

The value of remnant vegetation in the Keysbrook area to three species of threatened cockatoo.

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Introduction

Olympia Resources Ltd is currently seeking approval to develop a heavy mineral sands mine and primary processing facilities near Keysbrook in the south-west of Western Australia. The project area is located four kilometres to the west of the township of Keysbrook and approximately 70 kilometres south of Perth. The majority of the project area has been cleared for the grazing of dairy cattle, though there are some remnant patches of vegetation remaining.

The EPA has set the level of assessment for the proposal at Public Environmental Review (PER). As part of the PER process, further information is required on the potential value of the area to the Carnaby's (Short-billed) Black-Cockatoo *Calyptorhynchus latirostris* and the Forest Red-tailed Black-Cockatoo *Calyptorhynchus banksii naso*. The Long-billed (Baudin's) Black-Cockatoo *Calyptorhynchus baudinii* may also occur in the area.

All three species of cockatoo are likely to use the remnant vegetation for feeding, and possibly breeding.

Methods

Personnel

The field-work was carried out by Jenny Wilcox (*B.Sc. Biol./Env. Sci., Hons. Biol.*) of Western Wildlife and Lisa Boulden (*B.Sc. Cons. Biol., Postgrad. Dip. Env. Management*) of MBS Environmental. The report was prepared by Jenny Wilcox, with the map in Figure 1 prepared by Lisa Boulden.

Literature review

A brief review of some of the available literature was carried out in order to characterise the feeding and breeding habitat of each of the cockatoo species. In addition, the expert advice of Ron Johnstone (Curator of Ornithology, WA Museum) was sought.

Surveys for potential nesting hollows

In order to assess the potential value of the remnant vegetation to breeding cockatoos, so far as possible all large eucalypts were examined from the ground. Assessments of hollow suitability were made on the diameter of the entrance only. As surveys were undertaken from the ground, depth of hollows could not be determined, and other hollow characteristics such as aspect and type of hollow were not taken into account.

The surveys for potential cockatoo hollows were carried out on the 20th and 21st of October, 2005. The properties surveyed were those belonging to Mostert, Lanstal, Hill, Throssell and Lot 506. Each property retains areas of native vegetation of various sizes (Figure 1).

Surveys for cockatoos and other bird species

All cockatoos observed during the survey were recorded. All other bird species observed on each property were also recorded. Due to the relatively large size of the vegetation remnants, there was insufficient time available to carry out standardised bird surveys for density estimates, as well as survey for hollows.

Results

Literature review

The Forest Red-tailed Black-Cockatoo is listed as Schedule 1 (Endangered) under the WA Wildlife Conservation Act but is not yet listed under the EPBC Act. This species is restricted to the eucalypt forests of south-west of WA. The Forest Red-tailed Black-Cockatoo feeds on the seeds of Marri *Corymbia calophylla*, Jarrah *Eucalyptus marginata* Blackbutt *E. patens* and Sheoak *Allocasuarina fraseriana*, among others (Johnstone and Storr 1998). Birds nest in hollows in Marri or Jarrah. In Marri, nest hollows have been located between 8 and 14m above the ground, with an entrance diameter of 12 to 41cm (Johnstone and Storr 1998). The eggs are laid in October/November.

Nests of the Forest Red-tailed Black-Cockatoo are very difficult to locate, as the birds tend to return to the hollow after dark and it may take several nights to determine the location of the nest (R. Johnstone pers. comm.). Also, the hollows themselves may not be visible from the ground, so a visual inspection of trees from the ground will not identify all potential hollows. Although birds will chew around the edges of a hollow they are occupying, it is also possible for young or non-breeding birds to chew around hollows which are then not used for breeding (R. Johnstone, pers. comm.).

Red-tailed Black-Cockatoos have generally been found to breed on the ranges, but some birds have been found breeding on the plain. There is a breeding population of Red-tailed Black-Cockatoos close to the Keysbrook area (R. Johnstone, pers. comm.). Generally the trees that the birds use are very old (around 250 years) and in the later stages of senescence, and virtually all the trees are Marri (R. Johnstone, pers. comm.).

Carnaby's Black-Cockatoo is listed as Schedule 1 (Endangered) under the WA Wildlife Conservation Act, and as Endangered under the EPBC Act. This cockatoo is restricted to the south-west of WA. It feeds on the seeds of a range of proteaceous trees and shrubs including *Banksia*, *Dryandra*, *Hakea* and *Grevillea*. It also feeds on the seeds of eucalypts and Sheoak *Allocasuarina spp.* (Johnstone and Storr 1998). Traditionally, Carnaby's Black-Cockatoo breeds in the wheatbelt in spring, moving towards the coast after breeding. Loss of nest hollows and decreased food supply in the wheatbelt has resulted in the population shifting west-wards, and birds have been recorded breeding much closer to the coast than earlier records would indicate. Birds have been recorded breeding at Serpentine, Bannister, south of Mandurah and near Bunbury (Johnstone *et al.* 2003). Although this cockatoo usually nests in smooth-barked eucalypts, it has also been recorded nesting in Marri. The nest hollows are between 2.5 and 12m above the ground and have an entrance diameter of 23 to 30cm (Johnstone and Storr 1998). The eggs are laid in early July to mid October.

Baudin's Black-Cockatoo is listed as Schedule 1 (Endangered) under the WA Wildlife Conservation Act, and as Vulnerable under the EPBC Act. This cockatoo is generally restricted to the forests of south-west WA, though it also ventures onto the coastal plain south of Mundijong. It feeds on the seeds of Marri as well as a proteaceous shrubs and trees including *Banksia* and *Hakea*. This cockatoo breeds in the south-west with recent records as far north as Serpentine (Johnstone *et al.* 2003). Birds breed in hollows in Marri, Karri *E. diversicolor* and Wandoo *E. wandoo* (Johnstone and Storr 1998). The eggs are laid in October.

Surveys for potential nesting hollows

Table 1 lists the potential nesting hollows recorded during the survey. Most of the hollows observed were in large dead eucalypts, and most were located on the Mostert property. Other properties had a greater proportion of younger smaller eucalypts, or areas of *Banksia* or She-oak woodland, which were less likely to have suitable trees present. Some of the trees may not be suitable due to the presence of feral honeybees *Apis mellifera*. Some hollows had evidence of use as a nest in the past, such as a 'squared off' entrance (Figure 4), but there was no evidence of fresh chewing, despite the survey being in October when breeding occurs.

Table 1. Potential cockatoo nest hollows recorded 20th and 21st October.

Property	Location	Notes
Mostert	400013E, 6410332N	Dead Marri.
Mostert	399855E, 6410358N	Dead eucalypt. Not suitable due to feral bees.
Mostert	399810E, 6410382N	Half-dead Marri. Not suitable due to feral bees.
Mostert	399738E, 6410347N	Half-dead Marri. Evidence of possible use in past, but probably not used now. Bees scouting hollow.
Mostert	399702E, 6410307N	Dead eucalypt. Terminal hollow.
Mostert	399776E, 6410500N	Dead eucalypt. Potential but possibly too small.
Mostert	399806E, 6410512N	Dead eucalypt.
Mostert	399920E, 6410525N	Half-dead Jarrah. Possible chewing of hollow in past.
Mostert	399956E, 6410594N	Dead Marri. Terminal hollow. Feral bees in two smaller hollows of same tree.
Mostert	400162E, 6410434N	Dead eucalypt. Potential but possibly too small.
Mostert	400241E, 6410468N	Dead eucalypt. Terminal hollow. Evidence of possible use in past.
Mostert	399711E, 6410858N	Dead eucalypt. Potential but possibly too small.
Mostert	399984E, 6411060N	Live Marri. Feral Bees in another small hollow in same tree.
Mostert	399817E, 6411392N	Dead Jarrah. Hollow in fork between branches.
Lanstal	401747E, 6405951N	Dead eucalypt.
Lanstal	401981E, 6405525N	Dead eucalypt. Terminal hollow.
Hill	399414E, 6411108N	Dead Jarrah. Terminal hollow. Low potential
Hill	399520E, 6411384N	Dead eucalypt. Hollow in fork between branches.
Hill	399278E, 6411262N	Dead Jarrah. Terminal hollow.
Throssell	400723E, 6405450N	Dead eucalypt.

Observations of cockatoos

The only species of cockatoo observed directly during the survey was the Forest Red-tailed Black-Cockatoo (Table 2). There was also evidence of these birds feeding in most areas where Marri was present, with the ground under particular trees covered with fruits that had been broken open (Figure 2). The Red-tailed Black-Cockatoos were observed as single birds or in small groups of up to 20 individuals (Table 2). Most of the records in Table 1 are from the Mostert and Lanstal properties. This is because these properties were larger (and therefore may support more birds) and more time was spent on these larger sites looking for potential nest hollows (therefore increasing the chance that birds would be observed).

Table 2. Observations of cockatoos or evidence of cockatoos, 20th and 21st October 2005. Red-tailed Black Cockatoo = RTBC, Baudin's Black-Cockatoo = BBC.

Date	Property	Location	Species	Notes
20/10	Mostert	400130E, 6410397N	RTBC	Evidence of RTBC feeding; chewed Marri nuts on ground (Figure 2).
20/10	Mostert	400256E, 6410650N	RTBC	14 birds feeding in Marri on edge of forest.
20/10	Mostert	399958E, 6411079N	RTBC	1 female bird feeding in Marri.
20/10	Lanstal	401744E, 6405945N	RTBC	7 birds flying overhead, other birds heard calling nearby.
20/10	Lanstal	402718E, 6405456N	RTBC	2 birds flying.
21/10	Hill	399402E, 6411450N	RTBC	8 birds feeding in Marri on edge of forest.
21/10	Lanstal	402125E, 6406434N	RTBC	2 birds flying.
21/10	Lanstal	401602E, 6406006N	RTBC	5 birds flying.
21/10	Lanstal	400943E, 6405472N	RTBC	1 female bird feeding in Marri.
21/10	Throssell	400722E, 6405390N	RTBC	8 birds feeding in Marri.
21/10	Throssell	400783E, 6405374N	RTBC	20 birds roosting in dead eucalypts.
21/10	Lot 506	400733E, 6405269N	RTBC	5 birds feeding in Marri.
21/10	Lot 506	-	BBC	Evidence of BBC feeding; chewed nuts on ground (Figure 3).

The presence of the Baudin's Black-Cockatoo was inferred through the presence of Marri nuts that were marked distinctively by feeding birds (Table 2, Figure 3). The Carnaby's Black-Cockatoo was not observed in the study area. However, locals reported seeing large flocks of 'white-tailed black-cockatoos' in the area, which could be either flocks of Carnaby's Black-Cockatoo, flocks of Baudin's Black-Cockatoo, or mixed flocks of the two white-tailed black-cockatoo species.

Other bird observations

All other birds observed while the cockatoo surveys were carried out were recorded (Table 3). The most species were observed at Mostert and Lanstal. The Mostert property had the highest quality remnant vegetation.

Except for the waterbirds, almost all of the birds observed are reliant upon native vegetation for all or most of their needs, including breeding, foraging and shelter. The loss or reduction of native vegetation will be likely to result in the reduced abundance of some species, at least in the local area.

Table 3. Bird species observed at each study area during cockatoo surveys 20th and 21st October 2005.

Species	Mostert	Hill	Lanstal	Throssell	Lot 506
Anatidae (ducks and swans)					
Australian Shelduck <i>Tadorna tadornoides</i>			X		
Australian Wood Duck <i>Chenonetta jubata</i>			X		
Grey Teal <i>Anas gracilis</i>			X		
Pacific Black Duck <i>Anas superciliosa</i>			X		
Ardeidae (herons, egrets and bitterns)					
White-necked Heron <i>Ardea pacifica</i>			X		
White-faced Heron <i>Ardea (Egretta) novaehollandiae</i>	X		X		
Threskionithidae (ibis and spoonbills)					
Straw-necked Ibis <i>Threskiornis spinicollis</i>			X		
Falconidae (falcons)					
Nankeen Kestrel <i>Falco cenchroides</i>			X		
Columbidae (pigeons and doves)					
Common Bronzewing <i>Phaps chalcoptera</i>	X				
Crested Pigeon <i>Ocyphaps lophotes</i>	X	X			
Cacatuidae (cockatoos and corellas)					
Red-tailed Black-Cockatoo <i>Calyptorhynchus banksii</i>	X	X	X	X	X
Galah <i>Cacatua roseicapilla</i>	X	X	X	X	
Psittacidae (parrots, lorikeets and rosellas)					
Australian Ringneck <i>Barnardius zonarius</i>	X		X	X	X
Red-capped Parrot <i>Platycercus (Purpureicephalus) spurius</i>	X	X	X	X	X
Halcyonidae (kingfishers)					
Laughing Kookaburra <i>Dacelo novaeguineae</i>	X				
Meropidae (bee-eaters)					
Rainbow Bee-eater <i>Merops ornatus</i>			X	X	
Maluridae (fairy-wrens, grasswrens and emu-wrens)					
Splendid Fairy-wren <i>Malurus splendens</i>	X	X	X	X	X

Table 3. (cont.)

Species	Mostert	Hill	Lanstal	Throssell	Lot 506
Pardalotidae (pardalotes, thornbills, gerygones & allies)					
Spotted Pardalote <i>Pardalotus punctatus</i>	X				
Striated Pardalote <i>Pardalotus striatus</i>	X	X			
Weebill <i>Smicrornis brevirostris</i>	X	X			
Western Gerygone <i>Gerygone fusca</i>	X	X	X	X	
Inland Thornbill <i>Acanthiza apicalis</i>	X				
Western Thornbill <i>Acanthiza inornata</i>	X				
Yellow-rumped Thornbill <i>Acanthiza chrysorrhoa</i>	X	X	X	X	X
Meliphagidae (honeyeaters and chats)					
Brown Honeyeater <i>Lichmera indistincta</i>	X	X	X	X	X
Yellow-throated Miner <i>Manorina flavigula</i>			X		
Red Wattlebird <i>Anthochaera carunculata</i>	X	X			
Petroicidae (robins)					
Scarlet Robin <i>Petroica multicolor</i>	X	X	X	X	
Pachycephalidae (shrike-tits, whistlers and allies)					
Golden Whistler <i>Pachycephala pectoralis</i>	X	X			
Rufous Whistler <i>Pachycephala rufiventris</i>	X	X	X	X	X
Grey Shrike-thrush <i>Colluricincla harmonica</i>		X			X
Dicruridae (flycatchers, magpie-larks and fantails)					
Grey Fantail <i>Rhipidura fuliginosa</i>	X				X
Willie Wagtail <i>Rhipidura leucophrys</i>			X		
Campephagidae (cuckoo-shrikes and trillers)					
Black-faced Cuckoo-Shrike <i>Coracina novaehollandiae</i>	X		X	X	
White-winged Triller <i>Lalage tricolour (sueurii)</i>			X		
Artamidae (woodswallows, butcherbirds, magpies)					
Dusky Woodswallow <i>Artamus cyanopterus</i>			X		
Grey Butcherbird <i>Cracticus torquatus</i>	X				
Australian Magpie <i>Cracticus (Gymnorhina) tibicen</i>	X	X	X	X	
Corvidae (ravens and crows)					
Australian Raven <i>Corvus coronoides</i>	X	X	X		X
Motacillidae (pipits and wagtails)					
Richard's Pipit <i>Anthus australis (novaeseelandiae)</i>		X			
Zosteropidae (white-eyes)					
Silvereye <i>Zosterops lateralis</i>	X				X
Total species:	27	18	26	13	10

Discussion

All of the remnant vegetation present on the properties is suitable feeding habitat for species of cockatoo. The Red-tailed Cockatoos were only observed feeding on Marri at the time of survey, but are also likely to utilise areas of Jarrah and She-oak woodland for feeding. Carnaby's Black-Cockatoo are likely to feed on the Marri, Jarrah, Sheoak and Banksia, while Baudin's Black-Cockatoo are likely to feed on the Marri and Banksia.

As the Keysbrook area is mostly cleared, the remnant patches of forest and woodland in the area are probably important for feeding cockatoos. Depending on the vegetation type and the seasonal movements of cockatoos, different vegetation remnants may be utilised at different times of year. Loss of these patches of native vegetation may result in a reduction of cockatoos in the local area (the area between the Lanstal and Mostert properties). Although there are other patches of native vegetation in the surrounding area, the total food available in the area will be decreased.

Only a few potential nesting hollows were identified in the survey (Table 1). It is likely that this is an incomplete list, as hollows are sometimes not visible from the ground (R. Johnstone pers. comm.). Although none of the potential hollows identified showed evidence of occupation, this is also difficult to discern as the adult birds are not obvious at the nest, moving under the cover of darkness. As the study area is on the plain, and the Forest Red-tailed Black-Cockatoo and Baudin's Black-Cockatoo generally nest in the ranges, it could be argued that the area has a low potential to support breeding of these species. However, it is possible that low numbers of any of the cockatoos may breed in the area. Most of the potential hollows identified were on the Mostert property. This property appeared to have the largest trees, and has a higher potential to support breeding cockatoos than any of the other properties.

Conclusion

The vegetation remnants in the Keysbrook area are likely to provide food for all three species of cockatoo in the area, and the loss of these patches of native vegetation may result in a reduction of cockatoos in the local area (the area between the Lanstal and Mostert properties).

Overall, the potential of the vegetation remnants to provide breeding habitat for cockatoos is low, with the Mostert property showing the highest potential. In order to confirm this finding, a follow-up visit by Ron Johnstone (WA Museum) or Tony Kirkby, both highly experienced in finding cockatoo nests, could be carried out on the Mostert property. Advice should be sought from the EPA on the necessity of a follow-up visit.



Figure 2.
Marri nuts
chewed by
Red-tailed
Black
Cockatoos
while
foraging.



Figure 3.
Marri nuts
chewed by
Baudin's
(Long-billed)
Black-
Cockatoos
while
foraging.



Figure 4. Tree hollow in a Marri on the Mostert property showing signs of past use as a nest. Note the 'squared off' entrance.

References

- Johnstone, R., Kirkby, T., Stone, P. and Minton, C. (2003). White-tailed Black-Cockatoos: identification challenges and changes in distribution and status, and links with a community program – Cockatoo Care. *In* Conserving the Carnaby's Black-Cockatoo: Future Directions; proceedings from a conservation symposium. Perth, Western Australia.
- Johnstone R.E. & Storr G.M. (1998). *Handbook of Western Australian Birds. Volume 1: Non-passerines (Emu to Dollarbird)*. Western Australian Museum, Perth.