

First inventory of small non-flying mammals of the Cueva de los Guacharos National Natural Park (Huila, Colombia)

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High Andean mountain ecosystems have been cataloged as hotspots of mammalian diversity and endemism (Ceballos et al. 2006, Myers et al. 2000). However, deforestation rates in such montane forests is increasing (Armenteras et al. 2010), and with it, small non-flying mammal (SNFM) species and their populations are decreasing. SNFM fulfill ecological roles of great relevance for ecosystems, particularly because of their trophic importance as prey for primary consumers, mainly mesocarnivores (Janzen 1998), but also given their relevance as seed predators and dispersers (Xiao et al. 2005, Li & Zhang 2007). In Colombia, despite their ecological value, basic information on SNFM, including basic species surveys, are still scarce, especially in this type of ecosystems and even in protected areas such as national natural parks (Alberico 2000, Solari et al. 2013); such trend is probably due to the historic inaccessibility to most parts of the country and given the low interest on the group compared to other more charismatic species. Inventories of species are necessary for taxonomic and ecological studies, and as basis for generating appropriate conservation strategies. In this study we present the first small non-flying mammal inventory for Parque Nacional Natural Cueva de los Guacharos, Huila, Colombia.

Parque Nacional Natural Cueva de los Guacharos (PNNCG) (1.6023; -76.1355) is located in the eastern Andean range of Colombia, on the southeastern tip of the Huila, eastern portion of Cauca and the southwestern of Caquetá departments (Figure 1). PNNCG covers an extension of 9000 ha, with an average temperature of 16°C, annual precipitation of 3100 mm and an elevational gradient from 1100 to 2840 masl, including numerous biomes such as Subandean and Andean forests, subparamo, paramo and oak forests (MinAmbiente 2005). In 1980 PNNCG was declared biosphere reserve by UNESCO, and is known for its relevance as a wildlife corridor from the Andes to the Amazon piedmont (MinAmbiente 2005).

The study was conducted from February to July of 2014. We sampled for SNFM within the PNNCG using linear transects between 1800 and 2100 masl; on each linear transect we placed 100 Sherman traps and 3 pit fall traps. Each transect was surveyed for 10 consecutive nights in five different locations: mixed primary forest, mixed secondary forest, oaks forest, guacharos cave and the visitor center; each location was surveyed in three independent times, reaching a total of 150 sampling nights and an effort of 15.000 trap-nights. All individuals were measured and collected up to a series of 4 individuals for each species for posterior identification; individuals captured but not collected were marked and released.

We recorded a total of 11 SNFM species for PNNCG (Table 1), representing two orders (Didelphimorphia and Rodentia) and three families (Didelphidae, Heteromyidae and Cricetidae). A total of 198 individuals were captured, 66 collected, for a 1.32% capture success rate. The most abundant species was *Melanomys caliginosus*, followed by *Rhipidomys latimanus* and *Marmosops parvidens* (110, 23 and 17 individuals, respectively; Figure 2a). Highlights of the inventory include the first record of *Nephelomys nimbosus* for Colombia, only recorded for the Andean mountains of Ecuador (Percequillo 2003); also, the presence of *Transandinomys talamancae* and *Marmosops cauae* represent range extensions to their known distribution (Solari 2013) and are the first records for the Huila department. Likewise, the presence of *Heteromys anomalus* expanded the distribution to the south of Huila department; this species has only been reported in the northern part of the department (Anderson 2000, 2003).

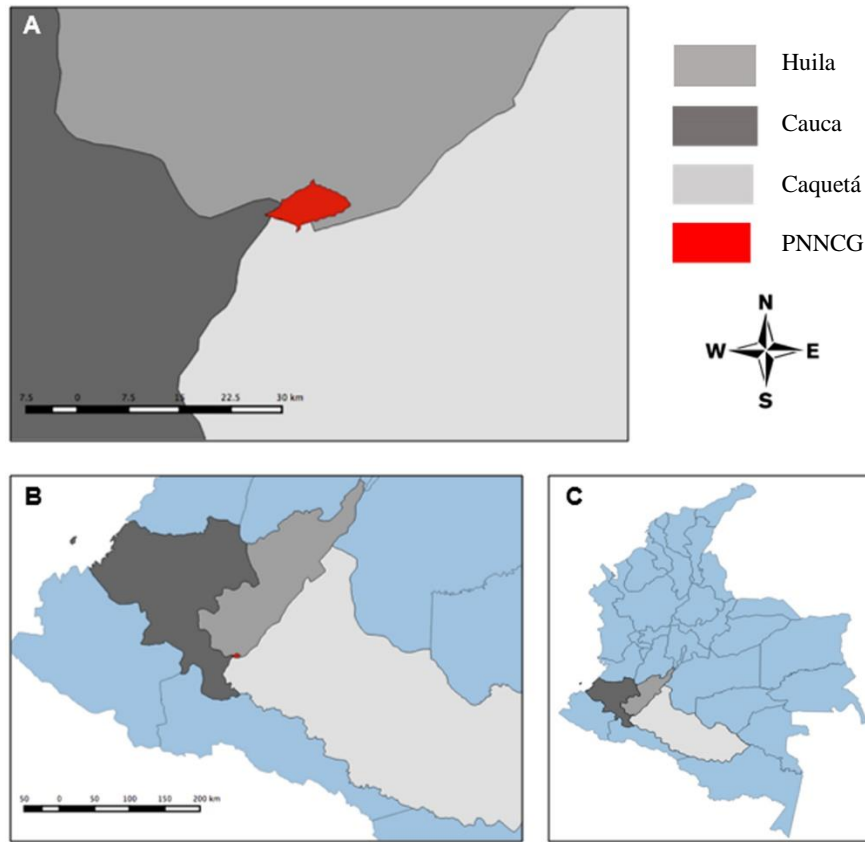


Figure 1. (A) Location of Cueva de los Guacharos National Natural Park (PNNCG) in the (B) Cauca, Caquetá and Huila departments and (C) Colombia.

In terms of the five locations sampled, we highlight that Guacharo’s cave and the visitor center reported the highest abundance of SNFM (31 and 111 individuals, respectively; Figure 2a). This may be due to the high production and availability of resources (Caro 2001, Meserve et al. 2003). Nevertheless, in terms of species richness and diversity, the most intervened locality, the visitor center, showed the lowest values (Species Richness (s) = 5, exponential Shannon index (e') = 2,13); in contrast, guacharos cave, the most pristine location, showed the highest values (s = 7, e' = 5,61; Figure 2b), supporting that SNFM diversity likely decreases with anthropic intervention, despite the increased abundance of certain species (Gomez-Laverde 1994).

To date no SNFM surveys had been done in PNNCG, with the only information available represented by scarce notes taken by Lemke (1982), reporting individuals of *Melanomys caliginosus* and *Nephelomys* sp. in the park. Accordingly, this can be considered the first systematic SNFM inventory for the park, expanding the geographical range of three species for the country and confirming a new record for Colombia, highlighting the lack of sampling effort for this group of organisms inside the country.

Even though the sampling location is a protected area, in fact the first declared protected area in the country, little research has been made in PNNCG for most groups. This lack of scientific information, together with the high deforestation rates on the buffer zone, the most urgent threat to the area, can reflect on a high vulnerability for most species in the park. Further research on these and other threats to the park, and in general to most of the Andean region of Colombia, is essential in order to provide scientific support for adequate management of these important national parks in the country.

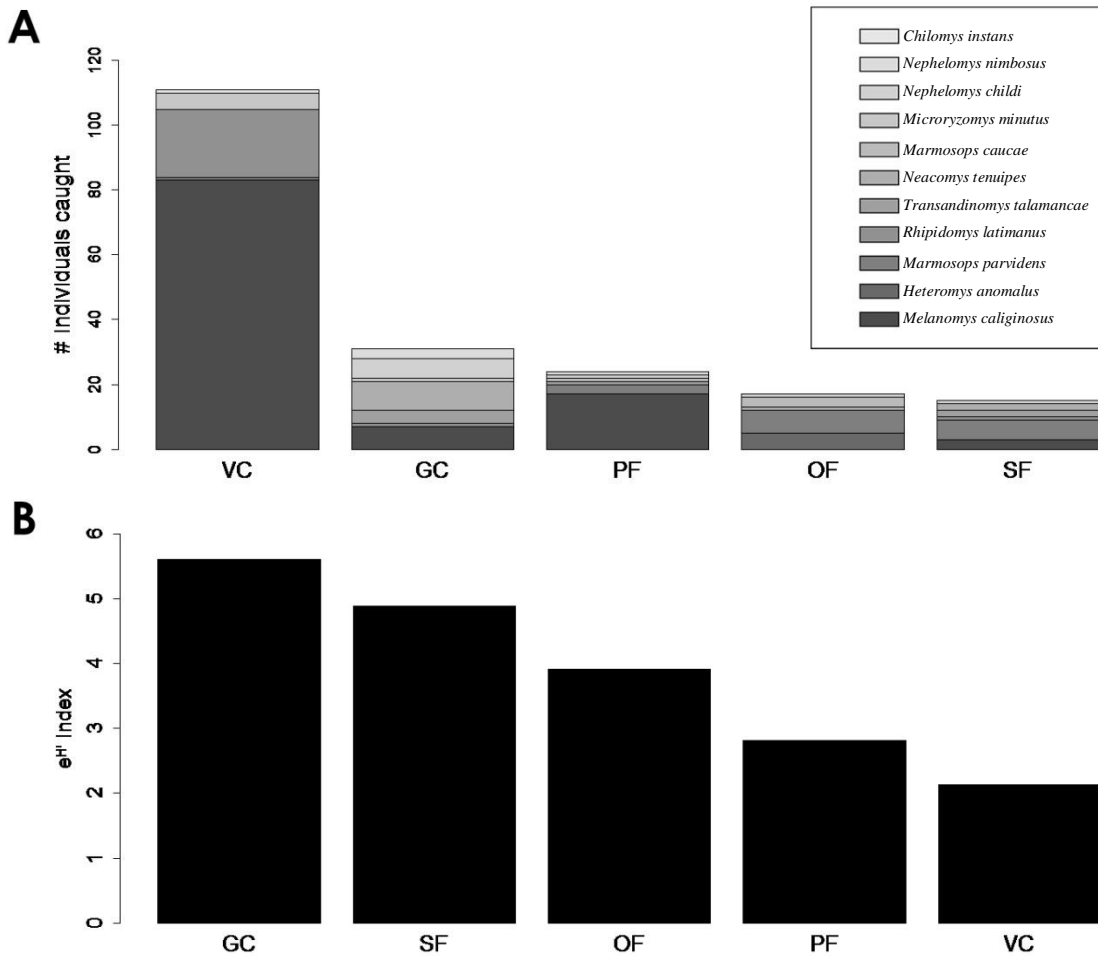


Figure 2. A) Small non-flying mammal abundance for 11 species recorded within the five sampled locations in PNNCG and (B) Exponential Shannon diversity index for the five locations sampled (PF: Primary forest, OF: Oak forest, GC: Guacharos cave, SF: Secondary forest, VC: Visitor center).

Table 1. Small non-flying mammals recorded for Cueva de los Guacharos National Natural Park according to taxonomic arrangement and location presence (PF: Primary forest, OF: Oak forest, GC: Guacharos cave, SF: Secondary forest, VC: Visitor center).

Order	Family	Tribe	Species	Location				
				PF	OF	GC	SF	VC
Didelphimorphia	Didelphidae	Monodelphini	<i>Marmosops cauceae</i>	X	X			
			<i>Marmosops parvidens</i>	X	X		X	X
Rodentia	Heteromyidae	Heteromyini	<i>Heteromys anomalus</i>		X			
			<i>Transandinomys talamancae</i>	X		X	X	
			<i>Melanomys caliginosus</i>	X		X	X	X
	Cricetidae	Oryzomyini	<i>Microroryzomys minutus</i>			X		X
			<i>Neacomys tenuipes</i>		X	X	X	
			<i>Nephelomys childi</i>	X	X	X	X	
			<i>Nephelomys nimbosus</i>	X		X		
			<i>Chilomys instans</i>					X
			<i>Rhipidomys latimanus</i>			X	X	X
			<i>Thomasomyini</i>					

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