
Carnaby's Cockatoo Surveys at Western Areas, New Morning Project Forrestania.

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Scope

During a field survey carried out by BIOTA Consulting during August-September 2018, a total of 1,445 Carnaby's Cockatoo breeding habitat trees were recorded in the proposed New Morning project area. Of this total, 186 trees were found to have potentially suitable nesting hollows for Carnaby's Cockatoos. These trees were mainly *Eucalyptus salmonophloia* and *E. urna*.

The scope of this work was to undertake a targeted survey and assess the 186 trees identified by BIOTA Consulting in their report (New Morning Level 1 Targeted Terrestrial Fauna Survey, December 2018) as being potentially suitable for use by Carnaby's Cockatoo *Calyptorhynchus latirostris*.

The following tasks were also included within the scope of this report;

- Provide details of visual inspection of potential breeding trees.
- Provide details of the importance of the potential habitat (breeding and foraging habitat) at New Morning and advice on the value of this habitat in the general Forrestania area.
- Assess the residual impact to Carnaby's Cockatoo of the New Morning project.
- Compile a summary Significance Table in accordance with the Australian Government Department of the Environment Significant Impact Guidelines 1.1 - Matters of National Environmental Significance

Survey Methodology and Techniques

Key objectives of the survey are to:

1. Carry out field visit to inspect potential breeding trees and assess the suitability of the hollows for use by Carnaby's Cockatoo.
2. Visually inspect all trees with suitable hollows with binoculars for signs of cockatoo use, including wear around the hollow, chewing, scarring and scratch marks on trunks and branches.
3. Physically examine hollows deemed to be possible cockatoo nest hollows using pole camera and photographing these hollows.
4. Log all observations of Cockatoos in the area.

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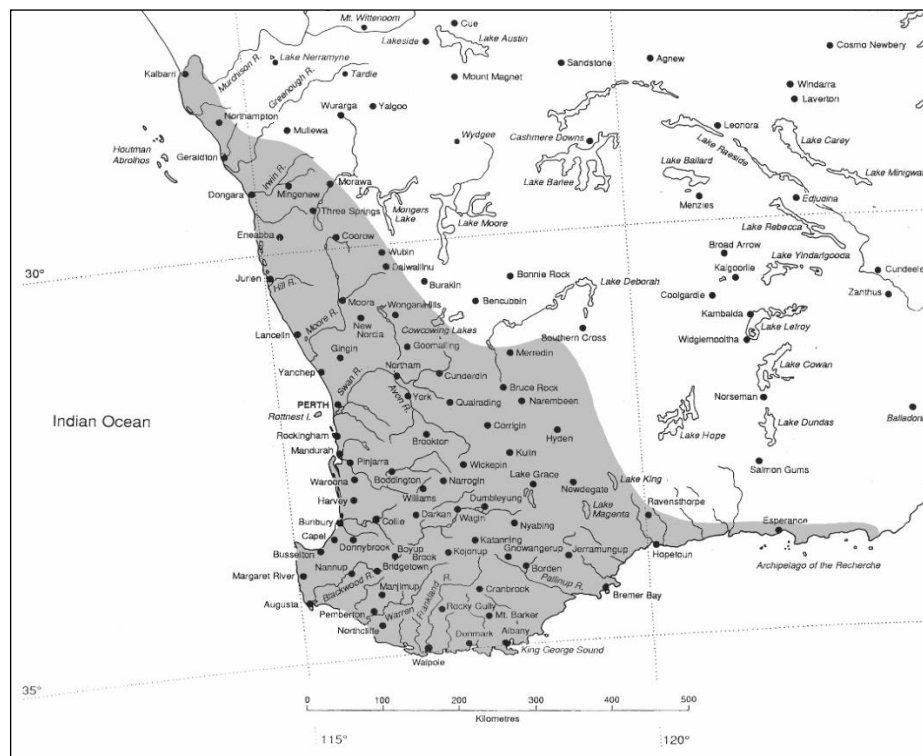
Species Background Information

Carnaby's Cockatoo (*Calyptorhynchus latirostris*)

Carnaby's Cockatoo is listed as 'fauna that is rare or likely to become extinct' (generally referred to as threatened fauna) under the Western Australian Wildlife Conservation Act 1950, Wildlife Conservation (Specially Protected Fauna) Notice 2010(2). It has been given a ranking of Endangered by the Western Australian Threatened Species Scientific Committee. It is also listed as Endangered under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

Distribution

Carnaby's Cockatoo is endemic to the south-west of Western Australia, north to the lower Murchison River and east to Nabawa, Wilroy, Waddi Forest, Nugadong, Manmanning, Durokoppin, Noogar (Moorine Rock), Lake Cronin, Ravensthorpe Range, head of Oldfield River, 20 km ESE of Coondingup and Cape Arid; also casual on Rottnest Island (Johnstone and Storr 1998).



Distribution map of Carnaby's Cockatoo.

Status and Habitat Preferences

This species is a postnuptial nomad, and birds originating in the central and northern Wheatbelt tending to move west after breeding. For example; most birds breeding in Badgingarra, Dandaragan, Moora and Bindoon regions tend to move west after breeding into higher rainfall areas especially the near-coastal Banksia scrubs e.g. at Wanagarren Nature Reserve, Nilgen Nature Reserve, Yanchep area and Wanneroo area then many of these move further south onto the southern Swan Coastal Plain including the southern Perth metropolitan area .

It is uncommon to common in the subhumid zone and wetter parts of the semiarid zone, scarce and patchily distributed in the drier parts of its range (north of Arrowsmith Lake and east of Marchagee, New Norcia, Toodyay, Tarin Rock and Lake Magenta) and scarce to moderately common in deep south-west (south of Margaret River, Nannup and Bridgetown and east of Albany).

The migration and movement of birds from the south-east portion of their breeding range (e.g. areas such as Broomehill, Lake Cronin, Hatter Hill and Lake King) tends to be from the inland breeding sites to the south coast then east or west along it.

Carnaby's Cockatoo usually travel in pairs or small flocks, although they are often seen in large flocks (up to 10,000) in non-breeding season (late spring to mid-winter), especially at Banksia scrubs and pine plantations on the Swan Coastal Plain. Because of the large-scale post-war clearing of semiarid sandplains, this species has declined in much of the wheatbelt.

Breeding

Breeding occurs mainly from early July to mid-December in the semiarid and subhumid interior from the Three Springs district south to the Stirling Range, west to Cockleshell Gully, Cataby, Regans Ford, Gingin, near mouth of Moore River, Yanchep, Serpentine, Mandurah, Lake Clifton, Bunbury, Nannup and Tone River and east to Manmanning, Kellerberrin, Woolundra, Lake Cronin, Hatter Hill and near Ravensthorpe (Storr-Johnstone Bird Data Bank).

Sites such as Forrestania and Hatter Hill are of interest, being at the eastern edge of this cockatoo's range, and the timing of breeding events and breeding success here appears to depend on climatic factors and available foraging habitat.

There has been an apparent shift in its breeding range further west and south since the middle of last century with a more rapid increase in the past 10–30 years into the Jarrah-Marri forests of the Darling Scarp and the Tuart forests of the Swan Coastal Plain.

There is also an indication that this species is expanding its breeding range in the far south-east i.e. Lake King and Ravensthorpe region.

Breeding Requirements

Carnaby's Cockatoo display strong pair bonds and mate for life. They nest in hollows of smooth-barked eucalypts especially Salmon Gum (*Eucalyptus salmonophloia*) and Wandoo (*Eucalyptus wandoo*) but nests have also been found in other eucalypts including York Gum (*Eucalyptus loxophleba*), Flooded Gum (*Eucalyptus rudis*), Tuart (*Eucalyptus gomphocephala*) and the rough-barked Marri (*Corymbia calophylla*). Eggs are laid on a mat of wood chips at the bottom of a large hollow (mostly top entry hollows) ranging from a few centimetres to 5 m deep; clutch 1–2 (mostly 2 but only one young reared). Incubation lasts 29 days and only the female incubates and broods. The nestling is brooded by the female during which time both rely on the male for food. The female then leaves the nest each day at dawn, sometimes returning mid-morning (with the male) to feed the chick. After about 2–3 weeks she ceases to brood and the chick is fed by one or both parents in the morning and at late evening.

Food

In the food descriptions, the genus *Dryandra* has been retained contra Mast and Thiele (2007) who combined *Dryandra sessilis* as *Banksia sessilis*, *Dryandra praemorsa* as *Banksia undata* and *Dryandra lindleyana* as *Banksia dallanneyi*.

Carnaby's Cockatoo has been observed feeding on a wide range of foods including the seeds of *Banksia attenuata*, *B. baxteri*, *B. coccinea*, *B. menziesii*, *B. grandis*, *B. prionotes*, *B. speciosa*, *B. ilicifolia*, *B. longifolia*, *B. ericifolia*, *B. quercifolia*, *B. hookeriana*, *Dryandra fraseri*, *D. praemorsa*, *D. carlinoides*, *D. squarrosa*, *D. sessilis*, *Corymbia calophylla*, *C. citriodora*, *Eucalyptus patens*, *E. todtiana*, *E. marginata*, *E. caesia*, *E. salmonophloia*, *Hakea erinacea*, *H. laurina*, *H. incrassata*, *H. lasiantha*, *H. lissocarpha*, *H. stenocarpa*, *H. trifurcata*, *Hakea undulata*, *H. prostrata*, *H. lasianthoides*, *H. cucullata*, *Grevillea* spp., *Pinus* spp. (including *P. radiata*, *P. caribaea* and *P. canariensis*), *Callitris*, *Jacaranda*, *Helianthus*, *Macadamia*, *Prunus*, *Carya*, *Liquidambar styraciflua*, *Mesomelaena* spp., *Citrullus lanatus* and *Erodium* spp.; flower buds, flowers and nectar of *Banksia attenuata*, *B. ericifolia*, *B. grandis*, *B. ilicifolia*, *B. menziesii*, *Callistemon* spp., *Corymbia calophylla*, *Dryandra lindleyana*, *D. squarrosa*, *D. sessilis*, *D. purdieana*, *D. erythrocephala*, *Eucalyptus erythrocorys*, *E. gomphocephala*, *E. patens*, *E. robusta*, *Grevillea robusta*, *Stenocarpus sinuatus*, *Protea* spp., insect larvae and insects (including weevils) from under bark, from wood of live and dead trees and shrubs, from galls and from flowers and flower stems, of *Acacia* spp. (including *A. saligna* and *A. pentedenia*) *Banksia* spp., *Eucalyptus* spp., *Jacksonia*, *Agonis* and *Xanthorrhoea*; also the flesh and juice of apples and persimmons.

Results of 2019 surveys to review potential nest trees.

The survey was carried out from 6 to the 9 January 2019. Virtually all 186 trees with potential nest hollows listed in the 2018 BIOTA report were inspected (see spreadsheet and appendix). No hollows could be located (even a tiny hollow or spout) in six trees (1098, 1145, 1266, 1275, 1307 and 1333 nor in any adjacent trees to these. No trees contained a hollow that had been used by Carnaby's Cockatoos recently or in the past. Only one tree 1328 contained a potential hollow, a top spout with depth of about 1 m and adequate floor space, however the hollow was split at base and showed no signs of recent or past use. Most of the hollows inspected were judged as tiny hollows (i.e. suitable for small obligate hollow nesting birds including Pardalotes and a small number probably suitable for small parrots including Ringnecks and Western Rosellas.

A total of 43 (452, 1002, 1185, 29, 31, 1419, 32, 969, 42, 30, 1405, 1367, 1066, 1077, 1045, 1054, 1071, 1074, 1037, 1051, 1353, 1245, 1351, 864, 1068, 997, 33, 1304, 1024, 20, 1334, 1308, 21, 1341, 1309, 1027, 1330, 830, 1328, 1314, 1339, 1340 and 1029) hollows including all those listed (Biota 2018) as showing signs of chewing or wear and those deemed large enough for a cockatoo were inspected. Where possible they were also photographed with a pole camera to determine if any were nest hollows or potential nest hollows (see table and photographs). Overall the bulk of these were too small and shallow, blocked with debris, burnt off stumps or with small jagged floors. Only one number 1328 had depth and floor space suitable for a cockatoo.

Not one of the 186 potential hollows showed any evidence of being used by Carnaby's Cockatoos and furthermore very few trees in this area had suitable hollows, possibly an impact of the regular fires that burn back hollows and spouts to a blackened stump especially in *Eucalyptus urna*.

On 7 January we observed a recently fledged juvenile Carnaby's Cockatoo resting alone, during heat of day, among leaves of a Salmon Gum near 750930E, 6406596N. The following morning at 0850 hr near the above site we observed a pair with the female feeding a juvenile (probably the same juvenile judging from its plumage and bill colour) they then rested among leaves in canopy. These

birds appeared to fly in from the west and adults often leave juveniles to rest when foraging some distance away. Foraging habitat and drinking sites are scarce in this area (i.e. locally around Flying Fox, New Morning and Spotted Quoll sites).

This was our only record of Carnaby's Cockatoos in the project area and these birds would most likely have bred locally including the New Morning area or possibly, but less likely, could have come from as far away as Lake Cronin, Forrestania or Hatter Hill areas that have small breeding populations. Small numbers have been recorded breeding at Lake Cronin, 7–10 pairs breed irregularly around Hatter Hill and these birds migrate south after breeding.

This is at the eastern limit of the distribution for Carnaby's Cockatoo in the south-west of the State. Although there are areas around Forrestania with good stands of Salmon Gum that contain hollows suitable for Carnaby's Cockatoos there is a general lack of foraging habitat (i.e. with extensive *Banksia*, *Dryandra* and *Hakea* scrubs.) This is also evident in areas around Corrigin, Kondinin, Kalgarin and Hyden that also have extensive woodlands with suitable hollows but lack adjacent suitable foraging habitat.

Conclusions

We found no direct evidence of Carnaby's Cockatoos breeding in the New Morning area. None of the 186 potential nest hollows studied showed evidence of cockatoo use and most of these hollows would be unsuitable even for small parrots including Purple-crowned Lorikeets, Australian Ringneck, Western Rosella and Mulga Parrot. The detailed survey of all potential nest hollows by BIOTA highlights the lack of large, top entry hollows in this area.

Overall we believe that the clearing of vegetation for the New Morning Project will not impact on the availability of breeding, feeding and roosting habitat for Carnaby's Cockatoo or cause a decline in the local (area/region) population, as summarised in Appendix A.

Despite the lack of breeding hollows clearing should occur outside the breeding season (breeding season September –January) and retain where possible any areas of heaths with *Banksia*, *Dryandra*, *Grevillea* and *Hakea* spp. etc. that provide foraging habitat for breeding birds. If the project timing requires clearing to be completed during the breeding season, a field survey should be conducted prior to commencing.

The fate of breeding populations of Carnaby's Cockatoo in this region (especially around Hatter Hill) is unknown and could only be temporary given the predictions for climate change. Modelling of south-west climate suggests a reduction in rainfall, increased frequency of drought, increased severe weather events and increased fires. This could lead to a decline in foraging habitat limiting food supplies in parts of their range. While successful breeding is recorded at Dragon Rocks, the small population at Hatter Hill appears to breed at irregular intervals.

Acknowledgements

We thank Colm Harkin and Ross McCarron for assistance on site and at Cosmic Boy.

Appendix A

Significant Impact Guidelines 1.1 - Matters of National Environmental Significance Summary Table

Matters of National Environmental Significance (EPBC Act 1999) – New Morning Project	
Significant Impact Criteria – Endangered Species	Carnaby’s Cockatoo
Lead to a long-term decrease in the size of a population	No
Reduce the area of occupancy of the species	No
Fragment an existing population into two or more populations	No
Adversely affect habitat critical* to the survival of a species	No
Disrupt the breeding cycle of a population	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species’ habitat	WSA to address
Introduce disease that may cause the species to decline, or	WSA to address
Interfere with the recovery of the species	No

*for activities such as foraging, breeding, roosting, or dispersal; for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators); to maintain genetic diversity and long term evolutionary development, or for the reintroduction of populations or recovery of the species or ecological community