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## DENSITY OF *SAGUINUS INUSTUS* (SCHWARTZ, 1951) IN THE INTERFLUVIUM OF THE CAQUETÁ–APAPORIS RIVERS, COLOMBIAN AMAZONIA

Claudia Idaly Castillo-Ayala  
Erwin Palacios

### Introduction

The Amazon bioregion is considered one of the highest biodiversity areas in the world. Primates are important components of this biodiversity, and with 15 genera, 81 species and 134 taxa, they are the most emblematic faunal group of Amazonia (Mittermeier *et al.*, 2002). *Saguinus* is perhaps the most diverse of Neotropical primate genera, with

13–15 species and 33 recognized forms (Hershkovitz, 1977; Rylands *et al.*, 2000). Deffler (2003a) recognizes the presence of six species of *Saguinus* in Colombia (40–46% of the total species in the genus), three of them exclusively distributed in the Colombian Amazon: *S. fuscicollis* (Spix, 1823), *S. nigricollis* (Spix, 1823), and *S. inustus* (Schwartz, 1951). *Saguinus inustus*, the mottled-face tamarin, is distributed in southeastern Colombia, west of the Andes, between the Guayabero-Guaviare rivers and the Caquetá River, and between the Mesay River and the border with Brazil; however, accurate eastern and western boundaries of its geographical range within the country are still unknown (Deffler, 2003a). The species is also present in western Brazil, between the Rio Negro and the Colombian border.

*Saguinus inustus* is one of the least-studied species of Neotropical primates; preliminary information on its ecology (ranging and diet) comes from only two short studies carried out near La Pedrera, at Comeyafú Indigenous Reserve, an interfluvial area between the Caquetá and Apaporis rivers (Palacios *et al.*, 2004; Deffler, unpublished data), and from occasional observations of foraging groups in the Amaná Sustainable Development Reserve in Brazil (de Souza *et al.*, 2004). Here we present the first data on the density of *S. inustus*. We collected this information during a primate survey in the lower Caquetá River as part of a larger effort started six years ago to document and monitor the densities of primates and 15 other large vertebrate species in eastern Colombian Amazonia (Palacios *et al.*, 2003; Palacios and Peres, 2005; Peres and Palacios, 2007).

### Methods

#### Study area

Censuses were carried out in the interfluvial area between the lower Caquetá and Apaporis Rivers, Amazonas, near Loma Linda indigenous community (01°16'S, 69°44'W, 101 m a.s.l.; Fig. 1), Córdoba Indigenous Reserve. Primary *terra firme* and *várzea* forests represented the majority of the forested matrix in the study site. An area of secondary *terra firme* forest (locally called *rastrajo*) located around the indigenous settlement comprised a small proportion of such matrix. There were also patches of what is locally known as savanna forest or *varillal*, which corresponds to primary forest with a mean height of 17–18 m, and a very sparse understory growing on rocky outcrops and white sands; and another savanna type known as *sabana capotuda*, with a mean canopy height of 8 m, deep soil litter and a very dense understory with intermingled vines and lianas.

#### Linear transects

We used the line transect method (Burnham *et al.*, 1980) to estimate *S. inustus* densities. From a zero point located ca. 100 m away from the community secondary forest area, two transects (4.6 and 4.9 km long, oriented 40°NW and 40°NE respectively) were cut; they were

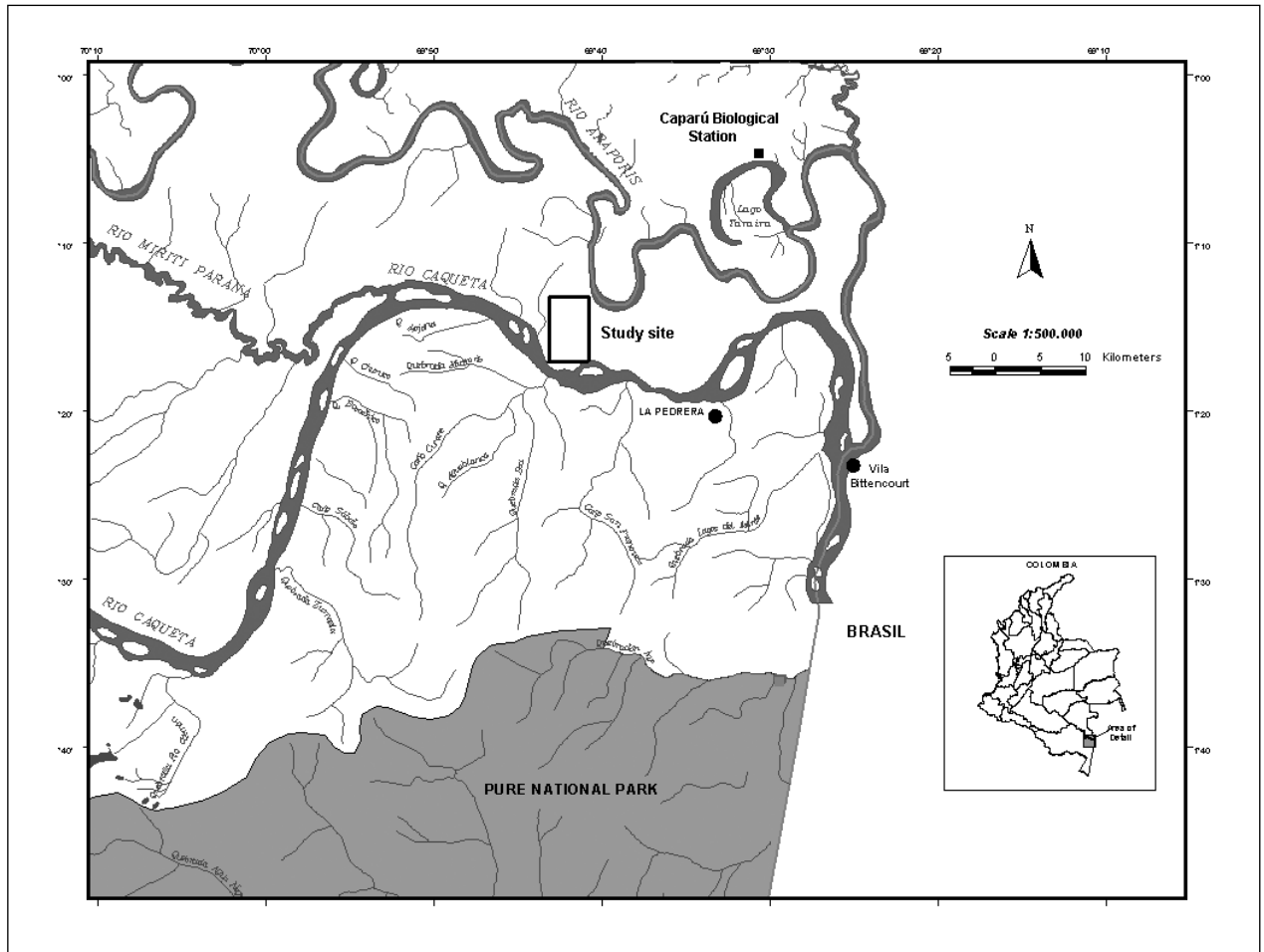


Figure 1. The lower Caquetá region in Eastern Colombian Amazonia. Black square shows the area where censuses were carried out.

marked with flagging tape every 50 m to facilitate accurate location of sightings. Transects were cut a month before we started the censuses, so at the time of the study, local fauna were already habituated to the transect paths. The shortest transect crossed nearly 2 km of *rastrojo*, 1.1 km of *varillal*, and 1.5 km of primary *terra firme* terrace forest. The second transect crossed hilly primary *terra firme* forest with sandy soils in the first half of its length and clay soils in the second, as well as patches of *sabana capotuda*.

Censuses were carried out during 10 days each month between October 2005 and February 2006. Independent observers walked the transects during days without rain at a mean speed of 1.2 km/h, between 0630 and 1130 hrs. Community members previously trained and able to accurately detect and identify local primate species participated in the surveys. Every time we encountered groups of *S. inustus*, we recorded the date, time, number of individuals, perpendicular distance from the transect, distance walked, height and type of forest. After each encounter, a maximum of 15 minutes were spent to obtain accurate counts of groups. Data were analyzed using DISTANCE 5.0 Beta 5 software (Thomas *et al.*, 2005).

## Results and Discussion

A total census effort of 380 km was achieved, during which groups of *S. inustus* were sighted 33 times. Six additional primate species are sympatric with *S. inustus* in the lower Caquetá and Apaporis interfluvial area: *Alouatta seniculus*, *Aotus cf. vociferans*, *Callicebus torquatus*, *Cebus albifrons*, *Cebus apella*, and *Saimiri sciureus*. Although the study site is included in the distribution range of *Lagothrix lagothricha*, this species was not recorded during the survey period. People from Loma Linda said they have never seen woolly monkeys in that area, and this is likely to be a consequence of a long history of human settlement and subsistence hunting in the region. *L. lagothricha* has not been recorded recently in the lower interfluvium of the Caquetá and Apaporis Rivers, east of the mouth of the Mirití River (Palacios, pers. obs.), and the species is likely to be locally extinct.

We estimated a *S. inustus* density of 3.8 groups/km<sup>2</sup> and 19.6 individuals/km<sup>2</sup>. Mean group size was 5.2 individuals (sd = 1.87). The mottled-face tamarin was one of the primate species most frequently encountered after *C. torquatus* and *S. sciureus* (Castillo-Ayala, in prep.).

Mottled-faced tamarin density at Loma Linda is in the range of that reported for other *Saguinus* species in nine different localities in western Amazonia (Soini, 1981; Freese *et al.*, 1982; Pook and Pook, 1982; Terborgh, 1983; Peres, 1997), but high compared with those reported for *S. fuscicollis* at some sites in eastern Colombian Amazonia (3.4–16.9 individuals/km<sup>2</sup>: Palacios *et al.*, 2003; Palacios y Peres, 2005; Palacios, unpublished data). In contrast, *S. fuscicollis* densities in three other sites in eastern Colombian Amazonia (Caño Arapa and Caño Esperanza, Puré National Park, and Caño Curare) were much higher (21.5, 26.5, and 30.3 individuals/km<sup>2</sup> respectively; Palacios, unpubl. data) than those found for *S. inustus* at Loma Linda. Mean group size is in the range recorded for other species of Amazonian *Saguinus*; for example, *S. fuscicollis* showed a group size range of two to eight individuals (Freese, 1975; Soini, 1981; Janson and Terborgh, 1985).

During the first month of censuses, 75% of the *S. inustus* sightings were in secondary forest, while in the second and third months the situation reversed, with 70% and 62.5% of the sightings in primary *terra firme* forest. During the last month of surveys the proportion of sightings of the species was similar for both types of forest (53.8% primary vs. 46.2% secondary). The preference for secondary forest during the first month of surveys may be a result of higher fruit availability of various species of *Inga* in the *rastrojos*. The sweet arils of *Inga* have been noted as one of the most consumed resources by the mottled-face tamarin (Palacios *et al.*, 2004). *S. inustus* may show resource use patterns similar to other species of *Saguinus*; for example, *S. fuscicollis* usually forages on one or a few species of plants during consecutive days until no more fruits are available (Defler, 2003a). This may be the case with *Inga* fruits; other primates such as red howlers also concentrate their foraging efforts in particular *Inga* fruit patches until crops are depleted (Palacios, unpublished data).

Based on occasional observations, Defler (2003a) suggested the possibility that *S. inustus* could be more abundant in secondary forests near indigenous settlements than in primary forests. Snowdon and Soini (1988) reported that some species of *Saguinus*, among them *S. nigricollis*, attain higher densities in secondary forests. Palacios *et al.* (2004) observed the presence of *S. inustus* in both types of forests; Defler (2003a) believes that *S. Geoffroyi* may have the same habitat preferences, and that *S. fuscicollis* seems to be the species of *Saguinus* with the more diverse habitat use, as this species uses primary forests as well as highly disturbed ones. *S. inustus* at the Caquetá–Apaporis interfluvium used an approximately equal proportion of primary and secondary forest (51.16% and 48.8% respectively). Fourteen percent of the sightings of *S. inustus* in primary forest corresponded to *sabana capotuda* habitat with characteristics that this species usually prefers; in a different study related to the ecology of the species, *S. inustus* regularly used portions of forest with dense understory (Castillo-Ayala, unpublished data). Furthermore, 85.7% of the encounters with groups of *S. inustus*

in secondary forest corresponded to *rastrojo alto* with a very dense understory. These preferences have been reported for other species of *Saguinus*; for example, Emmons and Feer (1999) mention that *S. fuscicollis*, *S. nigricollis* and *S. bicolor* often can be seen in habitats with high densities of lianas.

This first density estimate of *S. inustus* provides important data, but supplemental information from other areas of the Caquetá–Apaporis interfluvium will be necessary in order to assess the conservation status of the species in this region. The forests around the community of Loma Linda still offer appropriate habitats for the conservation of the species, including secondary forests at different successional stages, and a large proportion of primary forest. The forest matrix in the lower Caquetá and Apaporis interfluvium corresponds mainly to indigenous reserves (Palacios *et al.*, 2004), which support a large indigenous population that is increasing due to high birth and immigration rates. As a consequence, the need for new housing and croplands will continue to increase, transforming significant areas of primary forest. New surveys and ongoing studies on the ecology of the mottled-face tamarin will contribute to a better knowledge of its density in the Caquetá–Apaporis interfluvium, and will provide more data to help determine their forest type preferences, how they cope with habitat transformation, and the conservation strategies that need to be implemented with local communities to preserve this interesting primate.

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**Claudia Idaly Castillo-Ayala**, Conservation International Colombia, Cra. 13 No. 71 - 41, Bogotá, Colombia, e-mail: <clauscas@hotmail.com> and **Erwin Palacios**, Conservation International–Colombia and Estación Biológica Caparú, e-mail: <epalacios@conservation.org>.

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## NEW OCCURRENCE RECORDS AND EASTERN EXTENSION TO THE RANGE OF *CALLICEBUS CINERASCENS* (PRIMATES, PITHECIIDAE)

Maurício de Almeida Noronha  
Wilson Roberto Spironello  
Dayse Campista Ferreira

### Introduction

Spix (1823) first described the ashy black titi monkey (*Callicebus cinerascens*) from a male specimen assumed to have been collected along the Rio Iça near the border with Peru, in the state of Amazonas, Brazil. Van Roosmalen and colleagues (2002) questioned the origin of this specimen, maintaining that as all subsequent records were for the right bank of the Rio Madeira (Rylands, 1982; Hershkovitz, 1990; van Roosmalen *et al.*, 2002), the type locality must be incorrect. During his taxonomic revision of the genus *Callicebus*, Hershkovitz (1990) added three valid localities for *C. cinerascens*, one on the right bank of the Rio Aripuanã, and two on the right bank of the Rio Roosevelt. Rylands (1982) observed the species along the