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Distribution and Conservation Status of the Yellow-Tailed Woolly Monkey (*Oreonax flavicauda*, Humboldt 1812) in Amazonas and San Martín, Peru

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Introduction

The yellow-tailed woolly monkey (*Oreonax flavicauda*) is one of the largest and rarest Neotropical primates. First discovered in 1802 by Alexander von Humboldt (Humboldt and Bonpland, 1812), since then only a few field studies have been conducted on this species (Leo Luna, 1980, 1982; Butchart *et al.,* 1995a; DeLuycker, 2007) and it remains one of the least known of all primate species. *O. flavicauda* is restricted to a small area of pre-montane cloud forest between 1,400 and 2,500 m a.s.l. in the departments of San Martín and Amazonas in northern Peru (Leo Luna, 1980, 1982; DeLuycker, 2007). The species probably also occurs in small areas of Cajamarca, Huanuco, Loreto and La Libertad departments (Mittermeier *et al.*, 1975; Graves and O'Neil, 1980; Leo Luna, 1980, 1982, 1989; Parker and Barkley, 1981; DeLuycker, 2007; Rolando Aquino, pers. com.). *O. flavicauda* is endemic to the tropical Andes biodiversity hotspot (Myers *et al.*, 2000), and its habitat is characterised by rugged terrain of steep mountain sides and deep river gorges, with canopy

height of about 20–25 m, with a thick understory and lush vegetation cover. Low reproductive rates, long inter-birth intervals, low population densities, restricted habitat and limited geographic range all increase this species' vulnerability to extinction from human activities affecting the Peruvian Andes (Leo Luna, 1989; IUCN, 2006). Although no accurate census data exist, Nowak (1999) cites a population estimate of less than 250 individuals surviving in the wild. *O. flavicauda* is listed as Critically Endangered by the IUCN (2006) and currently featured as one of the 25 most endangered primate taxa (Mittermeier *et al.*, 2007).

The main threat to this species' survival is habitat loss from deforestation (Macedo Ruiz and Mittermeier, 1979; Leo Luna, 1980; Butchart *et al.*, 1995b; DeLuycker, 2007). Currently the species is present in several protected areas: Río Abiseo National Park, Alto Mayo Protected Forest, Cordillera Colán Reserved Zone, Cordillera Escalera Regional Conservation Area, and the Laguna de los Condores Reserved Zone. Hunting and logging are still known to occur in all of these reserves (e.g. Parks Watch Peru, 2003). Built in the 1980s, the Lima-Tarapoto highway runs through the departments of San Martín and Amazonas and brought with it many settlers from coastal and high mountain sierra departments (DeLuycker, 2007). Overpopulation and environmental degradation have caused continued immigration, giving San Martín and Amazonas some of the highest immigration levels in Peru (INEI, 2006). As a result, since the last field survey of *O. flavicauda* (Leo Luna, 1980) the area has undergone high levels of deforestation and many populations of the species now exist in isolated forest fragments. Hunting is also a major threat to the survival of the species (Macedo Ruiz and Mittermeier, 1979; Leo Luna, 1980, 1989; Butchart *et al.*, 1995a). In this study we aimed to gather up-to-date information on the status of *O. flavicauda* and to evaluate the current threat levels facing it; this also serves as a preliminary study for the implementation of a larger conservation study.

Methods

Between March and June 2007 we conducted a preliminary survey of *O. flavicauda* at 11 sites in Amazonas and San Martín departments. We also collected secondary data on a further six sites in Amazonas, Huanuco, La Libertad, Loreto and San Martín departments. Sites listed in previous studies (Mittermeier *et al.*, 1975; Graves and O'Neil, 1980; Leo Luna, 1980, 1982, 1989; Parker and Barkley, 1981; DeLuycker, 2007) as areas of this species' occurrence were surveyed for the continued presence of *O. flavicauda.* Other areas where habitat and climatic requirements could be met were also surveyed. All areas covered in this investigation were in the pre-montane cloud forest belt in the two eastern branches of the Andean Cordillera between 05°34' and 06°13'S and 77°01' and 76°31'W (Fig. 1), at altitudes ranging from 1,400 to 2,500 m a.s.l. Average temperatures for these areas are approximately 14–15°C, with average monthly rainfall between 15 mm in the dry season and 120 mm in the wet season. Primary data were collected during forest walks along existing trail systems accompanied by local residents. The location of all sites was recorded with GPS, as were points of encounter with the species. Additional data were also collected on threats to habitat in areas where this species occurs. Incidental data were collected on an *ad libitum* basis. Secondary data on species occurrence were collected from local informants and researchers. Additional data were collected on hunting practices, environmental problems and forest resource uses.

Results

Groups of *O. flavicauda* were found in three locations during this study. On 13 April 2007, near the village of Santa Rosa (05°40'13.5"S, 77°55'08.0"W), Amazonas department (Fig. 1), we encountered a group of eight *O. flavicauda*, consisting of five adults and three young, accompanied by a female white-bellied spider monkey (*Ateles belzebuth*; see Shanee *et al.*, 2007). The group was found in a fragment of forest adjoining pasture at an altitude of 1,875 m a.s.l. Throughout the encounter the group displayed aggressive behaviours such as branch shaking, "mooning" of the scrotal tuft and the short barking call characteristic of the species (Leo Luna, 1980; DeLuycker, 2007). On 2 May 2007, near the village of Shipasbamba, (05°54'35.3"S, 77°58'50.3"W), Amazonas department (Fig. 1), we encountered a group of nine *O. flavicauda*, consisting of two adult males, three adult females, one sub-adult and three juveniles. This group was found in an area of regenerating secondary forest within a larger forest fragment at an altitude of 2,305 m a.s.l., and again this group was detected aurally. We were able to approach the group and stand directly beneath them. Initial aggressive behaviours quickly gave way to more relaxed foraging.

On 27 April 2007, near the village of Paitoja (06°21'42.0"S, 77°04'52.1"W), San Martín department (Fig. 1), we heard the calls of two groups but were unable to locate them. This encounter took place in an area of contiguous primary forest at an approximate altitude of 1,787 m a.s.l. During this study we also found evidence of the presence of *O. flavicauda* in two additional sites: the private reserve of the Peruvian NGO Asociación de Ecosistemas Andinas (ECOAN), Abra Patricia (05°41'52.3"S, 77°48'38.6"W), in Amazonas department on the border with San Martín, and near the Gocta waterfalls (06°01'18.4"S, 77°53'12.4"W), also in Amazonas department (Fig. 1). Abra Patricia covers an area of mixed primary and regenerating secondary forest adjoining the Alto Mayo Protected Forest, which is known to contain this species (DeLuycker, 2007). At the Gocta waterfall we found half-eaten fruit (*Ficus* spp.) showing bite marks of a large bodied primate, and the presence of *O. flavicauda* was confirmed by local residents who told us of the species' occurrence in the small patch of forest surrounding the waterfall.

We were unable to directly observe *O. flavicauda* in any of the other six sites visited in this study. However, through informal interviews with local informants, and the use of photographic depictions and verbal descriptions of *O. flavicauda*, we were able to gather additional information on these sites. Results from these interviews confirmed the presence of *O. flavicauda* at Colca (05°53'40.9"S, 77°23'15.2"W) and Nuevo Mendoza (06°27'06.7"S, 77°05'46.3"W) in San Martín department and La Perla de Limasa (05°34'20.1"S, 77°58'53.7"W) in Amazonas

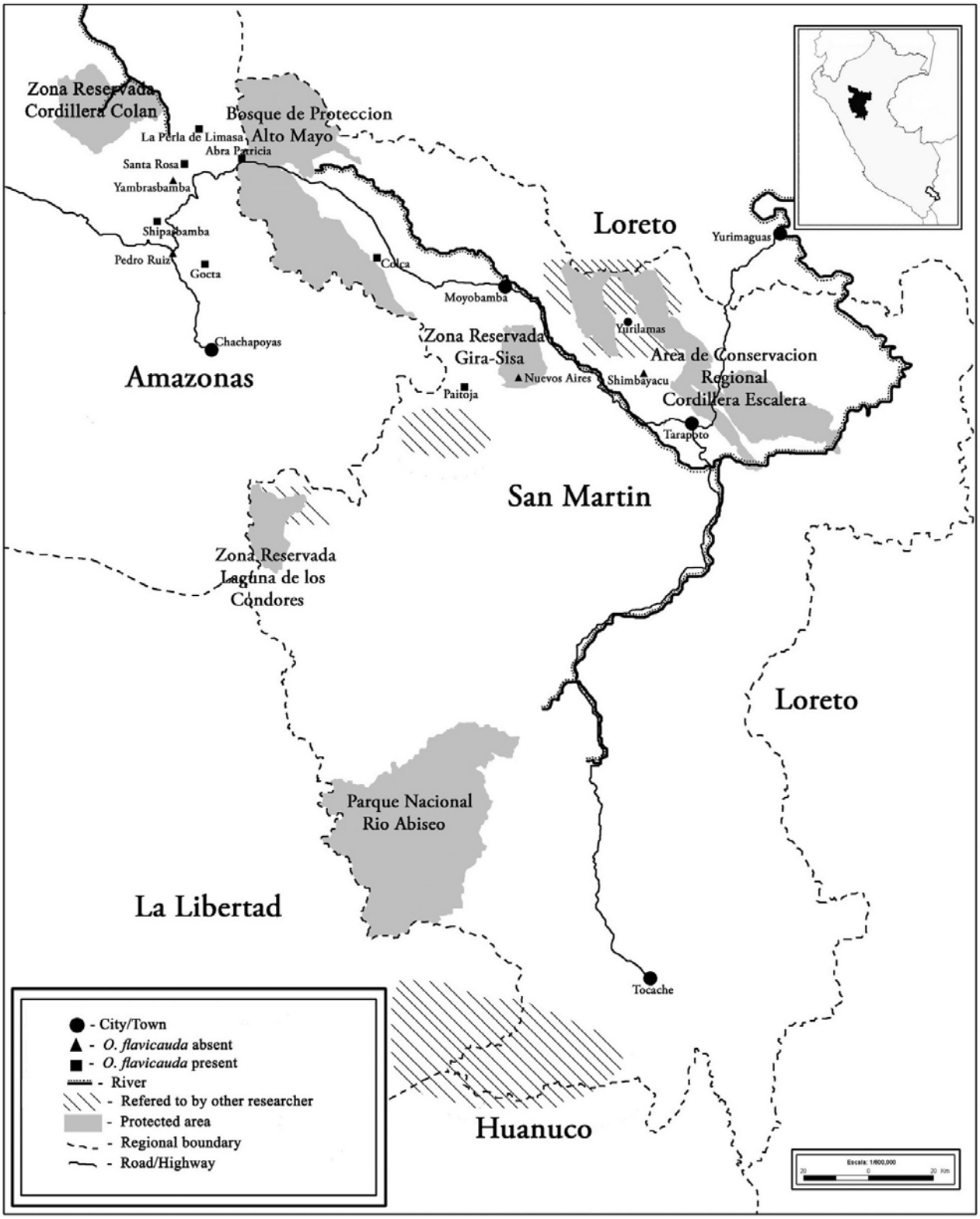

Figure 1. Map of sites visited during the study, showing the presence and absence of *Oreonax flavicauda*.

department (Fig. 1). All other areas visited during this study showed no evidence of the continued presence of *O. flavicauda*. These included the site of the "rediscovery" of the species in 1974 (Mittermeier *et al.*, 1975), Pedro Ruiz Gallo (05°56'36.3"S, 77°58'42.3"W) where the area was found to be completely deforested for several kilometres in all directions. The area around the town of Yambrasbamba (05°44'06.9"S, 77°55'30.0"W), listed by Leo Luna (1980) as *O. flavicauda* habitat, is almost completely deforested within several kilometres of the town. Reports from local informants and our own observations suggest that the species does not occur in either the Gira-Sisa Reserve (06°17'34.3"S, 76°54'24.7"W) or around the town of Shimbayacu (06°20'41.9"S, 76°31'58.4"W) in San Martín department. We were told of the confirmed presence of *O. flavicauda* in additional sites by researchers working in or involved with projects there. These site were in the Los Chilchos Valley (Hans Dignum, pers. com.), north of the Río Abiseo National Park in San Martín department and around the Río Metal river valley near Tocache in the far south of San Martín along the borders with La Libertad and Huanuco departments (Rolando Aquino, pers. com.).

Key informant questionnaires and *ad libitum* data collection showed that most people in these areas are dependent on income from timber extraction. Many people also showed concern about the level of deforestation and its implications for the future. Almost all informants said that they had noticed environmental problems affecting their lives and pointed to deforestation as the main cause of problems such as landslides, soil erosion, changes in the local climate and the disappearance of wildlife. The migrant populations in the area do not generally consume primate meat but opportunely hunt *O. flavicauda* with the intention of selling young animals as pets: in fact 8% of interviewees targeted primates whilst hunting, but only in the indigenous community of Shimbayacu did respondents say that primates were hunted for meat. Unfortunately no precise data could be collected on the percentage of primate off-take rates represented by *O. flavicauda*, as hunting was opportunistic and hunters indiscriminate in their choice of species. During the period of this study we collected incidental data on illegal trade in *O. flavicauda*. We found two recently caught *O. flavicauda* for sale and heard reports of several more. Prices ranged from 30–250 soles (about 10–70 US dollars).

Discussion

Determining population sizes and distributions for a species such as the yellow-tailed woolly monkey is made harder by its fragmented distribution, occurrence in mountainous terrain and by the fact that it has never been the subject of a full census. Nowak's (1999) estimate of less than 250 individuals was probably too low; however, we must conclude that the true population size will not now be much higher than this, with a continuing downward trend. The species' large body size, low reproductive rate and the need for large home ranges, as suggested by their low densities (Leo Luna, 1987; DeLuycker, 2007), makes it especially vulnerable to anthropogenic hunting pressures, and habitat destruction and its fragmented distribution will reduce the effective population size far below that of a single contiguous population (Purvis *et al.*, 2000). Therefore the largest, most secure, individual population should be used to determine the species' level of endangerment. We witnessed large areas within the boundaries of the Alto Mayo Protected Forest being cleared for agriculture and cattle ranching and new areas are being settled constantly. However, group sizes reported by DeLuycker (2007) within the boundaries of the Protected Forest are appreciably greater then those found during this study and in previous studies (Leo Luna, 1980; Parker and Barkley, 1981; Butchart *et al.*, 1995b), all of which were outside protected areas. This could possibly be due to relatively lower hunting pressures within the reserve.

We conclude that the main threats to this species continue to be land clearance and habitat degradation, and, contrary to recent reports (EDGE, 2007), hunting by both indigenous and immigrant communities for subsistence and trade is also a major threat to the survival of the species. Trade in *O. flavicauda* seems to be of a very local nature, but even such small levels of trade in a species as endangered as this could be disastrous. Leo Luna (1987) estimates that 600 individuals were killed by opportunistic hunters over a 10-year period, and our experience leads us to believe that similar numbers are being hunted today. During this study at least three infants were removed from the population, and presumably their mothers were killed in the process. Previous recommendations for the conservation of this species have concentrated on habitat protection and public awareness to reduce hunting pressure (Mittermeier *et al.*, 1975; Graves and O'Neil, 1980; Leo Luna, 1980, 1982; Parker and Barkley, 1981; Ríos and Ponce del Prado, 1989; DeLuycker, 2007). Much has been achieved in recent years, and currently there are several projects in place for the conservation of this and other endemic species in the area — for example, the community-based conservation project in the Los Chilchos valley, supported by Apenheul Primate Conservation Trust, IUCN Netherlands and the RABO Foundation, and also the ecosystem protection initiatives of Asociación Ecosistemas Andinos (ECOAN) and the Asociación Peruana para la Conservación de la Naturaleza (APECO). We recommend urgent conservation efforts throughout the distribution of *O. flavicauda*, concentrating on habitat protection. To best achieve this we feel that work should take place on four different levels: 1) increased protection and connectivity between protected areas, 2) better enforcement of conservation laws, 3) coordinated local and regional scale education and public awareness programs, and 4) investment in development of alternative income sources for rural populations.

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