

Population Density of Black Howlers (*Alouatta caraya*) in the Gallery Forests of the Argentinean Chaco: A Preliminary Assessment

Rachel Dvoskin^a Cecilia Paola Juárez^b Eduardo Fernandez-Duque^{c,d}

^aDepartment of Anthropology, New York University, New York, N.Y.,

^bFundación Ecosistemas del Chaco Oriental, Formosa, ^cCenter for Reproduction of Endangered Species, Zoological Society of San Diego, San Diego, Calif., USA;

^dCentro de Ecología Aplicada del Litoral, Corrientes, Argentina,

Key Words

Alouatta caraya · Black howler · Population density · Argentinean Chaco

Introduction

The black howler monkey (*Alouatta caraya*) is a widespread species found in southern Brazil, eastern Bolivia, Paraguay and northern Argentina [Thorington et al., 1984]. Studies of howlers in Argentina have found considerable variation in density and group size, which apparently correlate with changes in the habitat [Rúmiz, 1990; Brown and Zunino, 1994; Zunino et al., 2001]. While there are adequate demographic data from *A. caraya* populations in the flooded forests of Argentina [Pope, 1968; Thorington et al., 1984; Rúmiz, 1990; Brown and Zunino, 1994; Zunino et al., 1996, 2001], information from populations inhabiting the gallery forests of the Argentinean Chaco is comparatively limited [Arditi and Placci, 1990; Brown and Zunino, 1994].

We estimated the density and average group size of a black howler monkey population found in the gallery forests of Formosa Province in the Argentinean Chaco. The comparison of our data to those obtained from this area one and two decades ago [Arditi and Placci, 1990; Brown and Zunino, 1994] may allow us to detect long-term demographic fluctuations as seen in other howler monkey populations [Milton, 1996; Fedigan and Jack, 2001; Rudran and Fernandez-Duque, 2003].

KARGER

Fax +41 61 306 12 34
E-Mail karger@karger.ch
www.karger.com

©2004 S. Karger AG, Basel
0015-5713/04/0752-0093\$21.00/0

Accessible online at:
www.karger.com/fpr

Rachel Dvoskin
National Institutes of Health, 12420 Parklawn Drive
Rockville, MD 20852-1728 (USA)
Tel. +1 301 496 8814, Fax +1 301 443 8579
E-Mail rlk208@nyu.edu

Table 1. Population density estimates of black howlers in Guaycolec, Formosa, Argentina

Method	Individuals/km ²		Groups/km ²	
	1990	2001	1990	2001
Max. reliable T–A	9.2	11.6	1.9	2.0
Max. reliable O–A	8.3	11.6	1.7	2.0
Mean T–A	11.7	26.0	2.4	4.6
Nonlinear density plot	7.6	21.4	1.6	3.7

1990 values from Arditi and Placci [1990]. T–A = Transect-to-animal distance; O–A = observer-to-animal distance.

Methods

The region consists of a mosaic of grasslands, savannas, dry and gallery forests in the eastern Chaco of Argentina. The study area consisted of about 300 ha of gallery forest found along the banks of the Riacho Pilagá in the Guaycolec Ranch (58°13' W, 25°54' S). The semideciduous gallery forest is home to a black howler population (*A. caraya*) and a night monkey population (*Aotus azarai*). A more detailed description of the area can be found in Fernandez-Duque et al. [2002].

Three transects (1.9, 1.6 and 1.3 km) marked every 50 m with colored tape were walked systematically to collect the data. Each transect was walked 10 times at a pace of about 1 km/h between July 27 and August 20, 2001. Each transect was walked at least twice (once in each direction) during each of 4 time blocks (8.00–10.00, 10.00–12.00, 13.00–15.00, 15.00–17.00 h). Whenever monkeys were seen, 2 researchers recorded: animal-to-transect distance (a) and sighting angle (θ). Distances were estimated by pacing, and angles were determined with a compass. Observer-to-animal distance (b) was calculated using the trigonometric relationship $b = a/\sin\theta$. Upon sighting a group, observers stayed a maximum of 20 min to count individuals.

Density was calculated using the maximum reliable transect-to-animal distance, the maximum reliable observer-to-animal distance, the mean transect-to-animal distance and the nonlinear density plot methods [Struhsaker, 1981]. The maximum reliable perpendicular and sighting distance used for calculations was 36 m [Arditi and Placci, 1990] whereas the mean transect-to-animal distance was 16 m. The nonlinear density plot calculations were done, for comparative purposes with previous studies, combining the three transects into one 4.8-km transect and assuming a home range size of 50 ha [Arditi and Placci, 1990] and a transect width of 52 m.

Results

The total distance walked was 48 km. Seven groups of howlers totaling 40 individuals were encountered during the 30 censuses. Sightings occurred during all of the 4 time periods. The mean group size was 5.7 (SD 3.2, range 2–10). Density estimates are presented in table 1.

Discussion

The density estimates and average group size reported here are higher than those reported from the same gallery forests a decade ago [Arditi and Placci, 1990] and lower than those reported in the gallery forests of Formosa at the beginning of the 1980s (63 individuals/km² [Brown and Zunino, 1994]). Given the reports of a botfly epidemic that apparently affected the population in the early 1980s [Arditi and Placci, 1990; Brown and Zunino, 1994; Rudran and Fernandez-Duque, 2003], it is possible that the high densities obtained at that time reflect the status of the population before the epidemic. In the early 1990s the population was relatively sparse due to the harmful effects of the botfly infestation. The population may be slowly recovering, as indicated by an increase in density and average group size.

Although our density estimates are subject to potential errors because of the relatively small number of transect replicates, it is reassuring that regardless of the method considered, black howlers seem to be more numerous now than they were 10 years ago. The preliminary data presented here provide convincing evidence for an increase in population density and average group size during the last decade.

Long-term monitoring of this population will be necessary to identify possible factors responsible for this or future changes. This work was the first step in developing such a long-term project to study black howler monkeys in the Argentinean Chaco.

Acknowledgements

Special thanks go to the managers of Estancia Guaycolec, Mr. Emilio Arauz and Mr. John Adams, for their continuous support and to Marcelo Rotundo for his assistance in the field. Thanks are also due to the New York Consortium in Evolutionary Primatology for travel and living expenses for R.D. and to Drs. Clifford Jolly, Todd Disotell and Anthony Di Fiore for advice and support. This research was supported by grants to E.F.D. from the Center for Reproduction of Endangered Species of the Zoological Society of San Diego.

References

- Arditi SI, Placci LG (1990). Hábitat y densidad de *Aotus azarae* y *Alouatta caraya* en Riacho Pilagá, Formosa. *Boletín Primatológico Latinoamericano* 2: 29–47.
- Brown AD, Zunino GE (1994). Hábitat, densidad y problemas de conservación de los primates de Argentina. *Vida Silvestre Neotropical* 3: 30–40.
- Fedigan LM, Jack K (2001). Neotropical primates in a regenerating Costa Rican dry forest: A comparison of howler and capuchin population patterns. *International Journal of Primatology* 22: 689–713.
- Fernandez-Duque E, Rotundo M, Ramirez-Llorenz P (2002). Environmental determinants of birth seasonality in night monkeys (*Aotus azarae*) of the Argentinean Chaco. *International Journal of Primatology* 23: 639–656.
- Milton K (1996). Effects of bot fly (*Alouattomyia baeri*) parasitism on a free-ranging howler monkey (*Alouatta palliata*) population in Panamá. *Journal of Zoology (London)* 239: 39–63.
- Pope BL (1968). Population characteristics. In *Biology of the Howler Monkey* (*Alouatta caraya*) (Malinow M, ed.), *Bibl Primatol* No 7, pp 13–20. Basel, Karger.
- Rudran R, Fernandez-Duque E (2003). Demographic changes over thirty years in a red howler monkey population (*Alouatta seniculus*) in Venezuela. *International Journal of Primatology* 24(5): 925–947.
- Rúmiz DI (1990). *Alouatta caraya*: Population density and demography in Northern Argentina. *American Journal of Primatology* 21: 279–294.

- Struhsaker TT (1981). Census methods for estimating densities. In *Techniques for the Study of Primate Population Ecology* (Subcommittee on Conservation of Natural Populations, National Research Council, ed.), pp 36-80. Washington, National Academy Press.
- Thorington RW, Ruiz, JC, Eisenberg JF (1984). A study of a black howling monkey (*Alouatta caraya*) population in Northern Argentina. *American Journal of Primatology* 6: 357–366.
- Zunino GE, Bravo S, Ferreira FM, Reisenman C (1996). Characteristics of two types of habitat and the status of the howler monkey (*Alouatta caraya*) in northern Argentina. *Neotropical Primates* 4: 48–50.
- Zunino GE, González V, Kowalewski MM, Bravo SP (2001). *Alouatta caraya*: Relations among habitat, density and social organization. *Primate Report* 61: 37–46.

Erratum

In the article ‘Seed Dispersal by Sympatric Tamarins, *Saguinus mystax* and *Saguinus fuscicollis*: Diversity and Characteristics of Plant Species’, by Christoph Knogge and Eckhard W. Heymann, published in *Folia Primatologica* 2003;74:33–47, figure 3 was not published correctly. The solid curve should have been labelled ‘*Saguinus fuscicollis*’ and the dotted one ‘*Saguinus mystax*’. Corrected figure see below.

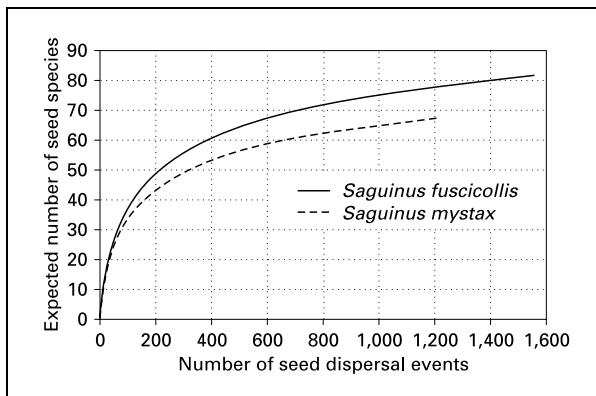


Fig. 3. Rarefaction curves for the relationship between the number of seed dispersal events and the number of seed species encountered in faecal samples.