

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Minister approved this conservation advice on 31/10/2015 and included this species in the Vulnerable category, effective from 31/10/2015

Conservation Advice

Probosciger aterrimus macgillivrayi

palm cockatoo (Australian)

Taxonomy

Conventionally accepted as *Probosciger aterrimus macgillivrayi* (Mathews, 1912).

Summary of assessment

Conservation status

Vulnerable

Criterion 4: (Vulnerable)

The highest category for which *Probosciger aterrimus macgillivrayi* is eligible to be listed is Vulnerable.

Probosciger aterrimus macgillivrayi has been found to be eligible for listing under the following listing categories:

Criterion 3: C2 (a)(ii) Vulnerable

Criterion 5: Vulnerable

Species can be listed as threatened under state and territory legislation. For information on the listing status of this species under relevant state or territory legislation, see <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

Reason for conservation assessment by the Threatened Species Scientific Committee

This advice follows assessment of information provided to the Committee to list *Probosciger aterrimus macgillivrayi*.

Public Consultation

Notice of the proposed amendment and a consultation document was made available for public comment for greater than 30 business days between 17 November 2014 and 9 January 2015. Any comments received that were relevant to the survival of the subspecies were considered by the Committee as part of the assessment process.

Sub-species Information

Description

The palm cockatoo (Australian) is a large cockatoo with a massive, curved dark grey bill and a long erectile crest (Pizzey & Knight, 1997; Higgins, 1999). Adults are entirely slate-black in colour except for a bright-red facial patch which flushes a deep scarlet when alarmed or excited (Pizzey & Knight, 1997; Higgins, 1999). Juveniles are similar to adults in colouration; however they have pale yellow scallop-like markings on the under-body and underwing coverts, a paler grey bill and paler pink facial patch (Pizzey & Knight, 1997; Higgins, 1999).

Palm cockatoos (Australian) are similar to the red-tailed black cockatoo (*Calyptorhynchus banksii*), which can be distinguished by the red or orange panels in their tail (Pizzey & Knight, 1997). The species can be seen singly, in pairs or in parties and are often found perching in

emergent trees calling and displaying, sometimes upside down with wings and crest spread (Pizzey & Knight, 1997). Palm cockatoos (Australian) have a distinctive whistle comprising of two syllabi, the first a deep and mellow note and the second a drawn-out, shrill and high-pitched note (Higgins, 1999). This whistle is just one of the many calls (over 27 documented so far) used by the palm cockatoo (Australian) which has a varied, extensive and complex vocal repertoire that appears to vary geographically (Zdenek, pers comm., 2015).

Distribution

Palm cockatoos (Australian) are conventionally accepted as a distinct subspecies distributed across the north of Cape York Peninsula, Queensland, from north of Pormpuraaw on the west coast to Saltwater Creek, Princess Charlotte Bay on the east coast (Storch, 1996; Higgins, 1999). The palm cockatoo (Australian) is the only subspecies of the palm cockatoo found on mainland Australia (Garnett et al., 2011). Palm cockatoos found in Papua New Guinea and Indonesia are generally considered to belong to different subspecies groupings. However, a paper by Murphy et al (2007) disputes the identification of the palm cockatoo (Australian) (*P. a. macgillivrayi*) as a separate subspecies and instead suggests that the Cape York population of palm cockatoos actually belongs to *P.a. aterrimus*. The degree of connectivity between palm cockatoo populations on Cape York is largely unknown.

Cultural Significance

The palm cockatoo occurs across the country of many different Indigenous groups on Cape York Peninsula. On the east of the cape the species is revered as a 'spirit bird' by members of the Utaalinganu, Kanthanampu, and Kuuku Ya'u language groups in the Lockhart River region, many of whom tell cultural stories relating to the species and consider it bad luck to harm or injure the birds (Zdenek, pers comm., 2015). The palm cockatoo (Australian) occurs on the homeland (Ngaachi) of the Kuuku I'yu (northern Kaanju) indigenous peoples. The Kuuku I'yu people have important social, cultural, spiritual, historical and ecological connections to their homeland and they recognise the rich biodiversity it supports, including habitat for rare and threatened species such as this palm cockatoo (*Kila*) (Chuulangun Aboriginal Corporation, 2010).

Relevant Biology/Ecology

The palm cockatoo (Australian) inhabits closed forest and riparian systems, and open woodlands adjacent to these habitats. The subspecies attains the highest densities in open woodlands adjacent to *Corymbia* and *Eucalyptus* dominated forest and has significantly lower densities in the closed forests themselves (Murphy, 2006). Individuals and small flocks feed in closed forests and littoral systems during the middle of the day, mostly on the hard seeds of fibrous and woody fruits of woodland, littoral and closed forest species, taken from the canopy and the ground (Wood, 1988; Storch, 1996).

Pairs are thought to occupy permanent breeding territories year-round, with each pair tending multiple nesting and display hollows that are visited and defended most mornings and afternoons, especially by males (Murphy et al., 2003). This behaviour is distinctive from many other species of parrot which live in flocks (Murphy et al., 2003). Nests are mostly in large hollow trees, primarily large eucalypts in woodland, with an average distance of 320 m to the rainforest (Murphy et al., 2003). However, there have also been observations of nests in smaller trees, which may be related to limitations in the availability of hollows at certain times (Murphy 2006). Pairs also claim numerous other hollow trees as display sites (Wood, 1988; Murphy et al., 2003). Quality nesting sites in tree hollows appear to be a limiting resource for the subspecies (Heinsohn et al., 2003; Zdenek, pers comm., 2015).

Palm cockatoos (Australian) have low breeding success. Factors contributing to this include laying a single egg; high nesting failure; and long inter-breeding intervals, breeding on average every 2.2 years (Murphy et al., 2003). A generation time of 17.7 years (BirdLife International, 2011) is derived from an age at first breeding of 4.0 years (extrapolated from mean values for other genera in Psittacidae) and longevity of 31.4 years, extrapolated from the maximum

longevity recorded in captivity. However, there are records of birds in captivity living to a greater age and breeding significantly later, with one female reaching 40 years of age before laying her first egg (Heinsohn et al., 2009).

Threats

The greatest threat to palm cockatoos is the cumulative impact of a range of contrasting mechanisms all operating to reduce the availability of nesting hollows, such as fire, cyclones, land clearing and competition.

Inappropriate fire regimes are a significant threat to palm cockatoos (Murphy et al., 2003). Fire affects the stability of the rainforest/woodland ecotone and is needed to maintain recruitment of large trees. Some woodlands with palm cockatoo nest-trees are being invaded by rainforest species, probably as a result of reduced fire frequencies (Russell-Smith et al., 2004). On the other hand, in some areas frequent, high-intensity fires are destroying nest trees directly, and may also indirectly reduce the number of breeding hollows available to palm cockatoos through the negative impacts on the abundance and diversity of termites (Abenspergtraun and Milewski, 1995), which play a significant role in the creation of new hollows (Perry et al., 1985). Nest-hollows are thought to be a limiting resource at Iron Range, with changes in fire patterns being the main cause (Murphy et al., 2003; Murphy & Legge, 2007).

Land clearing near Weipa for bauxite mining has also reduced hollow availability, and has removed small patches of rainforest feeding habitat (Gould, cited in Garnett et al., 2011). Furthermore, loss of nesting hollows is likely to be an ongoing issue as approximately 85% of the woodland habitats (Regional Ecosystem 3.5.2) on Cape York that contain the subspecies' preferred nest tree (*Eucalyptus tetradonta*) occur on either mining leases or mining exploration leases (Gould, 2010). Evaluation of post-mining revegetation efforts in the Weipa region has indicated that these habitats do not resemble the pre-mining forest conditions in either structure or species composition (Gould, 2012). Thus mining activities are likely to cause a net loss in the availability of woodland habitat containing hollow-bearing trees.

Palm cockatoos (Australian) also experience competition from sulphur-crested cockatoos (*Cacatua galerita*) that compete for nest-trees (Heinsohn et al., 2003) and have increased over the last 2 decades around Weipa (Gould, cited in Garnett et al., 2011).

The Palm Cockatoo is listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); No trade in this species is permitted.

How judged by the Committee in relation to the EPBC Act Criteria and Regulations

Criterion 1. Population size reduction (reduction in total numbers)			
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered Very severe reduction	Endangered Severe reduction	Vulnerable Substantial reduction
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%
A1	Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.		
A2	Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.		
A3	Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3]		
A4	An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.		
	<i>based on any of the following:</i> <ul style="list-style-type: none"> (a) direct observation [except A3] (b) an index of abundance appropriate to the taxon (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat (d) actual or potential levels of exploitation (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites 		

Evidence:

Insufficient data to determine eligibility

There is a very poor understanding of both the total population size of palm cockatoos in Australia and the magnitude of the likely declines in the number of breeding adults (Heinsohn pers comm., 2015). Although the number of mature individuals is thought to be declining, there is insufficient evidence to support estimates on the rate of decline (Garnett et al., 2011).

Following assessment of the information the Committee has determined that the species is not eligible for listing in any category under this criterion as there is insufficient evidence to support past, current or future population declines of greater than 30% in any 3-generation period.

Criterion 2. Geographic distribution is precarious for either extent of occurrence AND/OR area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Not eligible

Garnett et al (2011) estimated the extent of occurrence for the palm cockatoo (Australian) to be 57 000 km² and its area of occupancy is estimated to be 27 000 km² (the area of occupancy was calculated by putting a 2.5km buffer around all closed and riparian forest within the extent of occurrence).

Following assessment of the information the Committee has determined that the subspecies geographic distribution is not very restricted, restricted or limited. Therefore, the species has not been demonstrated to have met this required element of this criterion.

Criterion 3. Small population size and decline			
	Critically Endangered Very low	Endangered Low	Vulnerable Limited
Estimated number of mature individuals	< 250	< 2,500	< 10,000
AND either (C1) or (C2) is true			
C1 An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)	Very high rate 25% in 3 years or 1 generation (whichever is longer)	High rate 20% in 3 years or 1 generation (whichever is longer)	Substantial rate 10% in 10 years or 3 generations (whichever is longer)
C2 An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival based on at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(a) (ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals			

Evidence:

Eligible under Criterion 3 C2(a)(ii) for listing as Vulnerable

Garnett et al (2011) estimated the total number of mature individuals to be 3000 (limited) and decreasing: this figure was based on a tentative population estimate made by Garnett and Crowley (2000), and the estimate has neither been confirmed nor superseded since it was published. It is worth noting, although this estimate is very coarse it falls significantly below the threshold of 10,000. It is also thought that the Australian sub-species comprises a single connected population (Garnett et al., 2011).

The Committee considers that the estimated total number of mature individuals of this subspecies is limited and declining, and the subspecies' geographic distribution is precarious for its survival as 100% of mature individuals occur in a single subpopulation. Therefore, the subspecies has been demonstrated to have met the relevant elements of Criterion 3 to make it eligible for listing as Vulnerable.

Criterion 4. Very small population			
	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
Number of mature individuals	< 50	< 250	< 1,000

Evidence:

Not eligible

Garnett et al (2011) estimated the total number of mature individuals to be 3000, thus not considered low, very low or extremely low. Therefore, the subspecies has not been demonstrated to have met this required element of this criterion.

Criterion 5. Quantitative Analysis			
	Critically Endangered Immediate future	Endangered Near future	Vulnerable Medium-term future
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

Evidence:

Eligible under Criterion 5 for listing as Vulnerable

Population viability analysis based on data from Iron Range suggests that to maintain a stable population over 100 years the palm cockatoo (Australian) would need extremely low mortality rates for juveniles (<8.8%) and adults (3.3–4.9%) (Heinsohn et al., 2009). Evidence indicates that palm cockatoos experience high rates of nesting failure as a result of predation of nestlings and eggs, and infertility of eggs (Heinsohn et al., 2009). The subspecies is also estimated to have very low breeding success (annual probability of breeding success 0.11), with females attempting to breed only once every 2.2 years on average and only laying one egg per breeding attempt (Heinsohn et al., 2009). Data on juvenile and adult mortality rates are not available for the palm cockatoo (Australian), but Heinsohn et al (2009) ran models with a range of mortality estimates, including some based on data for the related taxon, Carnaby's black cockatoo, which indicated that juvenile mortality may be as high as 70% (± 14%) while adult mortality may be around 25% (± 5%) (mortality data based on Saunders, 1982).

In conducting a population viability analysis for the palm cockatoo (Australian) Heinsohn et al (2009) ran four models to predict the likely trajectory of the subspecies into the future: two of these models predicted negative to extremely negative growth rates with the likelihood of extinction occurring within 16 to 39 years; a third model predicted the subspecies to be depleted to approximately 9 individuals within 100 years; while the fourth model, using extremely conservative mortality estimates, predicted only small decreases in population size within 100 years. Based on the results of the population viability analysis, Heinsohn et al (2009) found it unlikely that palm cockatoos (Australian) could attain long enough life spans to sustain their extremely low rates of reproduction and suggested the subspecies was likely to be in decline. There are a number of sensitivities related to the data used in the population viability analysis conducted by Heinsohn et al (2009): information on breeding success was derived from just 28 nests and the information on breeding intervals was drawn from a three year study. Nevertheless, based on the significance of declines predicted by Heinsohn et al (2009), an expert committee, convened by BirdLife Australia in 2010 to review the conservation status of all Australian birds, determined that the subspecies faces >10% probability of extinction within 100 years (Garnett et al., 2011).

The Committee considers that the palm cockatoo (Australian) has a probability of extinction in the wild of $\geq 10\%$ in 100 years. Therefore, the subspecies has been demonstrated to have met the relevant elements of Criterion 5 to make it eligible for listing as Vulnerable.

Conservation Actions

Recovery Plan

The Committee recommends there should not be a recovery plan for *Probosciger aterrimus macgillivrayi* (palm cockatoo (Australian)) as the approved conservation advice for the subspecies provides sufficient direction to implement priority actions and mitigate against key threats.

Conservation and management Actions

Primary Conservation Action

- Implement active and appropriate fire management regimes to optimise the creation and longevity of large tree hollows.
- Ensure impacts from mining activity do not further reduce the amount of available breeding and foraging habitat.

Survey and monitoring priorities

- Monitor residence at key sites at Iron Range and along westward flowing rivers.

Information and research priorities

- Identify fire management regimes.
- Investigate the impacts on populations due to significant habitat disturbance events (e.g., cyclones, large fires).
- Develop techniques to characterise the age structure of the subspecies' populations.
- Determine the longevity, survival and other demographic parameters of the subspecies.
- Conduct genetic studies to understand population connectivity across Cape York.
- Identify the age and population status of suitable nest-trees away from the Iron Ranges.
- Identify what woodland habitat traits are required to support successful breeding.

Recommendations

- (i) The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by **including** in the list in the Vulnerable category:
Probosciger aterrimus macgillivrayi
- (ii) The Committee recommends that there should not be a recovery plan for this subspecies.

Threatened Species Scientific Committee

04/06/2015

References cited in the advice

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