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Short communication

A new population of the globally Endangered Red-fronted Macaw *Ara rubrogenys* unusually breeding in palms

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Summary

The Red-fronted Macaw *Ara rubrogenys* is endemic to Bolivia, where it is listed as "Critically Endangered" due to its reduced population size and persisting threats. This species is known to breed exclusively on steep cliffs in arid inter-Andean valleys. However, during a survey of the whole distribution, we noted a previously overlooked population breeding in stands of the also endemic and globally endangered palm *Parajubaea torallyi*. We observed five adult pairs and confirmed at least three active nests. Nests were in holes 14–20 m above the ground in dead palms, at 2,580–2,700 m asl. The scarcity of breeding habitat and current nest poaching were identified as the major threats for this population. This discovery broadens our understanding of the breeding ecology and widens the scope of action for the monitoring and conservation of the species.

Introduction

The Red-fronted Macaw *Ara rubrogenys* is among the most threatened parrots of the world, listed as "Endangered" on the IUCN Red List (BirdLife International 2008) and further listed as "Critically Endangered" in Bolivia (Rojas *et al.* 2009). This medium-sized macaw is endemic to a small area (c.5,000 km^2) on the east Andean slope of south-central Bolivia, between the departments of Santa Cruz, Cochabamba, Chuquisaca and Potosí. It inhabits subtropical, xerophytic thorny scrub with abundant cacti and scattered trees at 1,000-2,700 m elevation within the valley systems of the rivers Grande, Mizque and Pilcomayo. Although accurate censuses were not available for the whole population, partial censuses and estimates suggested a decline from c.5,000 individuals in the 1980s to 2,000–4,000 in 1991–1992 and as few as 700–800 in 2006–2008 (Rojas *et al.* 2009). The Red-fronted Macaw is known to breed exclusively on steep cliffs, mostly sited close to small, secondary rivers (BirdLife International 2008, Rojas *et al.* 2009). Here we report a previously overlooked breeding population at the upper level of the species's altitudinal range, which surprisingly uses palms instead of cliffs for breeding.

Field survey and results

A survey of the global distribution and population size of the Red-fronted Macaw was initiated in early January 2011. We were aimed to cover all the known breeding sites (Rojas *et al.* 2009) as well as previously unsurveyed areas which could hold the species, combining field work and interviews with local people. On 20–21 January, we visited the Área Natural de Manejo Integrado

El Palmar (Chuquisaca), a protected area created in 1997 for the conservation of the endemic and globally "Endangered" palma de Pasopaya *Parajubaea torallyi* (Moraes 1998). This was considered an unfavourable area for the reproduction of the Red-fronted Macaw since previous surveys showed the absence of cliffs for breeding (A. Rojas unpubl. data). However, on 21 January we observed two adult pairs flying over the palm forest, and the species is considered by local people as one of the symbols of the protected area, together with the Andean bear *Tremarctus ornatos*. We interviewed indigenous people about macaws, meeting EY (co-author of this paper) who lived in EL Palmar since he was born 25 years ago and worked there as wildlife ranger for the last two years. He reported that he had known of Red-fronted Macaws breeding in palms since he was young. Although EY proved able to clearly differentiate this species from other parrots inhabiting the area, we were originally rather sceptical about this information since neither the literature (del Hoyo *et al.* 1997, Juniper and Parr 2010) nor our previous 5-year experience of surveying Red-fronted Macaws (A. Rojas unpubl. data) provided evidence of this species breeding in substrates other than cliffs. In fact, the species is called *k'jaka loro* in the local Quechua language, which translates as "cliff-nesting parrot". Therefore, we encouraged EY to look for active nests and document his findings, providing him with binoculars and a digital camera.

After spending 10 days prospecting two valleys covered by palms, between early and mid- March 2011, EY was able to locate three active nests (N1, N2 and N3). Adult pairs of Red-fronted Macaws were repeatedly observed and photographed entering holes in dead palms, a time when they should be brooding young chicks (A. Rojas and J. L. Tella unpubl. data). One nest (N1) had been discovered by the author in the previous year (2010), when at least one chick fledged successfully. All the authors (except AR) revisited the area on 20–22 April 2011. On 21 April, we arrived at N1 at 08h20 after three hours of trekking. There were no macaws or other parrots around, so we took the opportunity to record details of the nest site including its GPS coordinates. The nest hole was c.20 cm in diameter, clearly enlarged by birds, and in a dead palm 8 m from the ground. The palm was c.30 cm in diameter at a height of 1.8 m, sited in a densely forested steep slope oriented SW, at 2,585 m. A pair of adult Red-fronted Macaws arrived at the site at 09h30, calling loudly, a behaviour typical of parents arriving at a nest at that time of the day to feed nestlings close to fledging age (as repeatedly observed during our surveys of cliff-nesting Red-fronted Macaws, A. Rojas and J. L. Tella unpubl. data). We immediately left the site to avoid disturbance. Walking towards N2, we discovered another dead palm (09h50) with a hole sharing the same nest characteristics, but no macaws were seen or heard. About 10 minutes later, we observed two pairs of adult Red-fronted Macaws flying in a straight direction towards this potential nest site. We arrived at N2 at 10h20. No birds were at the nest, but an adult Red-fronted Macaw was perched on the top of another dead palm, 53 m away from N2. When approaching it, a second adult emerged from a nest-hole in that palm (N4). The pair flew, calling loudly, and perched in a live palm 115 m from the nest. We suspected that N2 and N4 could be occupied by different pairs, since Red-fronted Macaws usually breed colonially on cliffs (Juniper and Parr 2010), with active nests often separated by just a few metres (A. Rojas and J. L. Tella unpubl. data). We thus observed the site in the hope that a second pair would arrive at N2. That was not the case, and the pair from N4 were still perched when we left the area at 11h25. Nonetheless, we could not discard the possibility that there was a second pair, since there is high variability in the time of feeding old nestlings, some pairs not arriving at the cliff nests before the afternoon (A. Rojas and J. L. Tella unpubl. data). N2 was 20 m above the ground and N4 at 14 m, both palms were dead and approximately 32–35 cm in diameter, sited on a palm-dense steep slope oriented WSW at 2,696 m. N3 was also in a dead palm but in a stand c.5 km far from N2. Unfortunately, we were unable to visit it again because of time-schedule constraints.

Monitoring and conservation implications

We observed five pairs of Red-fronted Macaws, although only confirmed three active nests, through a very short and spatially limited survey. Further efforts are thus needed to establish the actual population size breeding in palms. Such a complete survey is not easy to conduct; despite

the main distribution of *P. torallyi* being restricted to small valleys amounting to only 34 km² in El Palmar, there are several small palm stands scattered through the surrounding mountains between 2,400 and 3,400 m (Moraes 1998), most of them highly inaccessible.

Although somewhat speculative, we do not expect high breeding densities of Red-fronted Macaws to breed in palms, since macaws seem to select dead palms for nesting (as indicated by our survey and the long-term experience of EY). Dead palms are scarce, according to our observations, and full-grown palms, which are more at risk of dying, occur in low densities in El Palmar (< 1/600m²; Thompson *et al.* 2009). Moreover, human activities are limiting the regeneration and spread of palm stands (Thompson *et al.* 2009) despite of the protected status of El Palmar, linking Red-fronted Macaw conservation to the conservation of this endangered palm (Moraes 1998). In fact, we observed palms cut by people throughout the surveyed area, and even a person carrying recently-cut palm leaves with the help of a donkey. The ephemeral nature of cavities and loss of old palms may seriously compromise the populations of cavity-nesting birds (Cockle *et al.* 2011), and competition with the much more abundant parrot species we found breeding in palms (Mitred Parakeet *Aratinga mitrata*, Blue-crowned Parakeet *Aratinga acuticaudata*, and Turquoise-fronted Amazon *Amazona aestiva*) might further reduce the availability of nest holes for Red-fronted Macaws. Nest poaching and trade as pets are considered as major problems for the conservation of this species (BirdLife International 1998, Rojas *et al.* 2009). We also found evidence of this problem in El Palmar, since during our interviews we met an indigenous family who related us how they tried to take the chicks from a Red-fronted Macaw nest in a dead palm in 2010. However, when a person climbed the palm, the two full-grown nestlings flew away; they finally poached two *A. aestiva* that were still maintained as pets when we visited the family in April 2011.

Red-fronted Macaws breeding in palms may play an important role in conservation of the species even if their breeding numbers are low. The closest two colonies breeding in cliffs (with 2–3 breeding pairs in each) are c.30 km and 50 km away (authors' unpubl.data), and separated by high mountain ranges. This, together with the particular breeding behaviour in palms, suggests that the El Palmar population might be culturally and even genetically differentiated from the rest. Phylogenetic analyses suggest that tree cavity nesting is the ancestral state among parrots, that most taxa capable of using alternative nesting substrates also retain the ability to nest in tree cavities, and that most of the New World parrots that exploit alternative nesting substrates arose during a single radiation event 20–30 million years ago (Brightsmith 2005). Cultural diversity (Laiolo and Jovani 2007) and individual variability in behavioural traits are important in enabling species to cope with environmental and anthropogenic challenges (e.g. Carrete and Tella 2011), and the erosion of such diversity could further imperil the species. Future studies should elucidate whether the palm-breeding population of Red-fronted Macaws constitutes a "culturally significant unit" (Ryan 2006) that would merit special conservation efforts.

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