# FAUNA ASSESSMENT

### LOT 525 - 530 BROOMEHILL

Incorporating

### Carnaby's Black Cockatoo

&

Western Rosella (Inland ssp)

**Nest Habitat Surveys** 

FEBRUARY 2007

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## STATEMENT OF LIMITATIONS

#### **Scope of Services**

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.

#### Reliance on Data

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.

#### **Environmental Conclusions**

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.



#### **Report for Benefit of Client**

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.

#### **Other Limitations**

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.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.



### EXECUTIVE SUMMARY

This report has been prepared in response to an invitation from Co-operative Bulk Handling (CBH) to carry out a Level 2 (EPA 2004) fauna assemblage survey specifically incorporating a Carnaby's Black Cockatoo and inland sub-species of the Western Rosella nest habitat survey over an area of CBH owned land near Broomehill, Western Australia. The study site, Lots 525 to 530, is located directly adjacent to existing CBH infrastructure at Broomehill. Lots 525 to 530 have a combined total area of about 7.6 ha, the majority of which consists of some form of native vegetation. CBH have applied to DoE to clear remnant vegetation from the Lots (DOE Ref 603/1). In addition to the nest habitat survey the fauna assessment reported on here has been carried out to provide information on the potential impact the proposal may have on vertebrate fauna utilising the site.

The majority of the site consists of a Wandoo (*Eucalyptus wandoo*) woodland. Groundcover and understorey is generally very sparse. The central section of the study area is dominated by a species of Eucalypt (possibly a species of mallet). Understorey species and groundcover in this area is almost totally absent. The site shows considerable signs of historical and ongoing disturbance e.g. logging, tracks, scrapes, and rubbish.

Field survey work was carried out by Greg Harewood on the 23<sup>rd</sup> and 24<sup>th</sup> of January 2007. Greg Harewood (B.Sc, Zoology UWA 1984) has conducted a significant number of fauna assessment surveys in Western Australia including areas of the Pilbara, the south west, mid west and the Nullarbor. In addition to this survey he has conducted 8 other targeted surveys for Black Cockatoo nest hollows at Clackline, Wundowie, Whitby, Dunsborough, Eagle Bay, Borden, Moora and Kukerin.

A total of 42 trees with hollows were identified in and directly adjacent the site, with a significant number of the trees containing more than one. At least twenty three of the trees contain hollows with entrances between 5 and 12 cm wide, and can be considered potentially suitable for Western Rosellas. Nineteen trees contain hollows with entrances greater than 12cm in diameter. These trees represent potential Cockatoo nest habitat (and in some cases Western Rosella habitat). No evidence was found to suggest that any of the hollows had been or were currently in use by either of the targeted species.

The study site itself does not contain heathlands suitable for breeding Carnaby's Cockatoo to feed upon. The site also contains very little Casuarina, a favoured food source for the Western Rosella, the clearing of which is suspected to have contributed to the decline of this species in the wheatbelt.

A search of EPBC Act's Threatened Fauna list, DEC's Threatened Fauna Database and Priority List and scientific publications identified 21 specially protected, priority or migratory fauna species as possibly occurring in the general study area. Of the 21 species discussed, eleven are listed as potentially utilising/frequenting the study site, even if only infrequently or as vagrants.



The assessment suggests that no species of conservation significance has the potential to be affected directly to any degree by the proposal. The majority of species discussed are considered to be locally extinct or unlikely to use the site on a regular basis largely due to a lack of suitable habitat or because the site is on the extreme limit or just outside their normal range.

Of particular importance it's the potential impact the proposal may have on Carnaby's Black Cockatoo and the inland subspecies of the Western Rosella. The most significant impacts relate to

- the loss trees containing suitable breeding hollows (i.e. nest habitat);
- disturbance to breeding birds during clearing and
- the loss of foraging habitat, particularly for breeding birds.

The assessment survey reported on here established that the proposal site contains a significant number of trees with hollows potentially suitable for Carnaby's Black Cockatoos and the inland subspecies of the Western Rosella to utilise, though no signs of actual use by these species was observed. With the exception of Wandoo the site does not contain vegetation that would be considered significant/critical foraging habitat for either species, especially those vegetation types favoured by these species during breeding season i.e. kwongan heath or Casuarina woodlands.

As the project has some potential to impact on EPBC Act defined "critical" habitat it is considered prudent that a referral be submitted to the DEW so that a review of the project can be conducted. Despite this recommendation for referral it should be noted that a lack of nest hollows has not been identified by researchers as being an issue with respect to the abundance of Carnaby's Black Cockatoo and the inland spp of the Western Rosella in wheatbelt areas where feeding resources are most likely to determine the population size of these species in any one region. Despite this fact, the loss of hollows is significant in that suitable trees lost to clearing are not being replaced at a rate that counteracts the ongoing loss.

A management plan is proposed that principally aims to reduce the impact on any retained vegetation while reducing the potential for fauna to be killed or injured during the clearing and construction phase. It is recommended that CBH carry out selective rehabilitation of undeveloped sites with plant species considered suitable cockatoo/rosella food plants to enhance retained habitat on site. It is also suggested that CBH contribute in some way to ongoing cockatoo recovery programs currently in place throughout the wheatbelt as an offset to the loss of potential nest hollows on site.



## 1. INTRODUCTION

This report has been prepared in response to an invitation from Co-operative Bulk Handling (CBH) to carry out a Level 2 (EPA 2004) fauna assemblage survey specifically incorporating a Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and inland sub-species of the Western Rosella (*Platycercus icterotis xanthogenys*) nest habitat survey over an area of CBH owned land near Broomehill, Western Australia.

The study site, Lots 525 to 530, is located directly adjacent to existing CBH infrastructure at Broomehill, and is centred on approximately 33° 50' 51" S , 117° 38' 57" E (Figures 1, 2 & 3). The fauna assessment was limited to within the boundaries of the 6 lots as indicated in figures. Lots 525 to 530 have a combined total area of about 7.6 ha, the majority of which consists of some form of native vegetation.

CBH have applied to DoE to clear remnant vegetation from Lots 525 to 530 (DOE Ref 603/1). The current proposed development plan for the site is shown as Figure 3. In addition to the nest habitat survey the fauna assessment reported on here has been carried out to provide information on the potential impact the proposal may have on vertebrate fauna utilising the site.



### 2. SCOPE OF WORK

After consideration of CBH's application for a clearing permit (DOE Ref 603/1) the DoE have specifically requested that a fauna survey at level 2 as described in EPA Guidance Statement 56 (EPA 2004), specially targeting potential nesting habitat for Carnaby's Black Cockatoos (typically mature *Eucalyptus wandoo* and *or Eucalyptus salmonophloia*) and the inland sub-species of the Western Rosella (*Platycercus icterotis xanthogenys*) be carried out. In addition an unequivocal statement detailing the date of the survey, relevant experience of personnel involved, and detected presence or absence of suitable nesting hollows was also recommended.

Discussions with DoE officers (specifically Ken Downsborough) confirmed that <u>no fauna trapping</u> was required as part of the detailed survey but they would appreciate if some details on other fauna potentially utilising the site be provided.

To comply with DoE's request for a Level 2 fauna survey the assessment was carried out with reference to guidance and position statements published by the WA Environmental Protection Authority on fauna surveys and environmental protection (EPA 2002; EPA 2004). This survey report has specifically been prepared for use in the EPA's Environmental Impact Assessment (EIA) process and is considered suitable for this purpose.

The main aim of the survey work was to identify the sites significance to Carnaby's Black Cockatoo and the inland subspecies of the Western Rosella with respect to nest habitat. To comply with this requirement a detailed survey of the site was conducted.

In addition a fauna assemblage assessment has been conducted and follows closely requirements set out in EPA Guidance Statement 56 (EPA 2004), these being:

#### Background research or 'desktop' study

The purpose is to gather background information on the target area (usually at the locality scale). This involves a search of all sources for literature, data and map-based information.

#### Reconnaissance survey

The purposes are:

i) to verify the accuracy of the background study;



- ii) to further delineate and characterise the fauna and faunal assemblages present in the target area; and
- iii) to identify potential impacts.

The assessment involves a target area visit by suitably qualified personnel to undertake selective, low intensity sampling of the fauna and faunal assemblages, and to provide habitat descriptions and habitat maps of the project area.



### 3. METHODOLOGY

### 3.1 FAUNA HABITAT ASSESSMENT

#### 3.1.1 Overall Fauna Habitat Assessment

A habitat assessment was carried out specifically targeting the likely habitats of listed (under the relevant Federal and State Acts) threatened vertebrate species potentially occurring in the general area. The main aim of the habitat assessment was to determine if it was likely that any threatened species would be utilising the area, in addition to providing information on general fauna that may be present.

The initial phase of the assessment involved the review of available information on the habitats of the threatened species possibly occurring in the region. During the field survey the habitat at the site was assessed to determine its potential to be hosting any of the listed threatened species in addition to aiding in the compilation of a potential fauna list. Habitat elements that were assessed and noted, if present, were vegetation, rock outcrops, ground litter, hollow trees and fallen logs.

#### 3.1.2 Nest Habitat Assessment

A detailed ground base field survey was conducted over the site during a two day period. The aim of the survey was to document the presence of trees containing hollows potentially suitable for use by Carnaby's Black Cockatoos and/or Western Rosellas. The survey aimed to assess all trees within the study site.

The assessment of hollows was conducted from ground level. Because it is impossible to determine all the characteristics of hollows that are favoured by hollow nesting birds, the assessment of suitability was based entirely on the size of each hollow's entrance, though other factors such as orientation and position (relative to ground level) was also taken into consideration.

Hollows that had an entrance greater than about 12cm in diameter and would allow the entry of a cockatoo were recorded as a potential nesting site for the Black Cockatoo species. Hollows that were greater than about 5cm were recorded as a potential nesting site for Western Rosellas. It should be noted that the assessment of hollows from ground level is likely to result in an over estimation of the number of hollows that would be suitable for use by Cockatoos/Rosellas as the full characteristic of the hollow, from ground level can not be made.

Hollows were also studied with binoculars for signs of use (e.g. wear and chewing) and trunks and branches checked for scarring which may indicate use



by other fauna species (e.g. territory marking by parrot species such as the Galah). Signs of use were recorded. It should be noted that trees showing no signs can still be regarded as potential nesting sites as in most cases hollows will show little or no external indications of use.

Trees containing potential nesting sites were also scratched/raked with a large stick to mimic a climbing predator. If the hollow was in use by a cockatoo/rosella at the time of the survey this action was likely to result in the individual either peering from the hollow entrance to assess the danger or prompt it to leave the hollow. The effectiveness of this technique is however dependant on the timing of the survey with respect to the breeding seasons of the target species.

#### 3.2 FAUNA INVENTORY

#### 3.2.1 Opportunistic Fauna Survey

During the course of the reconnaissance field work non-systematic opportunistic observations of fauna species were made and recorded. Secondary evidence of fauna such as tracks, diggings and scats were also noted. Some active searching was undertaken in specific areas with the aim of locating the more elusive frog and reptile species that may inhabit the site. The survey included a series of close spaced transects across the site while searching under logs and leaf litter for fauna or signs of fauna and observations of bird species with binoculars.

#### 3.2.2 Potential Fauna

A list of all vertebrate fauna potentially occurring within the study area was compiled from searches done on the WA Museum (WAM) Database, the Department of Environment and Conservation Threatened Fauna Database, Department of the Environment and Water Resources Commonwealth Environment Protection and Biodiversity Conservation Database, Birds Australia's 'birdata", published and unpublished reports and specialist books detailing fauna of the general area. Species observed during field work have also been included. The results of the habitat assessment also provided information on the potential fauna assemblage.

Taxonomy and nomenclature for fauna species used in this report generally follow Aplin and Smith (2001) for amphibians and reptiles, How *et al.* (2001) for mammals and Johnstone (2001) for birds. Some names, including common names recommended for national and international use by Christidis and Boles (1994) for birds, are also used. Common names for reptiles and amphibians come from a variety of sources and are not necessarily generally accepted. Sources include Wilson and Swan (2005), Bush *et al* (2002), Tyler *et al.* (2000) and Glauret (1961).



#### 3.2.3 Fauna of Conservation Significance

The conservation status of fauna species in Western Australia is assessed under the federal *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the state administered *Western Australian Wildlife Conservation Act 1950* (WAWC Act). In addition on a global level the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN the acronym derived form its former name of the International Union for Conservation of Nature and Natural Resources) publish an international listing of species of conservation importance, known as the IUCN Red List. Important facets of the abovementioned fauna status definitions are discussed below.

Under the EPBC Act threatened fauna may be listed in any one of the following categories as defined in Section 179 of the Act:

- Extinct;
- \*Extinct in the wild;
- \*Critically endangered;
- \*Endangered;
- \*Vulnerable; and
- Conservation dependent.

\*Only species in those categories marked with an asterix are matters of national environmental significance under the EPBC Act.

The WAWC Act uses a set of schedules (see Table 1) in addition to utilising the categories defined by the EPBC Act.

#### Table 1: Western Australian Threatened Fauna Categories

Category	Code	Description
Schedule 1	S1	Fauna which is rare or likely to become extinct
Schedule 2	S2	Fauna which is presumed extinct
Schedule 3	S3	Birds which are subject to an agreement between the governments of Australia and Japan (JAMBA) relating to the protection of migratory birds and birds in danger of extinction
Schedule 4	S4	Fauna that is otherwise in need of special protection



In Western Australia, the Department of Environment and Conservation (DEC) also compile a supplementary list of priority fauna. The species listed are not considered threatened under the WAWC Act, but due to lack of knowledge or where species are poorly represented in secure conservation reserves some concern for there long term survival exists. The five classifications levels are shown in Table 2.

Category	Code	Description		
Priority 1	P1	Taxa with few, poorly known populations on threatened lands.		
Priority 2	P2	Taxa with few, poorly known populations on conservation lands.		
Priority 3	P3	Taxa with several, poorly known populations, some on conservation lands.		
Priority 4	P4	Taxa in need of monitoring (Not currently threatened or in need of special protection, but could be if present circumstances change)		
Priority 5	P5	Taxa in need of monitoring (Not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years)		

 Table 2: DEC Priority Fauna Categories

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 (JAMBA), the China Australia Migratory Bird Agreement (CAMBA) and the Bonn Convention (The Convention on the conservation of Migratory Species of Wild Animals). Species listed under JAMBA are also protected under Schedule 3 of the WAWC Act.

The conservation status of all the vertebrate fauna species listed as occurring or possibly occurring in the vicinity of the study area has been assessed using the most recent lists published in accordance with the above-mentioned Acts and DEC's priority fauna list and are indicated in the fauna listings of this report.

It should be noted that there are currently discrepancies between the Western Australian and Commonwealth threatened species lists. In an attempt to address this issue DEC and the Department of Environment and Water Resources (DEW, formerly DEH) have initiated an "alignment of lists" project where DEC provides advice on threatened species to the DEW so specific species can be assessed under the EPBC Act and the DEW database updated. As far as the author is aware this project is still in progress and subsequent changes in the DEW database may result in variations to the listings and classifications used for the project reported on here.



The IUCN Red List of Threatened Species provides taxonomic, conservation status and distribution information on taxa that have been globally evaluated using the IUCN Red List Categories and Criteria. Categories by the used a quite complex and have for this reason not been listed in this report. A full list of categories and their meanings are available at:

http://www.iucnredlist.org/info/categories\_criteria2001#categories.

This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those taxa that are facing a higher risk of global extinction (i.e. those listed as Critically Endangered, Endangered and Vulnerable). The IUCN Red List also includes information on taxa that are categorised as Extinct or Extinct in the Wild; on taxa that cannot be evaluated because of insufficient information (i.e. are Data Deficient); and on taxa that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation programme (i.e. are Near Threatened - NT).

Taxa that have been evaluated to have a low risk of extinction are classified as Least Concern (LC). The Least Concern assessments did not appear on IUCN Red Lists produced before 2003 (except for 225 cases in 1996) because the main focus has been on threatened species. However, for the sake of transparency and to place threatened assessments in context, all Least Concern assessments are now included. Unfortunately, there has not been a formal reporting process in place to capture all Least Concern assessments; hence the list provided is incomplete and some fauna species remain unclassified as yet. A process to capture the Least Concern listings has begun (at the species level only), but this is likely to take several years to complete.

Taxa not included on the IUCN Red List are those that went extinct before 1500 AD, Least Concern species that have not yet been data based, and species that have not yet been assessed (i.e., they are in the Not Evaluated category). The only taxonomic groups, that have been comprehensively assessed, are the amphibians, birds, mammals, conifers and cycads.

#### 3.2.4 Other Species of Significance

A number of other species not listed in official lists can also be considered of 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 bird species have been listed as 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 two 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 population's on the Swan Coastal Plain. (code Bp)

Other fauna species of regional significance due to declining populations on the Swan Coastal Plain, especially between Mandurah and Busselton, include the Honey Possum and Pygmy Possum (Dell 2000).

While the study site is not located on the Swan Coastal Plain, Bush Forever species, if present should be taken into consideration when determining an areas fauna value to ensure actions are taken that will aid in their continued existence in the region. Bush forever decreaser species are indicated as such within the species list held in Appendix A.



## 4. SURVEY CONSTRAINTS

The fauna assessment was designed and carried out to conform with a Level 2 survey as defined in EPA Guidance statement No. 56 (EPA 2004). The assessment has included a desktop analysis aimed at providing a list of expected species, a site reconnaissance survey aimed at habitat assessment and opportunistic fauna observations in addition to a detailed (Level 2) survey specifically targeting nest habitat of Carnaby's Black Cockatoo and the inland subspecies of the Western Rosella. Based on advice received from the DoE no fauna trapping or seasonal sampling was required and therefore not conducted.

The lack of observational data on some species should not be taken as necessarily indicating that a species is absent from the site. However, where species are eluded to as potentially present, this is stated in the context of suitable habitat being present and the possibility exists that the species may not be detected during field investigations due to:

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

In recognition of survey limitations a precautionary approach has been adopted for this assessment. Any species that would possibly occur within the study area as identified through ecological databases, publications and the habitat knowledge of the author has been assumed to potentially occur in the study area.

Field survey work was carried out by Greg Harewood on the 23<sup>rd</sup> and 24<sup>th</sup> of January 2007 and included repeated close spaced traverses across the site specifically looking for Cockatoo and Rosella nest habitat, in addition to opportunistic observations for fauna. In total about 10 hours was spent surveying the site.

Greg Harewood (B.Sc, Zoology UWA 1984) has conducted a significant number of fauna assessment surveys in Western Australia including areas of the Pilbara, the south west, mid west and the Nullarbor. In addition to this survey he has conducted 8 other targeted surveys for Black Cockatoo nest hollows at Clackline, Wundowie, Whitby, Dunsborough, Eagle Bay, Borden, Moora and Kukerin.

Fauna survey limitations and constraints are summarised in Table 3.



Potential Constraint	Survey Limitation (Yes/No) Significant Moderate Negligible	Comments on Survey Outcomes
Competency/Experience of the consultant carrying out the survey;	No	Consultant Zoologist that executed the survey has conducted many level 1 and level 2 surveys in WA and can be regarded as suitably qualified.
Scope	No	Consistent with DoE request, a targeted survey for Cockatoo and Rosella nest habitat was conducted. General habitat assessment and opportunistic surveys for other species was also carried out to enable a potential species list to be compiled. No constraints encountered.
Proportion of fauna identified, recorded and/or collected	Moderate	No trapping or seasonal sampling was requested by DoE and only opportunist observations/captures were made. Evidence (sighted/scats/signs) of about 18% of listed potential vertebrate species were made. It should be noted that the potential species list is very likely an over estimation of the species that use the proposal area on a regular basis.
Sources of information	No	No data collected from previous surveys of the site is known to exist. This lack of information is however not thought to be of significance with respect to the nest habitat assessment.
The proportion of the task achieved and further work	No	Nest habitat assessment over the entire site was carried out in detail and no further work is considered necessary in this respect.
Timing/weather/season/cycle	Moderate	The survey was conducted in early January 2007. Timing of the survey during cockatoo/rosella breeding season would provide additional information on the quality of habitat present if required.
Disturbances (e.g. fire, flood, accidental human intervention etc.) which affected results of survey	No	No disturbances occurred.
Intensity (in retrospect, was the intensity adequate)	No	Survey was adequate and consisted of close spaced traverses over entire site, several times.
Completeness (e.g. was relevant area fully surveyed);	No	Entire proposal area surveyed in detail several times.
Resources (e.g. degree of expertise available in animal identification to taxon level);	No	No unresolved problems/uncertainties arose with respect to identifying observed fauna species or fauna habitat. Consulting Zoologist experienced with WA fauna species/habitat.
Remoteness and/or access problems;	No	Proposal area was easily accessed
Availability of contextual (e.g. biogeographic) information on the region.	No	WAM, DEC, Birds Australia and DEW databases and specialist books/publications on the fauna of the region were consulted.

#### Table 3: Fauna Survey Limitations and Constraints



### 5. RESULTS

### 5.1 FAUNA HABITAT ASSESSMENT

#### 5.1.1 Regional Biological Context

The project area is situated in the southern section of the Avon Wheatbelt (P2) Bioregion. The Avon Wheatbelt P2 Bioregion is a subset of the original Avon Wheatbelt (AW) Bioregion defined in IBRA Version 5.1. Within this document the AW Bioregion is described as being an:

"Area of active drainage dissecting a Tertiary plateau in Yilgarn Craton. Gently undulating landscape of low relief. Proteaceous scrub-heaths, rich in endemics, on residual lateritic uplands and derived sandplains; mixed eucalypt, Allocasuarina huegeliana and Jam-York Gum woodlands on Quaternary alluvials and eluvials. Semi-arid (Dry) Warm Mediterranean. The south eastern boundary has been modified incorporating a small portion into the Mallee region. Extensively cleared for agriculture." (Thackway and Cresswell, 1996; IBRA, 2000).

The IBRA is used as the common unit to compare biological and biophysical attributes. Bioregions represent a landscape based approach to classifying the land surface and each region is defined by a set of major environmental influences which shape the occurrence of flora and fauna and their interaction with the physical environment. Such attributes are; climate, lithology/geology, landform, vegetation, flora and fauna, and landuse.

#### 5.1.2 Fauna Habitats within the Study Area

The extent of the broadly defined fauna habitats within the study area are shown in Figure 4 with a description of each given below. Additional information of the vegetation structure can be found in the relevant flora report.

1 Open Wandoo Woodland over Low Open Shrubland: The majority of the site consists of a Wandoo (*Eucalyptus wandoo*) woodland. Density and age of trees varies across the study site to the point of them being absent in some areas. Groundcover (grasses/herbs) and understorey (small shrubs/seedlings) is generally very sparse. Hollows (i.e. suitable for any obligate hollow nesting bird species/other fauna) are common, especially in the southern section of the study area, some in totally dead trees. Fallen logs are uncommon/rare though some large ones are present. Canopy continuity generally poor. Dense leaf litter confined to base of trees. Considerable areas of bare ground in sparsely treed areas. Shows signs of historical and ongoing disturbance e.g. logging, tracks, scrapes, and rubbish. Soil consists of a sandy clay. Plates 1 to 3.



2 Woodland/Open Forest: The central section of the study area is dominated by a species of Eucalypt (possibly a species of mallet). The trees form a relatively dense stand with a partly continuous canopy that is evident on the air photo. Hollows are very rare and when present very small in size. Understorey species and groundcover is almost totally absent. Fallen logs absent. Considerable leaf litter present. Plate 4.

#### 5.1.3 Nest Habitat Assessment

The entire study area was surveyed for potential Carnaby's Black Cockatoo and Western Rosella nest habitat on the 23<sup>rd</sup> and 24<sup>th</sup> of January 2007. The location of hollows considered potential nest habitat for either species are shown in Figure 5. Details on the hollows observed are held in Appendix C.

A total of 42 trees with hollows were identified, with a significant number of the trees containing more than one. At least twenty three of the trees contain hollows with entrances between 5 and 12 cm wide, and can be considered potentially suitable for Western Rosellas. Nineteen trees contain hollows with entrances greater than 12cm in diameter. These trees represent potential Cockatoo nest habitat (and in some cases Western Rosella habitat). No evidence was found to suggest that any of the hollows had been or were currently in use by either of the targeted species.

As previously mentioned the number of hollows identified as potentially suitable is very likely an over estimation of those that are actually suitable as full characteristics of each hollow was not determined. The existence of suitable hollows, even in breeding areas does not necessarily make them available for breeding as hollows must be spatially, structurally and temporally correct (Johnstone R. E & C, 2004). It should also be noted that while there has been a selective loss of large eucalypts in the western wheatbelt a shortage of hollows has not yet become evident (Garnett and Crowley 2000, CALM 2005). Nest hollow availability, though not currently limiting, is likely to be so in the future, especially if competition with Galahs *Eolophus roseicapillus* increases (Saunders and Ingram, 1987, 1998).

Of particular importance to the breeding success of Carnaby's Black Cockatoo is the presence of sufficient areas of sandplain heath (kwongan) adjacent to the nest sites ("within 12km" CALM 2005) to provide the necessary food for the population. In a comparison of the breeding success of Carnaby's Black-Cockatoo at five sites, it was found that sites with extensive areas of native vegetation had greater breeding success than sites where little native vegetation remained after clearing for agriculture (Saunders 1986, Saunders & Ingram 1987).



Although there may be a surplus of trees with hollows of sufficient size at some sites, clearing of native vegetation has left little heathland adjacent to the remaining woodlands (Cale 2003). The study site itself does not contain heathlands suitable for breeding Carnaby's Cockatoo to feed upon. The site also contains very little Casuarina, a favoured food source for the Western Rosella, the clearing of which is suspected to have contributed to the decline of this species in the wheatbelt (Garnett and Crowley 2000).

#### 5.2 FAUNA INVENTORY

#### 5.2.1 Opportunistic Fauna Surveys

The results of the opportunistic fauna survey carried out by the Author on the 23<sup>rd</sup> and 24<sup>th</sup> of January 2007 are summarised in Table 4 and listed in Appendix A. A total of 28 fauna species were observed (or positively identified from scats, tracks, skeletons or calls) within the study area during the reconnaissance survey, two of which are introduced feral species. A single listed threatened species (inland subspecies of the Western Rosella) and a single priority species (White-browed Babbler - Western spp) were observed. No migratory species were seen within the study area. Eight bush forever decreaser bird species were sighted.

#### 5.2.2 Potential Fauna

Table 4 summarises the numbers of potential species based on vertebrate class. A complete list of terrestrial vertebrate fauna possibly inhabiting or frequently the study area is held in Appendix A.

Details on specially protected and priority species expected and/or listed as potentially occurring in the general area are given in the section 5.2.3.

Not all species listed as potentially occurring within the study area (based on searches of the EPBC Act's Threatened Fauna and Migratory species lists, DEC's Threatened Fauna Database and various publications) are shown in the expected listing in Appendix A. Some species have been excluded from this list based largely on the lack of suitable habitat within the study area. Explanations on specific omissions of significant species are provided below.

Despite the omission of some species it should be noted that the list provided is still very likely an overestimation of the fauna species utilising the site (either on a regular of infrequent basis) as a result of the precautionary approach adopted for the assessment.



Group	Total number of potential species	Number of specially protected species	Number of priority /migratory species	Number of species observed
Amphibians	2	0	0	0
Reptiles	36	1	1	1
Birds	97 <sup>3</sup>	5	3	24 <sup>1</sup>
Mammals	23 <sup>5</sup>	2	0	3 <sup>1</sup>

Table 1: Summary	of Dotontial E	Found Species	(Ac listed in	$\Lambda$ n n o n d i $\chi$ $\Lambda$
Table 4. Summary	JI F Olenilai I	aulia Species	(AS IISIEU III	Appendix A)

Note: Some species fall into more than one category of protection, Superscript indicates number of introduced species making up total.

#### 5.2.3 Fauna of Conservation Significance

A search of EPBC Act's Threatened Fauna list, DEC's Threatened Fauna Database and Priority List and scientific publications identified 21 specially protected, priority or migratory fauna species as possibly occurring in the general study area. A brief account of these species with details on their distribution and habitat preference are given below.

Some species have been omitted from the listing of potential species held in Appendix A. Omissions are generally made because of a lack of suitable habitat being present within the study area though some are made if the species in question is known without doubt to be locally extinct. Of the 21 species discussed, eleven are listed as potentially utilising/frequenting the study site, even if only infrequently or as vagrants.

#### Southern Carpet Python Morelia spilota impricata

<u>Status and Distribution</u>: The south western population is classified as Priority 4 by DEC and is also listed in Schedule 4 under the *WC Act (1950)*. This sub species has wide distribution within the south west but is uncommon. Occurs north to Geraldton and Yalgoo and east to Pinjin, Kalgoorlie, Fraser Range and Eyre (Storr *et al*, 2002).

<u>Habitat</u>: This species has been recorded from semi-arid coastal and inland habitats, Banksia woodland, Eucalypt woodlands, and grasslands. It commonly utilises hollow logs for shelter.

<u>Likely presence in study area</u>: Most recent DEC database records from Ewlyamartup/Coyrecup (~23km NE) in 1996, so its presence within the general



area cannot be discounted. General lack of ground cover and hollow logs makes the majority of the site marginal/unsuitable for this species to persist. If present, population densities can be expected to be very low.

<u>Potential impact of proposed development</u>: Potentially present though unlikely to persist on site on a permanent basis due to marginal habitat. No significant impact on this species is anticipated. If present in general area will persist in adjoining bush remnants.

#### Great Egret Ardea alba

<u>Status and Distribution</u>: This species of egret is listed as migratory under the *EPBC Act (1999)* and under international agreements to which Australia is a signatory. The Great Egret is common and very widespread in any suitable permanent or temporary habitat (Morcombe 2003).

Species or species habitat listed as likely to occur in general area within EPBC database search.

<u>Habitat</u>: Wetlands, flooded pasture, dams, estuarine mudflats, mangroves and reefs (Morcombe 2003).

<u>Likely presence in study area</u>: No habitat within study area is suitable for this species. Not listed as a potential species.

Potential impact of proposed development: No impact on this species is anticipated.

#### Cattle Egret Ardea ibis

<u>Status and Distribution</u>: This species of egret is listed as migratory under the *EPBC Act 1999* and under 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 2003).

Species or species habitat listed as likely to occur in general area within EPBC database search.

<u>Habitat</u>: Moist pastures with tall grasses, shallow open wetlands and margins, mudflats (Morcombe 2003).

<u>Likely presence in study area</u>: No habitat within study area is suitable for this species. Not listed as a potential species.

<u>Potential impact of proposed development</u>: No impact on this species is anticipated.



#### White-bellied Sea Eagle Haliaeetus leucogaster

<u>Status and Distribution</u>: This species is listed as migratory under the *EPBC Act* (1999) and 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 2003).

Species or species habitat listed as likely to occur in general area within EPBC database search.

<u>Habitat</u>: They nest and forage usually 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 2003). White-bellied Sea-Eagles build a large stick nest, which is used for many seasons in succession.

<u>Likely presence in study area</u>: This species is unlikely to utilise or even fly over the site due to its position well away from any suitable habitat. Not listed as a potential species.

Potential impact of proposed development: No impact on this species is anticipated.

#### Peregrine Falcon Falco perigrinus

<u>Status and Distribution</u>: This species is listed as Schedule 4 under the *WC Act 1950*. 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).

<u>Habitat</u>: Diverse from rainforest to arid shrublands, from coastal heath to alpine (Morcombe 2003). 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.

<u>Likely presence in study area</u>: The species potentially utilises some sections of the study area as part of a much larger home range.



<u>Potential impact of proposed development</u>: Loss of any existing nest sites has the potential to impact on this species. No existing or potential nest sites were observed during the site survey. This species will not suffer any impact as a result of the proposed development.

#### Hooded Plover Charadrius rubricollis

<u>Status and Distribution</u>: Listed as Priority 4 by DEC. Southern Coasts and saltlakes north to Port Gregory, Three Springs, Mt Gibson, Lake Brown, lake Barlee, Lake Cowan and Eyre (Johnstone and Storr 1998).

<u>Habitat:</u> Margins and shallows of saltlakes, sandy and seaweedy beaches and estuaries, also dams (Johnstone and Storr 1998).

<u>Likely presence in study area</u>: While the area falls within this species range its preference for salt lakes and beaches means that it is a very unlikely visitor to the study area as no suitable habitat is present. DEC records from Ewlyamartup/Coyrecup (~23km NE). Not listed as a potential species.

<u>Potential impact of proposed development</u>: No impact on this species is anticipated.

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

<u>Status and Distribution</u>: Carnaby's Black Cockatoo is listed as Scheduled 1 under the *WAWC Act (1950)* and as Endangered under the *EPBC Act (1999)*. 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).

<u>Habitat</u>: Mainly proteaceous scrubs and heaths and adjacent eucalypt woodlands and forests; also plantations of *Pinus* spp. since the early 1930s. Attracted to seeding *Banksia*, *Dryandra*, *Hakea*, *Eucalyptus*, *Grevillea*, *Pinus* and *Allocasuarina* spp., flowering *Dryandra* sessilis, *D.* quereifolia, *Lambertia inermis*, *Banksia* grandis, *Eucalyptus* spp., *Grevillea* sp., and *Calistemon* spp. and also to fruiting almonds and the seeds of corkscrew grass *Erodium* sp. Roosting reported in flat-topped yates *Eucalyptus* occidentalis (Johnstone and Storr 1998). Breeding occurs mainly in winter/spring mainly in eastern forest and wheatbelt where they can find mature hollow bearing trees to nest in (Morcombe 2003). As its breeding habitat in the wheatbelt has diminished it has expanded its breeding range westward and southwards over the past fifty years into northern parts of the Darling Scarp, Swan Coastal Plain and deep south-west (Johnstone, R.E. & C and Kirkby, 2005)



<u>Likely presence in study area</u>: The study site falls within the known range of this species and it s likely to be a relatively frequent visitor to the general area. The results of the detailed nest habitat survey showed that a significant number of trees within the study site have the potential to provide suitable nest hollows for this species though no actual evidence of use was found.

<u>Potential impact of proposed development</u>: The most significant impact on this species of cockatoo has been the loss of sandplain heath (kwongan) in areas close to ("within 12km" CALM 2005) established breeding sites. The study site does not contain heath of this type and therefore no impact in this respect will occur.

Within the wheatbelt there has also been a selective loss of large eucalypts, which provide nesting trees for this species. Despite the significant decline in tree numbers, a shortage of hollows has not yet become evident (Garnett and Crowley 2000, CALM 2005). Nest hollow availability, though not currently limiting, is likely to be so in the future, especially if competition with Galahs *Eolophus roseicapillus* increases (Saunders and Ingram, 1987, 1998).

The proposed development will require the clearing of potential nest hollows which therefore has the potential to contribute to the overall reduction in suitable tree hollows even though the loss is not considered significant, if information form researchers is considered. The site does not contain heathlands suitable for breeding birds. These feeding resources are most likely to determine the population size of the species in any one region during breeding season. The degree and management of the loss of potential nest habitat is discussed in more detail later in this report.

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

<u>Status and Distribution</u>: Listed as Scheduled 1 under the *WAWC Act (1950)* and as Vulnerable under the *EPBC Act (1999)*. 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).

<u>Habitat</u>: Mainly eucalypt forests where it feeds primarily on the Marri seeds, (Morcombe 2003), Banksia, Hakea and *Erodium* sp. Also strips bark from trees in search of beetle larvae (Johnstone and Storr 1998).

<u>Likely presence in study area</u>: The study site is on the extreme eastern margin of this species documented range and it is probably only a rare visitor. Listed as a potential species.



<u>Potential impact of proposed development</u>: As this species is only likely to visit the general area very infrequently and is unlikely to breed here, no impact is anticipated.

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

<u>Status and Distribution</u>: This species is listed as Scheduled 1 under the *WAWC Act (1950)*. 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).

<u>Habitat</u>: Eucalypt forests, feeds on Marri, Jarrah, Blackbutt, Karri, Sheoak and Snottygobble. Breeding commences in winter/spring (Johnstone and Storr 1998).

<u>Likely presence in study area</u>: The study site is on the extreme eastern margin of this species documented range and it is probably only a rare visitor. Listed as a potential species.

<u>Potential impact of proposed development</u>: As this species is only likely to visit the general area very infrequently and is unlikely to breed here, no impact is anticipated.

#### Western Rosella (Inland ssp) Platycercus icterotis xanthogenys

<u>Status and Distribution</u>: The inland sub species of the Western Rosella is listed as Scheduled 1 under the *WAWC Act (1950)*. At present rare to moderately common (Johnstone and Storr 1998). Local extinctions have occurred in 25% of local government authorities, representing about 40% of the total range, mostly in the north and east (Saunders and Curry 1990, Saunders and Ingram 1995, Mawson and Long 1996, Mawson and Johnstone 1997). Still declining in wheatbelt, but stable in western woodland and forest (Mawson and Johnstone 1997). Distribution is within the semiarid southern interior: Wongan Hills (formerly), Kununoppin, Moorine Rock, Parker Range, Yardina Rock and Ten Mile Rocks, west to Toodyay, the Dale River, Mt Saddleback and Kojonup, and south to the Stirling Range, lower Fitzgerald River, Ravensthorpe, Frank Hann National Park and Red Lake; casual further north (Mt Jackson, Karalee, Gnarlbine Rock) (Johnstone and Storr 1998).

<u>Habitat</u>: Mainly eucalypt and casuarina woodlands and scrubs, especially of wandoo, flooded gum, salmon gum, tall mallees and *Allocasuarina huegeliana*. Attracted to seeding *E wandoo*, *A. huegeliana*, *Glischrocaryon flavescens* and *Olearia revoluta* and to flowering *Melaleuca acuminata* and *Eucalyptus eremophilra* (Johnstone and Storr 1998).



<u>Likely presence in study area</u>: A male of this sub species was identified within the study area during the survey period. Two other individuals (females) were also sighted but it was unclear what sub-species they represented or if in fact they were hybrids. The most recent DEC record for the general area is from Coyrecup NR in 1985 but the Birds Australia Atlas (Barrett *et al* 2003) suggests numerous sightings have been made in the broader region in more recent times. The results of the detailed nest habitat survey showed that a significant number of trees within the study site have the potential to provide suitable nest hollows for this species though no actual evidence of use was found.

<u>Potential impact of proposed development</u>: Loss of foraging habitat has the potential to impact on this species. The study site contains very little of one of this species favoured food sources, Casuarina and therefore no impact in this respect is anticipated if the proposal proceeds.

As with Cockatoos, there has been a selective loss of medium to large eucalypts, which provide nesting trees for this species throughout the wheatbelt. Despite the significant decline in tree numbers, a shortage of hollows has not yet become evident (Garnett and Crowley 2000). The proposed development will require the clearing of potential nest hollows which therefore has the potential to contribute to the overall reduction in suitable tree hollows even though the loss is not considered significant. The degree and management of the loss of potential nest habitat is discussed in more detail later in this report.

#### Barking Owl Ninox connivens connivens

<u>Status and Distribution</u>: Listed as Priority 2 by DEC. Found north to Perth (formerly) and east to Northam, Katanning and nearly to Bremer Bay. Declining in south west (Johnstone and Storr 1998).

<u>Habitat</u>: Dense vegetation, especially forest and thickets of waterside vegetation such as melaleucas (Johnstone and Storr 1998). Roosts in tree hollows.

<u>Likely presence in study area</u>: No DEC records for general area since 1897. Habitat appears unsuitable due to lack of tree density/wetlands though some hollows suitable for roosting are present. Not listed as a potential species.

Potential impact of proposed development: No impact on this species is anticipated.



#### Fork-tailed Swift Apus pacificus

<u>Status and Distribution</u>: The Fork-tailed Swift is listed as migratory under the *EPBC Act 1999* and under international agreements to which Australia is a signatory. It is a summer migrant (Oct-Apr) to Australia (Morcombe 2003).

Species or species habitat listed as likely to occur in general area within EPBC database search.

<u>Habitat</u>: Low to very high airspace over varied habitat from rainforest to semi desert (Morcombe 2003).

<u>Likely presence in study area</u>: It is potentially a very rare summer visitor to the study area but is entirely aerial and largely independent of terrestrial habitats.

<u>Potential impact of proposed development</u>: No impact on this species is anticipated as it is likely to be only an infrequent visitor to the general area and utilises a broad range of habitats. Not listed as a potential species.

#### Rainbow Bee-eater Merops ornatus

<u>Status and Distribution</u>: This species is listed as migratory under the *EPBC Act* (1999) and under 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 2003).

<u>Habitat</u>: Open Country, of woodlands, open forest, semi arid scrub, grasslands, clearings in heavier forest, farmlands (Morcombe 2003). Breeds underground in areas of suitable soft soil firm enough to support tunnel building.

<u>Likely presence in study area</u>: Likely to be relatively common in general area during seasonal migration period.

<u>Potential impact of proposed development</u>: No impact on this species is anticipated. This species is widespread and seasonally common in the south west. Extensive areas of suitable habitat are present in surrounding areas and the species will continue to utilise the site subsequent to development proceeding.

#### White-browed Babbler Pomatostomus superciliosus asbyi

<u>Status and Distribution</u>: This sub-species of the White-browed Babbler is listed as Priority 4 by DEC. Uncommon to common. Mainly arid and semi arid zones south of the tropic but not the Nullarbor Plain, Esperance Plain or near coastal sandplains between Murchison and Hill Rivers (Johnstone and Storr 2004).



<u>Habitat</u>: Drier, more open forest with shrubby understorey, mallee, mulga scrubs (Simpson & Day 2004). In arid, semiarid zones, edges of most types of thicket and scrub, including mulga, wattle and other acacia thickets, shrubby understorey of eucalypt and casuarina woodlands, mallee and tea-tree scrubs, bushy understorey of bloodwood and river gum flats, thickets of *Acacia rostellifera* and *Melaleuca* spp., partly cleared tracts of dense bush and uncleared road verges in farmlands. In humid south mainly understorey of karri *Eucalyptus diversicolor* forest (Johnstone and Storr 2004).

<u>Likely presence in study area</u>: Sighted using a small area of Rock Sheoak along the eastern boundary of the study area during the reconnaissance survey. There appears to be numerous records for the general area in the Birds Australia atlas (Barrett *et al* 2003). Most recent record on the DEC data base is from Ewlyamartup (~20km NE) in 1987. The vast majority of habitat within study area appears unsuitable for this species to use on a regular basis due to its relatively open nature. Within the study area Casuarina, in which individuals were sighted, is confined to a few scattered trees/tall shrubs and one small patch on the eastern boundary.

<u>Potential impact of proposed development</u>: May utilise a small area of the site at times but no significant impact on this species is anticipated. Extensive areas of remnant vegetation adjoining the site appears more suited for this species and it will persist here.

#### Western Whipbird (Southern ssp) Psophodes nigrogularis oberon

<u>Status and Distribution</u>: Listed as Priority 4 by DEC. Uncommon to moderately common (Johnstone and Storr 2004). At least half the habitat of this subspecies has been cleared for agriculture and the subspecies exists at only 12 known locations, and although the area of occupancy appears to have been reduced to about 800 km2 and may still be declining, the population is not severely fragmented. Found in south-western Western Australia with scattered subpopulations between Munglinup east of Ravensthorpe west to at least Cape Riche on the coast and inland to Sukey Hill, east of Cranbrook and north to Lake Grace (McNee, 1986, Cale and Burbidge, 1993). Largest subpopulations in Fitzgerald and Stirling Ranges National Parks (Cale and Burbidge, 1993).

<u>Habitat</u>: Mainly mallee and banksia scrubs; heathlands 1-2m high with *Melaleuca, Calothamnus, Isopogon, Hakea* and mallees. Also dense regrowth resulting from fire (Johnstone and Storr 2004). Domed nests, in which two eggs are laid, are built in dense vegetation (Blakers et al. 1984, Smith 1991).

<u>Likely presence in study area</u>: Most recent DEC record is from Coyrecup in 1963. No recent DEC or Birds Australia Atlas (Barrett *et al* 2003) records for



the immediate vicinity and the species is very likely locally extinct. Habitat within study area appears unsuitable.

<u>Potential impact of proposed development</u>: No impact on this species is anticipated. Not listed as a potential species.

#### Crested Shrike Tit Falcunculus frontatus leucogaster

<u>Status and Distribution</u>: Listed as Priority 4 by DEC. Occurs mainly in southern subhumid and semiarid interior from Moora, Kodj Kodjin, Narembeen, Bank Rock and Newman Rock, south to Pemberton, Lake Muir, Porongurup Range, lower Fitzgerald River, Forrestania, Maggie Hays Hill and Little Jam Hill and west to Julimar, Christmas Tree Well, Mt Saddelback and Boyup Brook (Johnstone and Storr 1998).

<u>Habitat</u>: Woodlands, scrubs and more open forest of Eucalypts, including Wandoo, (Johnstone and Storr 1998).

<u>Likely presence in study area</u>: Despite no DEC records appears to be some sightings from general area in the Birds Australia Atlas (Barrett *et al* 2003) and habitat appears suitable (i.e. Wandoo Woodland). Listed as a potential species.

<u>Potential impact of proposed development</u>: No impact on this species is anticipated. Extensive areas of remnant vegetation adjoining the site is similar in nature (with respect to the presence of Wandoo) and if the species is present in general area it will persist here.

#### Chuditch Dasyurus geoffroii

<u>Status and Distribution</u>: Listed as Scheduled 1 under the *WC Act (1950)* and as Vulnerable under the *EPBC Act (1999)*. 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.

<u>Habitat</u>: 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<sup>2</sup> whilst that for females is 3-4 km<sup>2</sup> (Sorena and Soderquist 1995).



<u>Likely presence in study area</u>: Most recent DEC record for this species in the Broomehill area is a dead specimen at Katanning in 1990. Presence within the general area at times can therefore not be discounted though lack of sightings suggest very low population densities. Study site itself lack substantial suitable daytime refuges, with only a small number of large hollow logs being present and it is unlikely to be utilised on a continual basis. Transient individuals are the most likely to make use of the site as they move between adjoining bush remnants.

<u>Potential impact of proposed development</u>: While listed as a potential species probability that it is present on site very low. Adjacent areas of remnant vegetation will still provide avenue for movement for transient individuals. No significant impact on this species is anticipated.

#### Red-tailed Phascogale Phascogale calura

<u>Status and Distribution:</u> Listed as Scheduled 1 under the WC Act (1950) and as Endangered under the EPBC Act (1999). This species was recorded across much of arid and semi-arid Australia, from western NSW, to central Australia (Tennant Creek), Great Sandy Desert, southwest Western Australia, and parts of southern South Australia. Populations are currently known from several isolated nature reserves in the south-west of Western Australia, from the wheatbelt to the south coast, such as Tutanning, Boyagin, Dryandra, Dongolocking, and Parkeyerring, as well as remnant vegetation on private property. Red-tailed Phascogales have also been recorded on the south coast near Ravensthorpe (DEC information pamphlet).

<u>Habitat</u>: The Red-tailed Phascogale inhabits Wandoo (*Eucalyptus wandoo*) and Sheoak (*Allocasuarina huegeliana*) woodland associations, with populations being most dense in the latter vegetation type. They show a preference for long unburnt habitat with a continuous canopy, as well as tree hollows. Wandoo trees provide excellent nesting sites in the form of hollow logs and limbs, which they line with grass and feathers. Nest sites occur in highly flammable areas, and may often be in dead sheoaks, skirts of live (or stumps of dead) grass trees (*Xanthorrhoea* spp.) (DEC information pamphlet).

<u>Likely presence in study area</u>: While the site contains numerous Wandoo hollows suitable for this species other facets of the habitat are marginal (e.g. canopy connectivity is generally poor and Sheoak is rare). Considered a potential species but if present population densities are expected to be very low.

<u>Potential impact of proposed development</u>: The study site is unlikely to be harbouring a significant population of this species and the impact on it, as a consequence of the proposal proceeding, is anticipated to be negligible.



#### Quenda Isoodon obesulus fusciventer

<u>Status and Distribution</u>: Listed as Priority 5 by DEC. 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 (DEC information pamphlet) and Nambung National Park (DEC pers. coms.)

<u>Habitat</u>: 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 will thrive in more open habitat subject to exotic predator control (DEC information pamphlet).

<u>Likely presence in study area</u>: No DEC database records. Habitat within the study area is unsuitable for this species due to a lack of dense groundcover. Not listed as a potential species

<u>Potential impact of proposed development</u>: No impact on this species is anticipated as it is very unlikely to utilise the site.

#### Quokka Setonix brachyurus

<u>Status and Distribution</u>: Listed as Scheduled 1 under the *WC Act* (1950) and as Vulnerable under the *EPBC Act* (1999). 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.

Species or species habitat listed as likely to occur in general area within EPBC database search.

<u>Habitat</u>: 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

<u>Likely presence in study area</u>: Not present as the habitat is unsuitable to maintain a population of this species.



<u>Potential impact of proposed development</u>: No impact is anticipated as this species is very unlikely to be present. It is not listed in this report as a potential species.

#### Western Brush Wallaby Macropus irma

<u>Status and Distribution</u>: Listed as Priority 4 by DEC. The Western Brush Wallaby is distributed across the south-west of Western Australia from north of Kalbarri to Cape Arid (DEC information pamphlet).

<u>Habitat</u>: 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. Uncommon in karri forest (DEC information pamphlet).

<u>Likely presence in study area</u>: No DEC database records. Lack of sightings suggests the species is locally extinct.

<u>Potential impact of proposed development</u>: No impact is anticipated as this species is very unlikely to be present. It is not listed in this report as a potential species.

#### 5.2.4 Other Species of Significance

Fourty species of birds potentially frequent or occur in the study area that are noted as Bush Forever Decreaser Species in the Perth metropoltan region, eight of which were sighted during the survey (see Appendix A).

Decreaser species are a significant issue in biodiversity conservation in the Perth section of the Coastal Plain as there have been marked reductions in range and population levels of many sedentary bird species as a consequence of disturbance and land clearing (Dell & Hyder-Griffiths 2002). It can be expected that with increasing pressures on land use, populations and the ranges of some fauna species will further decline in regional areas unless preventative measures are implemented. The impact on these species in the general area is likely to be negligible given the area of impact is relatively small and areas of similar habitat adjoin the area.



### 6. POTENTIAL IMPACTS

The proposed development requires the clearing of at least 7.6ha of vegetation from within Lots 525 to 530. Potential impacts on fauna and fauna habitat in general include:

- Loss of vegetation/fauna habitat,
- Fragmentation of vegetation/fauna habitat,
- Modifications to surface hydrology
- Changes to fire regimes
- Death or injury of fauna during clearing and construction.

Anticipated impacts as a consequence of the proposal on species of conservation significance are discussed in section 5.2.3. The assessment suggests that no species of conservation significance has the potential to be affected directly to any degree by the proposal. The majority of species discussed are considered to be locally extinct or unlikely to use the site on a regular basis largely due to a lack of suitable habitat or because the site is on the extreme limit or just outside their normal range.

Of particular importance it's the potential impact the proposal may have on Carnaby's Black Cockatoo and the inland subspecies of the Western Rosella. The most significant impacts relate to

- the loss trees containing suitable breeding hollows (i.e. nest habitat);
- disturbance to breeding birds during clearing and
- the loss of foraging habitat, particularly for breeding birds.

The assessment survey reported on here established that the proposal site contains a significant number of trees with hollows potentially suitable for Carnaby's Black Cockatoos and the inland subspecies of the Western Rosella to utilise. With the exception of Wandoo the site does not contain vegetation that would be considered significant/critical foraging habitat for either species, especially those vegetation types favoured by these species during breeding season i.e. kwongan heath or Casuarina woodlands.


# 7. MANAGEMENT

If the proposal proceeds the potential impacts of the development can be minimised or prevented with the implementation of some or all of the recommendations outlined below:

It is recommended that:

- Where possible retain and protect remnant vegetation on site that does not require clearing, including single, dead or isolated trees.
- Clearing should be conducted outside the known breeding season of Carnaby's Black Cockatoo (breeding around early July to December) and the inland spp of the Western Rosella (about August to November) to avoid disturbing/harming nesting birds.
- Areas to be cleared should be clearly marked and access to other areas restricted to prevent accidental clearing.
- Design additional project infrastructure, including access routes, vehicle and plant storage and turn around areas etc so that:
  - $\circ$   $\;$  previously disturbed areas should be used where possible; and
  - areas of identified significant vegetation (i.e. trees with hollows) should be avoided if possible.
- No dead, standing or fallen timber should be removed unnecessarily. Logs (hollow or not) and other debris resulting from land clearing should be used to enhance fauna habitat in untouched and rehabilitated areas if possible.
- Revegetation strategies for cleared areas not to be developed should be planned when and where possible (incorporating all CBH owned land at the site, not just current proposal area). Local seed stock that includes cockatoo/rosella food plants should be used in preference to other species. A list of cockatoo food plants is held in Appendix D while Rosellas are know to be attracted to seeding *E wandoo*, *A. huegeliana*, *Glischrocaryon flavescens*. *Olearia revoluta* and to flowering *Melaleuca acuminata* and *Eucalyptus eremophilra*. The selection of suitable species should be carried out after liaison with the local land care group to ascertain which species are most suitable for the Broomehill area.
- The loss of hollow trees has not been identified by researchers as having a significant impact on the abundance of Carnaby's Black Cockatoo and the inland spp of the Western Rosella in wheatbelt areas with feeding resources most likely to determine the population size of



these species in any one region. Despite this fact, the loss of hollows is significant in that suitable trees lost to clearing are not being replaced at a rate that counteracts the ongoing loss. To offset the loss of potential nest hollows from within the proposal site CBH should consider contributing in some way to programs currently operating that are aiming to protect, conserve and increase existing populations of Carnaby's Black Cockatoo in its nesting range. The main project underway is the Carnaby's Black Cockatoo recovery project being operated by Birds Australia (see Appendix D for contact details). One of the aims of the project is to repair and maintain existing tree hollows known to be used by cockatoos.

- A Construction and Operations Fire Management Plan should be prepared. The plan should include a contingency and response plan in the event of any bushfires that commence as a result of the construction works.
- All construction staff should be made aware that native fauna is protected. Personnel working on the project should not be allowed to bring firearms, other weapons or pets onsite.
- Native fauna injured during construction should be taken to a designated veterinary clinic or a DEC nominated wildlife carer.
- Any trenching required for services should be kept open for only as long as necessary and suitable escape ramps and bridging provided if the site is to be left unattended for extended periods. Pipe ends to be sealed to prevent fauna entry. Trenches should be inspected for fauna prior to filling. Fauna encountered should be removed by an experienced fauna handler.
- CBH should become involved in any community Fox baiting programs currently in place.



# 8. LEGISLATIVE OBLIGATIONS

## 8.1 WILDLIFE CONSERVATION ACT 1950

The objective of the *Wildlife Conservation Act 1950* is to provide for the protection of wildlife. The Act is administered by the Executive Director of the Department of Conservation and Land Management, under the direction and control of the Minister for the Environment. Under section 14, "Protection of Fauna", of this Act, all fauna is wholly protected throughout the State at all times, unless declared by the Minister by notice in the Government Gazette. Under section 14(2)(ba) of The Act, Fauna Notices are made by the Minister for the Environment listing specially protected fauna.

Disturbance or destruction of any native fauna over and above that reasonably required for construction works and access is considered an offence under the Act and necessary steps should be taken to inform mine personnel of this fact. The developer should also, as part of their management plan implement procedures that will reduce the chances of wildlife being injured or killed during clearing and construction on the site.

#### 8.2 COMMONWEALTH ENVIRONMENTAL PROTECTION & BIODIVERSITY CONSERVATION ACT 1999

A number of fauna species known to or potentially present within the general study area are listed under the federal *Environmental Protection and Biodiversity Conservation Act* (EPBC Act, 1999). 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. Of particular importance is the impact the proposal may have on Carnaby's Black Cockatoo which is listed as endangered under the EPBC Act.

If an action (i.e. the proposed development) is deemed to have a potential significant impact (taking into consideration the EPBC Act "Principal Significant impact Guidelines 1.1" - DEW 2006) on listed species a referral to the Department of Environment and Water Resources (DEW) is required.

A series of significant impact criteria are listed in the "Principal Significant impact Guidelines 1.1" document. The criteria most likely to trigger the requirement for a referral relevant to the proposal relates to any adverse effect the development will possibly have on habitat critical to the survival of the species (i.e. Carnaby's Black Cockatoo). Critical habitat is defined in the EPBC Act as habitat critical to the survival of a listed threatened species or community. Habitat is defined as the biophysical medium or media:



(a) occupied (continuously, periodically or occasionally) by an organism or group of organisms; or

(b) once occupied (continuously, periodically or occasionally) by an organism, or groups of organisms, and into which organisms of that kind have the potential to be reintroduced.

Critical habitat for the Carnaby's Black-Cockatoo is yet to be determined; however Cale (2003) lists the following which should be considered critical habitat:

1) Remaining woodland breeding sites in the south west of Western Australia, and feeding and watering areas used during the breeding period;

2) Woodland sites known to have supported breeding in the past and which could be used in the future if new food resources are established; and

3) Coastal kwongan (heath) and other areas where the cockatoos feed when not breeding,

Taking into consideration the above mentioned criteria it is considered by the Author that the proposed action possibly contains critical habitat as defined by section (2) above, as even if Cockatoos no longer use the site it is highly probable they once did. It is therefore considered prudent that a referral be submitted so that a review of the project by the DEW can be conducted.

Besides Carnaby's Black Cockatoo, no other listed EPBC Act species has the potential to be significantly impacted by the proposal.



## 9. CONCLUSION

The assessment survey reported on here established that the proposal site contains a significant number of trees with hollows potentially suitable for Carnaby's Black Cockatoos and the inland subspecies of the Western Rosella to utilise, though no signs of actual use by these species was observed. With the exception of Wandoo the site does not contain vegetation that would be considered significant/critical foraging habitat for either species, especially those vegetation types favoured by these species during breeding season i.e. kwongan heath or Casuarina woodlands.

As the project has some potential to impact on EPBC Act defined "critical" habitat it is considered prudent that a referral be submitted to the DEW so that a review of the project can be conducted.

Anticipated impacts as a consequence of the proposal on other species of conservation significance are discussed in section 5.2.3. The assessment suggests that no species of conservation significance has the potential to be affected to any degree by the proposal. The majority of species discussed are considered to be locally extinct or unlikely to use the site on a regular basis largely due to a lack of suitable habitat or because the site is on the extreme limit or just outside their normal range.

A management plan is proposed that principally aims to reduce the impact on any retained vegetation while reducing the potential for fauna to be killed or injured during the clearing and construction phase. It is recommended that CBH carry out selective rehabilitation of undeveloped sites with plant species considered suitable cockatoo/rosella food plants to enhance retained habitat on site. It is also suggested that CBH contribute in some way to ongoing cockatoo recovery programs currently in place through out the wheatbelt to help offset the loss of potential nest hollows on site.



## **10. REFERENCES**

(not necessarily cited)

Aplin, K.P. and Smith, L.A. (2001). Checklist of the frogs and reptiles of Western Australia, Records of the Western Australian Museum Supplement No. 63, 51-74.

Barrett, G. *et al* (2003). The New Atlas of Australian Birds. Royal Australian Ornithologists Union, Hawthorn East.

Blakers, M., Davies, S. J. J. F. and Reilly, P. N. (1984). The Atlas of Australian Birds. RAOU and Melbourne University Press, Melbourne.

Burbidge, A. (2004). Threatened Animals of Western Australia, CALM, Kensington, Western Australia.

Bush, B., Maryan, B., Browne-Cooper, R. & Robinson, D. (2002). Reptiles and Frogs of the Perth Region. UWA Press, Nedlands.

Cale, B. (2003). Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan 2002-2012. CALM, Wanneroo.

Cale, P. G. and Burbidge, A. H. (1993) Research Plan for the Western Ground Parrot, Western Whipbird and Western Bristlebird. Report to Australian National Parks and Wildlife Service.

CALM (2005). Fauna Note No. 05/2005 Carnaby's Cockatoo, Written by Tamra Chapman, Belinda Cale and Marion Massam. CALM, Wanneroo

Christidis, I. and Boles, W.E. (1994). The Taxonomy and Species of Birds of Australia and its Territories. RAOU, Monograph 2.

Cogger, H.G., (1975). Reptiles and Amphibians of Australia. Reed, Sydney

DEH (2006), EPBC Act - Principal Significant impact Guidelines 1.1, Matters of National Environmental Significance. EPBC Act Policy Statement

Dell, J. (2000). A Draft Summary of the Fauna Values of the Kemerton Bushland. Unpublished report DEP, Perth.

Department of Conservation and Land Management (2002). A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002.

Environmental Protection Authority (2002). Terrestrial Biological Surveys As An Element of Biodiversity Protection. Position Statement No. 3. EPA, Perth.



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

Garnett, S.T. and Crowley, G.M. (2000), The Action Plan for Australian Birds. Environment Australia, Canberra, ACT

Glauret, L. (1961). A Handbook of the Lizards of Western Australia. Handbook 6, Western Australian Naturalists Club, Perth.

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.

How, R., Cooper, N.K. and Bannister, J.L. (2001). Checklist of the mammals of Western Australia, Records of the Western Australian Museum Supplement No. 63, 91-98.

Johnstone, R.E. (2001). Checklist of the birds of Western Australia, Records of the Western Australian Museum Supplement No. 63, 75-90.

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.

Johnstone, R.E. & C (2004). Review of Baudin's Cockatoo and Forest Red-Tailed Black Cockatoo in South Western Australia with Special Reference to Collie Area – In Bluewater's Power Station PER May 2004 – Appendix C.

Johnstone, R.E. & C and Kirkby, T (2005). Impact Assessment of Roadside Vegetation for Realignment and Widening Works on Section of Great Northern Highway (Bindoon South) on Carnaby's Cockatoos. Unpublished report prepared for KBR.

McNee, S. (1986). Surveys of the Western Whipbird and Western Bristlebird in Western Australia, 1985. RAOU Rep. 18.



Mawson, P. R. and Johnstone, R. E. (1997). Conservation status of parrots and cockatoos in Western Australia. Eclectus 2:4-9.

Mawson, P. R. and Long, J. L. (1996). Changes in the status and distribution of four species of parrot in the south of Western Australia during 1970-1990. Pac. Conserv. Biol. 2:191-199.

Morcombe, M. (2004). Field Guide to Australian Birds. Steve Parish Publishing, Archerfiled, Queensland.

Menkhorst, P.and Knight, F. (2001). A Field Guide to the Mammals of Australia. Oxford University Press, Melbourne.

Nevill, S (ed) (2005). Guide to the Wildlife of the Perth Region. Simon Nevill Publications, Perth.

Pearson, D., (1993). Distribution, status and conservation of pythons in Western Australia. In Herpetology in Australia, a Diverse Discipline. Ed. Lunney, D., and D. Ayers. Transactions of the Royal Zoological Society of New South Wales. Surrey Beatty and Sons, Sydney. 383-395.

Saunders, D.A. (1986). Breeding season, nestling success and nestling growth in Carnaby's Black-Cockatoo, Calyptorhynchus funereus latirostris, over 16 years at Coomallo Creek, and a method for assessing the viability of populations in other areas. Australian Wildlife Research 13, 261-273.

Saunders, D.A. and Ingram, J.A. (1987). Factors affecting survival of breeding populations of Carnaby's Black-Cockatoo Calyptorhynchus funereus latirostris in remnants of native vegetation. In: Nature Conservation: The Role of Remnants of Native Vegetation. pp. 249-258. (Eds) D.A. Saunders, G.W. Arnold, A.A. Burbidge & A.J.M. Hopkins, Surrey Beatty & Sons, Chipping Norton

Saunders, D. A. and Curry, P. J. (1990). The impact of agricultural and pastoral industries on birds in the southern half of Western Australia: past, present and future. Proc. Ecol. Soc. Aust. 16:303-321.

Saunders, D. A. and Ingram, J. A. (1995). Birds of Southwestern Australia: An Atlas of Changes in the Distribution and Abundance of the Wheatbelt Avifauna. Surrey Beatty and Sons, Chipping Norton.

Saunders, D. A. and Ingram, J. A. (1998). Twenty-eight years of monitoring a breeding population of Carnaby's Cockatoo. Pac. Conserv. Biol. 4:261-270.

Saunders, D. A., Rowley, I. & Smith, G. T. (1985). The effects of clearing for agriculture on the distribution of cockatoos in the southwest of Western



Australia. In: Birds of Eucalypt Forests and Woodlands: Ecology, Conservation, Management (ed. A. Keast, H. F. Recher, H. Ford and D. Saunders), 309-321. RAOU/Surrey Beatty.

Simpson, K. and Day, N. (2004). Field Guide to the Birds of Australia. Penguin Books, Ringwood.

Smith, G. T. (1985). Fire effects on populations of the Noisy Scrub-bird (Atrichornis clamosus), Western Bristlebird (Dasyornis longirostris), and Western Whipbird (Psophodes nigrogularis). Pp. 95-102 in Fire Ecology and Management of Ecosystems in Western Australia. J. R. Ford (ed.). Western Australian Institute of Technology, Perth.

Sorena M. and T. Soderquist (1995). Western Quoll *Dasyurus geoffroyi*. pp 62-64 in Strahan R. (ed). (1995). The Mammals of Australia. Australian Museum / Reed Books.

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., Smith L.A. and Johnstone R.E. (2000). Frogs of Western Australia, Revised Edition, WA Museum, Perth.

Thackway, R. and Cresswell, I.D. (1995). An Interim Biogeographic Regionalisation for Australia. Australian Nature Conservation Agency, Canberra.

Wilson, S. and Swan, G. (2005) A Complete Guide to Reptiles of Australia. Reed, New Holland, Sydney.



# FIGURES













POTENTIAL FAUNA SPECIES LIST

# Fauna Observed or Potentially in Study Area

Broomehill - Lots 525 - 530

Compiled by Greg Harewood - Jan 2007 Sighted/Heard/Signs = +

Class Family Species	Common Name	Conservation Status	Observed Jan 07
· · · ·			
Amphibians			
Myobatrachidae Ground or Burrowing Frogs			
Myobatrachus gouldii	Turtle Frog	LC	
Pseudophryne guentheri	Güenther`s Toadlet	LC	
Reptiles			
<b>Gekkonidae</b> Geckoes			
Christinus marmoratus	Marbled Gecko		
Crenadactylus ocellatus	White-spotted Gecko		
Diplodactylus granariensis	Wheatbelt Stone Gecko		
Oedura reticulata	Reticulated Valvet Gecko		
Underwoodisaurus milii	Barking Gecko		
Pygopodidae Legless Lizards			
Aprasia pulchella	Pretty Worm Lizard		
Aprasia repens	Sand-plain Worm Lizard		
Delma australis			
Delma fraseri	Fraser's Scale-footed Lizard		
Lialis burtonis	Common Snake Lizard		
Pygopus lepidopodus	Common Scaleyfoot		
<b>Agamidae</b> Dragon Lizards			
Ctenophorus cristatus	Crested Dragon		
Pogona minor	Dwarf Bearded Dragon		

Class	Common	Conservation	Observed
Species	Name	Status	Jan 07
Varanidae			
Monitor's or Goanna's			
Varanus gouldii	Gould's Sand Monitor		
Varanus rosenbergi	Heath Monitor		
Scincidae Skinks			
Cryptoblepharus plagiocephalus	Fence Skink		
Ctenotus impar	South-western Odd-striped	d Ctenotus	
Egernia kingii	King's Skink		
Egernia multiscutata	Bull Skink		
Egernia napoleonis	Salmon-bellied Skink		
Hemiergis peronii	Three-toed Skink		
Lerista distinguenda	South-western Four-toed L	_erista	+
Menetia greyii	Dwarf Skink		
Morethia lineoocellata	Western Pale-flecked More	ethia	
Morethia obscura	Dusky Morethia		
Tiliqua occipitalis	Western Blue Tongue Liza	ard	
Tiliqua rugosa	Bobtail		
<b>Typhlopidae</b> Blind Snakes			
Ramphotyphlops australis	Southern Blind Snake		
Ramphotyphlops pinguis	Stout Blind Snake		
<b>Boidae</b> Pythons, Boas			
Morelia spilota imbricata	Southern Carpet Python	S4 P4 LR/nt	

Class Family Species	Common Name	Conservation Status	Observed Jan 07
<b>Elapidae</b> Elapid Snakes			
Echiopsis curta	Bardick		
Elapognathus coronatus	Crowned Snake		
Parasuta gouldii	Gould's Snake		
Parasuta nigriceps	Black-backed Snake		
Pseudonaja affinis	Dugite		
Simoselaps bertholdi	Jan's Banded Snake		
Birds			
<b>Casuariidae</b> Emus, Cassowarries			
Dromaius novaehollandiae	Emu	Bp LC	
<b>Phasianidae</b> Quails, Pheasants			
Coturnix pectoralis	Stubble Quail	LC	
Accipitridae Kites, Goshawks, Eagles, Harriers			
Accipiter cirrocephalus	Collared Sparrowhawk	Bp LC	
Accipiter fasciatus	Brown Goshawk	Bp LC	+
Aquila audax	Wedge-tailed Eagle	Bp LC	
Aquila morphnoides	Little Eagle	Вр	
Circus approximans	Swamp Harrier	LC	
Elanus caeruleus	Black-shouldered Kite		
Haliastur sphenurus	Whistling Kite	Bp LC	
Hamirostra isura	Square-tailed Kite	Вр	
<b>Falconidae</b> Falcons			
Falco berigora	Brown Falcon	Bp LC	
Falco cenchroides	Australian Kestrel	LC	
Falco longipennis	Australian Hobby	LC	
Falco peregrinus	Peregrine Falcon	S4 Bp LC	

lass Family <sub>Species</sub>	Common Name	Conservation Status	Observeo Jan 07
<b>Turnicidae</b> Button-quails			
Turnix varia	Painted Button-quail	Вр	
Turnix velox	Little Button-quail	LC	
Columbidae Pigeons, Doves			
Columba livia	Domestic Pigeon	Introduced	
Ocyphaps lophotes	Crested Pigeon	LC	
Phaps chalcoptera	Common Bronzewing	Bh LC	+
Phaps elegans	Brush Bronzewing	Bh LC	
Streptopelia senegalensis	Laughing Turtle-Dove	Introduced	+
<b>Cacatuidae</b> Cockatoos, Corellas			
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockat	oo S1 VU Be	
Calyptorhynchus baudinii	Baudin`s Cockatoo	S1 EN Bp EN C	2a(ii)
Calyptorhynchus latirostris	Carnaby`s Cockatoo	S1 EN Bp EN A	2bcd+3b
Eolophus roseicapilla	Galah		+
Psittacidae Parrots			
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	LC	+
Neophema elegans	Elegant Parrot	LC	+
Platycercus icterotis icterotis	Western Rosella (Western ssp)	Bp LC	+
Platycercus icterotis xanthogenys	Western Rosella (Inland ssp)	S1	+
Platycercus spurius	Red-capped Parrot		
Platycercus varius	Mulga Parrot		
Platycercus zonarius	Australian Ringneck Parrot		+
Polytelis anthopeplus	Regent Parrot	LC	

lass Family <sub>Species</sub>	Common Name	Conservation Status	Observed Jan 07
<b>Cuculidae</b> Parasitic Cuckoos			
Cacomantis flabelliformis	Fan-tailed Cuckoo	LC	
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	LC	
Chrysococcyx lucidus	Shining Bronze Cuckoo	LC	
Cuculus pallidus	Pallid Cuckoo	LC	
Strigidae Hawk Owls			
Ninox novaeseelandiae	Boobook Owl	LC	
<b>Tytonidae</b> Barn Owls			
Tyto alba	Barn Owl	LC	
Podargidae Frogmouths			
Podargus strigoides	Tawny Frogmouth	LC	
Aegothelidae Owlet-nightjars			
Aegotheles cristatus	Australian Owlet-nightjar	LC	
Halcyonidae Tree Kingfishers			
Dacelo novaeguineae	Laughing Kookaburra	Introduced	
Todiramphus sanctus	Sacred Kingfisher	LC	
Meropidae Bee-eaters			
Merops ornatus	Rainbow Bee-eater	Migratory JA LC	
Climacteridae Treecreepers			
Climacteris rufa	Rufous Treecreeper	Bh	+
Maluridae Fairy Wrens, GrassWrens			
Malurus splendens	Splendid Fairy-wren	Bh LC	

Class	Common	Conservation	Observed
Family Species	Name	Status	Jan 07

#### Pardalotidae

Pardalotes, Bristlebirds, Scrubwrens, Gerygones, Thornbills

Acanthiza apicalis	Broad-tailed Thornbill	Bh LC	
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Bh LC	
Acanthiza inornata	Western Thornbill	Bh LC	
Gerygone fusca	Western Gerygone	LC	
Pardalotus punctatus	Spotted Pardalote	LC	
Pardalotus striatus	Striated Pardalote	LC	+
Sericornis frontalis	White-browed Scrubwren	Bh LC	
Smicrornis brevirostris	Weebill	Bh LC	+
<b>Meliphagidae</b> Honeyeaters, Chats			
Acanthorhynchus superciliosus	Western Spinebill	LC	
Anthochaera carunculata	Red Wattlebird	LC	+
Anthochaera lunulata	Western Little Wattlebird	Вр	
Epthianura albifrons	White-fronted Chat	LC	
Lichenostomus ornatus	Yellow-plumed Honeyeater	Bh LC	+
Lichenostomus virescens	Singing Honeyeater	LC	
Lichmera indistincta	Brown Honeyeater	LC	
Manorina flavigula	Yellow-throated Miner	Bp LC	
Melithreptus brevirostris	Brown-headed Honeyeater	LC	
Melithreptus lunatus	White-naped Honeyeater	Bp LC	
Phylidonyris melanops	Tawny-crowned Honeyeater	Bp LC	
Phylidonyris nigra	White-cheeked Honeyeater	Вр	
Phylidonyris novaehollandiae	New Holland Honeyeater	Bp LC	

lass Family <sub>Species</sub>	Common Name	Conservation Status	Observed Jan 07
Petroicidae Australian Robins			
Eopsaltria australis	Western Yellow Robin	Bh LC	+
Microeca fascinans	Jacky Winter	LC	
Petroica cucullata	Hooded Robin	Bh	
Petroica goodenovii	Red-capped Robin	LC	
Petroica multicolor	Scarlet Robin	Bh LC	
Pomatostomidae Babblers			
Pomatostomus superciliosus ashbyi	White-browed Babbler (Western	spp) P4	+
Neosittidae Sitellas			
Daphoenositta chrysoptera	Varied Sittella	Bh LC	
Pachycephalidae Crested Shrike-tit, Crested Bellbird, Shrike Thrush	es, Whistlers		
Colluricincla harmonica	Grey Shrike-thrush	Bh LC	
Falcunculus frontatus leucogaster	Western Shrike-tit	P4 Be	
Pachycephala pectoralis	Golden Whistler	Bh LC	
Pachycephala rufiventris	Rufous Whistler	LC	+
Dicruridae Monarchs, Magpie Lark, Flycatchers, Fantails, Dro	ngo		
Grallina cyanoleuca	Magpie-lark	LC	
Myiagra inquieta	Restless Flycatcher	Bh LC	+
Rhipidura fuliginosa	Grey Fantail	LC	+
Rhipidura leucophrys	Willie Wagtail	LC	+
Campephagidae Cuckoo-shrikes, Trillers			
Coracina novaehollandiae	Black-faced Cuckoo-shrike	LC	+
Lalage sueurii	White-winged Triller		

Class Family Species	Common Name	Conservation Status	Observed Jan 07
<b>Artamidae</b> Woodswallows, Butcherbirds, Currawongs			
Artamus cinereus	Black-faced Woodswallow	Bp LC	
Artamus cyanopterus	Dusky Woodswallow	Bp LC	
Cracticus tibicen	Australian Magpie		+
Cracticus torquatus	Grey Butcherbird	LC	
Strepera versicolor	Grey Currawong	Bp LC	
<b>Corvidae</b> Ravens, Crows			
Corvus coronoides	Australian Raven	LC	+
<b>Motacillidae</b> Old World Pipits, Wagtails			
Anthus novaeseelandiae	Australian Pipit	LC	
<b>Dicaeidae</b> Flowerpeckers			
Dicaeum hirundinaceum	Mistletoebird	LC	
Hirundinidae Swallows, Martins			
Hirundo neoxena	Welcome Swallow	LC	
Hirundo nigricans	Tree Martin	LC	+
<b>Sylviidae</b> Old World Warblers			
Cincloramphus cruralis	Brown Songlark	LC	
Cincloramphus mathewsi	Rufous Songlark	LC	
<b>Zosteropidae</b> White-eyes			
Zosterops lateralis	Grey-breasted White-eye	LC	
Mammals			
<b>Tachyglossidae</b> Echidnas			
Tachyglossus aculeatus	Echidna	LR/Ic	

Class Family <sub>Species</sub>	Common Name	Conservation Status	Observed Jan 07
<b>Dasyuridae</b> Carnivorous Marsupials			
Antechinus flavipes	Yellow-footed Antechinus, Ma	ardo LR/Ic	
Dasyurus geoffroii	Chuditch	S1 VU VU C1	
Phascogale calura	Red-tailed Phascogale	S1 EN EN B1+	2bd
Sminthopsis crassicaudata	Fat-tailed Dunnart	LR/Ic	
Sminthopsis gilberti	Gilbert`s Dunnart	LR/Ic	
Phalangeridae Brushtail Possums, Cuscuses			
Trichosurus vulpecula	Common Brushtail Possum	LR/Ic	+
Burramyidae Pygmy Possums			
Cercartetus concinnus	Western Pygmy-possum	LR/lc	
<b>Macropodidae</b> Kangaroos, Wallabies			
Macropus fuliginosus	Western Grey Kangaroo	LR/Ic	+
Molossidae Freetail Bats			
Mormopterus planiceps	Western Freetail Bat	LR/Ic	
Tadarida australis	White-striped Freetail-bat	LR/nt	
Vespertilionidae Ordinary Bats			
Chalinolobus gouldii	Gould`s Wattled Bat	LR/Ic	
Chalinolobus morio	Chocolate Wattled Bat	LR/lc	
Nyctophilus geoffroyi	Lesser Long-eared Bat	LR/Ic	
Nyctophilus gouldi	Gould`s Long-eared Bat	LR/Ic	
Nyctophilus timoriensis	Greater Long-eared Bat		
Scotorepens balstoni	Inland Broad-nosed Bat		
Vespadelus regulus	Southern Forest Bat	LR/Ic	

lass Family <sub>Species</sub>	Common Name	Conservation Status	Observed Jan 07
Muridae Rats, Mice			
Mus musculus	House Mouse	Introduced	
Rattus rattus	Black Rat	Introduced	
Canidae Dogs, Foxes			
Vulpes vulpes	Red Fox	Introduced	
Felidae Cats			
Felis catus	Cat	Introduced	
Leporidae Rabbits, Hares			
Oryctolagus cuniculus	Rabbit	Introduced	+



**DEC & DEW DATABASE SEARCH RESULTS** 

Threaten	ed and	Priori	ty Fauna Database	Page 1 of	
Grid: 50	538952	mE 62	274919 mN / 579730 mE 6233462 mN	Broomehill (plus ~20km buffer)	
* Date	Certainty	Seen	Location Name	Method	
Schedule	1 - Fau	na that	is rare or is likely to become extinct		
Dasyurus	geoffroi	i	Chuditch	3 record	
This carnivo	orous marsu	ipial occu	pies large home ranges, is highly mobile and appear	s able to utilise bush remnants and corridors.	
1989	2	1	Carrolup		
1989	1	1	Katanning	Dead	
1990	1	1	KATANNING		
Phascoga	le calura	ı	<b>Red-tailed Phasco</b>	gale 2 record	
This arborea dense stands	l marsupia of rock sh	l seems to eoak (All	o prefer dense woodland or tall shrubland with a con locasuarina huegeliana) and wandoo (Eucalyptus wa	tinuous canopy and is most often associated with ndoo).	
1991	1	1	Katanning		
1996	1	1	Katanning	Dead	
Calyptorh	ynchus l	atirostr	is Carnaby's Black-O	Cockatoo 4 record	
This species plantations. trees to nest	moves aro Breeding o in.	ound sease occurs in v	onally in flocks to feeding areas in proteaceous scrub winter/spring, mainly in the eastern forests and when	and heaths and eucalypt woodlands as well as pin tabelt where they can find mature hollow-bearing	
1998	1	3	Katanning	Day sighting	
2001	1	2	Coyrecup Nature Reserve	Day sighting	
2001	1	1	Dartnall	Day sighting	
2001	1	12	Lake Toolbrunup	Day sighting	
Calyptorh	ynchus s	<b>p</b>	White-tailed Black	a Cockatoo 2 record	
These record	ls pertain to	o either B	Baudin's Black-Cockatoo or Carnaby's Black-Cockat	00.	
1986	1		Coyrecup Nature Reserve	Day sighting	
1998		1	Katanning	Day sighting	
Platycerci	us icterot	tis xant	hogenys Western Rosella (i	nland ssp) 4 record	
This subspect mallees.	cies of the V	Western I	Rosella occurs in eucalypt and casuarina woodlands	and scrubs, especially of Salmon Gum and tall	
1967	1	10	Katanning/Broomehill		
1977	1		Peringillup Nature Reserve	Day sighting	
1979	1		Broomehill Nature Reserve	Day sighting	
1985	1	3	Coyrecup Nature Reserve	Day sighting	
Schedule	2 - Pres	sumed e	extinct		
Onychoga	ılea luna	ta	Crescent Nailtail V	Vallaby 1 record	
1896	1	1	Katanning	Caught or trapped	
Schedule	4 - Oth	er spec	ially protected fauna		
Morelia s	pilota im	bricata	Carpet Python	1 record	
This species	occurs in a	a variety	of habitats including forest and heathland. It is often	arboreal and preys on birds, other reptiles and sma	
to medium s	ize mamma	als. This	species is listed under both Schedule 4 and Priority	4.	

Monday, 20 November 2006



Threate	ened and	Priori	ty Fauna Database		Page 2 of 2		
Grid: 50	538952	mE 62	274919 mN / 579730 mE 6233462 mN	Broomehill (plus ~20km	Broomehill (plus ~20km buffer)		
* Date	Certainty	Seen	Location Name	Method			
1996	1	1	Ewlyamartup/Covrecup	Day sighting			
Priority	v Two• Ta	nservation lands					
1110110	, 100 14		i i con poorty micon populations on cor				
Ninox c	onnivens c	onnive	ns Barking Owl (sou	thwest pop)	1 records		
This speci mammals.	es inhabits fo	orest and	woodland and is becoming increasingly rare in the	south-west. It preys on invertebrates an	nd small		
1897	1	1	Katanning	Caught or trapped			
Priority	y Four: Ta	axa in 1	need of monitoring				
Charadr	ius rubric	ollis	Hooded Plover		2 records		
This speci water's edg	es frequents t ge.	he margi	ins and shallows of salt lakes, also along coastal bea	ches, where it forages for invertebrate	es along the		
2000	1	1	Coyrecup Nature Reserve	Day sighting			
2002	1	4	Lake Ewlyamertup	Day sighting			
Pomatos	stomus sup	oercilio	sus ashbyi White-browed Ba	bbler (western wheatb	4 records		
This speci	es of bird live	es in euca	alypt forests and woodlands, and forages on or near	the ground for insects and seeds.			
1981	1		Peringillup Nature Reserve	Day sighting			
1985	1	5	Coyrecup Nature Reserve	Day sighting			
1986	1	3	3 Coyrecup Nature Reserve Day sigh				
1987	1		Ewlyamartup	Day sighting			
Psophod	les nigrogi	ularis o	beron Western Whipbir	d (sthn WA subsp)	1 records		
This subsp nesting in	becies occurs dense vegeta	from the tion.	Stirling Range east to Munglinup and north to Lake	e Grace and inhabits areas of mallee a	nd heath,		
1963	2	0	Coyrecup	Heard			
Morelia	spilota im	bricata	Carpet Python		1 records		
This speci to medium	es occurs in a 1 size mamma	a variety als. This	of habitats including forest and heathland. It is often species is listed under both Schedule 4 and Priority	n arboreal and preys on birds, other rej 4.	ptiles and small		
1996	1	1	Ewlyamartup/Coyrecup	Day sighting			
<ul> <li>* Information relating to any records provided for listed species:- Date: date of recorded observation</li> <li>Certainty (of correct species identification): 1=Very certain; 2=Moderately certain; and 3=Not sure.</li> <li>Seen: Number of individuals observed.</li> <li>Location Name: Name of reserve or nearest locality where observation was made</li> <li>Method: Method or type of observation</li> </ul>							





#### **Protected Matters Search Tool**

You are here: <u>DEH Home</u> > <u>EPBC Act</u> > <u>Search</u>

## **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 <u>caveat</u> at the end of the report.

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at <u>http://www.environment.gov.au/atlas</u> may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at <u>http://www.deh.gov.au/epbc/assessmentsapprovals/index.html</u>



Search Type: Buffer: Coordinates: Point 20 km -33.84802,117.6494



**Report Contents:** 

#### <u>Summary</u> Details

- <u>Matters of NES</u>
- Other matters protected by the EPBC Act
- Extra Information
- Caveat
- Acknowledgments

#### Summary

Matters of National Environmental Significance

30 January 2007 18:57

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 - see <a href="http://www.deh.gov.au/epbc/assessmentsapprovals/guidelines/index.html">http://www.deh.gov.au/epbc/assessmentsapprovals/guidelines/index.html</a>.

World Heritage Properties:			
National Heritage Places:	None		
Wetlands of International Significance: (Ramsar Sites)	2		
Commonwealth Marine Areas:	None		
Threatened Ecological Communities:	None		
Threatened Species:	7		
Migratory Species:	2		

#### 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 and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.deh.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

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. Information on EPBC Act permit requirements and application forms can be found at <a href="http://www.deh.gov.au/epbc/permits/index.html">http://www.deh.gov.au/epbc/permits/index.html</a>.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	5
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	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:	3
Other Commonwealth Reserves:	None
Regional Forest Agreements:	None

#### Details

#### **Matters of National Environmental Significance**

Wetlands of International Significance [ <u>Dataset Information</u> ] (Ramsar Sites)

LAKE MUIR - BYENUP LAGOON TOOLIBIN LAKE

Within same catchment as Ramsar site Within same catchment as Ramsar site

Threatened Species [ Dataset Information ]	Status	Type of Presence
Birds		
<u>Calyptorhynchus latirostris</u> * Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo	Endangered	Species or species habitat likely to occur within area
<u>Psophodes nigrogularis oberon</u> * Western Whipbird (western mallee)	Vulnerable	Species or species habitat likely to occur within area
Mammals		
<u>Dasyurus geoffroii</u> * Chuditch, Western Quoll	Vulnerable	Species or species habitat likely to occur within area
<u>Phascogale calura</u> * Red-tailed Phascogale	Endangered	Species or species habitat may occur within area
<u>Setonix brachyurus</u> * Quokka	Vulnerable	Species or species habitat may occur within area
Plants		
<u>Adenanthos pungens subsp. effusus</u> * Sprawling Spiky Adenanthos	Endangered	Species or species habitat likely to occur within area
<u>Roycea pycnophylloides</u> * Saltmat	Endangered	Species or species habitat likely to occur within area
Migratory Species [ Dataset Information ]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
<u>Haliaeetus leucogaster</u> White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
<u>Merops ornatus</u> Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
Other Matters Protected by the EPBC A	ct	
Listed Marine Species [ Dataset Information ]	Status	Type of Presence
Birds		
<u>Apus pacificus</u> Fork-tailed Swift	Listed - overfly marine	Species or species habitat may occur within area
	area	
<u>Ardea alba</u> Great Egret, White Egret	area Listed - overfly marine area	Species or species habitat may occur within area
<u>Ardea alba</u> Great Egret, White Egret <u>Ardea ibis</u> Cattle Egret	area Listed - overfly marine area Listed - overfly marine area	Species or species habitat may occur within area Species or species habitat may occur within area
Ardea alba Great Egret, White Egret Ardea ibis Cattle Egret Haliaeetus leucogaster White-bellied Sea-Eagle	area Listed - overfly marine area Listed - overfly marine area Listed	Species or species habitat may occur within area Species or species habitat may occur within area Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret Ardea ibis Cattle Egret Haliaeetus leucogaster White-bellied Sea-Eagle Merops ornatus Rainbow Bee-eater	area Listed - overfly marine area Listed - overfly marine area Listed - overfly marine area	Species or species habitat may occur within area Species or species habitat may occur within area Species or species habitat likely to occur within area Species or species habitat may occur within area
Ardea alba Great Egret, White Egret Ardea ibis Cattle Egret Haliaeetus leucogaster White-bellied Sea-Eagle Merops ornatus Rainbow Bee-eater Commonwealth Lands [ Dataset Information ]	area Listed - overfly marine area Listed - overfly marine area Listed Listed - overfly marine area	Species or species habitat may occur within area Species or species habitat may occur within area Species or species habitat likely to occur within area Species or species habitat may occur within area
Ardea alba Great Egret, White Egret Ardea ibis Cattle Egret Haliaeetus leucogaster White-bellied Sea-Eagle Merops ornatus Rainbow Bee-eater Commonwealth Lands [ Dataset Information ] Unknown	area Listed - overfly marine area Listed - overfly marine area Listed Listed - overfly marine area	Species or species habitat may occur within area Species or species habitat may occur within area Species or species habitat likely to occur within area Species or species habitat may occur within area
Ardea alba Great Egret, White Egret Ardea ibis Cattle Egret Haliaeetus leucogaster White-bellied Sea-Eagle Merops ornatus Rainbow Bee-eater Commonwealth Lands [ Dataset Information ] Unknown Extra Information	area Listed - overfly marine area Listed - overfly marine area Listed - overfly marine area	Species or species habitat may occur within area Species or species habitat may occur within area Species or species habitat likely to occur within area Species or species habitat may occur within area
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Ardea alba Great Egret, White Egret Ardea ibis Cattle Egret Haliaeetus leucogaster White-bellied Sea-Eagle Merops ornatus Rainbow Bee-eater Commonwealth Lands [ Dataset Information ] Unknown Extra Information State and Territory Reserves [ Dataset Information ] Broomehill Nature Reserve, WA	area Listed - overfly marine area Listed - overfly marine area Listed - overfly marine area	Species or species habitat may occur within area Species or species habitat may occur within area Species or species habitat likely to occur within area Species or species habitat may occur within area
Ardea alba Great Egret, White Egret Ardea ibis Cattle Egret Haliaeetus leucogaster White-bellied Sea-Eagle Merops ornatus Rainbow Bee-eater Commonwealth Lands [ Dataset Information ] Unknown Extra Information State and Territory Reserves [ Dataset Information ] Broomehill Nature Reserve, WA Peringillup Nature Reserve, WA	area Listed - overfly marine area Listed - overfly marine area Listed - overfly marine area	Species or species habitat may occur within area Species or species habitat may occur within area Species or species habitat likely to occur within area Species or species habitat may 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 Heritage and Register of National Estate properties, Wetlands of International 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.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the migratory and marine provisions of the Act have been mapped.

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.

#### Acknowledgments

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

- New South Wales National Parks and Wildlife Service
- Department of Sustainability and Environment, Victoria
- Department of Primary Industries, Water and Environment, Tasmania
- Department of Environment and Heritage, South Australia Planning SA
- Parks and Wildlife Commission of the Northern Territory
- Environmental Protection Agency, Queensland
- Birds Australia
- <u>Australian Bird and Bat Banding Scheme</u>
- <u>Australian National Wildlife Collection</u>
- · Natural history museums of Australia
- 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, Atherton and Canberra

- University of New England
- Other groups and individuals

ANUCLIM Version 1.8, Centre for Resource and Environmental Studies, Australian National University was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Last updated:

Department of the Environment and Water Resources GPO Box 787 Canberra ACT 2601 Australia Telephone: +61 (0)2 6274 1111

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POTENTIAL NEST HOLLOW INFORMATION

D	Tree Species	Coordinates (MGA Zone 50)	Tree Height (m)	Circumference at breast Height (m)	Hollow Height (m)	Entrance Facing	Hollow Entrance Size (cm)	Commnets
1	Ew	559888mE	12	21	5		10	snapped branch
-		559871mE	12	4.0			0	
2	EW	559946mE	11	1.2	4	E	0	snapped branch
3	Ew	6254643mN 559982mE	15	1.9	10/4	SE/W	8/8	snapped branch
4	Ew	6254641mN	15	1.7	6	NE	6	
5	Ew	6254608mN	12	2.6	8	E	6	
6	Ew	560032mE 6254564mN	13	2.6	6	UP	6	
7	Dead	559993mE 6254547mN	18	2.4	7	UP	6	
8	Ew	560006mE 6254479mN	12	1.8	6	N	10	
9	Dead	560034mE 6254488mN	11	1.1	5/5	UP	12/15	some possible chew marks - signs of use
10	Ew	560036mE 6254490mN	10	1.2	8	UP	10	
11	Dood	560094mE	10	2.2	5/2		20/20	
	Deau	560085mE	10	2.5	572	0F73	20/30	
12	Ew	6254716mN 560081mE	20	2.6	several	several	ALL <5	many small hollows
13	Ew	6254708mN	15	2.4	3.5	NE	25	
14	Ew	560149mE 6254701mN	20	2.4	15	NE	5	
15	Dead	560130mE 6254491mN	18	1.9	10	E	10	
16	Dead	560158mE 6254472mN	18	1.8	10	E	30	also several smaller hollows >10cm
17	Dead	560161mE 6254428mN	10	1.4	8	UP	+30	
10	Dood	560148mE	10	1 1	7	٩E	10	
10	Deau	560135mE	10	1.1	1	35	10	
19	Dead	6254409mN 560138mE	15	3.8	7	UP	+40	broken spout
20	Ew	6254397mN	15	1.5	6	SE	10	
21	Ew	560146mE 6254386mN	15	1.5	5.5	UP	10	
22	Ew	560147mE 6254389mN	15	1.9	3	UP	+30	Low
23	Dead	560141mE 6254381mN	17	2.5	5/2	S/N	25/25	4 other 15cm hollows
24	Fw	560153mE 6254375mN	19	3.1	5.5/7/7	F/UP/UP	ALL +30	3 broken branches
25		560141mE	16	0.1	5.5/1/1		+20	Bees = at 12m 10cm hollow
20	v	560157mE	10	<u>ک</u>	5		+50	
26	Ew	6254343mN 560137mE	17	1.4	12	UP	+20	
27	Ew	6254326mN	10	1.6	7	UP	+25	
28	Ew	6254312mN	20	1.9	8/8/8	UP/UP/UP	15	Chew marks on hollow
Q	Tree Species	Coordinates (MGA Zone 50)	Tree Height (m)	Circumference at breast Height (m)	Hollow Height (m)	Entrance Facing	Hollow Entrance Size (cm)	Commets
----	--------------	------------------------------	-----------------	---------------------------------------	-------------------	-----------------	------------------------------	----------------------------------
29	Ew	560122mE 6254320mN	21	2.4	10	UP	10	also two smaller hollows >10cm
30	Ew	560113mE 6254344mN	20	2.4	several	several	10-30	
31	Ew	560124mE 6254358mN	18	2.4	7	UP	25/25	two others higher 20cm entrance
32	Ew	560097mE 6254359mN	25	3.2	15	UP	+30	two others 10 and 15 cm entrance
33	Ew	560103mE 6254376mN	20	2.2	several	several	10	Bees
34	Ew	560095mE 6254382mN	20	2	7	UP	10	
35	Dead	560097mE 6254402mN	18	1.7	11	W	10	
36	Ew	560090mE 6254398mN	22	2	several	several	10-15	
37	Ew	560121mE 6254426mN	18	1.8	15	W	10/10	
38	Ew	560100mE 6254438mN	20	2.4	5/5	UP/S	30/15	
39	Ew	560076mE 6254426mN	25	3.1	15	N	10/10	
40	Dead	560051mE 6254431mN	25	2.5	5/5	UP/E	15/15	
41	Dead	560080mE 6254462mN	20	1.8	9/9	UP/N	10/10	
42	Ew	560039mE 6254441mN	30	3.6	several	several	10-12	

### **APPENIDIX D**

NATIVE PLANT SPECIES USED BY CARNABY'S BLACK COCKATOOS

# Carnaby's Black-Cockatoo

# Native plant species used by Carnaby's Black-Cockatoos

#### Food Sources Family Proteaceae

Genus	Species	Common name	part eaten	Height
Banksia	ashbyi	Ashby's Banksia	flowers, seeds	
	attenuata	Slender Banksia	flowers, seeds	
	grandis	Bull Banksia	flowers, seeds	
	littoralis	Swamp Banksia	flowers, seeds	
	menziesii	Firewood or Menzies Banksia	flowers, seeds	15m h
	verticillata	Granite Banksia	flowers, seeds	
	tricuspis	Lesueur Banksia	flowers, seeds	
Dryandra	aff incircioides		seeds	
	fraseri	no common name	flowers, seeds	1m h
	nivea	Couch Honeypot	flowers, seeds	1m h
	nobilis	Golden Dryandra	seeds	5m h
	praemorsa	Urchin or Cut-leaf Dryandra	flowers, seeds	2-4m h
	sessilis	Parrot bush	flowers, seeds	2-6m h
	speciosa	Shaggy Dryandra	flowers, seeds	1.5m h
Grevillea	apiciloba	Subsp. Digitata??	flowers, seeds	
	armigera	Prickly Toothbrush	flowers, seeds	
	paniculata	Kerosene Bush	seeds	1-3m h
	paradoxa	Bottlebrush Grevillea	seeds	
	petrophiloides	Pink Poker	seeds	1-3m h
	hookerana	Black Toothbrush	seeds	
Hakea	auriculata		seeds	
	circumalata		seeds	
	conchifolia	Shell-leaved Hakia	seeds	
	crassifolia		seeds	
	cyclocarpa		seeds	
	falcata		seeds	
	gilbertii	no common name	seeds	
	incrassata	Golfball or Marble Hakea	seeds	
				1.5m h &
	lissocarpha	Honeybush	seeds	w
	multilineata	Grass leaf Hakea	seeds	5m h
	obliqua	Needles and Corks	seeds	
Hakea	prostrata	Harsh Hakea	seeds	1-5m h
	ruscifolia	Candle Hakea	seeds	
	scoparia	no common name	seeds	2-3 m h
	sulcata	Furrowed Hakea	seeds	
	trifurcata	Two-leaved Hakea	seeds	2-3m h
	undulata	Wavy-leaved Hakea	seeds	
	varia	Variable-leaved Hakea	seeds	1-3m h
Isopogon	scabriuscula	no common name	seeds	
Lambertia	multiflora	Many flowered honeysuckle	flowers, seeds	1.5 m h

#### Food sources (cont) Family Myrtaceae

Genus	Species	Common name	part eaten	Height
Eucalyptus	marginata	Jarrah	seeds	
	todtiana	Coastal Blackbutt, Prickly Bark	seeds	
	wandoo	Wandoo	flowers	
			flowers, seeds,	
Corymbia	colophylla	Marri or redgum	nectar	
Callistemon	viminalis		nectar	

Principle information source: HANZAB.

#### Tree species used for nesting hollows

Genus	Species	Common name
Eucalyptus	salmonophloia	Salmon Gum
	wandoo	Wandoo or White Gum
	longicornis	Red Morrell
	loxophleba	York Gum
	gomphocephala	Tuart
	occidentalis	Swamp Yate
Corymbia	calophylla	Marri or Red Gum

#### Notes:

The species listed are those that Carnaby's Black-Cockatoo have been recorded feeding on.

It is very likely they will also feed on similar woody-fruited native species to these.

If you observe Carnaby's Black-Cockatoos feeding on other species please let Birds Australia WA know.

For greatest success when growing plants for Carnaby's Black-Cockatoo check the suitability of these species to your area and soil type and use local provenance seed.

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## PLATES



Plate 1: Open Wandoo Woodland over low Open Shrubland in north west section of study area.



Plate 2: Low Open Shrubland in north east section of study area



Plate 3: Open Wandoo Woodland over low Open Shrubland in southern section of study area.



Plate 4: Eucalypt Woodland/Open Forest that dominates the central portion of the study area