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FIRST RECORDS AND CONSERVATION STATUS OF *Mazama rufina* (CERVIDAE, ARTIODACTYLA) FROM PERU

Javier Barrio

Centro de Ornitología y Biodiversidad, Santa Rita 105, Of. 2, Urb. Huertos de San Antonio, Surco, Lima 33, Perú <javbar@corbidi.org>.

ABSTRACT. The presence of *Mazama rufina* (Cervidae, Artiodactyla) in Peru is confirmed. Previous reports on the species in this country were erroneous and correspond to *Mazama americana*. Records of *M. rufina* in Peru include two live individuals and collected remains from six other specimens. The distribution of the species in Peru seems to be restricted to the montane forests of the Equatorial Yungas, in northern Cajamarca and along the northern sector of the ridge between Piura and Cajamarca departments.

RESUMEN. Primeros registros y estado de conservación de *Mazama rufina* (Cervidae, Artiodactyla) en Perú. Se confirma la presencia de *Mazama rufina* (Cervidae, Artiodactyla) en el Perú. Los reportes anteriores de la especie en Perú fueron erróneos y los especímenes correspondían a *Mazama americana*. Los registros reportados en este trabajo incluyen dos individuos vivos y restos colectados de otros seis especímenes. La distribución de la especie en Perú parece estar restringida a los bosques montanos de las yungas ecuatoriales, en el norte de Cajamarca y a lo largo de la divisoria de cuencas entre los departamentos de Piura y Cajamarca.

Key words. Brocket deer. Cervidae. *Mazama americana*. *Mazama rufina*.

Palabras clave. Cervidae. *Mazama americana*. *Mazama rufina*. Venados.

The Ecuadorian dwarf brocket, *Mazama rufina* (Pucheran, 1851), is a deer species (Cervidae, Artiodactyla) that occurs along the montane and cloud forests of the Andes of northwestern South America, from the north part of the eastern Andes of Colombia to the southern Andes of Ecuador (Eisenberg, 1989; Tirira, 2001).

Other deer species that exclusively occur in the montane forests throughout the central and northern Andes are *Pudu mephistophiles*, *Mazama bricenni*, and *Mazama chunyi*. Besides, there are deer species that include the montane forest or its edge in their distribution: *Odocoileus virginianus*, *Mazama gouazoubira* (or *M. nemorivaga* if the split by Duarte [1998] is accepted) and *Mazama americana* (Czernay, 1987; Geist, 1998). The distribution maps of all six species have not yet been precisely drawn to their full extents (see maps in Eisenberg, 1989, and in Eisenberg and Redford, 1993). Even recent publications (e.g. Weber and Gonzalez, 2003) include imprecise distribution maps. Moreover, field data on montane forest brocket deer is poor, almost limited to the Peruvian dwarf brocket, *M. chunyi* (see Rumiz et al., 2007) and museum collections on these species are small.

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Some of the difficulties in knowing the distribution of brocket deer species are explained by the high diversity of *Mazama* species in the area and in all of South America. The diversity of *Mazama* is paralleled by the difficulty in the identification of its species and the complexity of its taxonomy as can be seen in Allen (1915), Hershkovitz (1959), and Geist (1998). Allen (1915) recognized four more species throughout the montane and cloud forests of northwestern South America—*M. tschudii*, *M. zetta*, *M. gualea* and *M. zamora*. These four species are currently included as subspecies of either *M. americana* or *M. gouazoubira* (Cabrera, 1961; Czernay, 1987; Wilson and Reeder 2005).

M. rufina was previously included in the Peruvian mammal list (Pacheco et al., 1995) based on wrongly identified photographs of two *M. americana* subspecies, as were later analyzed by myself. The general area where *M. rufina* lives in the northern Andes of Peru is also inhabited by *M. a. zamora* and *M. a. gualea* which meet their distribution there. Besides *M. americana*, *M. gouazoubira* was also recorded in northern Peru montane and cloud forests, in Colan, Amazonas Department (Butchart et al., 1995), but no specimen has been collected from Peru higher than 300 m. As for *M. americana* in Peru, several montane forest museum collection records exist, one as high up as 2500 m (Sanborn, 1953). In this article, I mention the first reports for *M. rufina* in Peru.

Localities at the northern Andes of Peru were visited for 2-3 days each, from June 2005 to August 2006, interviewing locals, and walking available trails crossing forests. Most of trails only crossed small isolated montane forest patches. The only exception was the large continuous forest in and around the Tabaconas Namballe National Sanctuary (TNNS, northern Cajamarca Department).

To determine the presence of *M. rufina*, I established a presence and absence index in the field, based on: 1) the species was observed by me, 2) remains from the species were found in the field or in possession of local people, and 3) local people described the species with detail. The first two indicators are unambiguous and definitive after analysis of the remains. The third indicator was based on unstructured interviews directed to local people living close to the forests and to local hunters. The interviews were not guided, and the locals were free to describe all deer species occurring in the area. I only interrupted to ask for details, especially size and color of some parts. Tissue samples were taken when remains from individuals were collected.

The first precise report of *M. rufina* in Peru took place in July 2005 when a resident from Tabaconas, a town at the northern Andes of Peru, captured a pregnant female that was run down by his dog (**Fig. 1A**). The female died the next day and only the skin was saved by the Tabaconas resident. The female was photographed while alive and the photo was sent to Lima by a WWF assistant in the area. The species was identified from the photograph. The skin was later collected by the author in February 2006, confirming the preliminary identification.

Another seven individuals were identified while researching the area (**Table 1**). Five specimens were determined from collected remains in the hands of local people—a complete skin, a skull and three front feet. One individual was found alive, recently captured by local people, and remains from another individual were found in the field by a colleague while researching vegetation in a shared expedition. All records from remains collected by locals were tracked down to the location where the animals were hunted or captured, all of which occurred from July 2005 through January 2006. The altitudes where the animals were either hunted or captured by locals ranged from 1790 to 2600 m, with oral records up to 2970 m.

The specimen found in the field was located inside the TNNS at 3250 m. The scattered remains included a broken skull, a front foot and dispersed hair, most probably leftovers of an individual killed by a puma (*Puma concolor*). This record was the only one found inside a Peruvian protected area, although most of the TNNS was not surveyed due to very

Fig. 1. A. *Mazama rufina* female from Tabaconas, Cajamarca, Peru. Photo credit: Walter La Torre. B. Young male *Mazama rufina* captured alive and kept captive by local inhabitants in San José de Alianza, near the Huamantanga forest, northern Cajamarca, Peru. Photo credit: Javier Barrio.

Table 1

Collected *Mazama rufina* remains from in the field. CORBIDI stands for the scientific collection of the Centro de Ornitología y Biodiversidad (Center for Ornithology and Biodiversity), at Lima, Peru. S = sex, M = male, F = female. The latitude (LAT) and longitude (LONG) are stated in the reference coordinate World Geodetic System of 1984 (WGS 84). ALT = altitude in meters.

Museum Number	Sample	S	Department	Locality	LAT	LONG	ALT
CORBIDI 0016	Skull + forefoot	M	Cajamarca	Lagunas Arreviatadas	05º14'03"	79º17'06"	3250
CORBIDI 0017	Skull	F	Piura	Cerro Las Cuevas	05º01'48"	79º21'00"	2000
CORBIDI 0020	Skin	F	Cajamarca	Tabaconas	05º19'06"	79º17'22"	1790
CORBIDI 0021	Forefoot	M	Cajamarca	Pajonal	05º16'53"	79º15'44"	2450
CORBIDI 0022	Forefoot	F	Cajamarca	Cruz chiquita	05º18'43"	79º18'46"	2600
CORBIDI 0023	Forefoot	F	Piura	Shumaya	05º21'12"	79º20'55"	2115
CORBIDI 0024	Skin + feet	F	Cajamarca	Tabaconas	05º18'15"	79º17'28"	1860
CORBIDI 0029	Hair from live specimen	M	Cajamarca	San José de Alianza	05º42'01"	78º56'25"	1900

difficult accessibility. The montane forest the species inhabits extended from 1750 to around 3300 m in the area. All specimens with corresponding tissue samples are deposited at the scientific collection of the Centro de Ornitología y Biodiversidad (Center for Ornithology and Biodiversity), Lima, Peru.

The southernmost location reported for *M. rufina* is the Huamantanga forest, Cajamarca Department, located at 5º 42' S, 78º 56' W. There, a young male was captured alive and kept captive by local inhabitants (**Fig. 1B**). The distribution of the species seems to stop at the North Peru Low (NPL) or Huancabamba Depression, a known barrier for bird

distributions (Vuilleumier, 1984), but not as important for small mammals (Pearson, 1982).

The two previous records of the species in Peru (Pacheco, 2002; Amanzo et al., 2003) were based on misidentified captive individuals, as was verified by photographs provided. Both seem to belong to *M. americana*. Neither of the individuals included the diagnostic characteristics of *M. rufina*. These are cinnamon red hair throughout the body, black lower legs, white border of relatively small black ears including white interspersed hair on the inner side, and a black mask on the head extending from the nose to the nape, including chin but not cheeks (Czernay, 1987). Also, it has small white mental and narial patches (Hershkovitz, 1982; Czernay, 1987) and pointed ears. It seems that the subspecies that led to the confusion include a young *M. a. zamora* from the eastern slope of the Andes of north Peru and Ecuador (record from Amanzo et al., 2003), and a small subspecies (an undescribed subspecies or *M. a. gualea*) from the western slope of the Andes of south Ecuador and north Peru (see photo in page 534 in Pacheco, 2002).

The species, until now, has only been recorded unambiguously from 1) the Tabaconas massif, 2) the east of Mancucur, well north of the Manta Mountains, 3) the Huamantanga forest west of Jaen, on the Corcovado cordillera, and 4) highlands of the Samaniego River. If we include oral records that clearly describe the species, we could add the Manta Mountains to the distribution of the species in Peru (see **Fig. 2**). The individual records are distributed along the montane forests of the ridge that separates the department of Piura from north Cajamarca, and a branch range to the east, all of them north of the NPL.

As was described above, the Ecuadorian dwarf brocket, *M. rufina*, occurs from the north part of the central Andes of Colombia to the

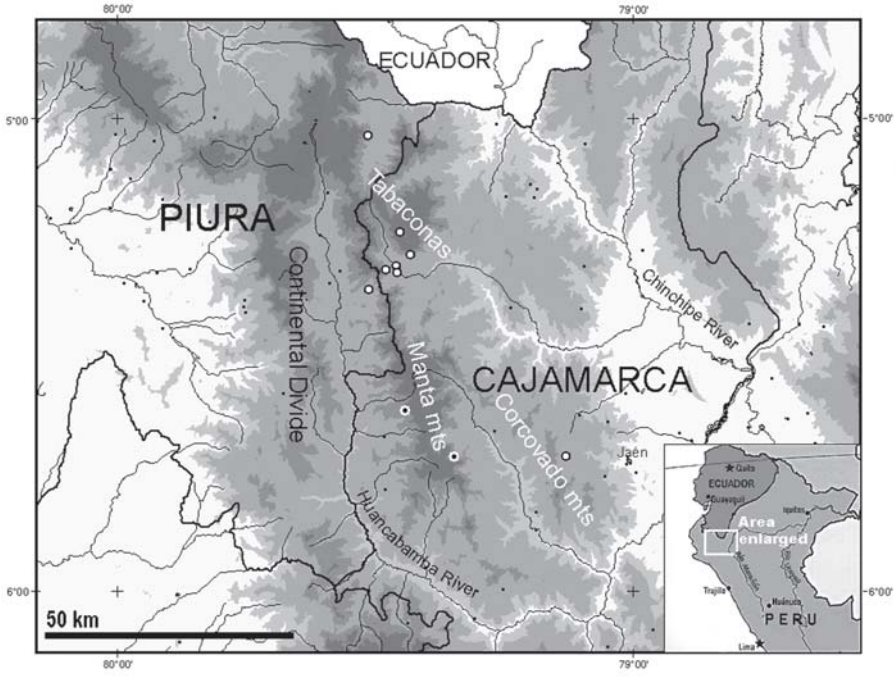

Fig. 2. Localities where *Mazama rufina* was recorded in Peru. White circles with black borders indicate either collected remains from the species or live specimens. Black dots with white borders indicate places where oral records clearly described the species.

northern Andes of Peru, at the north side of the Huancabamba Depression or NPL. The known altitudinal distribution in Peru ranges from 1790 to 3250 m, always inside humid montane forests.

Although the NPL is not a barrier for most small mammals (Pearson, 1982; Pacheco and Patterson, 1992), much less for a medium-sized one, it appears to be one for species specialized on humid montane forests (Albuja and Patterson, 1996; Vivar et al., 1997). That specialization may have deterred *M. rufina* from crossing the large gaps of dry forest and Andean grassland into the eastern Andean humid forests to the southeast. The presence of northern pudu, *P. mephistophiles*, in the eastern Andean montane forests of Peru should not be considered a competitive restriction for the brocket deer and much less as a competitive exclusion, given that both species coexist north of the NPL (Barnett, 1999; Tirira, 2007). There seems to be enough size difference and niche partitioning in the form of differentiation in altitude use between both species (Tirira, 2007) as to allow for coexistence.

The main threat endured by *M. rufina* in the studied area is habitat loss. Most new records of *M. rufina* were found in a heavily degraded and deforested area (CDC, 2002). The humid montane forest is reduced to patches in most of the area, so that the brocket population might be fragmented with some subpopulations probably isolated.

If the distribution range is continuous, its total range in Peru would be around 400 to 450 km^2, an area calculated using the Arc View 3.2 GIS and based only on the location of current records, the location of montane forests and the altitude range. However, it does not take into account the severe fragmentation of the forest, or the areas without forest. Considering the distribution area of the montane forest and the heavy fragmentation and current loss of the forests *M. rufina* inhabits in Peru, the species should be considered as Endangered (EN) in Peru using Criteria B1ab(ii, iii) (IUCN, 2001). These criteria are extent of occurrence estimated to be less than 5000 km^2, and estimates indicating a severely fragmented range and a projected continued decline in area of occupancy and quality of habitat (IUCN, 2001).

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