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First preliminary inventory of Non-Flying Mammals of the Alto Fragua Indi-Wasi National Park, Colombia

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The Andean-Amazon foothills represent a biodiversity hotspot in southern Colombia (Kattan et al. 2004, Bass et al. 2010) but deforestation in the region is occurring at an alarming rate (Hernández et al. 1992) and security problems have made access difficult. Biological surveys are needed in this region to document the local fauna and to help generate strategies to preserve it. In this study, we report the first preliminary inventory of large and medium-sized terrestrial mammals for the Alto Fragua Indi-Wasi National Park.

Fieldwork was carried out in the foothills of the eastern Andes of Colombia in the upper Amazon Basin, Caquetá Department, in the Alto Fragua Indi-Wasi National Park. This park is bordered to the west by Serranía de los Churumbelos National Park and to the north by Cueva de los Guacharos National Park. The specific study area was near the northern limit of the Alto Fragua Indi-Wasi National Park (Figure 1). The area is dominated by primary forest with a combination of Amazonian and Andean flora, including many Arecaceae, Rubiaceae and epiphytes, with a canopy height of ca. 20 m. Annual precipitation in the two closest meteorological stations (San José de Fragua and El Mono) ranges between 3400 to 4400 mm; the dry season starts in early December and continues up to February, and the rainy season starts in March and lasts up to the end of June (Parques Nacionales Naturales de Colombia 2005). The region is characterized by very steep hills and landslides thus access to some areas is difficult, especially during the rainy season.

The study was conducted from January of 2012 to April of 2013. Three methods were used to sample mammals: i) observation counts along two different transects (A and Q) were made from January to December 2012, between 6:30 am and 4:00 pm, following recommendations given by Buckland et al. (2001) and Peres (1999). Transect A was 3.8 km long with an elevation range between 800 and 1600 masl; transect Q was 5.4 km long with an elevation range from 800 and 1550 masl (Figure 1). ii) Three camera traps (Bushnell) were installed 1 km apart along transect Q, and were operated from August 2012 to April 2013. Cameras were set with an interval of 5 seconds between detections and were active 24 hours/day for a total of 1350 trap-nights. Camera traps have been proven to be an effective technique to record medium and large mammal species (Nichols et al. 2011). iii) Anecdotic observations in the field and from information provided by local hunters. Identification of species was based on Emmons & Feer (1990) and taxonomy followed Wilson & Reeder (2005).

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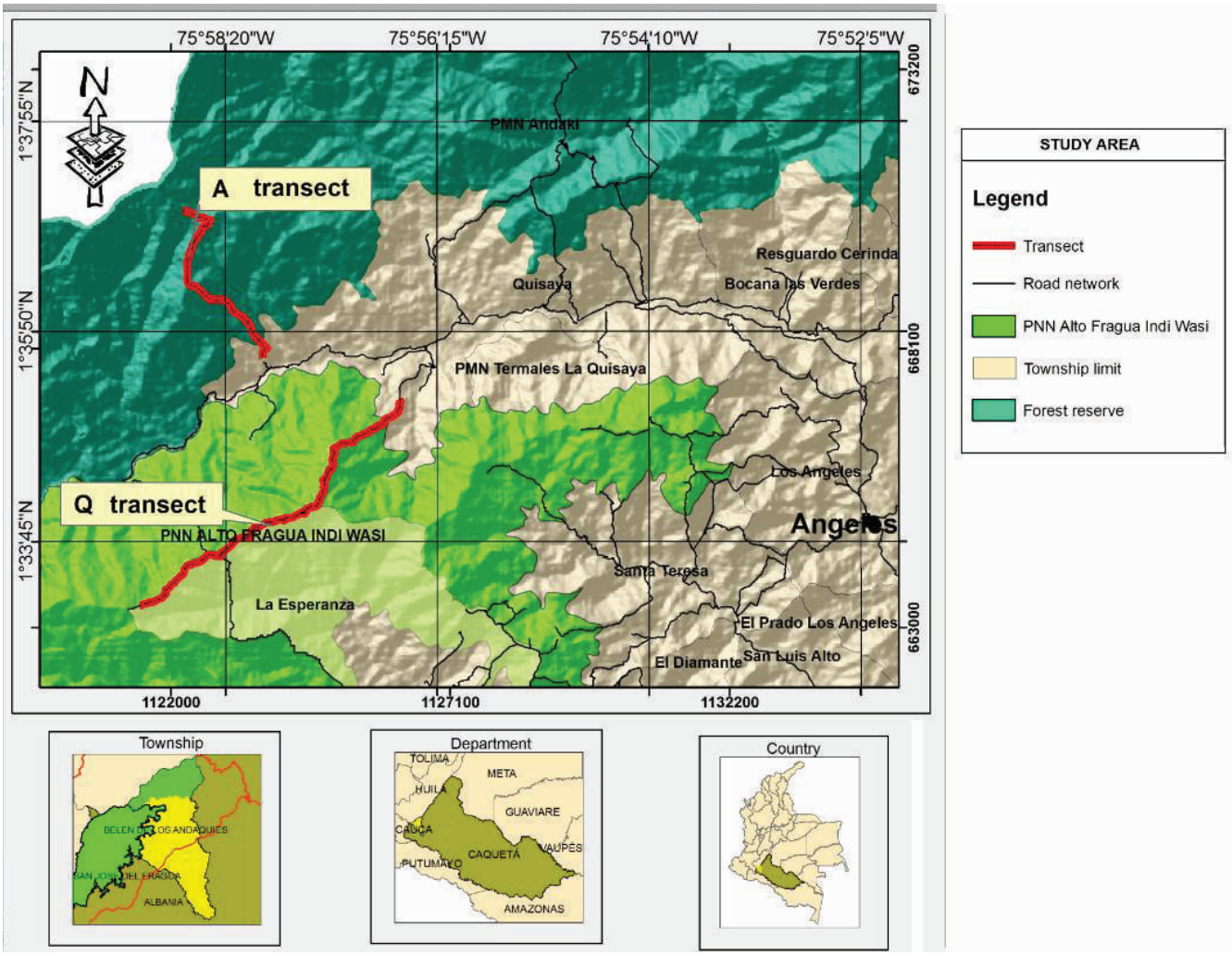

Figure 1. Map of the study area for medium and large-size mammals in Alto Fragua Indi-Wasi National Park.

Overall, we recorded 29 mammal species based on the three methods (Figure 2). Five orders, 11 families and 14 species were recorded based on observation counts along transects, four orders, 8 families and 13 species by camera traps, and 8 orders, 14 families and 16 species through anecdotic observations (Table 1). Of the total species recorded, 21 species are considered Least Concern, two species are listed as Near Threatened, five Vulnerable and one Endangered (*Lagothrix lagotrichia lugens*; UICN 2014). The observation of *Mustela felipei* was allocated to the species given the proximity to the only known locations (Ramirez-Chaves & Mantilla-Meluk 2009, Ramírez-Chaves & Patterson 2014); however, considering the potential misidentification with *M. frenata*, we consider this record as potential. Also, our camera-trap picture of *Leopardus tigrinus* is also considered potential since the picture do not allow certain identification. The records of *Speothos venaticus* and the potential record of *Mustela felipei* represent expansions to their known geographical ranges (Beisiegel & Zuercher 2005, DeMatteo & Loiselle 2008, Ramirez-Chaves & Mantilla-Meluk 2009, Ramirez-Chaves & Patterson 2014). Camera traps registered two different pumas (*Puma concolor*) and three different spectacled bears (*Tremarctos ornatus*), including a juvenile.

The southern Andean-Amazon foothills have been little investigated but clearly are an important area for biodiversity. Records of the Bush Dog (*Speothos venaticus*), and potentially the Colombian weasel (*Mustela felipei*), obtained during this study represent new records for the park and the zone, and also document geographical range expansions for these two endangered

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mammal species. Records of the Pacarana (*Dinomys branickii*) confirm the presence of this rare and enigmatic species in the zone. Further, the presence of Andean mammals such as wooly monkeys (*Lagothrix lagotrichia lugens*) and mountain tapirs (*Tapirus pinchaque*), together with Amazonian species, such as the bush dog (*Speothos venaticus*), indicate that Alto Fragua Indi-Wasi National Park is an important area for conservation of Andean and Amazonian unique species. Similarly, the presence of four felids and one canid living in sympatry suggest that the area supports a high quality and quantity of prey (Foster et al. 2010). Thus, overall, these results suggest the zone is still well preserved in terms of large and medium-sized mammals.

Although the area still appears to be in a good conservation status, there are currently numerous pressures threatening it. Hunting occurs in the area, mostly for local consumption, but there is a growing local market for meat in the nearby villages. Increased commercial hunting could pose an increasing problem in the future. Deforestation in the zone is also occurring at an extremely high rate, which indicates a potential future threat for many species. Clearly, more research and control is needed in this biodiversity hotspot.

Table 1. Medium and large-size mammals recorded in the northern area of Alto Fragua Indi-Wasi National Park according to taxonomic arrangement, conservation status and method of detection (C-T: Camera-traps, O: Observation, A: Anecdotic).

Order	Family	Genus	Species	Conservation status (IUCN, 2014)	Method		
					C-T	*O*	*A*
Artiodactyla	Cervidae	*Mazama*	*americana*	Least concern		X	X
	Tayassuidae	*Tayassu*	*tajacu*	Least concern	X	X	X
Carnivora	Canidae	*Speothos*	*venaticus*	Near threatened	X		
		Leopardus	*pardalis*	Least concern	X		
		Leopardus	*tigrinus**	Vulnerable	X		
	Felidae	*Leopardus*	*wiedii*	Near Threatened			X
		Puma	*concolor*	Least concern	X		
		Puma	*yagouaroundi*	Least concern	X		
		Eira	*barbara*	Least concern	X	X	
	Mustelidae	*Lontra*	*longicaudis*	Least concern			X
		Mustela	*felipei**	Vulnerable		X	
	Procyonidae	*Nasua*	*nasua*	Least concern	X	X	X
	Ursidae	*Tremarctos*	*ornatus*	Vulnerable	X		
Cingulata	Dasypodidae	*Cabassous*	*unicinctus*	Least concern	X		X
		Dasypus	*kappleri*	Least concern	X		X
		Dasypus	*novemcinctus*	Least concern	X	X	X
Didelphimorphia	Didelphidae	*Chironectes*	*minimus*	Least concern			X
Perissodactyla	Tapiridae	*Tapirus*	*pinchaque*	Endangered			X
Pilosa	Myrmecophagidae	*Tamandua*	*tetradactyla*	Least concern			X
Primates	Atelidae	*Lagothrix*	*Lagotrichia*	Vulnerable		X	X
	Cebidae	*Saimiri*	*sciureus*	Least concern		X	
		Sapajus	*apela*	Least concern		X	
	Pitheciidae	*Pithecia*	*monachus*	Least concern		X	
Rodentia	Cuniculidae	*Cuniculus*	*paca*	Least concern		X	X
	Dasyproctidae	*Dasyprocta*	*fuliginosa*	Least concern		X	X
	Dinomyidae	*Dinomys*	*branickii*	Vulnerable	X		X
	Erethizontidae	*Coendou*	*prehensilis*	Least concern			X
	Sciuridae	*Microsciurus*	*flaviventer*	Least concern		X	
		Sciurus	*igniventris*	Least concern		X	

* Potential observation

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Figure 2. Some mammal species photographed by camera traps in Alto Fragua Indi-Wasi National Park: A) *Tremarctos ornatus*, B) *Speothos venaticus*, C) *Puma concolor*, D) *Leopardus tigrinus* (potential), E) *Leopardus pardalis*, F) *Puma yagouaroundi*, G) *Dinomys branickii* (photographed opportunistically).

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