

## First experimental release of the red-and-green macaw *Ara chloropterus* in Corrientes, Argentina

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**SUMMARY:** In 2015 seven captive-bred red-and-green macaws *Ara chloropterus* were experimentally released into the Iberá National Park, Corrientes, Argentina. After a month in a pre-release cage, they were hard released. Two birds were preyed upon, three flew beyond our detection range, one transmitter was recovered underwater, and one bird was recaptured. We identify ways in which future releases of captive-bred macaws could be improved.

**BACKGROUND:** The red-and-green macaw became extinct from Argentina in the nineteenth century. To restore its role as a consumer and disperser of large fruits and seeds in a subtropical savannah we developed a project to reintroduce this species to a protected area in Corrientes province, northeast Argentina.

**ACTION:** On 30 September 2015, after a quarantine period of five months, four male and three female macaws were transported to a pre-release aviary (4 m height, 8 m length, 4 m width) near a small forest patch in the campsite of Monte Rey, Iberá National Park (27°44'S, 56°40'W). Macaws came from three zoos; at least four were captive bred, while the others were of unknown origin. During a one-month training period we promoted fruit search behaviour, consumption of native fruits and flight abilities. Macaws were fitted with radio-collars (Telenax TXE-311CP; 30 g) and monitored with VHF receivers (RX-TLNX). On 31 October 2015, we flushed the group from the cage; a week later, following problems that led to the recapture of most individuals, we conducted a second release in which we let the macaws exit at their own pace. Every day we provided supplemental food on a feeding platform installed on a tree near the cage.

**CONSEQUENCES & DISCUSSION:** During the first release, six of the seven birds left the aviary. Most macaws landed on flooded terrain and could not take off from deep marsh vegetation. We recaptured four macaws within 24 h of release. A fifth flew at least 5 km, but was captured when it returned to the aviary after its partner was recaptured. The sixth individual was not recaptured, but stayed near the aviary.

During the second release, all the birds left the aviary. One male and one female stayed in a single tree in the forest patch where the aviary was, without visiting the feeding platform. Both were found dead 4-5 days after the second release, following two consecutive nights of strong thunderstorms. Both showed signs of predation, probably by a wildcat based on hair and faeces found nearby. The male of a second pair was

recaptured after the female disappeared on day two. This female's transmitter was found underwater 18 days later. The collar was still closed, indicating that the bird died, of unknown cause. The three remaining birds flew in different directions, on days one, five and six, beyond the detection range of our equipment (2-5 km). In both releases, group cohesion was poor.

Despite the low survival of released individuals, this 'hard' release generated information that could improve future releases of this and other species. We modified the release protocol for our next release as follows: (1) Closely track social integration to ensure that the release group is cohesive (Estrada 2014), which is expected to improve learning by imitation, vigilance, and reduce the risk of individuals dispersing in different directions. (2) Allow macaws to leave the aviary at their own pace, following closely any birds seen leaving in a state of distress to ensure they do not land on the ground. Such departures may cause disorientation and an overly-fast dispersal, preventing managers from supplementing food and protecting individuals (White *et al.* 2012). (3) Intensively train individuals for at least eight weeks to improve flight endurance and manoeuvrability, which should reduce their risk of landing on flooded land or reed beds from which they cannot take off (Collazo *et al.* 2003). (4) Keep some individuals inside the aviary (Armstrong 2015) to increase the incentive for released birds to stay nearby and improve post-release monitoring. (5) Train the group to respond to a whistle, allowing them to be called to the feeding platform for supplemental food and their overall state to be assessed (Estrada 2014). (6) Train birds to develop anti-predatory behaviours such as recognizing potential predators as threats and responding accordingly, with vigilance behavior and alarm calls (White *et al.* 2005).

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