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# Mammals of Reserva Particular do Patrimônio Natural Santuário do Caraça, state of Minas Gerais, Brazil

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**Abstract:** We present here a compilation of the mammal species associated with the Reserva Particular do Patrimônio Natural (RPPN) Santuário do Caraça. From records confirmed by captures, visual observations, and indirect evidence we list 70 species of mammals, including *Alouatta guariba*, *Chrysocyon brachyurus*, *Leopardus pardalis*, *Leopardus wiedii*, *Pecari tajacu*, *Puma concolor*, *Tapirus terrestris* and *Trinomys moojeni* that are considered to be threatened species according to the Red Lists (Minas Gerais, Brazil, IUCN) and nine species endemic to the Atlantic Forest. Our findings reaffirm the importance of the reserve for the conservation of mammals, but also identify areas in need of further investigation, particularly regarding the threatened species.

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## Introduction

Reserva Particular do Patrimônio Natural (RPPN) Santuário do Caraça, from here on referred as Caraça, is a private nature reserve located in the state of Minas Gerais, Brazil. It is situated in the geomorphological domain called the Iron Quadrangle in the southern stretch of the Serra do Espinhaço mountain range (Giulietti *et al.* 1997), where the vegetation represents a transition region between the Cerrado and Atlantic Forest biomes (Paula 1997). The RPPN was legally established in 1994 with the aim of protecting its total area of 11,233 hectares, of which 10,187.89 hectares are completely devoted to biodiversity conservation (Fr. L. Palú, personal communication).

An initiative to identify priority conservation areas in Minas Gerais culminated in the publication of an Atlas (Drummond *et al.* 2005) that maps the different regions of the state and highlights the relevance of each to, among other things, their distinct fauna. Caraça was thus assessed as being of "Very High Biological Importance" with regard to its mammalian fauna because of the high diversity of the species within its boundaries (Drummond *et al.* 2005).

Over 240 species of mammals are found in Minas Gerais, representing more than 45% of the Brazilian fauna of mammals (Drummond *et al.* 2005). This number of species is attributed to the high diversity of available habitats (Drummond *et al.* 2005). Three major biomes and their areas of transition are found in Minas Gerais - Caatinga, Cerrado and the Atlantic Forest (Giulietti *et al.* 1997), the latter two are considered as biodiversity hotspots (Myers *et al.* 2000). In spite of such high levels of biodiversity, the ongoing environmental degradation in Minas Gerais jeopardizes mammal species, forty of which are under threat to some degree of extinction (COPAM 2010; Chiarello *et al.* 2008; IUCN 2013). Compounding matters further is the lack of scientific knowledge about the occurrence of different species of mammals in natural areas of Minas Gerais, including protected areas. This lack of scientific knowledge makes it very difficult to prioritize areas for the conservation of mammals (Drummond *et al.* 2005). For example, a previous study (Costa *et al.* 1998) pointed-out that gaps in scientific knowledge about mammals in Minas Gerais is a relevant obstacle to their conservation.

At Caraça, studies of mammals have included an investigation of bat assemblages (Falcão *et al.* 2003), and several studies focusing on single species including *Chrysocyon brachyurus* (Silva and Talamoni 2003, 2004; Sábato *et al.* 2006; Santos *et al.* 2012a), *Tapirus terrestris* (Talamoni and Assis 2009), *Trinomys moojeni* (Cordeiro-Júnior and Talamoni 2006; Cordeiro-Júnior *et al.* 2010), *Guerlinguetus ingrami* (Alvarenga and Talamoni 2005, 2006) and *Callicebus nigrifrons* (Cäsar and Young 2008; Cäsar *et al.* 2008, 2012; Cäsar and Zuberbühler 2012; Santos *et al.* 2012b), however, there has been no formal attempt at compiling a comprehensive species list for the mammals at Caraça. Thus, herein we present a list of species of the mammals associated with Caraça by compiling data obtained during the execution of previous studies and adding novel, unpublished data obtained through new survey work. We then used this list and these data to identify which species are listed in the Red Lists and to identify gaps in our knowledge of the mammals of Caraça.

## Materials and Methods

### *Study area*

The Reserva Particular do Patrimônio Natural (RPPN) Santuário do Caraça (20°0′51″ S, 43°29′28″ W, 11,233 ha) is located between the cities of Catas Altas and Santa Bárbara, Minas Gerais, in southeastern Brazil (Figure 1). It is situated on the slopes of the mountain range known as the Serra do Espinhaço, and possesses a mosaic of

different plant communities including semideciduous forests, cerrado, and open areas such as high-altitude and rocky fields. The region is characterized by a dry season from April to September and a wet season from October to March. With elevations ranging from 850 to 2070 m above sea level, the climate of Caraça is classified as Köppen's Cwa, with an annual average rainfall of 1,373 mm, of which 81.5% occurs between October and March. June is considered the coolest month and January the warmest (Sá Júnior *et al*. 2012). Mean annual temperature is *ca.* 19°C, with maximum temperatures seldom reaching 30°C and minimum temperatures rarely below zero.

### Data collection

Information on the mammalian fauna of Caraça was additionally obtained from studies conducted at the site over the last decade (Falcão *et al.* 2003; Silva and Talamoni 2003, 2004; Cordeiro-Júnior and Talamoni 2006; Talamoni and Assis 2009; Cordeiro-Júnior *et al.* 2010), which are now presented in this work, and new study with the use of camera traps for medium and large mammals, and through interviews with residents and staff of the locality. Below are summarized the different methods employed in obtaining records of mammals.

Sampling of medium and large mammals was performed using direct (live and dead) and indirect (fragments of individuals found in feces of carnivores) observations obtained in transects traversed along trails and roads within existing patches of cerrado and semideciduous forest. This sampling was performed primarily during the search for, and collection of, feces for the study of the diet of *T. terrestris* (Talamoni and Assis 2009).

Records of various species of mammals were also made using camera-traps (Trapa-câmera®) (details in Tomas and Miranda 2003). Six cameras were used for six months (February–July 2008) to sample six different areas named Tabuões, Sanctuary (forest vegetation immediately surrounding the buildings), Tanque Grande, Bosque, Belchior and Descampado (Figure 1). The first five areas are characterized by the presence of vegetation of semideciduous forest and cerrado while the area called "Descampado" is characterized by the presence of cerrado vegetation. Part of this last area is covered by a vegetation type locally known as "Capoeira" which is a heavily human-altered formation characterized by the presence of shrubs and grasses with some remnant elements from the semideciduous forest and the Rupestrian fields (Morais and Lombardi 2006). Included in the sampling areas was the artificial lake Tanque Grande (Figure 1), where a transect was established at the margin of forest of the body of water.

Cameras were installed in pairs in three of these areas for 15 consecutive days under continuous operation (24 hours) and scheduled to take pictures at intervals of 20 seconds. After the 15-day sampling period, cameras were transferred to three other areas, so that each area was sampled over the course of 30 days, resulting in a total sampling effort of 1,253 trap-nights. In each area, two sampling points were set out at a distance of 500 meter radius from each other. The traps were arranged about 50 cm above the ground on opposite sides of roads, allowing the two flanks of the animals to be photographed,

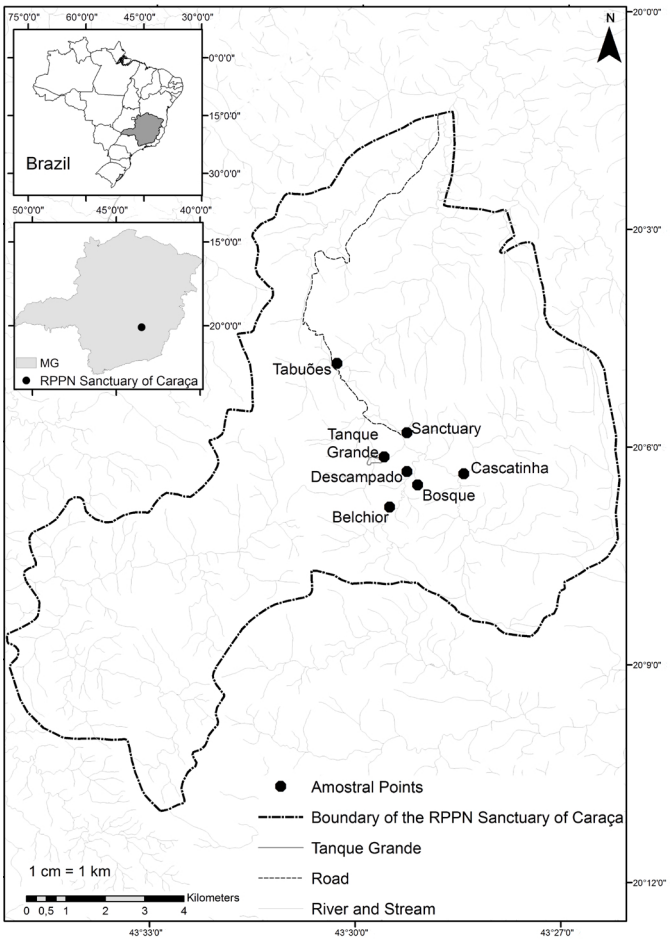


**Figure 1.** Map showing the limits of the state of Minas Gerais, and the localization of the Reserva Particular do Patrimônio Natural (RPPN) Santuário do Caraça. Highlighted, the limits of the RPPN with the sampling sites where we used live-traps for sampling of small mammals, camera traps for medium and large mammals, and mist-nets for bats. See Material and Methods for details.

facilitating identification.

Sampling of small, non-flying mammals (rodents and marsupials) was performed using live-traps (wire mesh trap 30 cm × 15 cm × 15 cm) in forested areas [Tanque Grande (Cordeiro-Júnior and Talamoni 2006), portion of the forest along the path to the cave Gruta do Padre Caio (Cordeiro-Júnior *et al*. 2010), and in areas of cerrado [Descampado (Silva and Talamoni 2003)] (Figure 1). In total, the sampling effort was 18,940 trap-nights in semideciduous forest and 5,472 trap-nights in cerrado. Traps were arranged in transects within each habitat, with intervals of 20–25 m between each trap. Traps were baited with a mixture of banana, sardines, and peanut butter and were inspected each morning during sampling days.

Sampling of bats was performed by capturing individuals using mist-nets in different habitats of Caraça, which included areas of forest (Tabuões and Tanque Grande), cerrado (Cascatinha trail), and buildings within, and adjacent to, Sanctuary (Figure 1; details in Falcão *et al.* 2003).

Voucher specimens of some species of rodents, marsupials and bats were collected and deposited in the scientific collections of the Museu de Ciências Naturais (MCN) and the bat collection of the Mestrado em Zoologia de Vertebrados (MZ), both of the Pontifícia Universidade

Católica de Minas Gerais (PUC Minas). The trapping of small mammals and bats was performed under licenses issued by the Instituto Brasileiro do Meio Ambiente e Recursos Naturais Renováveis (IBAMA #093/2000 and #14066-1) and the Chico Mendes Institute for Biodiversity Conservation (ICMBio #22279-1 and 28120-1). Nomenclature of mammals follows Wilson and Reeder (2005), Paglia *et al.* (2012) and Feijó and Langguth (2013) for *Conepatus amazonicus*.

## Results and Discussion

We documented 70 species of mammals in Caraça, representing 26 families and 10 orders (Table 1; Figure 2). Forty-six species were documented by trapping (live-traps, mist-nets and camera-traps), sixteen by visual observation of individuals, four species were recorded by collecting individuals found dead on the roads (*Cabassous unicinctus*, *Dasypus novemcinctus*, *Euphractus sexcinctus*, *Leopardus pardalis*), and four species from bone fragments found in feces of maned wolf (*Calomys tener*, *Didelphis albiventris, Galea spixii*, *Thrichomys apereoides*) (Table 1). Seven other species were documented from the reports of residents and/or employees of the reserve (Table 2), but since these reports were not confirmed during field surveys we treat these as species of potential association with the reserve area.

About 40% of the species we recorded were documented during the first compilation of the mammalian fauna at Caraça (Strang 1981). The increased number of species documented by us is due to the greater number of species of small mammals (rodents, marsupials and bats). It is noteworthy to recognize that all the species presented herein are known to occur in a protected area of the state of Minas Gerais (IEF 2011).

Among the 70 species we recorded, eight species are considered threatened with extinction, six as *Data Deficient*, and two classified as *Near Threatened* (COPAM 2010; Chiarello *et al.* 2008; IUCN 2013). Among the threatened mammals recorded in Caraça, the order Carnivore had the greatest number of species (n = 4) (Table 1). All four of these species are listed as threatened with extinction in the state of Minas Gerais and in Brazil (COPAM 2010; Chiarello *et al.* 2008). Considering that this group is very vulnerable to extinction (Weaver *et al.* 1996)—mainly due to the loss and alteration of their natural habitat (Chiarello 2005)—it must be emphasized that such carnivorous species serve as "umbrella species" (Noss *et al.* 1996; Carroll *et al.* 2001), because the environmental requirements that have to be met for their survival (*e.g.,* habitat characteristics and food availability), benefit taxa of lower trophic levels as well (Roberge and Angelstam 2004).

Two mammal species recorded at Caraça, *Alouatta guariba* and *Pecari tajacu*, are listed as threatened in the state of Minas Gerais (COPAM 2010) (Table 1). These two species were not reported by Strang (1981), and their presence at Caraça was only recently confirmed. The presence of *P. tajacu* was confirmed by camera-traps (Figure 2) in the area near the Caraça stream, in a place known as Tabuões.

*Alouatta guariba* has been sighted more frequently in the last decade. Two events of systematic cutting of the forest in Caraça, one in 1920–1930 and another in 1950–1960 (Fr. L. Palú, personal communication), probably had a direct negative influence on the occurrence and distribution of the mammalian fauna in the reserve because of the destruction and degradation of the habitat. In the case of primates, species of *Alouatta* are known to have low population densities in small forest fragments that are surrounded by an inhospitable habitat (Peres 1997) and become inconspicuous, as they tend to vocalize less frequently, thus hindering the recognition of their presence (A. Hirsch, personal information). Furthermore, *A. guariba* has difficulty moving among fragmented forest (Peres 1997). Thus, these reasons perhaps explain the rarity of this primate in the area.

The tapir (*Tapirus terrestris*), a species regarded as threatened (COPAM 2010; IUCN 2013), is known to be present in Caraça and is more active nocturnally. Using camera-traps, a total of 18 records of *T. terrestris* were obtained, of which 77.7% (n = 14) were obtained at night (18:00 h to 06:00 h) and 23.3% (n = 4) during the day. The time period of greatest occurrence was between 20:00 and 22:00 (27.7%, n = 5) followed by the period between 02:00 h and 04:00 h (16.6%, n = 3).

The importance of tapirs in the maintenance of an ecosystem, and probably in the distribution of different plant species especially those in the understory of forests, was reported by Talamoni and Assis (2009). Although no scientific study on seed dispersal by tapirs has been conducted in Caraça, it can be assumed that tapirs facilitate the recovery of forests in reserve since they consume large quantities of fruit and disperse the seeds in their feces.

Only one species of rodent from Caraça is considered to be in threat of extinction (COPAM 2010; IUCN 2013). The echimyid *Trinomys moojeni* has, as far as is known, a very restricted geographic distribution, with records only from the type locality (Conceição do Mato Dentro, Minas Gerais) (Pessoa *et al.* 1992), the Parque Nacional da Serra do Cipó (Corrêa *et al.* 2005) and Caraça (Cordeiro-Júnior and Talamoni 2006). This species occupies forested areas at approximately 1000 m above sea level in the transition zone between the Cerrado and the Atlantic Forest (Pessoa *et al.* 1992; Corrêa *et al.* 2005; Cordeiro-Júnior and Talamoni 2006).

The marsupial *Monodelphis americana* is also a noteworthy small mammal of Caraça since it is classified as *Data Deficient* (Chiarello *et al.* 2008) (Table 1). It is likely that the lack of data on this species is because it is not frequently captured in the forests of southeastern Brazil due to the common usage of traditional traps (wire mesh traps) (Fonseca and Kierulff 1989) at the expense of pitfall traps which seem to be the most appropriate method for this species (Pardini *et al.* 2005). Other species of the same genera, *Monodelphis scalops,* is also classified as *Data Deficient* (Chiarello *et al.* 2008), and it was registered during an event of predation by *Bothrops neuwiedi* (Figure 2). *Monodelphis scalops* is considered rare and was already captured in Serra do Brigadeiro, in the eastern part of the State of Minas Gerais (Moreira *et al.* 2009).

Four other mammal species recorded at Caraça are also classified as *Data Deficient* (IUCN 2013); these include two bats, *Vampyressa pusilla* and *Histiotus velatus*, and *Mazama americana* (Figure 2), and *Dasyprocta azarae* (Table 2); *D. azarae* was singled-out as being of rare occurrence in

**Table 1.** Mammal species of Reserva Particular do Patrimônio Natural Santuário do Caraça and their respective conservation status. Voucher number of specimens collected and deposited in the Museu de Ciências Naturais (MCN) and the bat collection (MZ) of the Mestrado em Zoologia de Vertebrados, Pontifícia Universidade Católica de Minas Gerais. Abbreviations: Method of record: C = capture; Vi = visualization; Ph = photography; De = dead; Fr = bone fragment. Habitat: Fo = forest; Ce = cerrado. Conservation status: NI = Not Included; DD = Data Deficient; LC= Least Concern; EN = Endangered; VU = Vulnerable; NT= Near Threatened in the state of Minas Gerais (MG), Brazil and worldwide (IUCN) following COPAM (2010), Chiarello *et al*. (2008) and IUCN (2013) respectively. In the Reference column is provided information on where species were mentioned prior to this list; the other species are presented for the first time.

| TAXON | COMMON NAME | RECORD/ HABITAT | CONSERVATION STATUS MG / BRAZIL / IUCN | VOUCHER NUMBER | REFERENCE |
|---|---|---|---|---|---|
| **Didelphimorphia (n = 9)** | | | | | |
| Family Didelphidae | | | | | |
| *Caluromys philander* (Linnaeus, 1758) | Bare-tailed Woolly Opossum | C / Fo | NI / NI / LC | | |
| *Didelphis albiventris* Lund, 1840 | White-eared Opossum | Fr | Ni / NI / LC | | 1 |
| *Gracilinanus microtarsus* (Wagner, 1842) | Brazilian Gracile Opossum | C / Fo | Ni / NI / LC | MCN-M 3121 | 1 |
| *Marmosops incanus* (Lund, 1840) | Gray Slender Opossum | C / Fo | Ni / NI / LC | MCN-M 3026 | |
| *Micoureus demerarae* (Thomas, 1905) | Woolly Mouse Opossum | C / Fo | Ni / NI / LC | | |
| *Monodelphis americana* (Müller, 1776) | Three-striped short-tailed Opossum | C / Fo | Ni / DD / LC | | |
| *Monodelphis domestica* (Wagner, 1842) | Gray Short-tailed Opossum | C / Ce | Ni / NI / LC | MCN-M 3023 | |
| *Monodelphis scalops* (Thomas, 1888) | Long-nosed Short-tailed Opossum | Ph / Fo | Ni / DD / LC | | |
| *Philander frenatus* (Olfers, 1818) | Southeastern Four-eyed Opossum | C / Fo | Ni / NI / LC | MCN-M 3035 3036 | |
| **Pilosa (n = 1)** | | | | | |
| Family Myrmecophagidae | | | | | |
| *Tamandua tetradactyla* (Linnaeus, 1758) | Southern Tamandua | Vi / Fo | NI / NI / LC | | |
| **Cingulata (n = 3)** | | | | | |
| Family Dasypodidae | | | | | |
| *Cabassous unicinctus* (Linnaeus, 1758) | Southern Naked-tailed Armadillo | De / Fo | NI / NI / LC | | |
| *Dasypus novemcinctus* Linnaeus, 1758 | Nine-banded Armadillo | De / Ce | NI / NI / LC | | 2 |
| *Euphractus sexcinctus* (Linnaeus, 1758) | Six-banded Armadillo | De / Ce | NI / NI / LC | | |
| **Perissodactyla (n = 1)** | | | | | |
| Family Tapiridae | | | | | |
| *Tapirus terrestris* (Linnaeus, 1758) | Brazilian tapir | Ph / Ce, Fo | EN / NI / VU | | |
| **Artiodactyla (n = 3)** | | | | | |
| Family Cervidae | | | | | |
| *Mazama americana* (Erxleben, 1777) | South American Red Brocket | Ph / Fo | NI / NI / DD | | |
| *Mazama gouazoubira* (G. Fisher, 1814) | South American Brown Brocket | Ph / Fo | NI / NI / LC | | |
| Family Tayassuidae | | | | | |
| *Pecari tajacu* (Linnaeus, 1758) | Collared Peccary | Ph / Ce | VU / NI / LC | | |
| **Primates (n = 4)** | | | | | |
| Family Atelidae | | | | | |
| *Alouatta guariba* (Humboldt, 1812) | Brown Howler Monkey | Vi / Fo | VU / NI / LC | | |
| Family Callitrichidae | | | | | |
| *Callithrix penicillata* (E. Geoffroy, 1812) | Black-tufted-ear-Marmoset | Vi / Fo | Ni / NI / LC | | |
| Family Cebidae | | | | | |
| *Sapajus nigritus* (Goldfuss, 1809) | Black-horned Tufted Capuchin | Vi / Fo | NI / NI / NT | | |
| Family Pitheciidae | | | | | |
| *Callicebus nigrifrons* (Spix, 1823) | Black-fronted Titi Monkey | Vi / Fo | NI / NI / NT | | |
| **Carnivora (n = 10)** | | | | | |
| Family Canidae | | | | | |
| *Cerdocyon thous* (Linnaeus, 1766) | Crab-eating Fox | Vi / Ce | NI / NI / LC | | |
| *Chrysocyon brachyurus* (Illiger, 1815) | Maned Wolf | Vi / Ce | VU / VU / NT | | |
| Family Felidae | | | | | |
| *Leopardus pardalis* (Linnaeus, 1758) | Ocelot | De / Fo | VU / VU / LC | | |
| *Leopardus wiedii* (Schinz, 1821) | Margay | Ph / Fo | EN / VU / NT | | |
| *Puma concolor* (Linnaeus, 1771) | Cougar | Ph / Ce | VU / VU / LC | | |
| *Puma yagouaroundi* (É. Geoffroy, 1803) | Jaguarundi | Vi / Fo | NI / NI / LC | | |
| Family Mephitidae | | | | | |
| *Conepatus amazonicus* (Lichtenstein, 1838) | Striped Hog-nosed Skunk | Vi / Ce | NI / NI / LC | | |

**Table 1.** *Continued.*

| TAXON | COMMON NAME | RECORD/ HABITAT | CONSERVATION STATUS MG / BRAZIL / IUCN | VOUCHER NUMBER | REFERENCE |
|---|---|---|---|---|---|
| Family Mustelidae | | | | | |
| *Eira barbara* (Linnaeus, 1758) | Tayra | Vi / Ce | NI / NI / LC | | |
| *Galictis cuja* (Molina, 1782) | Lesser Grison | Vi / Ce | NI / NI / LC | | |
| Family Procyonidae | | | | | |
| *Nasua nasua* (Linnaeus, 1766) | South American Coati | Vi / Ce | NI / NI / LC | | |
| **Chiroptera (n = 18)** | | | | | |
| Family Molossidae | | | | | |
| *Eumops perotis* (Schinz, 1821) | Greater Bonneted Bat | C | NI / NI / LC | MZ 92 | 2 |
| *Molossus molossus* (Pallas, 1766) | Pallas' Mastiff Bat | C | NI / NI / LC | MZ 94 96 | 2 |
| *Tadarida brasiliensis* (I. Geoffroy, 1824) | Brazilian Free-tailed Bat | C | NI / NI / LC | MZ 93 95 | 2 |
| Family Phyllostomidae | | | | | |
| *Anoura caudifer* (É. Geoffroy, 1818) | Tailed tailless Bat | C | NI / NI / LC | MZ 115 | 2 |
| *Anoura geoffroyi* Gray, 1838 | Geoffroy's Tailless Bat | C | NI / NI / LC | MZ 126 | 2 |
| *Artibeus lituratus* (Olfers, 1818) | Great Fruit-eating Bat | C | NI / NI / LC | | 2 |
| *Carollia perspicillata* (Linnaeus, 1758) | Seba's Short-tailed Bat | C | NI / NI / LC | MZ 109 122 127 | 2 |
| *Desmodus rotundus* (É. Geoffroy, 1810) | Common Vampire Bat | C | NI / NI / LC | MZ 114 | 2 |
| *Platyrrhinus lineatus* (É. Geoffroy, 1810) | White-lined Broad-nosed Bat | C | NI / NI / LC | MZ 121 123 124 | 2 |
| *Pygoderma bilabiatum* (Wagner, 1843) | Ipanema Broad-nosed Bat | C | NI / NI / LC | MZ 116 118 119 | 2 |
| *Sturnira lilium* (É. Geoffroy, 1810) | Little Yellow-shouldered Bat | C | NI / NI / LC | MZ 110 112 113 | 2 |
| *Vampyressa pusilla* (Wagner, 1843) | Southern Little Yellow-eared Bat | C | NI / NI / DD | MZ 111 128 | 2 |
| Family Vespertilionidae | | | | | |
| *Eptesicus brasiliensis* (Desmarest, 1819) | Brazilian Brown Bat | C | NI / NI / LC | MZ 100 | 2 |
| *Histiotus velatus* (I. Geoffroy, 1824) | Tropical Big-eared Brown Bat | C | NI / NI / DD | MZ 98 | |
| *Lasiurus blossevillii* (Lesson & Garnot, 1826) | Red Bat | C | NI / NI / LC | MCN-MQ 38 39 | 2 |
| *Myotis levis* (I. Geoffroy, 1824) | Yellowish Myotis | C | NI / NI / LC | MZ 97 99 101 102 | |
| *Myotis nigricans* (Schinz, 1821) | Black Myotis | C | NI / NI / LC | MZ 103 106 | 2 |
| **Lagomorpha (n = 1)** | | | | | |
| Family Leporidae | | | | | |
| *Sylvilagus brasiliensis* (Linnaeus, 1758) | Tapeti | Vi / Ce | NI / NI / LC | | 1 |
| **Rodentia (n = 21)** | | | | | |
| Family Caviidae | | | | | |
| *Cavia aperea* Erxleben, 1777 | Brazilian Guinea Pig | C / Ce | NI / NI / LC | MCN-M 3033 | 1 |
| *Galea spixii* (Wagler, 1831) | Spix's Yellow-toothed Cavy | Fr | NI / NI / LC | | 1 |
| *Hydrochoerus hydrochaeris* (Linnaeus, 1766) | Capybara | Vi / Fo | NI / NI / LC | | |
| Family Cricetidae | | | | | |
| *Akodon cursor* (Winge, 1887) | Cursorial Grass Mouse | C / Ce, Fo | NI / NI / LC | MCN-M 3027 3055 | 1 |
| *Blarinomys breviceps* (Winge, 1887) | Brazilian Shrew Mouse | C / Fo | NI / NI / LC | MCN-M 3057 | |
| *Calomys tener* (Winge, 1887) | Delicate Laucha | Fr | NI / NI / LC | | 1 |
| *Cerradomys subflavus* (Wagner, 1842) | Flavescent Rice Rat | C / Ce, Fo | NI / NI / LC | MCN-M 3025 3029 | 1 |
| *Juliomys pictipes* (Osgood, 1933) | Contrera's Juliomys | C / Fo | NI / NI / LC | MCN-M 3022 | |
| *Necromys lasiurus* (Lund, 1841) | Hairy-tailed Akodont | C / Ce | NI / NI / LC | | 1 |
| *Nectomys squamipes* (Brants, 1827) | Atlantic Forest Water Rat | C / Fo | NI / NI / LC | | |
| *Oligoryzomys nigripes* (Olfers, 1818) | Black-footed Colilargo | C / Ce, Fo | NI / NI / LC | MCN-M 3024 | 1 |
| *Oligoryzomys* sp. | | C /Ce, Fo | | MCN-M 3028 3030 | 1 |
| *Oxymycterus delator* Thomas, 1909 | Paraguayan Hocicudo | C / Ce | NI / NI / LC | | |
| *Rhipidomys mastacalis* (Lund, 1840) | Atlantic Forest Climbing Mouse | C / Ce, Fo | NI / NI / LC | | |
| *Thaptomys nigrita* (Lichtenstein, 1829) | Ebony Grass Mouse | C / Fo | NI / NI / LC | MCN-M 3020 3032 | |
| Family Cuniculidae | | | | | |
| *Cuniculus paca* (Linnaeus, 1766) | Spotted Paca | Ph / Ce | NI / NI / LC | | 1 |
| Family Dasyproctidae | | | | | |
| *Dasyprocta azarae* Lichtenstein, 1823 | Azara's Agouti | Vi / Ce | NI / NI / DD | | |

**Table 1.** *Continued.*

| TAXON | COMMON NAME | RECORD/ HABITAT | CONSERVATION STATUS MG / BRAZIL / IUCN | VOUCHER NUMBER | REFERENCE |
|---|---|---|---|---|---|
| Family Echimyidae | | | | | |
| *Thrichomys apereoides* (Lund, 1839) | Common Punaré | Fr | NI / NI / LC | | 1 |
| *Trinomys moojeni* (Pessôa, Oliveira & Reis, 1992) | Moojen's Atlantic Spiny-rat | C / Fo | VU / NI / EN | MCN-M 1036 1037 | 3 |
| **Family Erethizontidae** | | | | | |
| *Coendou prehensilis* (Linnaeus, 1758) | Brazilian Porcupine | Vi / Fo | NI / NI / LC | | |
| Family Sciuridae | | | | | |
| *Guerlinguetus ingrami* (Thomas, 1901) | Southeastern Squirrel | C / Fo | NI / NI / LC | MCN-M 3034 | 4 |

1 Information from Silva and Talamoni 2003; 2 Information from Falcão *et al*. (2003); 3 Information from Cordeiro-Júnior and Talamoni (2006); 4 Information from Alvarenga and Talamoni (2005, 2006).

**Table 2.** Mammalian species with reports of occurrence in the Reserva Particular do Patrimônio Natural Santuário do Caraça. Abbreviations: Conservation status: NI = Not Included; DD = Data Deficient; LC= Least Concern; VU = Vulnerable; NT= Near Threatened.

| TAXON | COMMON NAME | CONSERVATION STATUS* MG / BRAZIL / IUCN |
|---|---|---|
| **Pilosa** | | |
| Family Myrmecophagidae | | |
| *Myrmecophaga tridactyla* Linnaeus, 1758 | Giant Anteater | VU / VU / VU |
| Cingulata | | |
| Family Dasypodidae | | |
| *Dasypus septemcinctus* Linnaeus, 1758 | Seven-banded Armadillo | NI / NI / LC |
| **Primates** | | |
| Family Callitrichidae | | |
| *Callithrix geoffroyi* (Humboldt, 1812) | Geoffroyi's Tuffed-ear Marmoset | NI / NI / LC |
| **Carnivora** | | |
| Family Canidae | | |
| *Lycalopex vetulus* (Lund, 1842) | Hoary Fox | NI / NI / LC |
| **Family Felidae** | | |
| *Panthera onca* (Linnaeus, 1758) | Jaguar | CR / VU / NT |
| **Family Mustelidae** | | |
| *Lontra longicaudis* (Olfers, 1818) | Neotropical Otter | VU / NI / DD |
| **Family Procyonidae** | | |
| *Procyon cancrivorus* (G. [Baron] Cuvier, 1798) | Crab-eating Raccoon | NI / NI /LC |

Caraça by Strang (1981), and we only add one additional record from a direct observation made by the first author.

The two mammal species at Caraça that are classified as *Near Threatened* (IUCN 2013) are the primates *Sapajus nigritus* and *Callicebus nigrifrons*. It should be noted that even though these species are currently in this category because they do not meet the criteria usually employed for consideration as *Threatened*, they are likely to be classified as endangered in the near future (IUCN 2013) and, for that reason, deserve special attention.

Among the primate species that we documented at Caraça we would like to point-out that the primate *Callithrix geoffroyi* may be in contact with populations of *Callithrix penicillata* in the reserve. *Callithrix penicillata* is a species of marmoset with a wide natural or original distribution in Brazil (Vivo 1991) and is typically found in cerrado areas in the central region, southwest, west, and north of the state of Minas Gerais (Rylands and Mendes 2008; Rylands *et al*. 2009), and is often sighted in Caraça (Table 1). However, there are reported observations of *C. geoffroyi* (Table 2) in the reserve as well, and possible *C. penicillata* × *C. geoffroyi* hybrids (Figure 2). *Callithrix geoffroyi* is endemic to the Atlantic Forest (Rylands *et al.* 1993), and is distributed in the states of Espírito Santo and the forested eastern and northeastern part of Minas Gerais (Vivo 1991; Rylands *et al*. 2009). *Callithrix geoffroyi* reaches its extreme western distribution at the Bacia do Rio Doce in the Parque Nacional da Serra do Cipó (Oliveira *et al.* 2003). According to these authors, the Serra do Cipó may be the biogeographical division that separates these two species of marmosets. The occurrence of possible hybrids of these two species is known in the state of Minas Gerais (Coimbra-Filho *et al*. 1993), as well as in areas near Caraça (Passamani *et al*. 1997). According to Vivo (1991), the species *C. jacchus, C. penicillata,* and *C. geoffroyi* form a very close group, attested to by several cases of hybridization in captivity. Clearly, genetic studies of the *Callithrix* in Caraça are needed in order to determine if hybridization is occurring, and if so, what is the distribution of the contact zone.

Of all the mammals recorded at Caraça (Table 1), nine species are endemic to the Atlantic Forest biome. These include two marsupials (*M. scalops* and *Gracilinanus microtarsus*), four rodents (*Blarinomys breviceps, Juliomys*


**Figure 2.** Photographic records of mammal species present in the Reserva Particular do Patrimônio Natural Santuário do Caraça, state of Minas Gerais, Brazil. (A) *Tapirus terrestris*, (B) *Leopardus wiedii*, (C) *Puma concolor*, (D) *Cuniculus paca*, (E) *Mazama americana*, (F) *Pecari tajacu*, (G) possible hybrid of *C. penicillata* × *C. geoffroyi*, (H) *Monodelphis scalops*.

*pictipes, Thaptomys nigrita* and *Guerlinguetus ingrami*) and three primates (*A. guariba*, *S. nigritus*, and *C. nigrifrons*) (Paglia *et al.* 2012). The Atlantic Forest has the second largest number of unique species among biomes in Brazil, with most of them (70%) being rodents and bats (Paglia *et al.* 2012). In the present study, as expected, most of the recorded species (55%) were also rodents and bats. This remarkable representation of small mammals in the reserve should be highlighted in the environmental education activities commonly performed at Caraça.

Additional work is needed to confirm the species records obtained from interviews (Table 2) given the significance of biodiversity conservation and because three of these species (*Myrmecophaga tridactyla, Panthera onca* and *Lontra longicaudis*) are under the threat of extinction (COPAM 2010; Chiarello *et al.* 2008; IUCN 2013). Furthermore, there is a historical report from 20 years ago of the spider monkey, *Brachyteles hypoxanthus* (Kuhl, 1820), occurring in the region, according to a description given by a former hunter (M.F. Vasconcelos, personal communication); however, this species was not included in Table 2 because of the low probability of this species still inhabiting the region.

If the occurrences of the species recorded through interviews are confirmed, the list of the species of mammals of Caraça would total 77, which is a significantly higher species richness than other protected areas in the state of Minas Gerais. For example, Schneider *et al.* (2000) recorded 59 species in the Parque Nacional da Serra da Canastra (71,525 ha), Câmara *et al.* (1999) recorded 34 species in the Áreas de Proteção Especial no Parque Estadual Serra do Rola-Moça (3,400 ha), this park being located within a metropolitan region, and Câmara and Oliveira (2012) recorded 55 species in the Parque Nacional da Serra do Cipó (33,800 ha).

The results presented herein demonstrate not only the importance of the RPPN Santuário do Caraça for the maintenance of local biodiversity, but also the great value of using different methodologies in conducting long-term inventories (Rodrigues *et al.* 2002) in order to obtain a reliable sample of the mammalian species present at a given location.

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