

## A Behavioural Study of Black Howler Monkeys (*Alouatta caraya*)

### Introduction

Over 8 weeks, between mid-April and mid-June, 2018, different groups of black howler monkeys, *Alouatta caraya*, were observed in four different woodlands (montes) across Reserva Don Luis, in the Iberá Wetlands in the province of Corrientes, northern Argentina. A number of group dynamics and aspects of their behaviour were of interest, including group size and composition, and instances of grunting and howling, in particular as a reaction to human presence. However, no statistical sampling methods were used to analyse these data, and therefore the results ought to be taken only as qualitative observations. A brief literature review will provide some background information regarding the general behaviour of *A. caraya* and other relevant data.

### Species Overview

*A. caraya* live in groups of 3 up to 18 individuals and occur across a range of habitats in northern Argentina, eastern Bolivia, central and southern Brazil and most of Paraguay. Their habitats include gallery forest, Chaco forest, and inundated forest, and wetland forest islands, such as those that occur in the Pantanal and in Esteros del Iberá. There is evidence to suggest that two taxa of the species exist, according to a study that differentiated populations genetically across two geographies (Santa Cruz, Bolivia, and Mato Grosso and Goias, Brazil)<sup>1</sup> - and furthermore, that hybridization between different taxa of *Alouatta* is known to take place in the wild in areas where more than one taxon exists<sup>2</sup>.

*A. caraya* are currently classified as being of “Least Concern” under IUCN's Red List of Threatened Species, however, as all other primates, their populations and habitats are in continuous decline<sup>3</sup>. Their habitats are threatened by conversion and agricultural expansion for soy and cattle ranching in the Brazilian Cerrado, soy in the Bolivian Chaco, and small-scale farms and cattle ranching in Argentina<sup>4</sup>. Therefore, proactive conservation efforts would ideally seek to halt and eventually reverse habitat loss (including conversion, degradation and fragmentation) in order to ensure the persistence and success of the species.<sup>5,6</sup> Efforts to protect the habitats of *A. caraya*, particularly forests and wetlands, would contribute to global and national goals on climate change, biodiversity, and sustainable development.<sup>7</sup>

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<sup>1</sup>Nascimento, et al. 2005. Cytochrome b polymorphisms and population structure of two species of *Alouatta* (Primates). *Cytogenetic and Genome Research*, 108(1-3):106-11.

<sup>2</sup>Bicca-Marques, 2008. Survey of *Alouatta caraya*, the black-and-gold howler monkey, and *Alouatta guariba clamitans*, the brown howler monkey, in a contact zone, State of Rio Grande do Sul, Brazil: evidence for hybridization. *Primates*, 49:246-252.

<sup>3</sup>Arroyo & Dias, 2010. Effects of Habitat Fragmentation and Disturbance on Howler Monkeys: A Review. *American Journal of Primatology* 72:1-16.

<sup>4</sup>Fernandez-Duque, et al. 2008. *Alouatta caraya*. The IUCN Red List of Threatened Species. Accessed online 15<sup>th</sup> July 2018. <http://www.iucnredlist.org/details/41545/>

<sup>5</sup>Oklander, et al. 2017. Genetic structure in the southernmost populations of black-and-gold howler monkeys (*Alouatta caraya*) and its conservation implications. *PLoS ONE* 12(10): e0185867.

<sup>6</sup>Zunino, G. & Kowaleski, M. 2008. Primate research and conservation in northern Argentina: the field station Corrientes (Estacion Biologica de Usos Múltiples – EBCo). *Tropical Conservation Science*, Vol.1 (2):140-150.

<sup>7</sup>For example, land-use targets captured in Nationally Determined Contributions in the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC), Goal C and associated targets under the Convention on Biological Diversity (CBD) [a new agreement will replace these in 2020], and Goals 13 and 15 of the Sustainable Development Goals (SDGs).

As their common name would suggest, howler monkeys expend a lot of time and energy emitting loud calls (ranging from roars and howls to grunts) through their anatomically specialised vocal apparatus. Their calls can be heard from a distance of up to 5km, depending in part on the topography (sound travels better across some landscapes than others). The vocalisations of *A. caraya*, which can be short- or long-distance, are used for a range of different functions. These include warning calls to alert members of a group of a predator or other threat, re-establishing contact between lost individuals, and during aggressive interactions between members of one or of different groups<sup>8</sup>; as well as spontaneous calls made at dawn, and in anticipation of/during storms. One study, however, found that calls are used first and foremost to regulate space by means of announcing presence/occupancy, (rather than in self-defence or predator deterrence), which can also help to settle disputes without acts of a more physical nature<sup>9</sup>.

### Observations

Observations were carried out over 24.5 hours in total (mostly comprised of sessions of around 1 hour), primarily in three different sites: Monte casa, Monte grande, and Monte mono. Spontaneous and shorter observations took place in two other woods, El Tacuaral and Monte sur. The groups of black howler monkeys within hearing distance of Reserva Don Luis often howled and grunted at dawn and in anticipation of an oncoming storm, consistent with the findings in the literature.



Photo taken by Beatriz Luraschi on 30<sup>th</sup> June, 2018, at Reserva Don Luis, of an adult male black howler monkey at Monte casa.

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<sup>8</sup>Holzmann, et al. Short-distance vocalizations of the black and gold howler monkey (*Alouatta caraya*) in the Atlantic Forest of Argentina. 2017. SAREM Series A – Mammalogical Research, Vol. 2. Primatology in Argentina, Eds. Kowaleski, M. & Oklander, L.

<sup>9</sup>Da Cunha, R. & Byrne, R. 2006. Roars of black howler monkeys (*Alouatta caraya*): evidence for a function in inter-group spacing. *Behaviour*, 143, 1169-1199.

*A. caraya* were sighted mostly in the lower and medium strata of the forest, between 5 and 10 meters from the ground. Observed group size varied between 3 and 7 individuals, although it is likely that not all were in sight at a given time. This is particularly true for very young members of a group, some of which tried to stay out of sight in the top stratum of foliage, hidden behind leaves, while other more curious individuals clearly did not mind proximity to humans (as seen in Monte mono on the 2<sup>nd</sup> May).<sup>10</sup> It was difficult to establish exact group size for this reason, and group size and composition changed over time between sightings. For instance, 7 howler monkeys were sighted in Monte casa at a time in late April, after which only 5 were sighted at a time. In Monte grande on the other hand, it appears that two separate groups exist, each with an adult male, but these were seen together on the 15<sup>th</sup> May. This is quite unusual because adult males tend to be exclusive to their group and highly territorial.

Two births were recorded during the study period, the first in Monte mono in early May (first seen on 10<sup>th</sup> May), and the second in Monte grande (first seen on 22<sup>nd</sup> June). Both were likely no more than 1-2 weeks old when first sighted; they very small in size and still clinging to their mother's chests.

The group of howler monkeys in Monte casa is evidently the most accustomed to humans, and rarely produce any vocalisations other than grunting when humans approach their territory. They see humans daily and it is likely that they do not feel threatened by their presence. The adult male, however, howled on every occasion when there was a sudden change in weather conditions, usually from calm to windy/stormy, and from warm to cold (e.g., when thunderstorms were approaching, a strong wind picked up, or when the temperature dropped significantly).

The group of howler monkeys in Monte mono appeared more timid and was noticeably less accustomed seeing humans than the group in Monte casa. These monkeys were harder to spot, and in some cases, seemed deliberately stay quiet and in the highest stratum of the forest, shielded by foliage, out of sight. In some cases, it took up to an hour to spot the monkeys. However, this group didn't vocalise much other than grunting, bar one occasion, when there were two observers (25<sup>th</sup> May). The alpha male howled and roared for the entire duration of the observation session (45 minutes), and the females urinated and defecated near the observers. There is no obvious reason as to why they reacted in this way, when at other times they were calm. This occasion was the first time the group was observed since a new-born was seen clinging to its mother's chest two weeks earlier. The youngest howler monkey was not seen again.

Two groups of howler monkeys were identified in Monte Grande. One was often seen in the southern end of the wood, made up of one adult male, and two adult females, with the second group made up of one adult male, two adult females, and one juvenile (sex unclear). The latter group did behave defensively on one early observation, huddling in the highest part of a pindó palm (*Syagrus romanzoffiana*), with the alpha male howling continuously during the full hour of observation. There were no further instances of defensive vocalisations, only light grunting, in all subsequent observations in Monte grande.

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<sup>10</sup> See table in Annex 1 for field notes on observations.

Finally, in the wood referred to as “El tacuaral” (due to the dense growth of a *Guadua* species – clumping bamboo plants in the family of grasses that can grow up to 20m in height covering a large part of the wood), one group of howler monkeys was seen on two occasions. This wood is quite remote and very difficult to access, and it is therefore highly likely that the howler monkeys here had not seen humans in several years. On both occasions, the monkeys urinated and defecated in reaction to human presence, but did not vocalize, other than some grunts (but no howls).

#### Further research

Given the distinct ecosystem dynamics, species composition and topography (woodlands often surrounded by water bodies), movement patterns and the general behaviour of *A. caraya* populations in Esteros del Iberá is likely to vary from populations that occur in continuous, closed-canopy forests. The observations in this study prompt several questions about group dynamics and the mobility of individuals, and further research to explore these could enrich our knowledge base about this iconic species and strengthen conservation efforts:

- (i) Under what circumstances do adult, alpha males co-exist, and tolerate proximity to one another, as those observed in Monte grande?
- (ii) Do groups or individuals move between woodlands? How frequently and why?
- (iii) Do populations of *A. caraya* in Iberá vocalise in different ways, or less frequently, than forest populations (further testing the hypothesis that regulating space is the primary function of vocalisations)?

Annex I. Table 1. Notes on observations

<b>Date</b>	<b>Location</b>	<b>Time</b>	<b>Weather</b>	<b>Number of individuals</b>	<b>Group composition</b>	<b>Behavioural observations</b>
17/04/2018	Monte casa	17:30 - 18:30	28C, sun	5	1 adult male, 2 adult females, 1 juvenile female, 1 juvenile male	Alpha male grunting and closest to me; others mostly quiet and quite still.
18/04/2018	Monte casa	11:30 - 12:30	30C, sun	5	As above	Two adult females grunting and also seem the most timid (adult male not grunting). The juveniles and adult male appear curious and come closer.
20/04/2018	Monte mono	11:00 - 12:30	30C, sun, light wind	4	1 adult male, 2 adult females, 1 juvenile male	Noticeably more timid than the monkeys in Monte casa; more hidden in the trees. Only grunting, no howling. One female took an interest in my yellow backpack and got very close to it when I was further away.
21/04/2018	Monte grande	10:00 - 11:30	28C, sun	None sighted		
24/04/2018	Monte grande	11:00 - 12:15	28C, sun	None sighted		
25/04/2018	Monte casa	10:00 - 11:30	25C, sun	7	1 adult male, 2 adult females, 1 juvenile female, 3 juvenile males	Juvenile female particularly inquisitive. No howling by any individuals, just grunting by adult male and 1-2 females.

28/04/2018	Monte grande (south end and north end)	10:30 - 12:30	30C, sun	South: 3, North: 4	South: 1 adult male, 2 adult females; North: 1 adult male, 2 adult females, 1 juvenile (sex unclear)	South: two individuals not bothered by my presence; North: Very defensive, howled as I approached and continued to do so for the full hour that I was observing them for, and stayed in the same pindo huddled together.
02/05/2018	Monte mono	09:30 - 11:00		4	1 adult male, 2 adult females, 1 juvenile male	Some light grunting by adult male, with others quietly looking on, staying close to adult male.
04/05/2018	Monte grande (north end)	09:30 - 11:00	23C, cloudy	3 (North)	1 adult male, 2 adult females	Did not howl, just light grunting by male.
10/05/2018	Monte mono	09:30 - 11:00	Windy and warm, ca. 25C	4	1 adult male, 2 adult females, and 1 newborn clinging to it's mother's chest	Curious, not defensive, despite new baby. Some grunting by adult male but no howling.
11/05/2018	Monte mono	10:00 - 11:30	18C	None sighted		Two of us on foot, waited and walked around the monte for an hour but did not see or hear them.
15/05/2018	Monte grande (south)	09:30 - 11:00	15C	4	2 adult males!, 1 adult female, 1 juvenile female	Calm. Light grunting.
16/05/2018	Monte casa	15:30 - 16:30	15C	5	1 adult male, 1 adult female, 1 juvenile female, 2 juvenile males	Calm, eating. Only light grunting. Looked at me but did not appear threatened or defensive.

20/05/2018	El tacuaral	11:30-12:00	14C, overcast	5	1 adult male, 4 adult females,	There were three of us on foot - defensive behaviour; defecating, urinating, but no howling. These monkeys very rarely see people and must have therefore felt somewhat threatened by our presence.
24/05/2018	Monte grande (south)	10:00 - 11:30	18C	3	2 adult males, 1 juvenile (?)	Calm, feeding on leaves in a tree. Did not mind my presence.
25/05/2018	Monte mono	16:30 - 17:15	22C	4	1 adult male, 2 adult females, 1 juvenile female (newborn not sighted)	There were two of us on foot - worth noting! Very defensive behaviour; defecating, urinating, howling.
27/05/2018	Monte grande (south)	15:00 - 15:10	18C	3	1 adult male, 2 adult females	Calmly feeding on leaves in one tree. [There were three of us passing on horseback, stopped to observe for ca. 10 minutes]
30/05/2018	Monte mono	10:00 - 11:30	15C	4	1 adult male, two adult females, 1 juvenile female (newborn not sighted)	Defensive behaviour; howling, defecating, urinating for approximately 15 minutes. Then they retreated.
31/05/2018	Monte casa	09:30 - 10:30	14C	5	1 adult male, 1 adult female, 1 juvenile female, 2 juvenile males	Calm, light grunting.

01/05/2018	Monte mono	10:00 - 11:00	10C	None sighted		
03/06/2018	El tacuaral	10:30 - 11:30	14C	3	3 adult females (male not seen)	There were two of us on foot. Some minor defensive behaviour (defecating, urinating), but only light grunting without loud howling.
05/06/2018	Monte mono	10:00 - 11:15	15C	4	1 adult male, 2 adult females, 1 juvenile female (newborn not sighted)	Calm, light grunting, did not take much notice of me otherwise.
06/06/2018	Monte grande	09:30 - 10:30	12C	None sighted		
08/06/2018	Monte grande (south)	10:30 - 12:00	10C, windy	3	1 adult male, 2 adult females	Calm, only light grunting. They fed on leaves and retreated after about an hour towards the northern part of the monte.
12/06/2018	Monte casa	10:00 - 11:00	11C, light wind	5	1 adult male, 3 adult females, 1 juvenile male	They were calm and were grunting lightly.
22/06/2018	Monte casa	15:00 - 16:00	20C	4	1 adult male, 1 adult female, 2 juvenile males	There were five of us on foot. They were calm and adult male and one of the adult females were grunting lightly.
22/06/2018	Monte grande	17:15 - 18:00	20C	5	One adult male, three adult females, one new born clinging to it's mother's chest.	There were four of us on horseback, we stopped to observe for ca. 10 mins. They were calm and did not appear to feel threatened by our presence. They stopped feeding and

						observed
28/06/2018	El tacuaral	13:30 - 14:00	14C, rain	None sighted		

*[Unless stated otherwise, observations involved just one person. This is important because the howler monkeys tended to behave differently, usually more defensively, if more than one person was present.]*

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