *Nyctophilus geoffroyi (Lesser Long-eared Bat)* | | | |
| 461. | 24085 | *Oryctolagus cuniculus (Rabbit)* | Y | | |
| 462. | 25508 | *Phascogale tapoatafa (Brush-tailed Phascogale)* | | | |
| 463. | 48070 | *Phascogale tapoatafa subsp. wambenger (South-western Brush-tailed Phascogale, Wambenger)* | | T | |
| 464. | 24166 | *Pseudocheirus occidentalis (Western Ringtail Possum)* | | T | |
| 465. | 24240 | *Pseudomys occidentalis (Western Mouse)* | | P4 | |
| 466. | 24063 | *Pseudorca crassidens (False Killer Whale)* | | | |
| 467. | 24243 | *Rattus fuscipes (Western Bush Rat)* | | | |
| 468. | 24245 | *Rattus rattus (Black Rat)* | Y | | |
| 469. | 24145 | *Setonix brachyurus (Quokka)* | | T | |
| 470. | 24111 | *Sminthopsis gilberti (Gilbert's Dunnart)* | | | |
| 471. | 48113 | *Stenella coeruleoalba (Striped Dophin)* | | | |
| 472. | 24167 | *Tarsipes rostratus (Honey Possum, Noolbenger)* | | | |
| 473. | 25521 | *Trichosurus vulpecula (Common Brushtail Possum)* | | | |
| 474. | 24158 | *Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)* | | | |
| 475. | 30954 | *Tursiops aduncus (Indo-Pacific Bottlenose Dolphin)* | | | |
| 476. | 24069 | *Tursiops truncatus (Bottlenose Dolphin)* | | | |
| 477. | 24206 | *Vespadelus regulus (Southern Forest Bat)* | | | |
| 478. | 24040 | *Vulpes vulpes (Red Fox)* | Y | | |
| **Reptile** | | | | | |
| 479. | 42368 | *Acritoscincus trilineatus (Western Three-lined Skink)* | | | |
| 480. | 44629 | *Anilios australis* | | | |
| 481. | 24990 | *Aprasia pulchella (Granite Worm-lizard)* | | | |
| 482. | 24991 | *Aprasia repens (Sand-plain Worm-lizard)* | | | |
| 483. | 25335 | *Caretta caretta (Loggerhead Turtle)* | | T | |
| 484. | 43380 | *Chelodina colliei (South-western Snake-necked Turtle)* | | | |
| 485. | 25336 | *Chelonia mydas (Green Turtle)* | | T | |
| 486. | 24980 | *Christinus marmoratus (Marbled Gecko)* | | | |
| 487. | 30893 | *Cryptoblepharus buchananii* | | | |
| 488. | 25020 | *Cryptoblepharus plagiocephalus* | | | |
| 489. | 25031 | *Ctenotus catenifer* | | | |
| 490. | 25047 | *Ctenotus impar* | | | |
| 491. | 25049 | *Ctenotus labillardieri* | | | |
| 492. | 24995 | *Delma australis* | | | |
| 493. | 25346 | *Dermochelys coriacea (Leatherback Turtle)* | | T | |
| 494. | 24939 | *Diplodactylus polyophthalmus* | | | |
| 495. | 25251 | *Echiopsis curta (Bardick)* | | | |
| 496. | 25096 | *Egernia kingii (King's Skink)* | | | |
| 497. | 25100 | *Egernia napoleonis* | | | |
| 498. | 25250 | *Elapognathus coronatus (Crowned Snake)* | | | |
| 499. | 25290 | *Elapognathus minor (Short-nosed Snake)* | | P2 | |
| 500. | 30919 | *Hemiergis gracilipes* | | | |
| 501. | 25475 | *Hemiergis peronii* | | | |
| 502. | 25117 | *Hemiergis peronii subsp. peronii* | | | |
| 503. | 25118 | *Hemiergis peronii subsp. tridactyla* | | | |
| 504. | 25119 | *Hemiergis quadrilineata* | | | |
| 505. | 25366 | *Hydrophis elegans (Elegant Seasnake, Bar-bellied Seasnake)* | | | |
| 506. | 42410 | *Hydrophis ornatus (Ornate Reef Seasnake, Sea Snake)* | | | |
| 507. | 43384 | *Hydrophis platurus (Yellow-bellied Seasnake)* | | | |
| 508. | 25131 | *Lerista distinguenda* | | | |
| 509. | 25133 | *Lerista elegans* | | | |
| 510. | 25147 | *Lerista lineata (Perth Slider, Lined Skink)* | | P3 | |
| 511. | 25005 | *Lialis burtonis* | | | |
| 512. | 25184 | *Menetia greyii* | | | |
| 513. | 25240 | *Morelia spilota subsp. imbricata (Carpet Python)* | | | |
| 514. | 25191 | *Morethia lineoocellata* | | | |
| 515. | 25192 | *Morethia obscura* | | | |
| 516. | 25252 | *Notechis scutatus (Tiger Snake)* | | | |
| 517. | 25255 | *Parasuta nigriceps* | | | |
| 518. | 25510 | *Pogona minor (Dwarf Bearded Dragon)* | | | |
| 519. | 24907 | *Pogona minor subsp. minor (Dwarf Bearded Dragon)* | | | |
| 520. | 25511 | *Pseudonaja affinis (Dugite)* | | | |

| | Name ID | Species Name | Naturalised | Conservation Code | [1]Endemic To Query Area |
|---|---|---|---|---|---|
| 521. | 25259 | *Pseudonaja affinis subsp. affinis (Dugite)* | | | |
| 522. | 25008 | *Pygopus lepidopodus (Common Scaly Foot)* | | | |
| 523. | 25519 | *Tiliqua rugosa* | | | |
| 524. | 25218 | *Varanus gouldii (Bungarra or Sand Monitor)* | | | |
| 525. | 25225 | *Varanus rosenbergi (Heath Monitor)* | | | |

**Conservation Codes**
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Australian Government

Department of the Environment and Energy

# EPBC Act Protected Matters Report

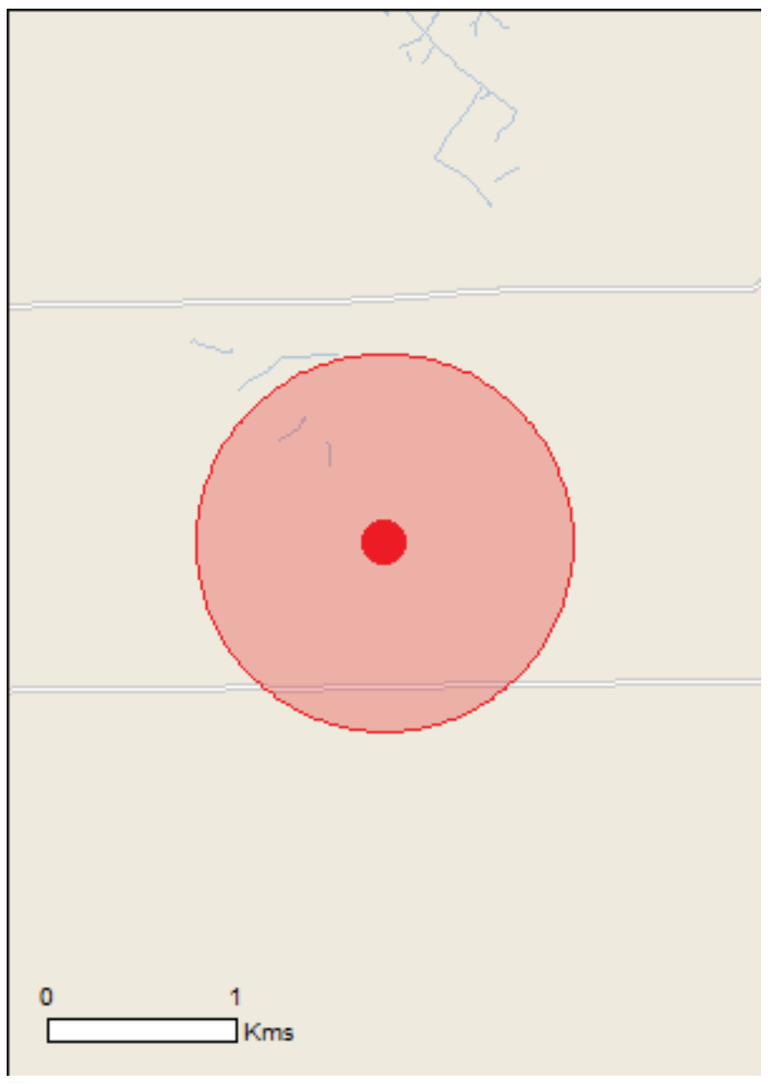
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 17/08/17 13:37:05



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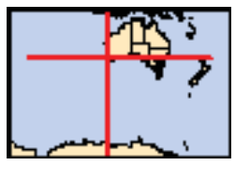
Coordinates

Buffer: 1.0Km



# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance: | 1 |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 1 |
| Listed Threatened Species: | 25 |
| Listed Migratory Species: | 10 |

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

| | |
|---|---|
| Commonwealth Land: | None |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 14 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Commonwealth Reserves Marine: | None |

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

| | |
|---|---|
| State and Territory Reserves: | None |
| Regional Forest Agreements: | None |
| Invasive Species: | 24 |
| Nationally Important Wetlands: | None |
| Key Ecological Features (Marine) | None |

# Details

## Matters of National Environmental Significance

### Wetlands of International Importance (Ramsar) [ Resource Information ]

| Name | Proximity |
|---|---|
| Vasse-wonnerup system | Within 10km of Ramsar |

### Listed Threatened Ecological Communities [ Resource Information ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

| Name | Status | Type of Presence |
|---|---|---|
| Banksia Woodlands of the Swan Coastal Plain ecological community | Endangered | Community may occur within area |

### Listed Threatened Species [ Resource Information ]

| Name | Status | Type of Presence |
|---|---|---|
| **Birds** | | |
| Calidris canutus<br>Red Knot, Knot [855] | Endangered | Species or species habitat may occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Calyptorhynchus banksii naso<br>Forest Red-tailed Black-Cockatoo, Karrak [67034] | Vulnerable | Species or species habitat likely to occur within area |
| Calyptorhynchus baudinii<br>Baudin's Cockatoo, Long-billed Black-Cockatoo [769] | Vulnerable | Breeding known to occur within area |
| Calyptorhynchus latirostris<br>Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523] | Endangered | Breeding likely to occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| **Fish** | | |
| Nannatherina balstoni<br>Balston's Pygmy Perch [66698] | Vulnerable | Species or species habitat may occur within area |
| **Mammals** | | |
| Dasyurus geoffroii<br>Chuditch, Western Quoll [330] | Vulnerable | Species or species habitat likely to occur within area |
| Pseudocheirus occidentalis<br>Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911] | Vulnerable | Species or species habitat may occur within area |
| **Plants** | | |
| Andersonia gracilis<br>Slender Andersonia [14470] | Endangered | Species or species habitat may occur within |

| Name | Status | Type of Presence |
|---|---|---|
| | | area |
| Banksia nivea subsp. uliginosa<br>Swamp Honeypot [82766] | Endangered | Species or species habitat likely to occur within area |
| Banksia squarrosa subsp. argillacea<br>Whicher Range Dryandra [82769] | Vulnerable | Species or species habitat known to occur within area |
| Brachyscias verecundus<br>Ironstone Brachyscias [81321] | Critically Endangered | Species or species habitat may occur within area |
| Caladenia huegelii<br>King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309] | Endangered | Species or species habitat likely to occur within area |
| Chamelaucium sp. S coastal plain (R.D.Royce 4872)<br>Royce's Waxflower [87814] | Vulnerable | Species or species habitat likely to occur within area |
| Darwinia whicherensis<br>Abba Bell [83193] | Endangered | Species or species habitat may occur within area |
| Diuris micrantha<br>Dwarf Bee-orchid [55082] | Vulnerable | Species or species habitat may occur within area |
| Drakaea elastica<br>Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753] | Endangered | Species or species habitat likely to occur within area |
| Drakaea micrantha<br>Dwarf Hammer-orchid [56755] | Vulnerable | Species or species habitat may occur within area |
| Gastrolobium papilio<br>Butterfly-leaved Gastrolobium [78415] | Endangered | Species or species habitat may occur within area |
| Lambertia echinata subsp. occidentalis<br>Western Prickly Honeysuckle [64528] | Endangered | Species or species habitat may occur within area |
| Petrophile latericola<br>Laterite Petrophile [64532] | Endangered | Species or species habitat likely to occur within area |
| Synaphea sp. Fairbridge Farm (D. Papenfus 696)<br>Selena's Synaphea [82881] | Critically Endangered | Species or species habitat may occur within area |
| Verticordia densiflora var. pedunculata<br>Long-stalked Featherflower [55689] | Endangered | Species or species habitat may occur within area |
| Verticordia plumosa var. vassensis<br>Vasse Featherflower [55804] | Endangered | Species or species habitat likely to occur within area |

| Listed Migratory Species | | [ Resource Information ] |
|---|---|---|
| * Species is listed under a different scientific name on the EPBC Act - Threatened Species list. | | |
| Name | Threatened | Type of Presence |
| Migratory Marine Birds | | |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Migratory Terrestrial Species | | |

| Name | Threatened | Type of Presence |
|---|---|---|
| Motacilla cinerea<br>Grey Wagtail [642] | | Species or species habitat may occur within area |
| **Migratory Wetlands Species** | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat may occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area |
| Calidris canutus<br>Red Knot, Knot [855] | Endangered | Species or species habitat may occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat may occur within area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area |

## Other Matters Protected by the EPBC Act

**Listed Marine Species** [ Resource Information ]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

| Name | Threatened | Type of Presence |
|---|---|---|
| **Birds** | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat may occur within area |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Ardea alba<br>Great Egret, White Egret [59541] | | Breeding known to occur within area |
| Ardea ibis<br>Cattle Egret [59542] | | Species or species habitat may occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area |
| Calidris canutus<br>Red Knot, Knot [855] | Endangered | Species or species habitat may occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Haliaeetus leucogaster<br>White-bellied Sea-Eagle [943] | | Species or species habitat likely to occur within area |
| Merops ornatus<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area |
| Motacilla cinerea<br>Grey Wagtail [642] | | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat may occur within area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area |

## Extra Information

### Invasive Species [ Resource Information ]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

| Name | Status | Type of Presence |
|---|---|---|
| Birds | | |
| Anas platyrhynchos<br>Mallard [974] | | Species or species habitat likely to occur within area |
| Columba livia<br>Rock Pigeon, Rock Dove, Domestic Pigeon [803] | | Species or species habitat likely to occur within area |
| Streptopelia senegalensis<br>Laughing Turtle-dove, Laughing Dove [781] | | Species or species habitat likely to occur within area |
| Sturnus vulgaris<br>Common Starling [389] | | Species or species habitat likely to occur within area |

| Name | Status | Type of Presence |
|---|---|---|
| **Mammals** | | |
| Bos taurus<br>Domestic Cattle [16] | | Species or species habitat likely to occur within area |
| Canis lupus familiaris<br>Domestic Dog [82654] | | Species or species habitat likely to occur within area |
| Felis catus<br>Cat, House Cat, Domestic Cat [19] | | Species or species habitat likely to occur within area |
| Feral deer<br>Feral deer species in Australia [85733] | | Species or species habitat likely to occur within area |
| Mus musculus<br>House Mouse [120] | | Species or species habitat likely to occur within area |
| Oryctolagus cuniculus<br>Rabbit, European Rabbit [128] | | Species or species habitat likely to occur within area |
| Rattus rattus<br>Black Rat, Ship Rat [84] | | Species or species habitat likely to occur within area |
| Sus scrofa<br>Pig [6] | | Species or species habitat likely to occur within area |
| Vulpes vulpes<br>Red Fox, Fox [18] | | Species or species habitat likely to occur within area |
| **Plants** | | |
| Asparagus asparagoides<br>Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473] | | Species or species habitat likely to occur within area |
| Brachiaria mutica<br>Para Grass [5879] | | Species or species habitat may occur within area |
| Cenchrus ciliaris<br>Buffel-grass, Black Buffel-grass [20213] | | Species or species habitat may occur within area |
| Chrysanthemoides monilifera<br>Bitou Bush, Boneseed [18983] | | Species or species habitat may occur within area |
| Chrysanthemoides monilifera subsp. monilifera<br>Boneseed [16905] | | Species or species habitat likely to occur within area |
| Genista sp. X Genista monspessulana<br>Broom [67538] | | Species or species habitat may occur within area |
| Lycium ferocissimum<br>African Boxthorn, Boxthorn [19235] | | Species or species habitat likely to occur within area |
| Olea europaea<br>Olive, Common Olive [9160] | | Species or species habitat may occur within area |
| Pinus radiata<br>Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780] | | Species or species habitat may occur within |

| Name | Status | Type of Presence |
| --- | --- | --- |
| | | area |
| Rubus fruticosus aggregate<br>Blackberry, European Blackberry [68406] | | Species or species habitat likely to occur within area |
| Tamarix aphylla<br>Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018] | | Species or species habitat likely to occur within area |

# Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods.  Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc).  In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

# Coordinates

-33.69454 115.46617

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.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# APPENDIX D

## SIGNIFICANT SPECIES PROFILES

**Unnamed land snail *Bothriembryon irvineanus***

Status and Distribution: Listed as Priority 2 by the DBCA. Distribution is poorly documented. NatureMap database contains only four records, all from Ambergate Reserve.

Habitat: Not documented.

Likely presence within the subject site: Status in the subject site is difficult to determine but it is considered highly unlikely that this species persists in the area.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Unnamed scorpionfly *Austromerope poultoni***

Status and Distribution: Listed as Priority 2 by the DBCA. Distribution is poorly documented. NatureMap database contains widely scattered records from Eneabba to Walpole.

Habitat: Occurs predominantly in dense understorey vegetation in high rainfall forest where it has been collected from beneath forest debris (logs, rocks) and in pitfall traps. Most NatureMap records are in the Jarrah forest belt.

Likely presence within the subject site: Status in the subject site is difficult to determine but it is considered highly unlikely that this species persists in the area.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Carter's Freshwater Mussel *Westralunio carteri***

Status and Distribution: Listed as Schedule 3 under the *WC Act* and as Vulnerable (A2c) by the ICUN. Carter's freshwater mussel is the only freshwater mussel species endemic to south-western WA, ranging from the Moore River south to the Frankland River (Morgan *et al.* 2011).

Habitat: Occurs in greatest abundance in slower flowing streams with stable sediments that are soft enough for burrowing amongst woody debris and exposed tree roots. Salinity tolerance is quite low (Morgan *et al*. 2011).

Likely presence within the subject site: The small seasonal creekline appears not to represent suitable habitat for this species.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Salamanderfish *Lepidogalaxias salamandroides***

Status and Distribution: Listed as Scheduled 2 under the *WC Act*. Common within its restricted range in near coastal wetlands between Augusta and Albany (Morgan *et al.* (2011).

Habitat: Highly acidic, shallow freshwater pools and swamps in coastal heathland which dry out in summer.

Likely presence within the subject site: The subject site is well outside of the current documented distribution of this species.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Balston's Pygmy Perch *Nannatherina balstoni***

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act*. Morgan *et al.* (1996) states that this fish is the rarest of all the endemic fish of the south west. Status is defined as fairly secure by Allen *et al.* (2003) presumably given that, on the south coast, significant areas of habitat are within national parks. Confined to drainages and wetlands near the coast from between Margaret River and Two Peoples Bay. Historical records from Moore River.

Habitat: Acidic, tannin stained freshwater pools, streams and lakes within 30km of the coast, typically situated amongst peat flats. Prefers shallow water and is commonly found in association with tall sedge thickets (Allen *et al.* 2003). Morgan (1996) found them most common in shallow pools and creeks that often dry up in summer. Lower numbers were observed in the permanent major rivers surveyed.

Likely presence within the subject site: The subject site is well outside of the current documented distribution of this species.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Wester Mud Minnow *Galaxias munda***

Status and Distribution: Listed as Scheduled 1 under the *WC Act*. Morgan *et al.* (1996) found during their survey of south west rivers that this species was "rare throughout most of its distribution, but occasionally abundant in the headwaters and tributaries of rivers and in a number of shallow pools connected to streams". In contrast Allen *et al.* (2003) states that this species is common in coastal drainages of south-western Australia between Albany and Margaret River, with an isolated population known from Gingin (Beatty 2010).

Habitat: Typically found in small flowing streams near submerged vegetation, occasionally in still water of ponds, swamps and roadside drains. Water is usually darkly tannin stained and acidic (pH 3.0 – 6.0) (Allen *et al.* 2003).

Likely presence within the subject site: The subject site is well outside of the current documented distribution of this species.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Pouched Lamprey *Geotria australis***

Status and Distribution: Listed as Priority 1 by the DBCA. Status is secure but abundance has decreased due to proliferation of obstacles to upstream spawning migration such as dams and weirs. A southern hemisphere species. Western Australian distribution includes coastal drainages of the south west from Perth to Albany (Allen *et al.* 2003).

Habitat: This species lives in mud burrows in the upper reaches of coastal streams for the first 4 years of life until migrating to the sea. Adults migrate up to 60km upstream during spawning (Allen *et al.* 2003).

Likely presence within the subject site: The small seasonal creekline appears not to represent suitable habitat for this species.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Perth Lined Lerista *Lerista lineata***

Status and Distribution: Listed as Priority 3 by DPaW. Found in the lower west coast from Perth to Leschenault Peninsula/Kemerton. It has also been found at Rottnest Island and Garden Island (Storr *et al.* 1999).

Habitat: This small species of skink inhabits white sands (Storr *et al.* 1999) under areas of shrubs and heath where it inhabits loose soil and leaf litter (Nevill 2005) particularly in association with banksias (Bush *et al.* 2002).

Likely presence within the subject site: This species has not been found south of Bunbury in recent times. The single documented record south of Bunbury (West Busselton) is considered erroneous. This species is therefore considered unlikely to be present in the study area even if habitat was suitable.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species will occur.

**Coastal Plains Skink *Ctenotus ora***

Status and Distribution: Listed as Priority 3 by DBCA. *Ctenotus ora* is a recently described species of medium sized skink with a restricted range in the south-west of Western Australia, most of which has been cleared for agriculture and urban development. It cannot reliably be distinguished from the more widespread *C. labillardieri* except by DNA sequences, but the two species appear to have disjunct distributions. Based on only five specimens reliably identified as *Ctenotus ora*, the species is apparently restricted to the southern Swan Coastal Plain and Cape Naturaliste area, as far north as Pinjarra and south as far as Yallingup (Kay & Keogh 2012).

Habitat: Sandy substrates with low vegetation (including heath) in open *Eucalyptus/Corymbia* woodland over *Banksia* (Kay & Keogh 2012). Individuals have been found sheltering under *Banksia* logs on white sand, and trapped in eucalypt woodland with *Banksia* or peppermint mid-storey, or heath (Bamford *et al.* 2010). Open eucalypt woodland over *Banksia* and low vegetation on sandy coastal plain and coastal dunes (Wilson and Swan 2013).

Likely presence within the subject site: Status of this species within the subject site is difficult to determine without a detailed survey, however, given the small extent of suitable habitat and its generally degraded state it is not anticipated to be present.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Short-nosed Snake *Elapognathus minor***

Status and Distribution: Listed as Priority 2 by DPaW. Found north to Busselton and east to Two Peoples Bay (Storr *et al.* 2002).

Habitat: Restricted to the humid coastal plains of the deep south west (Storr *et al.* 2002). Inhabits heaths edging swamps though also known to inhabit wet sclerophyll forest. Shelters in low dense vegetation such as tussocks and sedges (Wilson and Swan 2013)

Likely presence within the subject site: The subject site is well outside of the current documented distribution of this species.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Australasian Bittern *Botaurus poiciloptilus***

Status and Distribution: Classified as Schedule 2 under the *WC Act* and as Endangered under the *EPBC Act*. The species is uncommon to rare (Morcombe 2004), but locally common in wetter parts of south west (Johnstone and Storr 1998). Occurs north to Moora and east to Mt Arid (Johnstone and Storr 1998).

Habitat: Freshwater wetlands, occasionally estuarine; prefers heavy vegetation (Morcombe 2004) such as beds of tall dense *Typha*, *Baumea* and sedges in freshwater swamps (Johnstone and Storr 1998).

Likely presence within the subject site: The subject site contains no suitable habitat for this species.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Eastern Great Egret *Ardea alba* (*modesta*)**

Status and Distribution: This species of egret is listed as Schedule 5 under the *WC Act,* as Migratory under the *EPBC Act* and Migratory under some international agreements to which Australia is a signatory. The eastern great egret is common and very widespread in any suitable permanent or temporary habitat (Morcombe 2004).

Habitat: Wetlands, flooded pasture, dams, estuarine mudflats, mangroves and reefs (Morcombe 2004).

Likely presence within the subject site: This species potentially utilises creek lines, drains and paddocks when inundated during the wetter months of the year in small numbers. Unlikely to breed onsite.

Listed as a potential species based on currently available information.

Potential impact of proposed development: Temporary loss/modification of highly degraded areas of foraging habitat (i.e. paddocks). No significant impact on this species will occur.

**Cattle Egret *Ardea ibis***

Status and Distribution: This species of egret is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* and under some international agreements to which Australia is a signatory. The cattle egret is common in the north sections of its range but is an irregular visitor to the better watered parts of the state (Johnstone and Storr 1998). The population is expanding (Morcombe 2004). Infrequently observed around the Bunbury/Australind area in paddocks with livestock (G. Harewood pers. obs.).

Habitat: Moist pastures with tall grasses, shallow open wetlands and margins, mudflats (Morcombe 2004).

Likely presence within the subject site: The species is only recorded in the south west sporadically and in small numbers. While it may occur occasionally its frequency of occurrence would be very low and temporary and therefore it does not warrant consideration.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Blue-billed Duck *Oxyura australis***

Status and Distribution: Recently listed as Priority 4 by DBCA (DBCA 2015). Rare to moderately common (most plentiful on the Swan Coastal Plain and in the Great Southern). South-western: north to Lake Pinjarrega and east to Esperance; vagrant further north and east (as far as Thundelarra and Kalgoorlie). Also south-eastern Australian and Tasmania (Johnstone and Storr 1998).

Habitat: Well vegetated freshwater swamps, large dams and lakes (Pizzey and Knight 2012), winters on more open water (Morcombe 2014). Occasionally salt lakes and estuaries freshened by floodwaters (Johnstone and Storr 1998).

Likely presence within the subject site: The subject site contains no suitable habitat for this species.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Glossy Ibis *Plegadis falcinellus***

Status and Distribution: This species is listed as Schedule 3 under the *WC Act* and as Migratory under the *EPBC Act* and under international agreements to which Australia is a signatory. The Glossy Ibis frequents swamps and lakes throughout much of the Australian mainland, but is most numerous in the north. It is a non-breeding visitor to Tasmania and the south-west of Western Australia. The Glossy Ibis is both migratory and nomadic. Its range expands inland after good rains, but its main breeding areas seem to be in the Murray-Darling Basin of New South Wales and Victoria, the Macquarie Marshes in New South Wales, and in southern Queensland. Glossy Ibis often move north in autumn, then return south to their main breeding areas in spring and summer (Pizzey & Knight 2012).

Habitat: Well vegetated wetlands, wet pastures, rice fields, floodwaters, floodplains, brackish or occasionally saline wetlands, mangroves, mudflats, occasionally dry grasslands (Pizzey & Knight 2012).

Likely presence within the subject site: The species is only recorded in the south west very sporadically and in small numbers. While it may occur occasionally its frequency of occurrence would be extremely low and temporary and therefore it does not warrant consideration.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Migratory Shorebirds**

A number of migratory shorebirds are listed in various databases and publications as potentially occurring in the general area. Not all specific species are discussed in detail.

Status and Distribution: Migratory shorebirds are listed under Schedule 5 of the *WC Act,* as Migratory under the *EPBC Act* and under various international agreements to which Australia is a signatory. All species are either widespread summer migrants to Australia or residents. State and Federal conservation status varies between species.

Habitat: Varies between species but includes beaches and permanent/temporary wetlands varying from billabongs, swamps, lakes, floodplains, sewerage farms, saltwork ponds, estuaries, lagoons, mudflats sandbars, pastures, airfields, sports fields and lawns.

Likely presence within the subject site: The subject site contains no suitable habitat for migratory shorebirds.

None considered potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Eastern Osprey *Pandion haliaetus***

Status and Distribution: This species is listed as Schedule 5 under the *WC Act,* as Migratory under the *EPBC Act* and under some international agreements to which Australia is a signatory. Moderately common to very common in sheltered seas around the north and west coast islands south to 31°S; uncommon to common on mainland coasts, estuaries and large rivers north of tropic, rare to uncommon elsewhere (Johnstone and Storr 1998).

Habitat: Coasts, estuaries, bays, inlets, islands, and surrounding waters, coral atolls, reefs, lagoons, rock cliffs and stacks. Ascends larger rivers (Pizzey & Knight 2012). Construct nests on prominent headland, large trees, communication towers (Simpson & Day 2010).

Likely presence within the subject site: The subject site contains no suitable habitat for this species.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**White-bellied Sea Eagle *Haliaeetus leucogaster***

Status and Distribution: This species is listed as Marine under the *EPBC Act* and as Migratory under international agreements to which Australia is a signatory. White-bellied sea eagles are moderately common to common on Kimberley and Pilbara islands, coasts and estuaries, on Bernier, Dorre and Dirk Hartog Is., in Houtman Abrolhos and in the Archipelago of the Recherche; rare to uncommon elsewhere (Johnstone and Storr 1998). Also found in New Guinea, Indonesia, China, southeast Asia and India. Scarce near major coastal cities (Morcombe 2004).

Habitat: Sea eagles usually nest and forage near the coast over islands, reefs, headlands, beaches, bays, estuaries, mangroves, but will also live near seasonally flooded inland swamps, lagoons and floodplains, often far inland on large pools of major rivers. Established pairs usually sedentary, immatures dispersive (Morcombe 2004). White-bellied sea-eagles build a large stick nest, which is used for many seasons in succession.

Likely presence within the subject site: The subject site contains no suitable habitat for this species.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Peregrine Falcon *Falco peregrinus***

Status and Distribution: This species is listed as Schedule 7 under the *WC Act*. Individuals of this species are uncommon/rare but wide ranging across Australia. Moderately common at higher levels of the Stirling Range, uncommon in hilly, north west Kimberley, Hamersley and Darling Ranges; rare or scarce elsewhere (Johnstone and Storr 1998).

Habitat: Diverse from rainforest to arid shrublands, from coastal heath to alpine (Morcombe 2004). Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes (Johnstone and Storr 1998). The species utilises the ledges, cliff faces and large hollows/broken spouts of trees for nesting. It will also occasionally use the abandoned nests of other birds of prey.

Likely presence within the subject site: This species potentially utilises some sections of the subject site as part of a much larger home range though only likely to occur infrequently. No evidence of nesting seen.

Listed as a potential species based on available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Masked Owl *Tyto novaehollandae novaehollandae***

Status and Distribution: Listed as Priority 3 by DBCA. Found north to Yanchep and east to Yealering, Gnowangerup and Albany, casual further north. Locally common in south west (e.g. Margaret River area) but generally uncommon (Johnstone and Storr 1998).

Habitat: Roosts and nests in heavy forest, hunts over open woodlands and farmlands (Morcombe 2004). Probably breeding in forested deep south west with some autumn–winter wanderings northwards (Johnstone and Storr 1998).

Likely presence within the subject site: May occasionally reside in general area though status uncertain. It is unlikely to be specifically attracted to the site.

Not listed as a potential species as it would most probably only ever occur rarely.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Fork-tailed Swift *Apus pacificus***

Status and Distribution: The fork-tailed swift is listed as Schedule 5 under the *WC Act,* as Migratory under the *EPBC Act* and under some international agreements to which Australia is a signatory. It is a summer migrant (Oct-Apr) to Australia (Morcombe 2004).

Habitat: Low to very high airspace over varied habitat from rainforest to semi desert (Morcombe 2004).

Likely presence in subject site: This species is potentially an very occasional summer visitor to the subject site but is entirely aerial and largely independent of terrestrial habitats. Would only occur very infrequently and then only for very brief periods of time.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Rainbow Bee-eater *Merops ornatus***

Status and Distribution: This species is listed as Schedule 5 under the *WC Act,* as Migratory under the *EPBC Act* and under some international agreements to which Australia is a signatory. The rainbow bee-eater is a common summer migrant to southern Australia but in the north they are resident (Morcombe 2004).

Habitat: Open Country, of woodlands, open forest, semi arid scrub, grasslands, clearings in heavier forest, farmlands (Morcombe 2004). Breeds underground in areas of suitable soft soil firm enough to support tunnel building.

Likely presence within the subject site: This species is a common seasonal visitor to south west. Possibly breeds in some sections of the subject site where ground conditions permit (e.g. sandy areas) though population levels would not be significant as it usually breeds in pairs, rarely in small colonies (Johnstone and Storr 1998).

Listed as a potential species based on available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Grey Wagtail *Motacilla cinerea***

Status and Distribution: The grey wagtail is listed as Schedule 5 under the *WC Act* and as Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. A rarely recorded, accidental vagrant that has on a few occasions been recorded on widely separated parts of the Australian coastline (Pizzey & Knight 2012).

Habitat: In Australia, near running water in disused quarries, sandy, rocky streams in escarpments and rainforest, sewerage ponds, ploughed fields and airfields (Pizzey & Knight 2012).

Likely presence within the subject site: A highly occasional vagrant. Rarely recorded in the south west and even less inland.

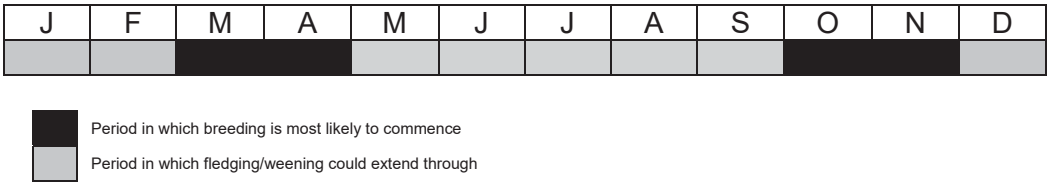
Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Forest Red-tailed Black-Cockatoo *Calyptorhynchus banksii naso***

Status and Distribution: Listed as Scheduled 3 under the *WC Act* and as Vulnerable under the *EPBC Act*. Found in the humid and subhumid south west, mainly hilly interior, north to Gingin and east to Mt Helena, Christmas Tree Well, North Bannister, Mt Saddleback, Rock Gully and the upper King River (Johnstone and Storr 1998).

Habitat: Eucalypt forests, feeds on marri, jarrah, blackbutt, karri, sheoak and snottygobble. The forest red-tailed black cockatoo nests in the large hollows of marri, jarrah and karri (Johnstone and Kirkby 1999). In marri, the nest hollows of the forest red-tailed black cockatoo range from 8-14m above ground, the entrance is 12 – 41cm in diameter and the depth is one to five metres (Johnstone and Storr 1998).




Breeding commences in winter/spring. There are few records of breeding in the forest red-tailed black cockatoo (Johnstone and Storr 1998), but eggs are laid in October and November (Johnstone 1997; Johnstone and Storr 1998).

Recent data however indicates that breeding in all months of the year occurs with peaks in spring and autumn–winter (Ron Johnstone pers. comm.). Incubation period 29 – 31 days. Young fledge at 8 to 9 weeks (Simpson and Day 2010).

Likely presence within the subject site: Not observed during the survey period but known to frequent the general area. Small areas of favoured foraging habitat (i.e. marri, jarrah and banksia) present. Larger trees (≥50cm DBH) can be considered potential breeding habitat. No roosting sites identified.

Listed as a potential species based on currently available information.

Potential impact of proposed development: Potential for the loss of a small number of paddock trees. This will not have a significant impact on the species.

**Baudin's Black-Cockatoo *Calyptorhynchus baudinii***

Status and Distribution: Listed as Scheduled 3 under the *WC Act* and as Vulnerable under the *EPBC Act*. Confined to the south-west of Western Australia, north to Gidgegannup, east to Mt Helena, Wandering, Quindanning, Kojonup, Frankland and King River and west to the eastern strip of the Swan Coastal Plain including West Midland, Byford, Nth Dandalup, Yarloop, Wokalup and Bunbury (Johnstone and Storr 1998). On the southern Swan Coastal Plain this cockatoo is in some areas resident but mainly a migrant moving from the deep south-west to the central and northern Darling Range. Between March and September most flocks move north and are concentrated in the northern parts of the Darling Range. During this period birds forage well out onto the southern Swan Coastal Plain to areas such as Harvey, Myalup, Bunbury, Capel, Dunsborough and Meelup. While generally more common in the Darling Range this species can also be common on parts of the southern Swan Coastal Plain especially in mid-August – September when flocks begin to return to their breeding quarters (Johnstone 2008).

Habitat: Mainly eucalypt forests where it feeds primarily on the Marri seeds, (Morcombe, 2003), Banksia, Hakeas and *Erodium* sp. Also strips bark from trees in search of beetle larvae (Johnstone and Storr 1998). This species of cockatoo nests in large tree hollows, 30–40 cm in diameter and more than 30 cm deep (Saunders 1974).

Baudin's black-cockatoo breeds in late winter and spring, from August to November or December (Gould 1972; Johnstone 1997; Saunders 1974; Saunders *et al*. 1985). Eggs laid in October (Johnstone and Storr 1998). Based on observations at currently known nest sites breeding mainly occurs within the October-December period (Ron Johnstone pers. comm.). Incubation is 28 – 30 days. Young fledge at 8 to 9 weeks (Simpson and Day 2004).

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| | | | | | | | | | | | |

Period in which breeding is most likely to commence

Period in which fledging/weening could extend through

Likely presence within the subject site: Not observed during the survey period but known to frequent the general area. Small areas of favoured foraging habitat (i.e. marri and banksia) present. Larger trees (>50cm DBH) can be considered potential breeding habitat. No roosting sites identified.

Listed as a potential species based on currently available information.

Potential impact of proposed development: Potential for the loss of a small number of paddock trees. This will not have a significant impact on the species.

**Carnaby's Black-Cockatoo *Calyptorhynchus latirostris***

Status and Distribution: Carnaby's black cockatoos are listed as Scheduled 2 under the *WC Act* and as Endangered under the *EPBC Act*. Confined to the south-west of Western Australia, north to the lower Murchison River and east to Nabawa, Wilroy, Waddi Forest, Nugadong, Manmanning, Durokoppin, Noongar (Moorine Rock), Lake Cronin, Ravensthorpe Range, head of Oldfield River, 20 km ESE of Condingup and Cape Arid; also casual on Rottnest Island (Johnstone and Storr 1998).

Habitat: Forests, woodlands, heathlands, farms; feeds on Banksia, Hakeas and Marri. Carnaby's cockatoo has specific nesting site requirements. Nests are mostly in smoothed-barked eucalypts with the nest hollows ranging from 2.5 to 12m above the ground, an entrance from 23-30cm diameter and a depth of 0.1-2.5m (Johnstone and Storr, 1998).

Breeding occurs in winter/spring mainly in eastern forest and wheatbelt where they can find mature hollow bearing trees to nest in (Morcombe 2004). Judging from records in the Storr-Johnstone Bird Data Bank, this species is currently expanding its breeding range westward and south into the Jarrah – Marri forest of the Darling Scarp and into the Tuart forests of the Swan Coastal Plain including the region between Mandurah and Bunbury. Carnaby's black cockatoo has been known to breed close to the town of Mandurah, as well as at Dawesville, Lake Clifton and Baldivis (pers. comm., Ron Johnstone, WA Museum) and there are small resident populations on the southern Swan Coastal Plain near Mandurah, Lake Clifton and near Bunbury. At each of these sites the birds forage in remnant vegetation and adjacent pine plantations (Johnstone 2008).

Carnaby's black-cockatoo lays eggs from July or August to October or November, with most clutches being laid in August and September (Saunders 1986). Birds in inland regions may begin laying up to three weeks earlier than those in coastal areas (Saunders 1977). The female incubates the eggs over a period of 28-29 days. The young depart the nest 10–12 weeks after hatching (Saunders 1977; Smith & Saunders 1986).

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Period in which breeding is most likely to commence
Period in which fledging/weening could extend through

Likely presence within the subject site: Not observed during the survey period but known to frequent the general area. Small areas of favoured foraging habitat (i.e. marri, jarrah and banksia) present. Larger trees (>50cm DBH) can be considered potential breeding habitat. No roosting sites identified.

Listed as a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Chuditch *Dasyurus geoffroii***

Status and Distribution: Listed as Scheduled 3 under the *WC Act* and as Vulnerable under the *EPBC Act.* Formerly occurred over nearly 70 per cent of Australia. The chuditch now has a patchy distribution throughout the jarrah forest and mixed karri/marri/jarrah forest of southwest Western Australia. Also occurs in very low numbers in the Midwest, Wheatbelt and South Coast Regions with records from Moora to the north, Yellowdine to the east and south to Hopetoun.

Habitat: Chuditch are known to have occupied a wide range of habitats from woodlands, dry sclerophyll (leafy) forests, riparian vegetation, beaches and deserts. Riparian vegetation appears to support higher densities of chuditch, possibly because food supply is better or more reliable and better cover is offered by dense vegetation. Chuditch appear to utilise native vegetation along road sides in the wheatbelt (CALM 1994). The estimated home range of a male chuditch is over 15 $km^2$ whilst that for females is 3-4 $km^2$ (Sorena and Soderquist 1995).

Likely presence within the subject site: Without a detailed survey the status of this species within the subject site is difficult to determine however given there are some nearby records (Bancroft and Bamford 2008, G. Harewood pers. obs. 2013) it must be considered a potential species

Listed as a potential species based on available information.

Potential impact of proposed development: Potential for the loss of a small number of paddock trees. This will not have a significant impact on the species.

**South-western Brush-tailed Phascogale *Phascogale tapoatafa wambenger***

Status and Distribution: Listed as Scheduled 6 under the *WC Act*. Present distribution is believed to have been reduced to approximately 50 per cent of its former range. Now known from Perth and south to Albany, west of Albany Highway. Occurs at low densities in the northern jarrah forest. Highest densities occur in the Perup/Kingston area, Collie River valley, and near Margaret River and Busselton (DBCA information pamphlet). Records are less common from wetter forests. Local records from Kemerton, Stratham, Binningup, Busselton, Capel, Dardanup, College Grove, Gwindinup, Yoongarillup and Dalyellup (G. Harewood pers. obs.).

Habitat: This subspecies has been observed in dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover. A nocturnal carnivore relying on tree hollows as nest sites. The home range for a female brush-tailed phascogale is estimated at between 20 and 70 ha, whilst that for males is given as twice that of females. In addition, they tend to utilise a large number (approximately 20) of different nest sites throughout their range (Soderquist 1995). Can also persist in floristically degraded areas such as relatively dense and continuous, but parkland cleared woodland in farmland (G. Harewood pers. obs.).

Likely presence within the subject site: Habitat appears too degraded and/or fragmented to support a population of this species.

Listed as a potential species based on available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Bilby *Macrotis lagotis***

Status and Distribution: The bilby is listed as Schedule 3 under the *WC Act* and as Vulnerable under the *EPBC Act*. Current distribution in suitable habitat from Tanami Desert west to near Broome and south to Warburton. Former distribution extended south to Margaret River, though apparently absent from the coastal plain (Burbidge 2004).

Habitat: Current habitat included Acacia shrublands, spinifex and hummock grassland (Menkhorst and Knight 2011).

Likely presence within the subject site: Regionally extinct.

Not listed as a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Southern Brown Bandicoot *Isoodon obesulus fusciventer***

Status and Distribution: Listed as Priority 4 by DBCA. Widely distributed in the south west from near Cervantes north of Perth to east of Esperance, patchy distribution through the Jarrah and Karri forest and on the Swan Coastal Plain, and inland as far as Hyden. Has been translocated to Julimar State Forest, Hills Forest Mundaring, Tutanning Nature Reserve, Boyagin Nature Reserve, Dongolocking Nature Reserve, Leschenault Conservation Park, and Karakamia and Paruna Sanctuaries (DBCA information pamphlet) and Nambung and Yalgorup National Parks (DBCA pers. coms.).

Habitat: Dense scrubby, often swampy, vegetation with dense cover up to one metre high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Populations inhabiting Jarrah and Wandoo forests are usually associated with watercourses. Quendas can thrive in more open habitat subject to exotic predator control (DBCA information pamphlet).

Likely presence within the subject site: Habitat appears too degraded and/or fragmented to support a population of this species.

Listed as a potential species based on available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Western Ringtail Possum *Pseudocheirus occidentalis***

Status and Distribution: Listed as Scheduled 1 under the *WC Act* and as Vulnerable under the *EPBC Act.* Common in suitable habitat (de Tores 2008). The species is widespread and relatively common in vegetated remnants within the Swan Coastal Plain and along the Whicher Scarp between Bunbury and Busselton (G. Harewood pers. obs.). The highest densities of this species are recorded in Peppermint habitat near Busselton area; relatively high densities are found in Jarrah/Marri forest at Perup (de Tores 2008).

The western ringtail possum has a restricted distribution in south-western Western Australia. Most known populations (natural and translocated) are now restricted to near coastal areas of the south west from the Dawesville area to the Waychinicup National Park. Inland, it is also known to be relatively common in a small part of the lower Collie River valley, the Perup Nature Reserve and surrounding forest blocks near Manjimup. It has also been recorded in stands of Peppermint near the Harvey River and in Jarrah/Marri forest near Collie; however, the long term persistence of the species in these areas is not confirmed (de Tores *et al.* 2004). The western ringtail possum was formerly more widespread: in the 1970s it was known from *Casuarina* woodlands in the wheatbelt near Pingelly (south-east of Perth), and it is thought to have once occurred throughout much of

south-western Western Australia (but not necessarily continuously distributed) (Maxwell *et al.* 1996; de Tores 2008).

Habitat: The western ringtail possum was once located in a variety of habitats including coastal peppermint, coastal peppermint-tuart, jarrah-marri associations, sheoak woodland, and eucalypt woodland and mallee. Coastal populations mostly inhabit peppermint-tuart associations with highest densities in habitats with dense, relatively lush vegetation. In these areas the main determinants of suitable habitat for WRPs appears to be the presence of *Agonis flexuosa* either as the dominant tree or as an understorey component of eucalypt forest or woodland (Jones *et al*. 1994a). Inland, the largest known populations occur in the Upper Warren area east of Manjimup (Wayne *et al.* 2005). In this area the peppermint tree is naturally absent and jarrah-marri associations constitute the species refuge and foraging habitat. In areas where peppermint is absent or rare WRPs have been observed feeding predominately on young jarrah, *Nuytsia floribunda* and *Allocasuarina fraseriana* (G Harewood pers. obs.).

Likely presence within the subject site: The results of the WRP assessment indicate that this species is utilising vegetation within the subject site as habitat. It is likely to occur wherever a reasonably dense midstorey vegetation is present.

Listed as a potential species based on available information.

Potential impact of proposed development: No impact on this species or its preferred habitat is anticpated.

**Quokka *Setonix brachyurus***

Status and Distribution: Listed as Scheduled 3 under the *WC Act* and as Vulnerable under the *EPBC Act*. Rare and restricted in south west W.A. from south of Perth to Two Peoples Bay. The distribution of the Quokka includes Rottnest and Bald Islands, and at least 25 known sites on the mainland, including Two Peoples Bay Nature Reserve, Torndirrup National Park, Mt Manypeaks National Park, Walpole-Nornalup National Park, and various swamp areas through the south-west forests from Jarrahdale to Walpole. Only known population on the coastal plain is located just south of Bunbury (Stratham).

Habitat: Mainland populations of this species are currently restricted to densely vegetated coastal heaths, swamps, riverine habitats including tea-tree thickets on sandy soils along creek systems where they are less vulnerable to predation. The species is nocturnal.

Likely presence within the subject site: The subject site contains no suitable habitat for this species.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Western Brush Wallaby *Macropus irma***

Status and Distribution: Listed as Priority 4 by DBCA. The western brush wallaby is distributed across the south-west of Western Australia from north of Kalbarri to Cape Arid (DBCA information pamphlet).

Habitat: The species optimum habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland, and is uncommon in karri forest (DBCA information pamphlet).

Likely presence within the subject site: The subject site contains no suitable habitat for this species.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Western False Pipistrelle *Falsistrellus mackenziei***

Status and Distribution: Listed as Priority 4 by DBCA and as near threatened by the ICUN. Confined to south west W.A. south of Perth and east to the wheat belt. Most records are from karri forests but also recorded in wetter stands of jarrah and tuart and other woodlands on the Swan Coastal Plain (Menkhorst and Knight 2011). Range appears to be contracting southwards, presumably due to drying climate (Bullen pers. comm.).

Habitat: This species of bat occurs in high forest and coastal woodlands. It roosts in small colonies (5-30 individuals) in hollow trees, branches and stumps. Forages between the canopy and the understory of tall forest trees (Churchill 2008).

Likely presence within the subject site: Habitat appears too degraded and/or fragmented to support a population of this species.

Listed as a potential species based on available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Western Mouse *Pseudomys occidentalis***

Status and Distribution: Listed as Priority 4 by DBCA. Formerly occurred in a diagonal band across south west WA to the western Nullarbor Plain, now confined to Ravensthorpe Range, Fitzgerald National Park and several smaller reserves in the southern wheatbelt (Menkhorst and Knight 2011).

Habitat: The western mouse shows a preference for long unburnt habitat (30-50 years) on sandy clay loam or sandy loam surfaces. Vegetation in suitable habitats is variable and includes sparse low shrubland, tall dense shrubland, sparse to dense shrub mallee and mid-dense woodland (Menkhorst and Knight 2011).

Likely presence within the subject site: The subject site is outside of this species current documented range.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**Water Rat *Hydromys chrysogaster***

Status and Distribution: Listed as Priority 4 by DBCA. The water rat is widely distributed around Australia and its offshore islands, New Guinea and some adjacent islands. It occurs in fresh brackish water habitats in the south-west of Western Australia, but occurs in marine environments along the Pilbara coastline and offshore islands. Previous survey work in the south west suggested this species was relatively common and widespread though difficult to capture (Christensen *et al.* 1985, How *et al.* 1987).

Habitat: The water rat occupies habitat near permanent water, fresh, brackish or marine. Likely to occur in all major rivers and most of the larger streams as well as bodies of permanent water in the lower south west (Christensen *et al.* 1985).

Likely presence within the subject site: The small seasonal creekline appears not to represent suitable habitat for this species.

Not considered a potential species based on currently available information.

Potential impact of proposed development: No impact on this species or its preferred habitat will occur.

**DISCLAIMER**

This fauna assessment report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Greg Harewood ("the Author"). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints. In accordance with the scope of services, the Author has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

The conclusions are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of preparing the report. Also it should be recognised that site conditions, can change with time.

Within the limitations imposed by the scope of services, the field assessment and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

In preparing the report, the Author has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, the Author has not verified the accuracy of completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. The Author will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to the Author.

The report has been prepared for the benefit of the Client and no other party. The Author assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of the Author or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

The Author will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

# APPENDIX 5: DESKTOP ABORIGINAL HERITAGE ASSESSMENT

*Ethnosciences*

**ABN 47 065 099 228**

*Ethnography, Heritage & Cultural Interpretation*

# Report of a Desktop Aboriginal Heritage Assessment of Doral's Yalyalup Project Area near Busselton, Western Australia

*Prepared for Doral Mineral Sands Pty Ltd*

By Edward M. McDonald & Bryn Coldrick

July 2017

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# *Ethnosciences*

**ABN 47 065 099 228**

## *Aboriginal Heritage*

## Disclaimer

The results, conclusions and recommendations contained within this report are based on information available at the time of its preparation. Whilst every effort has been made to ensure that all relevant data has been collated, the authors can take no responsibility for omissions and/or inconsistencies that may result from information becoming available subsequent to the report's completion.



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## Abbreviations

| | |
|---|---|
| ACMC: | Aboriginal Cultural Material Committee |
| AHA: | *Aboriginal Heritage Act 1972* |
| AHIS: | Aboriginal Heritage Inquiry System |
| Doral: | Doral Mineral Sands Pty Ltd |
| DPLH: | Department of Planning, Lands and Heritage |
| SWALSC: | South West Aboriginal Land and Sea Council |

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## Summary & Recommendations


Doral Mineral Sands Pty Ltd (Doral) commissioned Ethnosciences to undertake a desktop Aboriginal heritage assessment of the Yalyalup Project Area which Doral plans to mine for mineral sands. The survey area is located approximately 8.5km southeast of Busselton (Figure 1) and is located wholly within the South West Boojarah #2 (WC06/4) native title claim, which is represented by the South West Aboriginal Land and Sea Council (SWALSC).

The desktop assessment involved searches of the Aboriginal Heritage Inquiry System (AHIS) and a review of pertinent available reports of previous investigations in the surrounding area. The study found that there are no Registered Aboriginal Sites or 'Other Heritage Places' currently listed within or in close proximity to the proposed Yalyalup Project Area (Figure 1). There are a number of ethnographic sites recorded in the surrounding area, including the Sabina River (DPLH 17353) and Abba River (DPLH 17354), as well as archaeological sites.

No specific heritage surveys seem to have been previously conducted over the entirety of the subject land. There is, therefore, a possibility that currently unidentified ethnographic and archaeological sites may be present within the proposed project area.


### *Recommendations*

1. It is recommended that Doral commission ethnographic and archaeological surveys of the proposed Yalyalup Project Area before carrying out any works that may impact an Aboriginal Site as defined by Section 5 of the *Aboriginal Heritage Act (1972)*;
2. It is recommended that these surveys involve relevant Aboriginal people nominated by the South West Boojarah #2 (WC06/4) native title claim group via the South West Aboriginal Land and Sea Council (SWALSC); and
3. It is recommended that Doral ensure that all ground staff and contractors are made aware of their obligations under the *Aboriginal Heritage Act (1972)*, particularly with regard to unauthorised disturbance of an Aboriginal Site (s.17) and the requirement to report any suspected Aboriginal Sites (s.15).


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## Introduction

In June 2017, Ethnosciences was commissioned by Doral Mineral Sands Pty Ltd (Doral) to undertake a desktop Aboriginal heritage survey of the Yalyalup Project Area which Doral plans to mine for mineral sands (Figure 1).

The proposed project area is located approximately 8.5km southeast of Busselton in Western Australia and is located wholly within the South West Boojarah #2 (WC06/4) (SWB) native title claim, which is represented by the South West Aboriginal Land and Sea Council (SWALSC).

The main objectives of the desktop survey were to:

1. Identify any known Aboriginal heritage issues that may affect the proposed development; and
2. Make recommendations for any further research and/or consultation that may be required to meet the requirements of the *Aboriginal Heritage Act 1972* (AHA).

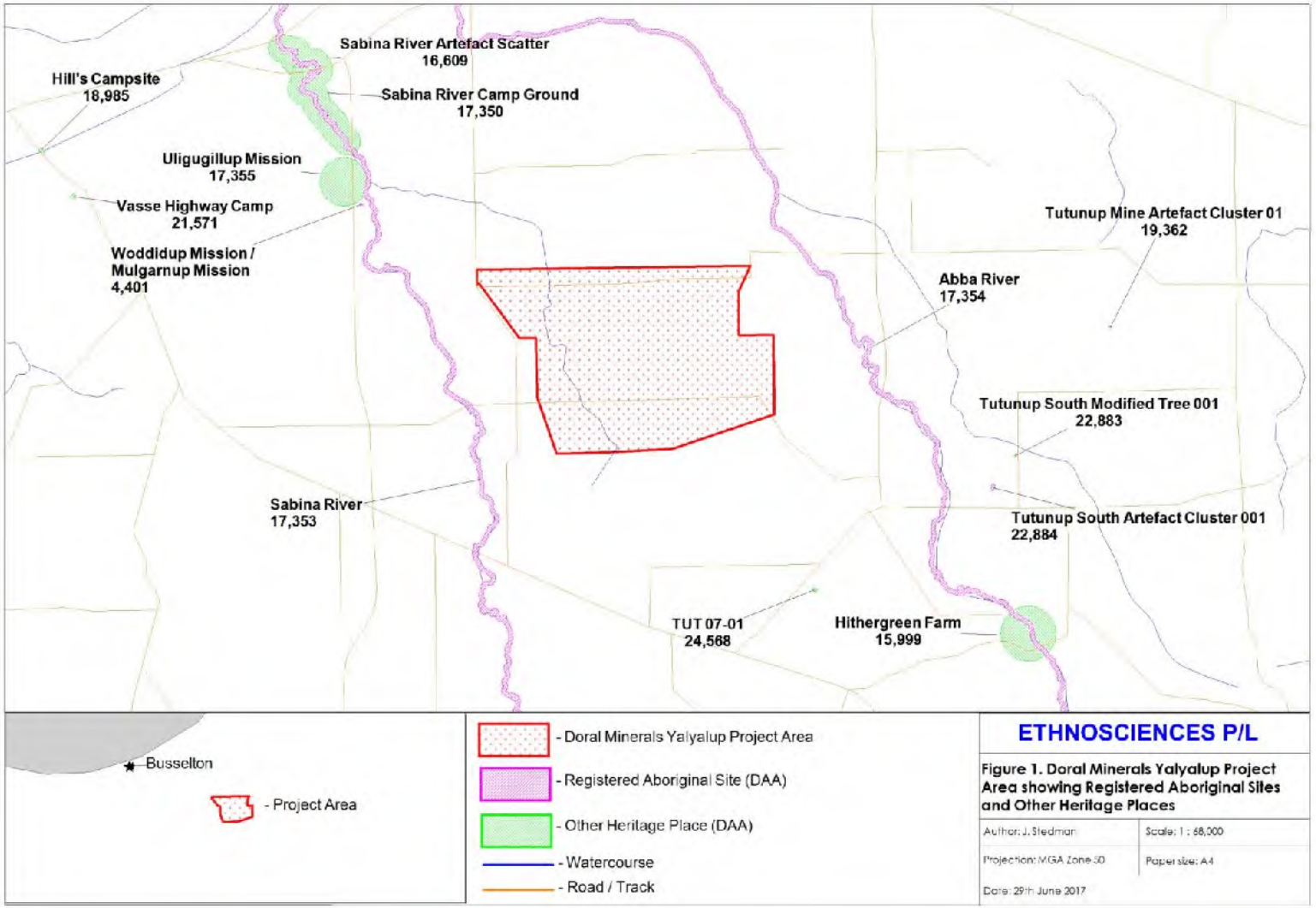


**Figure 1: The Yalyalup Project area showing Registered Aboriginal Sites and 'Other Heritage Places'**

## Legislative Context [1]

The *Aboriginal Heritage Act* (1972) (AHA) is the primary piece of State legislation relating to Aboriginal heritage and defines and protects Aboriginal sites and objects. Aboriginal sites are places to which the Act applies by operation of Section 5 (outlined below) and are currently protected whether they are known to the Department of Planning, Lands and Heritage (DPLH) or not.

Section 5 of the AHA defines an Aboriginal Site as follows:

> *a. any place of importance and significance where persons of Aboriginal descent have, or appear to have, left any object, natural or artificial, used for, or made or adapted for use for, any purpose connected with the traditional cultural life of Aboriginal people, past or present;*
>
> *b. any sacred, ritual or ceremonial site, which is of importance and special significance to persons of Aboriginal descent;*
>
> *c. any place which, in the opinion of the Committee,[2] is or was associated with Aboriginal people and which is of historical, anthropological, archaeological or ethnographic interest and should be preserved because of its importance and significance to the cultural heritage of the State;*
>
> *d. any place where objects to which the Act applies are traditionally stored, or to which, under the provisions of this Act, such objects have been taken or removed.*

Aboriginal Objects are defined by s6:

> *(1) Subject to subsection (2a), this Act applies to all objects, whether natural or artificial and irrespective of where found or situated in the State, which are or have been of sacred, ritual or ceremonial significance to persons of Aboriginal descent, or which are or were used for, or made or adapted for use for, any purpose connected with the traditional cultural life of the Aboriginal people past or present.*

Subsection 2a of s6 exempts the WA Museum collection held under s9 of the *Museum Act 1969* from the provisions of the AHA.

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[1] As we are not lawyers, Doral is advised to seek independent legal advice on any legal matters of concern in relation to the AHA and its operation or other relevant legislation such as the *Native Title Act (1993).*

[2] The Aboriginal Cultural Material Committee (ACMC) whose role it is, among other functions, to evaluate on behalf of the community the importance of places and objects (S39(2) & (3)), and to advise the Minister.

Under S39(3), the AHA gives primacy to "associated sacred beliefs, and ritual or ceremonial usage, in so far as such matters can be ascertained" in the Aboriginal Cultural Material Committee's (ACMC's) evaluation of the importance of places and objects. Other evaluative criteria are set out in S39(2)(2-d) which lists "existing use or significance attributed under relevant Aboriginal custom"; "former or reputed use or significance which may be attributed upon the basis of tradition, historical association, or Aboriginal sentiment"; "potential anthropological, archaeological or ethnographical interest" and "aesthetic values".

Unauthorised disturbance of an Aboriginal Site is an offence under Section 17 which states that:

*17. A person who -*

> *excavates, destroys, damages, conceals or in any way alters any Aboriginal site; or, in any way alters, damages, removes, destroys, conceals, or who deals with in a manner not sanctioned by relevant custom, or assumes the possession, custody or control of, any object on or under an Aboriginal site, commits an offence unless he is acting with the authorisation of the Registrar under section 16 or the consent of the Minister under section 18.*

Based on our interpretation of this section of the AHA, we generally advise our clients that where a place is a Registered Aboriginal Site, or might reasonably be expected to constitute an Aboriginal Site, that they should not undertake any of the activities outlined above that might result in a breach of s.17, and that they should apply for Ministerial consent under s18 to limit their potential liability under the AHA. In cases where a place is "Lodged" with the DPLH, we also recommend that clients take a precautionary approach and seek Section 18 consent in order to clarify the status of the place under s.5.

S18 of the AHA provides a mechanism for landowners and proponents to seek consent from the Minister of Aboriginal Affairs to use land that might contain an Aboriginal Site(s) (i.e., a place to which the Act applies), and in effect to disturb those sites, and thereby protect themselves from potential prosecution under s.17. After considering the recommendations of the ACMC and having regard to the "general interest of the community", the Minister may either consent to the use of the land for the purpose sought, with or without conditions, or refuse consent.

Other State legislation, such as the *Environmental Protection Act 1986* (EP Act), can in some instances complement the AHA (for example, in cases where physical protection of the natural environment is required to protect sites of Aboriginal heritage significance) (EPA 2004). Aboriginal heritage can also be afforded protection by Commonwealth legislation, in particular the *Aboriginal and Torres Strait Islander Heritage Protection Act (1984)*. Aboriginal people who believe that a significant place or object is under threat and that State Government protection is inadequate can apply to the Federal Environment Minister to protect the place or object.

## Desktop Study Methods

The desktop research involved in the first instance an examination of the Register of Aboriginal Sites using the online Aboriginal Heritage Inquiry System (AHIS) maintained by the Department of Planning, Lands and Heritage (DPLH).

A review of previous published and unpublished ethnohistorical and ethnographic material, including previous heritage reports, was also undertaken. These included:

- Aboriginal consultation in relation to the proposed Tutunup Satellite Mineral Sands Mine on Lot 100 Wonnerup South Road (McDonald 2007), which was an extension to the original Tutunup mining operation (McDonald, Hales and Associates 2002);
- Ethnographic and archaeological surveys of Doral's Yoongarillup Resource Zones (McDonald 2012; Edwards 2012; Ogilvie & Hovingh 2014);
- Ethnographic survey and community consultation in relation to the Grice Mineral Sands Mine (Wonnerup South: M70/785) for Cristal Mining (McDonald 2013); and
- Ethnographic survey of the Wonnerup North Mineral Sands Project for Cristal Mining (McDonald 2014).

The project area was also encompassed by a number of broad-scale heritage surveys, including:

- Lower South-west Aboriginal heritage study by McDonald, Hales & Associates for the Gnuraren Aboriginal Progress Association (McDonald, Hales & Associates 1994); and
- Research undertaken as part of the National Estate Component of the Western Australia Regional Forest Agreement (CSR, Edith Cowan University and McDonald, Hales & Associates 1997).

## Ethnographic Background

Daisy Bates (1985, 1992 and n.d.) was the first researcher to systematically collect information regarding the social organisation, language and customs of the indigenous people of the South West region of Western Australia. She (1985:39) referred to the Aboriginal people occupying the South West from around Jurien Bay in the north to a point just east of Esperance as the 'Bibbulmun Nation'. She reported that the Bibbulmun were comprised of a number of local groupings with similar customs and beliefs though regional differences, including forms of descent and dialect, were evident (Bates 1985:46–54). According to Bates (1985:54), the Bibbulmun who traditionally occupied the Busselton area were known as the *Dunan Wongi* after the name of their local dialect.

Later researchers, however, provide a different perspective to that of Bates. Berndt (1979), following Tindale (1974), for example, suggested that at the time of British colonisation the South West was occupied by thirteen 'tribes' or socio-dialectal groups that formed a discrete socio-cultural bloc similar to what Bates referred to as the 'Bibbulmun Nation'. Tindale (1974) and Berndt (1979) reported that the groups occupying the region in which the study area is located were the *Wardandi* 'tribe' or socio-dialectal group (see Figure 2). Tindale (1974:259) described the *Wardandi* territory as:

> *From Bunbury to Cape Leeuwin, chiefly along the coast; at Geographe Bay, the vicinity of Nannup and Busselton. According to one informant, the tribal name is linked with the [`wardan'] or crow, but the name given in vocabularies for crow is [`kwa:kum']. They were also called the "seacoast people," and the detailed Nina Layman MS gives "werdandie" also "wartine" as meaning "the sea". In yet another version it is the derivative of the negative term.*

Bates (1985:47) also had reported that the Bibbulmun around the Busselton area were called *Waddarn-di*, or sea people; however, she commented that this term referred to all coastal people, including the groups stretching from Esperance to Bunbury and beyond.[3]

[3] The term *Waddarn-di/Wardandi* is an example of what Sutton (2003:74–75) would refer to as 'environmental identity names' and not a language group name. Bates (1985:47) also reports that people who lived along rivers in the South West were referred to as 'Bilgur'; estuary people as 'Darbulung'; and hill people as 'Buyun-gur'. Sutton (2003) discusses how 'tribal' names identified by Tindale (1974), whose provenance might be somewhat doubtful, have now been adopted by Aboriginal groups.

Bates' unpublished notes (for example, n.d. Section II Geographical Distribution) suggest that a number of important camping places associated with an initiates' (*beedawong* or *moolyeet*) trail were located in the Busselton area (see also Bates 1985). These camps, in the order listed by Bates (comments in parentheses are Bates' own), include:

- *Ngamboornup* (Broadwater);
- *Win'in'up* (winnaitch);[4]
- *Yoonderup* (Busselton River);
- *Kelgalup* or *Kel'al'up* (Butter factory);
- *Kooneengoonderup* (Estuary);
- *Beerdalup*;
- *Kwarreedup*;
- *Ken'yee'dup*;
- *Woojoolgup*;
- *Kweejerdup*;
- *Joorgadup* or *Joorak guttuk* (on the Abba River); and
- *Wannerdup* or *Menbinup*. [5]

It has not been possible, to date, to positively identify *Joorgadup/Joorak guttuk* or its location on the Abba River. It needs to be stressed that there are often major difficulties in clearly identifying some of the places listed by Bates (see McDonald, Hales & Associates 1999; McDonald and Venz n.d.). First is the nature of Aboriginal placenames themselves where a number of places may be known by the same or similar names. For example, in the South West there were a number of places recorded by Bates called *Walyalyup* (place of the Eaglehawk) or other dialectal variants of that name. Second is the use of names and reference points by Bates herself. She is far from consistent in her use of names and dialectal variations

McDonald and Christensen (n.d.) have questioned the basis of Tindale's, and particularly Berndt's, analyses.

[4] Bates glosses 'winnaitch' as "avoided" or "sacred". An examination of Bates' unpublished manuscripts indicates that *Win'in'up* is located between the road and the old railway bridge in Busselton on the Vasse River.

[5] Possibly refers to Wonnerup.

of names. She also frequently uses different (English language) reference points to situate an Aboriginal placename. As a consequence of these problems, we must be cautious in applying a placename listed by Bates to a precise location in the context of heritage surveys, particularly in the absence of detailed information. Nevertheless, it appears likely that there were a number of camps located in the landscape surrounding the study area that were associated with the '*moolyeet* trail'.[6]

Hallam (1975), Ward (1981:18) and Gibbs (1987) provide detail of various aspects of the traditional economic and social life of Nyungars in the area. The research indicates that the rich habitat of the Busselton region, particularly the riverine and estuarine zones where numerous fish traps [*mungah/mungar*] were constructed, allowed for large gatherings of Aborigines during seasonal availability of certain foods (see Collard 1994; Ward 1981; Gibbs 1987). When food resources became limited at various times of the year, there is some evidence to suggest that Nyungars dispersed in smaller family groups over their range (see Hallam 1975; Ward 1981). nShann (1978) and Jennings (1983) document various aspects of Nyungar-European relations during the colonial period in the Busselton area.

[6] However, it is not clear that in pre-colonial times the 'moolyeet trail' had the status of a single integrated route as is now is generally attributed to it (e.g. Vinnicombe 1989) as Bates (1985) herself seems to raise doubts about it. She notes (1985:51–52), for example, that one of her informants travelled from Busselton to Albany with initiates after colonisation but notes, "whether this was due to the facilities afforded by white settlement, and the greater ease with which long journeys could be accomplished under white protection cannot be definitely ascertained." McDonald and Venz (n.d.) provide a more detailed discussion of these issues.

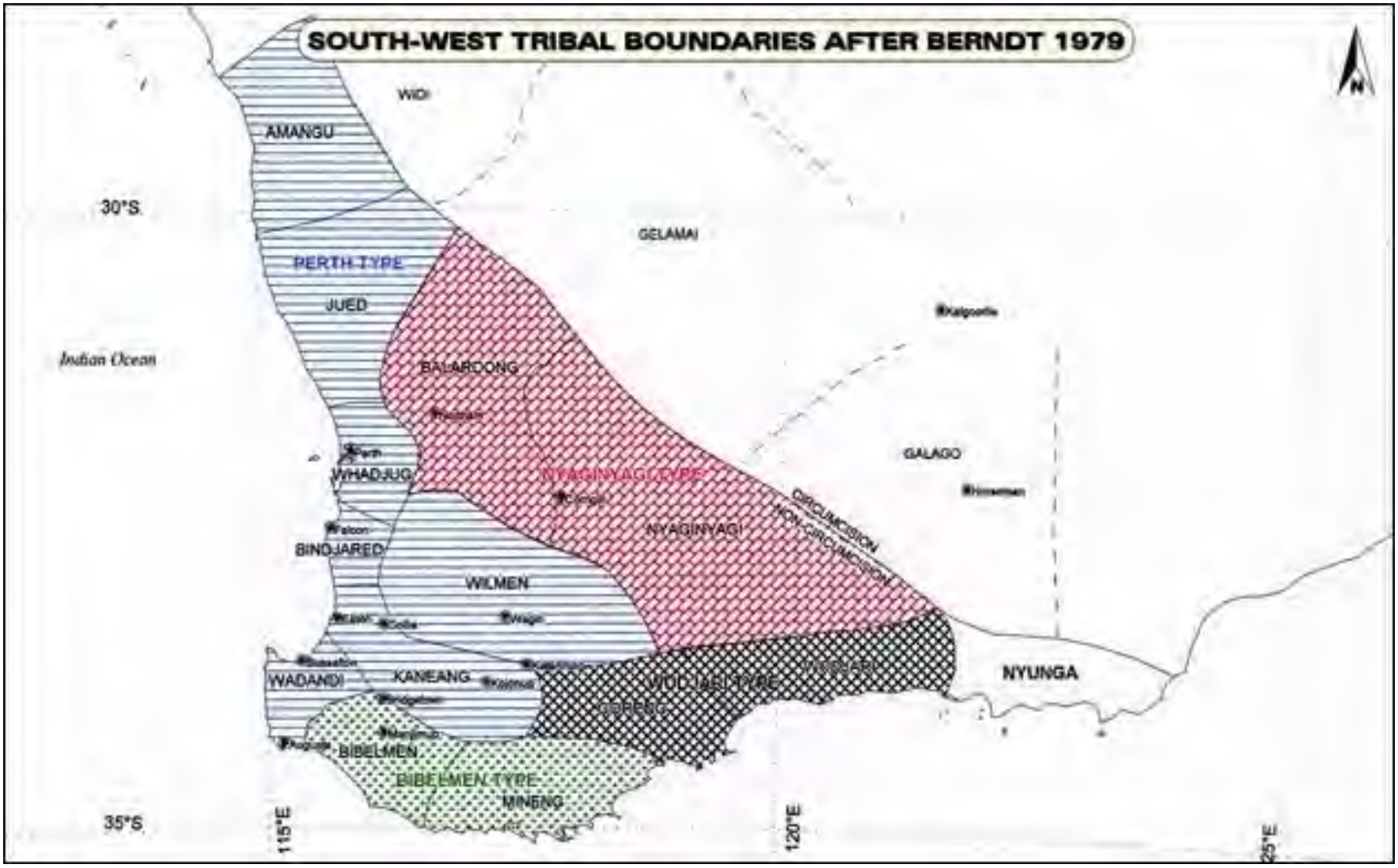


**Figure 2: South-West Tribal Boundaries after Berndt 1979**

## Desktop Study Results

The search of the AHIS found that there are no Registered Aboriginal Sites or 'Other Heritage Places' currently listed within or in close proximity to the proposed Yalyalup Project Area (Figure 1). There are a number of sites recorded in the surrounding area, and these are discussed briefly below.

### *Ethnographic Sites Surrounding the Study Area*

#### Woddidup Mission/Mulgarnup Mission (DPLH 4401)

Woddidup Mission/Mulgarnup Mission (DPLH 4401) is a Registered Aboriginal Site close to the Sabina River to the northwest of the proposed Project Area, and is listed as a Camp and Mission. Mulgarnup Mission was inspected from Sues Road during a previous ethnographic survey for Cristal Mining. The Aboriginal consultants reported that they had seen archival references to Mulgarnup Mission in the public library in Albany including references of Aboriginal people being sent from that region to the mission (McDonald 2013). It was noted that the Mulgarnup Mission ruins have suffered considerable damage as a result of apparent impacts from cattle and weathering (see the plates in McDonald 2013 and in McDonald & Cuthbert 1998).

#### Hithergreen Farm (DPLH 15999)

This listing is Lodged with the DPLH as a camp site and a place of 'spiritual' meaning . It is mapped by the AHIS on the Abba River to the southeast of the proposed Project Area.

#### Sabina River Camp Ground (DPLH 17350)

The Sabina River Camp Ground (DPLH 17350), which is located to the northwest of the proposed Project Area, is listed on the AHIS as an 'Other Heritage Place' with the following attributes: Artefacts/Scatter, Historical, Arch Deposit, Camp. It has been assessed as 'Not a Site' under the AHA and is listed in Stored Data. This place was reported following a survey by Cuthbert and Hovingh (1998) for RGC Mineral Sands (see also Goode 1999).

As noted in an earlier report (McDonald 2010), DPLH 17350 Sabina River Camp Ground was not originally identified as a place separate from DPLH 17353 Sabina River with its recorded

mythological and historical values. It would seem that the 'historical' and 'camp' values of the listing of DPLH 17350 Sabina River Camp and 'camp' values associated with the listing for 'Uligugalup Mission' (DPLH 17355) are essentially a duplication of the historical and pathway values associated with the listing for DPLH 17353 Sabina River. Aboriginal consultants did not identify DPLH 17350 Sabina River Camp Ground as a place separate from DPLH 17353 Sabina River during a previous survey for Cristal Mining (McDonald 2013).

### Sabina River (DPLH 17353)

The Sabina River (DPLH 17353), which lies to the west of the proposed Project Area, is a registered mythological site with historical values including a pathway. This site was reported and listed following the survey by Cuthbert and Hovingh (1998; see also McDonald 2007/2011 and Goode 1999). Aboriginal consultants have in the past raised concerns about potential impacts to this river as a result of mining operations (see, for example, McDonald 2013).

### Abba River (DPLH 17354)

The Abba River (DPLH 17354), which lies to the east of the proposed Project Area, is a registered mythological site with historical values (see Cuthbert & Hovingh 1998; see also Goode 2003 and McDonald 2010). Bates (n.d.) reports that a major camp (*Joorgadup/Joorak guttuk*) was located on the Abba River; however, it has not been possible to date to positively identify its location. During a previous survey for the Wonnerup North Mineral Sands Project, Aboriginal consultants reported that the river, in common with all rivers, was created by the *Waugal* and that people camped all along it in the past (McDonald 2014).

### Uligugillup Mission (DPLH 17355)

Uligugillup Mission (DPLH 17355), which is shown on the AHIS to the northwest of the proposed Project Area, is listed in Stored Data as a historical site and camp.[7] It is not an Aboriginal Site under the AHA.

[7] According to the Busselton Historical Society, there are a number of versions of the spelling of the name: Uligugalup, Uligugillup, etc.

We have previously concluded on the basis of historical and ethnographic data, as well as the results of two archaeological surveys (Cuthbert & Hovingh 1998 and Thomson 2013), that Uligugillup Mission (DPLH 17355), which was listed based on the report by Cuthbert & Hovingh (1998; see also Goode 1999) did/does not exist as a separate entity and that there was a single mission in the area: DPLH 4401 Mulgarnup Mission (McDonald 2013). For further discussion, see McDonald 2013; McDonald & Cuthbert 1997; McDonald, Hales and Associates 1995).

### Hill's Campsite (DPLH 18985)

Hill's Campsite (DPLH 18985) is Lodged with the DPLH as a historical site and camp to the northwest of the proposed Project Area. It is located near the intersection of Vasse Highway and Burn Boulevard.

### Vasse Highway Camp (DPLH 21571)

Vasse Highway Camp (DPLH 21571) is Lodged with the DPLH as a camp to the northwest of the proposed Project Area. It is located to the south of the intersection of Vasse Highway and Paterson Drive.

## *Archaeological Sites Surrounding the Study Area*

### Sabina River Artefact Scatter (DPLH 16609)

This artefact scatter is shown on the AHIS to the north-northwest of the proposed Project Area along the northern side of Bussell Highway. It is listed in Stored Data and is therefore not an Aboriginal Site under the AHA.

### Tutunup Mine Artefact Cluster 01 (DPLH 19362)

This artefact scatter was reported following a survey at Tutunup South (Tempus 2006) and is shown on the AHIS east of the proposed Project Area to the north of Sabina Road. It is listed in Stored Data and is therefore not an Aboriginal Site under the AHA.

### Tutunup South Modified Tree (DPLH 22883)

This listing relates to a modified tree to the southeast of the proposed Project Area, along the western side of Banksia Road. It was reported following a survey at Tutunup South (Tempus 2006). It is listed in Stored Data and is therefore not an Aboriginal Site under the AHA.

### Tutunup South Artefact Cluster (DPLH 22884)

This artefact scatter was reported following a survey at Tutunup South (Tempus 2006), north of Williamson Road and west of Banksia Road, to the southeast of the proposed Project Area. It is a Registered Aboriginal Site.

### TUT 07-01 (DPLH 24568)

This modified tree to the south of the proposed Project Area is currently Lodged with the DPLH.

## *Previous Surveys*

The AHIS indicates that portions of the proposed Yalyalup Project Area may have been subject to previous heritage surveys in relation to the proposed Busselton Flood Protection Project undertaken by AIC and a drilling program and bore installation conducted by Goode.

As stated above, the Yalyalup area was also included in a number of broad-scale heritage investigations, including the Lower South West Aboriginal heritage study undertaken by McDonald, Hales & Associates for the Busselton-based Gnuraren Aboriginal Progress Association under the National Estates Grants Programme (McDonald, Hales & Associates 1994) and the research undertaken as part of the National Estate Component of the Western Australia Regional Forest Agreement (CSR, Edith Cowan University and McDonald, Hales & Associates 1997).

It would appear that no ethnographic or archaeological sites were reported in the Yalyalup area as a result of any of these studies. However, it would also appear that no specific heritage surveys have previously been conducted over the entirety of the subject land.

## Conclusions and Recommendations

This report has presented the findings of a desktop Aboriginal heritage assessment of Doral's proposed Yalyalup Project Area, southeast of Busselton. The study has found that there are no Registered Aboriginal Sites or 'Other Heritage Places' currently listed within or in close proximity to the proposed Yalyalup Project Area (Figure 1). There are a number of ethnographic sites in the surrounding area including the Sabina River (DPLH 17353) and Abba River (DPLH 17354), as well as archaeological sites.

The study also found that although portions of the proposed Yalyalup Project Area may have been subject to previous heritage surveys and broad-scale heritage investigations, no specific heritage surveys seem to have been previously conducted over the entirety of the subject land. There is, therefore, a possibility that currently unidentified ethnographic and archaeological sites may be present within the proposed project area.

### *Recommendations*

1. It is recommended that Doral commission ethnographic and archaeological surveys of the proposed Yalyalup Project Area before carrying out any works that may impact an Aboriginal Site as defined by Section 5 of the *Aboriginal Heritage Act (1972)*;
2. It is recommended that these surveys involve relevant Aboriginal people nominated by the South West Boojarah #2 (WC06/4) native title claim group via the South West Aboriginal Land and Sea Council (SWALSC); and
3. It is recommended that Doral ensure that all ground staff and contractors are made aware of their obligations under the *Aboriginal Heritage Act (1972)*, particularly with regard to unauthorised disturbance of an Aboriginal Site (s.17) and the requirement to report any suspected Aboriginal Sites (s.15).

## References

AIC (nd)Report on an archaeological and ethnographic survey of the proposed Busselton Flood Protection Project in Busselton, Western Australia.

Bates, D. (1985) *The Native Tribes of Western Australia*. I. White (ed.) National Library of Australia, Canberra.

Bates, D. (1992) *Aboriginal Perth: Bibbulmun Biographies and Legends.* P. J. Bridge (ed.) Hesperian Press. Victoria Park. First published 1925.

Bates, D. (n.d.) Section II (Geographical), Daisy Bates Collection, State Archives ACC 1212A.

Berndt, R. M. (1979) 'Aborigines of the Southwest' in R. M. & C. H. Berndt (eds.) *Aborigines of the West*. University of Western Australia Press, Nedlands, pp. 81–89.

Collard, L. (1994) A Nyungar Interpretation of Ellensbrook and Wonnerup Homesteads. Elizabeth Cowan University, National Trust of Australia, Mt Lawley.

CSR, Edith Cowan University and McDonald, Hales & Associates (1997) Western Australia Regional Forest Agreement: Aboriginal Consultation Project Report, Volume 2 (National Estate Component). Unpublished report prepared for The Regional Forest Agreement Steering Committee.

Cuthbert, D. & Hovingh, R. (1998) Report on an Aboriginal Heritage Survey of the Proposed Mineral Sands Mine, Loc 7 and Loc 3819 (M70/785) and Mineral Leases M70/255, M70/359, M70/513, Capel. Unpublished report prepared by McDonald, Hales & Associates for RGC Mineral Sands.

Ecoedge (2016) Report of a Level 1 Flora and Vegetation Survey at the Yalyalup Proposed Mine Area. Unpublished report prepared for Doral Mineral Sands, February 2016.

Edwards, K. (2012) Report of an Archaeological Survey Doral Yoongarillup Resource Zones Southwestern W.A. Unpublished report prepared by Tempus Archaeology for Doral Mineral Sands Pty Ltd on behalf of Ethnosciences, February 2012.

Gibbs, M. (1987) Aboriginal Gatherings in the West Coastal Region of Southwest Western Australia: an Ethnohistorical Study. Unpublished Honours thesis for the University of Western Australia, Nedlands.

Goode, B. (1999) Survey for Ethnographic Sites along Bussell Highway/South Western Highway (Capel Golf Course-Gelorup to Busselton), Lower Southwest, Western Australia. Unpublished report.

Goode, B. (nd) An Aboriginal Heritage Survey for the Drilling Program and Bore Installation on the Swan Coastal Plain, Dunsborough to Capel, Western Australia.

Hallam, S. J. (1975) *Fire and Hearth: a Study of Aboriginal Usage and European Usurpation in Southwestern Australia*. Canberra: Australian Institute of Aboriginal Studies.

Jennings, R. (1983) *Busselton "…outstation on the Vasse" 1830–1850*. The Shire of Busselton, Western Australia.

McDonald, E. M. (with B. Coldrick) (2007) Report of an Aboriginal Consultation in Relation to a Proposed Mineral Sands Mine, Lot 100 Wonnerup South Road, Wonnerup, Western Australia. Unpublished report prepared by Ethnosciences for Bemax Resources Incorporating Cable Sands, April 2007 (Revised October 2011).

McDonald, E. M. (with B. Coldrick) (2010) Report of an Aboriginal Consultation in Relation to a Proposed Mineral Sands Mine, Loc 7 and Loc 3819 (M70/785), Wonnerup, near Capel, Western Australia. Unpublished report prepared by Ethnosciences for Bemax Resources, Incorporating Cable Sands.

McDonald, E. M. (2012) Report of an Ethnographic Survey of Doral's Yoongarillup Resource Zones, Yoongarillup, near Busselton, Western Australia. Unpublished report prepared by Ethnosciences for Doral Mineral Sands, August 2012.

McDonald, E. M. (2013) Report of an Ethnographic Survey and Community Consultation in Relation to a Proposed Mineral Sands Mine, Grice (Wonnerup South: M70/785), Wonnerup, near Busselton, Western Australia. Unpublished report prepared by Ethnosciences for Cristal Mining Australia (formerly Bemax Resources), May 2013.

McDonald, E. M. (2014) Report of an Ethnographic Survey of the Aboriginal Heritage Values of the Wonnerup North Mineral Sands Project near Busselton, Western Australia. Unpublished report prepared by Ethnosciences for Cristal Mining Australia, May 2014.

McDonald, E. M. & Christensen, W. (n.d.) 'B[u]rndt Recipes – A Pinch of Daisy Bates, a Large Dollop of Radcliffe-Brown, Carefully Overlaid with a Fine Mesh of Tindale: Notes on the Social Organisation of Some Western Australian Tribes.' Paper read at the Anthropological Society of Western Australia meeting, October 1999.

McDonald, E. M. & Cuthbert, D. (1998) Report of the Ethnographic Survey: Airport Development Plan, Busselton. Unpublished report prepared by McDonald, Hales & Associates for Heath Developments.

McDonald, E. M. & Venz, T. (n.d.) Trails and Sites: Daisy Bates' Ethnography and the Problems of Identifying Places of Aboriginal Heritage Values in the Southwest of Western Australia. Paper delivered at Ireland's Heritage Conference, Castlebar, Co. Mayo, October 2002.

McDonald, Hales & Associates (1995) National Estates Grants Programme Aboriginal Sites in the Lower South-west Heritage Study. Unpublished report prepared by McDonald, Hales & Associates for Gnuraren Aboriginal Progress Association.

McDonald, Hales & Associates (1999) Report of an Aboriginal Heritage Survey: Jangardup Mineral Sands Lease Area, Western Australia. Unpublished report prepared by McDonald, Hales & Associates for the Noongar Land Council.

McDonald, Hales & Associates (2002) Report of an Aboriginal Heritage Survey Proposed Tutunup Titanium Mineral Mine Near Capel, Western Australia. Unpublished report for Cable Sands (WA) Pty Ltd.

Ogilvie, J. & Hovingh, R. (2014) A Supplementary Report on an Aboriginal Archaeological Survey of the Yoongarillup Zone, near Busselton, Western Australia. Unpublished report

prepared for Doral Mineral Sands Pty Ltd by Snappy Gum Heritage Services Pty Ltd on behalf of Ethnosciences, April 2014.

Shann, E. O. G. (1978) *Cattle Chosen*. Nedlands: University of Western Australia Press.

Sutton, P. (2003) *Native Title in Australia: an Ethnographic Perspective*. Cambridge: Cambridge University Press.

Tempus Archaeology (2006) Report on Phase I & II Archaeological Investigations Tutunup South Minerals Sands Project (M70/609), Shire of Busselton, WA. Unpublished report prepared for Bemax Incorporating Cable Sands (WA) Pty Ltd.

Tindale, N. B. (1974) *Aboriginal Tribes of Australia*. Canberra: Australian National University Press.

Thomson, J. (2013) Report on an Aboriginal Archaeological Assessment of the Grice Mineral Sands Deposit, Wonnerup South, Southwest Region, Western Australia. Unpublished report prepared by TCHM for Ethnosciences and Cristal Mining Australia Ltd.

Vinnicombe, P. (1989) *Goonininup: an Historical Perspective of Land Use and Associations in the Old Swan Brewery Area*. Western Australian Museum, Perth.

Ward, K. (1981) 'Gone Fishing': Patterns of Aboriginal Subsistence around Geographe Bay. Unpublished BA (Hons) Thesis for University of Western Australia, Department of Anthropology.