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RESEARCH ARTICLE

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# Playback point counts and N-mixture models suggest higher than expected abundance of the critically endangered blond titi monkey in northeastern Brazil

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## Abstract

Effective management of threatened species requires accurate population size estimation and monitoring. However, reliable population size estimates are lacking for many endangered species. The critically endangered blond titi monkey (*Callicebus barbarabrownae*) is an endemic primate of the Caatinga biome in Northeastern Brazil. A previous assessment based on presence-only data estimated a minimum population size of 260 mature individuals in 2,636 km$^2$, and studies based on visual records suggested very low local relative abundance. However, this cryptic species is known to be difficult to visually detect. We played back recordings of *C. barbarabrownae* loud calls to count the number of responding groups in 34 sampling sites during 9 consecutive days in a 221-km$^2$ study area. Repeated group counts at sites were used in N-mixture models, which account for imperfect detection, to estimate the number of groups in relation to dry forest area and distance to villages. We estimated a total of 91 groups in the study area. Considering the mean number of adults per group as three, we estimated a population of 273 adult individuals, resulting in a density of 2.3 individuals/km$^2$ in the dry forest habitat. Detection probability was four times higher for surveys conducted between sunrise to midmorning than between midmorning to sunset. We also found that *C. barbarabrownae* abundance increases with increasing dry forest area and increasing distance to the nearest village, indicating the need to promote dry forest restoration in the Caatinga. As our results suggest a larger population of *C. barbarabrownae* than had been previously estimated for its entire distribution, our results suggest a need for similar assessments in other areas to reliably estimate the total population size. This study demonstrates how playback surveys coupled with N-mixture models can be used to estimate population sizes of acoustically-responsive primates, and thus contribute to more effective conservation management.

**KEYWORDS**

Caatinga, *Callicebus barbarabrownae*, dry forest, endangered species, imperfect detection, IUCN Red List

  