

Photographic identification of bands confirms age of breeding Carnaby's Black Cockatoos *Calyptorhynchus latirostris*

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In September 2009, three banded female Carnaby's Black Cockatoos *Calyptorhynchus latirostris* were identified at their nest sites by reading their leg bands. They had been banded as part of a 40-year study of the biology of a black cockatoo population at Coomallo Creek in the northern wheatbelt of Western Australia. Two techniques were employed to read the bands; a spotting telescope mounted on a tripod and a hand held, digital single lens reflex camera with a telephoto zoom lens. The telescope enabled only one number on one band to be recorded, while the digital camera allowed all numbers on the bands of all three females to be recorded. The resultant photographs showed that there was no damage to the tarsi caused by the bands. One female was at least 25 years old, one was at least 19 and the third was 19.

INTRODUCTION

In a review of the biological consequences of ecosystem fragmentation, Saunders *et al.* (1991) noted that longevity of individuals has some influence over the loss of species from remnants of native vegetation; that is the process of "species relaxation." The longer individuals live, the longer they may remain in the remnant. However, just because a species is found in a remnant of native vegetation does not mean it will remain in that remnant over time. As pointed out by Saunders *et al.* (1991) successful reproduction and recruitment are necessary. Managers of conservation areas need to identify the age structure and reproductive success of vulnerable species that may be targeted for conservation management.

Carnaby's Black Cockatoo *Calyptorhynchus latirostris* is such a species. It is a large cockatoo (about 650g) (Saunders 1974) found only in the southwest of Western Australia. It has undergone a major decline in range and abundance over the past 50 years (Saunders 1990). It is now listed as *endangered* under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and as "Fauna that is rare or likely to become extinct" in Schedule 1 of the Western Australian *Wildlife Conservation Specially Protected Fauna) Notice 2010* under the *Wildlife Conservation Act 1950*. As a result of its conservation status, it is the subject of a recovery plan (Cale 2003) and management actions are conducted under the auspices of a recovery team.

A population of Carnaby's Black Cockatoo was studied in some detail at Coomallo Creek in the northern wheatbelt of Western Australia from 1969 to 1976. The results of this study have been published in a series of papers reporting on: the availability of tree hollows (Saunders 1979); food and movements (Saunders 1980); breeding behaviour and

biology (Saunders 1982); vocal repertoire and individual vocal recognition (Saunders 1983); and nestling growth rates and reproductive success (Saunders 1986). This population was monitored in each of 22 of the 28 years from 1969 to 1996 using the protocol set out by Saunders and Ingram (1987). The results of this monitoring program were reported in Saunders and Ingram (1998).

The intensive study from 1969 to 1976 was based on individually marked birds using patagial tags (Rowley and Saunders 1980). While these tags did provide easy identification using binoculars and telescopes, enabling important findings on the ecology, behaviour and movements of the species, birds with such tags were at a serious disadvantage compared with birds identified with an individually numbered leg band (Saunders 1988). For example, over a six-year period the annual rate of return of tagged females to breed was 59 per cent ($n = 172$, range 42–76) compared with females banded ($n = 12$) only, of which 100 per cent returned the next season (two years of data). As a result, the use of patagial tags was discontinued.

As with all parrots, Carnaby's Black Cockatoo has short tarsi which provide limited length on which to place bands/rings. In addition, the feathers on the thighs make it difficult to see leg bands when the bird is standing. The species also possesses a very powerful bill, which can easily crush conventional aluminium leg bands. Accordingly the Australian Bird and Bat Banding Scheme produced special stainless steel bands for use on this species (Figure 1). These bands are 5 millimetres wide, 36 millimetres long and 1 millimetre thick. When closed the band has an internal diameter of about 10 millimetres. The bands have the following stamped on them:

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210-XXXXX



Figure 1. Female Carnaby's Black Cockatoo (210-01694) on 18 September 2009.

“210-” is the size of the band and “XXXXX” is the individual number. The height of the numerals is 2.2 millimetres. These bands were used from 1970 until 1996. This address is no longer used on bands issued by the Australian Bird and Bat Banding Scheme.

When it became apparent that patagial tags posed serious problems, it was decided to attempt to use colour bands to make it easier to identify individuals. Over several years, 31 adult females were individually marked with a numbered leg band on one tarsus and two colour bands on the other. The colour bands were made by taking 210- stainless steel bands that had been used, grinding off the numbers and lettering and then painting them with enamel paint used by modellers. The rough surface produced by the grinding allowed the paint to adhere more effectively than on an untreated surface.

During monitoring from 1977 to 1996, attempts were made to identify breeding females by examining their tarsi with a Kowa spotting telescope (40x magnification and 65mm diameter objective) mounted on a tripod. With a cooperative bird and wind-free conditions, it was possible to identify individuals with colour bands, and on several occasions, to read the numbers on a band, or sufficient numbers to be able to identify the individual.

BAND IDENTIFICATION METHODS

Between 14 and 18 September 2009, the Coomallo Creek study area was revisited to monitor the Carnaby's Black Cockatoo population, in the first complete survey since 1996 using Saunders and Ingram's (1987) protocol. An effort was made to check each hollow tree known to have had a nest of a Carnaby's Black Cockatoo in the past. In addition, other trees were examined to see if the species was nesting in them. When a hollow was being used by a black cockatoo, the contents were recorded and an attempt made to examine the female for bands. A further survey was conducted between 9 and 13 November 2009 to check all hollows and measure and band any nestlings. An analysis of breeding seasons and changes in the number of

hollow trees over the past 40 years will be presented elsewhere. Where females were still incubating or brooding, attempts were made to see if any were banded. This was done by gently scraping the side of the tree. If a female was in the hollow, this was usually sufficient for her to move to the entrance of the hollow to see what was causing the scraping. The female was then examined in two ways; using the same telescope and tripod as employed in the past and using a Canon 400D digital single lens reflex camera with an EF 100-400mm f4.5-5.6L IS USM Telephoto Zoom Lens. The camera was hand-held, producing relatively sharp images utilising the lense image stabilising mode. Best results with the camera were achieved in bright light and high shutter speeds (higher than 1/600th second). Often the female would fly to a nearby tree and perch. Ideal conditions for viewing were when the female perched on a dead branch so that her tarsi could be examined from a range of angles, particularly underneath.

Over the two visits in 2009, 41 active nesting attempts were observed: 21 were by females with no bands; 16 females could not be examined sufficiently carefully to see if they were banded or not; and four females were thought to have been banded. Three of these banded females were seen in September. They were all incubating eggs. These females were not seen in November as their nestlings were large and they were no longer brooding during the day. The fourth female believed to be banded was seen in November. She happened to be at the hollow feeding her nestling when we visited. As she left the hollow one of us thought that she was banded, but she did not stay nearby, so we had no further opportunity to attempt to examine her tarsi.

The other three banded females were identified, but only via the camera. The telescope was no help. During the time the camera was being used to identify the females, only one number on one band was noted utilising the telescope.

FEMALES IDENTIFIED

The first female identified was 210-03089. On 16 September, 50 photographs were taken of her between 1250 and 1301 hours.

This female was banded as a breeding adult on 21 November 1994 when using a hollow less than 182 metres from where she was breeding in 2009. She was also colour banded and only faint traces of the Red/Red combination were visible on the bands on the left tarsus. There is no apparent damage to her tarsi after 15 years of wearing bands. Carnaby's Black Cockatoo do not breed until they are at least four years old (Saunders 1982, Saunders and Ingram 1998), so this individual was at least 19 years old in November 2009.

The second female identified was 210-01876. On the 17 September, 53 photographs were taken of her between 1300 and 1313 hours. This female was banded as a breeding adult on 8 November 1988. In 2009 she was breeding in a hollow 454 metres from the one she was using in 1988. She was also colour banded in 1988 with the combination Orange/Yellow on the right tarsus. None of the colour was left on the colour bands. There is no apparent damage to her tarsi after 21 years of wearing bands. This individual was at least 25 years old in November 2009.

The third female identified was 210-01694 (Figure 1). On the 18th September, 96 photographs were taken of her between 0832 and 0857 hours. She was banded as a nestling on 19 November 1990. This bird was 19 years old in November 2009. She had fledged from a hollow 2 048 metres from where she was nesting in 2009. Once again there is no apparent damage to her tarsus over the 19 years she was wearing the band.

Aged at least 25, female 210-01876 is the oldest known breeding female Carnaby's Black Cockatoo in the wild. This extends the previous record for breeding females of this species reported by Saunders and Ingram (1998) as at least 19 years old. Female 210-03089 equalled this earlier record. At 19, female 210-01694 is the oldest known aged breeding female. The record for the oldest Carnaby's Black Cockatoo in the wild was reported by Saunders and Dawson (2009). It was a known aged tagged male that was 34 years old.

Because it has the added advantage of a permanent record of the band sightings and is faster to collect and process images, the camera is a far superior technique for identifying banded Carnaby's Black Cockatoos. This digital technique was not available to DAS during the monitoring period 1969–1996. Carnaby's Black Cockatoos remain relatively calm when their nest sites are approached. The length of time taken to get sufficient photographs to read the band numbers (11–25 minutes in these cases) is no longer than the time the females are out of the hollow when being fed by the males during incubation and brooding (Saunders 1982), so the disturbance is unlikely to result in any desertion. Certainly it did not cause any desertions in these three cases, or in any cases when DAS was using a telescope to read bands in the past. Any further monitoring of the Coomallo Creek population should incorporate photographic examination of the tarsi of incubating and brooding females.

The flat stainless steel bands are now no longer used. They have been replaced by round stainless steel bands which are narrower and have only 320-XX-XXX stamped on them, where 320 is the size and XX-XXX is the individual number. The height of the numerals is also 2.2 millimetres. It remains to be seen if these bands can be read using the same camera technique.

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