ISSN (impresso/printed) 0103-5657
ISSN (on-line) 2178-7875

Revista Brasileira de Ornitologia

Volume 20 / Issue 20
Número 4 / Number 4
www.ararajuba.org.br/sbo/ararajuba/revbrasorn.htm Dezembro 2012 / December 2012

Publicada pela / Published by the
Sociedade Brasileira de Ornitologia / Brazilian Ornithological Society
Belém - PA

Revista Brasileira de Ornitologia

SOCIEDADE BRASILEIRA DE ORNITOLOGIA
(Fundada em 1987 / Established in 1987)
www.ararajuba.org.br

DIRETORIA / ELECTED BOARD (2011-2013)
Presidente / president: Cristina Yumi Miyaki, *Universidade de São Paulo*, São Paulo, SP
1° Secretária / 1st Secretary: Carla Suertegaray Fontana, *Pontifícia Universidade Católica do Rio Grande do Sul*, Porto-Alegre, RS sbo.secretaria@gmail.com
2° Secretária / 2nd Secretary: Maria Alice dos Santos Alves, *Universidade do Estado do Rio de Janeiro,* Rio de Janeiro, RJ
1° Tesoureira / 1st Treasurer: Celine Melo, *Universidade Federal de Uberlândia*, Uberlândia, MG - tesouraria@gmail.com
2° Tesoureira / 2nd Treasurer: Luciana Vieira de Paiva, *Faculdade Anhanguera de Brasília*, Brasília, DF

CONSELHO DELIBERATIVO / ELECTED COUNCILORS
2008-2012
Caio Graco Machado, *Universidade Estadual de Feira de Santana*, Feira de Santana, BA
2011-2015
Márcio Amorim Efe, *Universidade Federal de Alagoas*, Maceió, AL
James J. Roper, *Universidade de Vila Velha*, Vila Velha, ES
Claiton Martins Ferreira, *Universidade Federal do Rio Grande do Sul*, Porto Alegre, RS
Márcia Cristina Pascotto, *Universidade Federal de Mato Grosso*, Barra do Garças, MT

CONSELHO FISCAL / FINNANCIAL COUNCIL
2011-2013
Fabiane Sebaio de Almeida, *Associação Cerrado Vivo para Conservação da Biodiversidade*, Patrocínio, MG
Rudi Ricardo Laps, *Universidade Federal de Mato Grosso do Sul*, Campo Grande, MS
Paulo de Tarso Zuquim Antas, *PTZA Consultoria e Meio Ambiente*, Brasília, DF

A ***Revista Brasileira de Ornitologia*** (ISSN 0103-5657 e ISSN 2178) é um periódico de acesso livre editado sob a responsabilidade da Diretoria e do Conselho Deliberativo da Sociedade Brasileira de Ornitologia, com periodicidade trimestral, e tem por finalidade a publicação de artigos, notas curtas, resenhas, comentários, revisões bibliográficas, notícias e editoriais versando sobre o estudo das aves em geral, com ênfase nas aves neotropicais. Todos os volumes ***Revista Brasileira de Ornitologia*** podem ser acessados gratuitamente através do site http://www.ararajuba.org.br/sbo/ararajuba/revbrasorn.htm

The ***Revista Brasileira de Ornitologia*** (ISSN 01035657 e ISSN 2178-7875) is an open access jornal edited by the Elected Board and Councilors of the Brazilian Ornithological Society and published four times a year. It aims to publish papers, short communications, reviews, news, and editorials on ornithology in general, with an emphasis on Neotropical birds. All volumes of ***Revista Brasileira de Ornitologia*** can be dowloaded for free at http://www.ararajuba.org.br/sbo/ararajuba/revbrasorn.htm

Projeto Gráfico e Editoração Eletrônica / Graphics and electronic publishing: Regina de Siqueira Bueno (e-mail: mrsbueno@gmail.com).

Capa: Três espécies de aves típicas das florestas de bambu do estado do Acre, cuja avifauna é analisada neste volume por Guilherme (da esquerda para a direita): choca-do-bambu (*Cymbilaimus sanctaemariae*; Foto: Andrew Whittaker), anambé-de-cara-preta (*Conioptilon mcilhennyi*; Foto: Edson Guilherme) e ferreirinho-de-cara-branca (*Poecilotriccus albifacies*; Foto: Andrew Whittaker).

Front cover: Three bird species typical of the bamboo dominated forests in the Brazilian state of Acre, whose avifauna is analyzed in this volume by Guilherme (from left to right): Bamboo Antshrike (*Cymbilaimus sanctaemariae*; Photo: Andrew Whittaker), Black-faced Cotinga (*Conioptilon mcilhennyi*; Photo: Edson Guilherme), and White-cheeked Tody-Tyrant (*Poecilotriccus albifacies*; Photo: Andrew Whittaker).

ISSN (impresso/printed) 0103-5657
ISSN (on-line) 2178-7875

Revista Brasileira de Ornitologia

Volume 20 / Issue 20
Número 4 / Number 4
www.ararajuba.org.br/sbo/ararajuba/revbrasorn.htm Dezembro 2012 / December 2012

Publicada pela / Published by the
Sociedade Brasileira de Ornitologia / Brazilian Ornithological Society
Belém - PA

Revista Brasileira de Ornitologia

Artigos publicados na *Revista Brasileira de Ornitologia* são indexados por:
Biological Abstract, Scopus (Biobase, Geobase e EMBiology), Zoological Record e Web of Science®.

Manuscripts published by Revista Brasileira de Ornitologia are covered by the following indexing databases:
Biological Abstracts, Scopus (Biobase, Geobase, and EMBiology), Zoological Records and Web of Science®.

Registro no ZooBank
urn:lsid:zoobank.org:pub:6F023490-1FF1-41FD-A720-84F548E5D65C

ZooBank Register
urn:lsid:zoobank.org:pub:6F023490-1FF1-41FD-A720-84F548E5D65C

FICHA CATALOGRÁFICA

Revista Brasileira de Ornitologia / Sociedade Brasileira de Ornitologia. Vol. 20, n.1 (2012) -
Belém, A Sociedade, 2005 -
v. : il. ; 30 cm.

Continuação de:. Ararajuba: Vol.1 (1990) - 13(1) (2005).

ISSN: 0103-5657 (impresso)
ISSN: 2178-7875 (on-line)

1. Ornitologia. I. Sociedade Brasileira de Ornitologia.

Revista Brasileira de Ornitologia

Volume 20 – Número 4 – Dezembro 2012 / Issue 20 – Number 4 – December 2012

SUMÁRIO / CONTENTS

ARTIGOS / PAPERS

NOTAS / SHORT-COMMUNICATIONS

Revista Brasileira de Ornitologia, 20(4), 393-442
Dezembro de 2012 / December 2012

ARTIGO/ARTICLE

Birds of the Brazilian state of Acre: diversity, zoogeography, and conservation

Edson Guilherme[1]

[1] Universidade Federal do Acre, Museu Universitário, Laboratório de Ornitologia. Campus Universitário - BR 364, Km 04, Distrito industrial, Rio Branco - Acre, Brazil. CEP: 69915-900. E-mail: guilherme@ufac.br.

Received 12 March 2012. Accepted 27 July 2012.

ABSTRACT: The Brazilian state of Acre borders Peru and Bolivia to the west and south, and the Brazilian states of Amazonas and Rondônia to the north and east, respectively. The state is located within the lowlands of the western Amazon basin, adjacent to the foothills of the Andes, within a "megadiverse" region of the Brazilian Amazon basin. Despite its diversity, the region is still only poorly known in scientific terms, and is considered to be a priority for future biological surveys. Given this situation, the present study aims to contribute to the scientific knowledge of the avian fauna of southwestern Amazonia, by evaluating the following questions – (a) how many and which bird species occur in the state of Acre?; (b) how are these species distributed within the state?; and (c) what are the priority areas for new ornithological surveys within the state of Acre? My methodological procedures included (a) a wide literature search; (b) two years of field surveys, including observation records and the collection of voucher specimens; (c) map the distribution of avian taxa within the two main interfluvial regions (east and west of the Purus River) of the state; and (d) the identification of contact and possible hybridization zones, based on the distribution of parapatric sister taxa. The literature search and fieldwork resulted in the compilation of 9550 avian records, encompassing 4763 specimens, of which 2457 (51.5%) were collected during the past five years. A total of 667 species were confirmed for the state of Acre, representing 75 families and 23 orders. A total of 64 migratory species were also recorded, of which 46.8% (n=30) are Nearctic migrants, 15 (23.4%) were considered to be intratropical migrants, and 19 (29.6%) were classified as austral migrants. Overall, 41 of the recorded species and subespecies were endemic to the Inambari center of endemism. Of all forest avian taxa present year round in the state, 79% are distributed in both main interfuvial regions, 16% were recorded only in the central-western sub-region (west of the Purus), and 5% only in the eastern sub-region (east of the Purus). At least five pairs of purported sister taxa presented allopatric distributions, whereas 15 had parapatric distribution within the state. Two zones of secondary contact (east and west) were identified, which coincided with two possible hybridization zones. The main conclusions of this study are: (a) the total number of species recorded in the state is high but will probably increase as new surveys are conducted; (b) neither of the state's major rivers – the Purus and the Juruá – act as physical barriers to the dispersal of most of the resident species found in the state; (c) the zones of secondary contact found do not coincide with the basins of these two major rivers, which supports the idea that factors other than physical barriers to dispersal determine the present distribution of some of the resident bird taxa of Acre; and (d) birds restricted to the white-sand forests (campinas and campinaranas) found only in the western portion of the state, as well as those found only in the dense forests of eastern Acre, constitute together the most threatened elements of the state's avifauna since no conservation units protect these specific habitats.

KEY-WORDS: Amazonia; areas of endemism; contact zones; hybridization; Purus; white sand forests.

INTRODUCTION

The Amazon basin encompasses the largest and most diverse tract of continuous tropical rainforest found anywhere in the World. Covering more than six million square kilometers in nine countries of northern South America, the region is home to more than 40,000 plant species, 427 mammals, 1294 birds, 378 reptiles, 427 amphibians, and more than 3,000 species of fish, representing around 10% of the planet's biodiversity (Mittermeier *et al.* 2003). Despite this biological richness, few of the plans proposed for the development of the region have contemplated the effective protection of these natural resources. In most cases, this is justified by the lack of adequate information on this diversity, which might enable its inclusion in the decision-making processes underpinning strategic planning. However, relatively little has been done to compile the existing data and catalog the species that occur in the region, or their geographic ranges.

Brazil has one of the richest avian faunas in South America, with a current total of 1832 species (CBRO 2011). Despite this diversity and the fact that ornithological research began in Brazil in the 16th century, the first systematic catalog of Brazilian birds was only produced in the mid-20th century (Pinto, 1938; 1944; 1978). The seminal work on the country's birds is that of Sick (1985; 1997), which provides detailed

historical, ecological, behavioral, and zoogeographic data on most of the species known to occur in Brazil at the time it was published.

Regional (state) avifaunal lists are also important tools for comparative studies of species richness, distribution, and conservation status within different parts of the country. These inventories and their products may be essential to the definition of effective public policies for the protection of natural resources on a local scale, that is: within minor political divisions. In Brazil, systematic inventories of regional avifaunas have now been conducted for 18 states (Carlos *et al.* 2010). Whereas this represents two-thirds of Brazil's 26 states, there was no standardization of approaches or methods, which has hampered comparative studies considerably (Carlos *et al.* 2010).

Bird diversity in Brazilian Amazonia

The diversity of birds in lowland Amazonia varies considerably among its different regions. In a review of the available data, Haffer (1987; 1990) demonstrated that local species richness tends to increase from east to west, following the same tendency recorded for other organisms, such as primates (Voss and Emmons 1996; Silva *et al.* 2005a) and plants (Gentry 1988). Some sites in western Amazonia, near the foothills of the Andes, may contain more than 500 species. Terborgh *et al.* (1984) recorded 526 species at Cocha Cashu in southeastern Peru, for example, whereas Parker *et al.* (1994) observed 575 species at Tambopata, also in southeastern Peru. In Brazil, Whittaker *et al.* (2002) recorded 548 species in the Alto Juruá Extractivist Reserve in Acre.

In central and eastern Amazonia, by contrast, the number of species does not exceed 450, even at the best-documented sites. Borges *et al.* (2001) recorded 445 species in the Jaú National Park in central Amazonia (in the Brazilian state of Amazonas), for example, whereas Valente (2006) registered only 367 species in the Ferreira Pena Scientific Station in Pará, eastern Amazonia. These differences appear to be determined mainly by variation in precipitation, topography, and environmental heterogeneity (Cohn-Haft *et al.* 1997; Rahbeck & Graves 2001).

Zoogeography of Amazonian birds

The distribution pattern of animals within a given region is related to local biotic and abiotic factors. This implies that the occurrence of a species within a given area is related to its capacity to adapt to the local climatic (e.g., temperature and humidity) and ecological conditions, such as the availability of habitats and feeding resources (Krebs 2001). Given their capacity to disperse and adapt, some species become widely distributed, whereas others, less adaptable, are restricted to much more limited geographic ranges (Stattersfield *et al.* 1998).

The principal factors that determine species distributions and the diversity of species within a given terrestrial environment, at different scales of analysis, include latitude, seasonality, temperature, precipitation, topography, the size and productivity of the area, geologic history, and the heterogeneity of habitats (Field *et al.* 2009; Hillebrand 2004; Rahbeck 2005; Hawkins *et al.* 2003; Rahbeck & Graves 2001). In general, the colonization of a given region by a species depends on the availability of ecological space and the lack of geographic barriers to dispersal. However, successful colonization by a species depends on its dispersal capacity, and its ability to compete for the resources available within the target area (Krebs, 2001).

In the Amazon basin, the hydrographic network appears to play an important role in the distribution patterns of many bird species (Sick 1967; Haffer 1992b). Most areas of endemism are delimited by the courses of major rivers, such as the Madeira, Tapajós, and Xingu (Cracraft 1985; Silva *et al.* 2005b). The allopatric distribution of sister taxa along opposite banks of the Amazon and other major rivers was first reported by the early explorers, such as Wallace (1852). Other authors, such as Snethlage (1910) concluded that, in addition to functioning as barriers to dispersion for some forest-dwelling birds, rivers also serve as corridors for the species that inhabit open savanna enclaves, using the riverbank vegetation to migrate. Based on results of a collecting trip conducted along the banks of the Madeira River, Hellmayr (1910) observed that some species only occurred on one side of the river, while in other cases, closely related taxa were found on opposite banks.

Despite the effectiveness of Amazonian rivers as zoogeographic barriers, it appears that the color of their water—which is related to their sediment loads—plays an important role in their biogeographic importance (Ayres & Clutton-Brock, 1992; Aleixo 2004). The rivers of the Amazon basin are classified according to their origin and the color of their water: rivers that originate in the Andes region carry large quantities of sediments, and are known locally as "whitewater" rivers, due to their light beige coloration; rivers that originate in the Guianan or Brazilian shields are classified as "blackwater" or "clear water" rivers, respectively, due the relative lack of sediments in the water (Junk 1983).

A number of studies have shown that some whitewater rivers are less effective barriers to gene flow between populations of vertebrates such as amphibians (Gascon *et al.* 2000) birds (Aleixo 2004, Fernandes *et al*. 2012), and mammals (Ayres & Clutton-Brock 1992; Patton *et al.* 1994; Silva *et al.* 2005a; Peres *et al.* 1996; Patton & Silva 1998) than are blackwater rivers. One explanation for this is that whitewater rivers are highly

meandrous—their courses change constantly, resulting in a mosaic of oxbow lakes and islands throughout the basin (Toivonem *et al.* 2007). This process favors the migration or passive dispersal of animals between margins (Ayres & Clutton-Brock 1992; Silva *et al.* 2005a; Haffer 2001). These whitewater rivers include the Purus and Juruá in the southwestern Amazon basin, which are two of the major right-bank tributaries of the Solimões (Amazon River). Whatever the color of their water, however, all the major rivers, such as the Amazon, Tapajós and Negro, tend to be less effective as barriers in their headwater reaches, where their margins are much closer together (Haffer 1992b; 2001; Hayes & Sewlal 2004).

A common distribution pattern in the Amazon basin is the occurrence of two or more closely related taxa within contact zones. These contact zones are often characterized by the parapatric distribution of sister taxa within a relatively narrow and well-defined area (Haffer 1987). Parapatric taxa occur in adjacent areas (Haffer 1992a), which are often delimited by physical or ecological barriers, although in some cases, there is contact, and even overlap between their geographic ranges (Haffer 1992a; 1997; Aleixo 2007). In some cases, these contact zones are characterized by intense interspecific competition (Haffer 1986; 1987; 1992a; Price, 2008). One of the direct consequences of this contact is the possibility of gene flow between neighboring populations, depending on the genetic similarity of the taxa involved, which may lead to hybridization (Haffer 1986; 1997; Price, 2008) and the formation of distinct hybrid zones (Haffer 1987). These zones are usually characterized by the coexistence of pure and hybrid individuals within the same areas (Aleixo 2007).

Contact zones may be either primary or secondary. Primary contact zones arise as a consequence of the differentiation of local populations in response to selection pressures associated with environmental gradients (Endler 1982), whereas secondary zones are the result of the re-encounter of previously isolated populations, which have differentiated under distinct ecological conditions (Haffer 1997). Haffer (1987, 1997) believed that all contact zones between Amazonian birds are secondary, resulting from the geographic expansion of sister taxa, which were previously isolated in forest refuges, as a consequence of global climate changes. In this case, the presence of contact zones may indicate the location of ancient ecological barriers, which have disappeared over time (Haffer 1987).

Ornithological research in the Brazilian state of Acre

Ornithological research in Acre only began in the 1950s, when two pioneering expeditions were undertaken in what was, at the time, still only a Brazilian territory rather than a state. The first of these took place in the eastern portion of the territory (Vanzolini, 1952; Pinto & Camargo, 1954), with the subsequent excursion exploring the western portion (Novaes, 1957; 1958).

Eastern Acre was visited firstly by the private collector José Hidasi, in 1968, and then in 1976 by Geraldo Pereira da Silva, an employee of the Evandro Chagas Institute in Belém. Records of some of the specimens collected during these expeditions can be found in the ornithological literature (Novaes 1978; Pierpont & Fitzpatrick 1983; Teixeira *et al.* 1994; Hidasi & Bankovics 1997; Sick 1997).

During the 1990s, a number of professional ornithologists visited western Acre, in particular the Serra do Divisor National Park and the Alto Juruá Extractivist Reserve. The occurrence of more than 500 local species of birds was recorded during these expeditions (Whittaker & Oren 1999; Whittaker *et al.* 2002).

In 2005, I began the research for my doctoral dissertation, which was entitled "Bird fauna of the Brazilian state of Acre: diversity, zoogeography, and conservation". This project included more than 20 expeditions to poorly-known or unexplored areas within the state. The results of this research were presented in my dissertation (Guilherme 2009) and have been published in a number of papers (Guilherme 2007; Guilherme & Santos 2009; Aleixo & Guilherme 2010; Guilherme & Borges 2011; Guilherme & Dantas 2011a).

During this same period, Dante Buzzetti carried out a detailed ornithological survey of the Chandless State Park (Buzzetti 2008), while Luiz Mestre and Gregory Thom studied the bird communities in areas affected by fire within the Chico Mendes Extractivist Reserve (Mestre *et al.* 2010a). The compilation of the data from all these studies and the description of the distribution patterns of the bird species in the Brazilian state of Acre constitute the principal theme of this paper.

MATERIAL AND METHODS

Study Area

The Brazilian state of Acre in located in the southwestern Amazon basin, bordering Bolivia and Peru to the south and west, and the Brazilian states of Amazonas and Rondônia to the north and east, respectively (Figure 1). The state covers a total area of 164,221.36 km², which corresponds to 4.26% of the area of Brazil's northern region, and 1.92% of the country as a whole (Governo do Acre 2012).

Most of the state is located within two adjacent hydrographic basins, that of the Purus River, in the eastern and central portions of the state, and the Juruá, in the west (Figure 2). All the watercourses of these two basins belong to the hydrographic basin of the Amazon

FIGURE 1. Location of the Brazilian state of Acre with respect to other neighboring national states and countries.

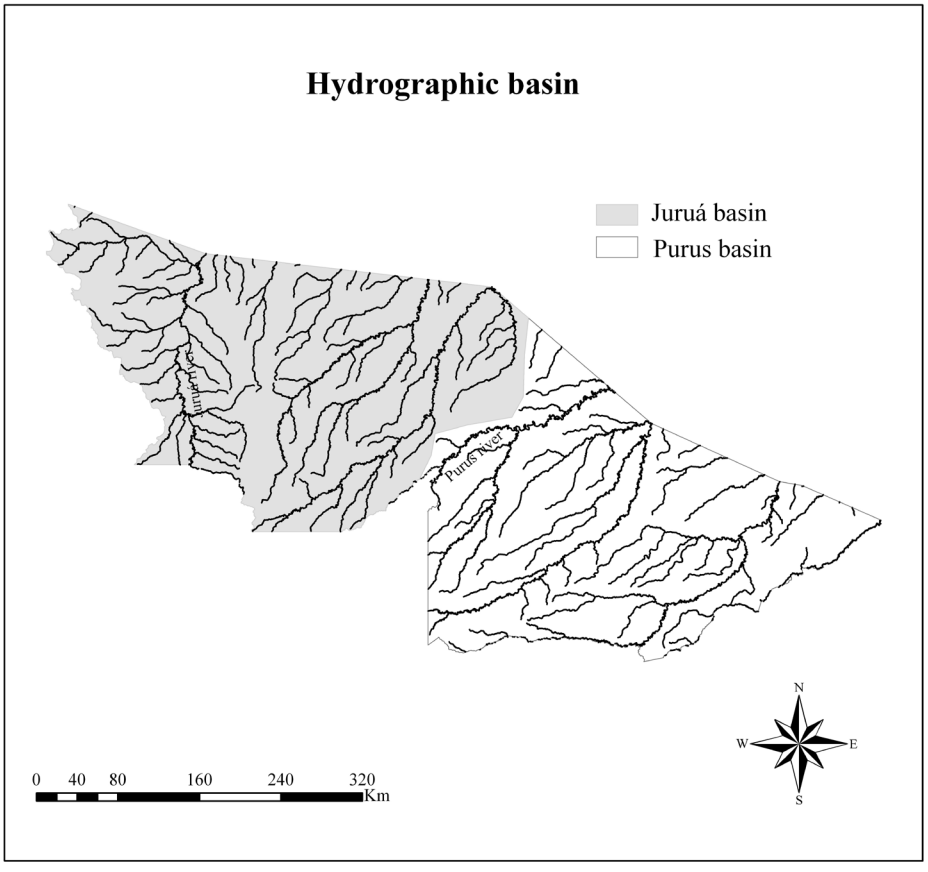

FIGURE 2. Location of the two main hydrographic basins within the Brazilian state of Acre, roughly corresponding to the western and eastern sub-regions of the state as adopted here.

River. The state's drainage system is well distributed, and is composed of meandering rivers with short straight channels that flow over sedimentary rocks mainly in a southwest to northeast direction.

The climate of Acre is hot and humid, with the relative humidity of the air ranging from 80% to 90%. As in other parts of the Amazon basin, there are two main climatic seasons – a dry season, from May to October, when precipitation decreases substantially, and a rainy season, from November to April, when rainfall is almost constant (Duarte & Marcarenhas 2007). Abrupt cold snaps are common during the dry season. This phenomenon is known locally as "friagem", and is the result of the movement of polar fronts, which are forced northwards by the Atlantic Polar Air Mass, which advances over the Chaco plain to western Amazonia (Acre 2000). Annual precipitation ranges from 1600 mm to 2750 mm, with the highest values being recorded in the west of the state, which is closer to the equator, and has suffered less habitat destruction, while the lowest rainfall levels occur in the eastern portion of the state, which is less preserved (Cunha & Duarte, 2005).

Three subtypes of climate can be found in the state, following Köppen's classification (Duarte 2007). In this scheme, the climate of the Juruá basin can be assigned to subtype *Af3*, in which the precipitation in the driest month is above 60 mm, and the annual total is between 2000 and 2500 mm (Cunha & Duarte, 2005; Duarte, 2007, 2008). The Purus basin climate is classified as *Am3*, in which annual precipitation is the same as *Af3*, but that of the driest month is lower, between 30 mm and 60 mm. The Acre River basin climate (subtype *Am4*) is even drier, with annual precipitation of 1500-2000 mm and mean rainfall in the driest month (June) of around 30 mm. The mean annual temperature of the state as a whole is approximately 24.5°C, with a maximum of around 32°C (Acre 2000).

The Ecological-Economic Zoning (EEZ) of the state of Acre (Acre 2000) defined three phyto-ecological regions – the dense rainforest, open rainforest, and the campinas-campinaranas (white-sand forest) domains. I have adopted this classification to identify the principal habitats occupied by the different bird species in the state (Appendix 1). The principal characteristics of these domains are as follows:

Dense Rainforest (hereafter DRF): This domain is characterized by large trees (20-50 m in height), lianas, and epiphytes. The distribution of this habitat within the state of Acre is related to that of tertiary and quaternary sediments in areas with annual precipitation above 2300 mm, and average temperatures of 22° to 23°C (IBGE 2005). These geomorphological and climatic conditions prevail primarily in the west of the state, where the climate is more humid (dry seasons are shorter) than the east. The diagnostic feature of this type of forest is a uniform canopy with emergent trees and sparse or absent undergrowth (Acre 2000). Depending on the edaphic conditions and topography, the region's DRFs can be subdivided into three distinct formations – alluvial, lowland, and submontane forests (IBGE, 2005).

Open Rainforest (hereafter ORF)*:* Like the dense rainforest, this type of forest is composed of medium to large trees, but with a predominance of shrubby trees and woody lianas (IBGE, 2005). This type of habitat is associated with areas of sedimentary rocks of Plio-Pleistocene origin in lowland Amazonia, which are characterized by undulating hills – the Solimões Formation – or hilly interfluvia (Acre 2000). The ORF habitats are found throughout most of Acre, on a variety of geomorphological units, but can be subdivided into two formations – lowland and alluvial – based on edaphic and topographic criteria (IBGE, 2005). These habitats can also be differentiated into a number of different forest types, based on the relative dominance of palms, bamboos and/or lianas (IBGE 2005; Acre 2000).

Campinas and Campinaranas: These habitats are found throughout the Amazon basin, where they grow on white sandy soils (Anderson 1981; IBGE 2005; Silveira 2003), which are extremely nutrient-poor and have a highly permeable subsoil (Jirka *et al.* 2007). Given these soil characteristics, campinaranas have a relatively thick layer of superficial roots when compared with other types of Amazonian vegetation (Jirka *et al.* 2007; Silveira 2003). The campinas are characterized by irregular, open vegetation, with undergrowth of reduced stature. These habitats are made up of relatively dense stands of small, thin trees, with few emergent trees (Silveira, 2003). In Acre, campinaranas are only found in the Juruá basin, mainly in the municipalities of Cruzeiro do Sul and Mâncio Lima. The habitats are normally found in areas drained by blackwater rivers, such as the Bagé and the Machadinho (Acre 2000). Silveira (2003) described four distinct types of white-sand vegetation in southwestern Amazonia – open shrubby campina, campina dominated by buriti (*Mauritia flexuosa*) palms, campina grasslands, and campinarana *sensu lato*. In addition to the campinaranas located along the border with the Brazilian state of Amazonas, a small area of this vegetation was sampled on the left bank of the Cruzeiro do Vale stream in the municipality of Porto Walter (Guilherme & Borges 2011).

Literature search

I derived a preliminary list of birds that occur in Acre from a systematic review of the available literature. The first step was to identify and compile all the available references to construct a database containing all the records of birds available for the state. For each record, I searched for the following information: 1) the precise location of the observation and/or specimen collection;

2) species and, when available, subspecies identification; 3) the observer(s) and/or collector(s) associated with the record; 4) the date of the record; and 5) when applicable, the institution in which the specimen(s) were deposited. I used these data to establish a spreadsheet in Microsoft Excel® in which each line represented a record and each column contained the different types of information listed above. The next step was to update the scientific nomenclature of many records, given that the names of some general, species and the status of some subspecies have changed during recent taxonomic reviews.

The references I used to compile the preliminary species list for the period between 1950 and 2005 were Pinto & Camargo (1954), Novaes (1957; 1958), Whittaker & Oren (1999), Guilherme (2001), Whittaker *et al.* (2002), and Rasmussen *et al.* (2005). The subsequent period (since 2005) is covered by my doctoral thesis (Guilherme 2009) and all subsequent publications (Guilherme & Santos 2009; Aleixo & Guilherme 2010; Guilherme & Dantas 2011a, Guilherme & Borges 2011, Mestre *et al.* 2010a).

Specimens deposited in natural history museums

Based on the references reporting on the ornithological expeditions conducted in Acre, I could trace the whereabouts of practically all bird specimens collected in the state. Collections holding bird specimens collected in Acre are the Museu Paraense Emílio Goeldi (MPEG), Museu de Zoologia da Universidade de São Paulo (MZUSP), Museu Nacional do Rio de Janeiro (MNRJ), Museu de Zoologia da Universidade Estadual de Campinas (ZUEC/UNICAMP), Louisiana State University Museum of Natural Sciences (LSUMZ), *Florida Museum of Natural* History (FMNH), and the American Museum of Natural History (AMNH). An additional 34 specimens are deposited in the private collection of Prof. José Hidasi (CPJH), in Goiânia, Goiás (Brazil).

The vast majority (ca. 85%) of the bird specimens collected in Acre have been deposited in the Dr. Fernando C. Novaes Collection of the Goeldi Museum in Belém, Brazil, and all of these specimens were examined during the present study. I obtained information on the specimens from all other museums directly from the curators responsible for each collection via electronic mail. Whenever a doubt arose with regard to the identification or locality of a specimen, I contacted the curator once again. In these cases, the queries were resolved either textually or by photographs.

Localities

I established a database for the cataloguing of all the localities in Acre for which at least one avian record is available, that is, at least one record in the literature or a specimen deposited in a museum. For records obtained prior to 1990, I traced localities and their respective coordinates in the Ornithological Gazetteer of Brazil (Paynter & Taylor 1991). For records obtained after 1991, locality information and coordinates were retrieved from the techni cal reports, scientific papers, and specimen labels. For the expeditions conducted by myself between 2005 and 2009 (Guilherme 2009), geographic coordinates were obtained directly in the field with a Garmin 72® GPS receiver.

Taxonomy and nomenclature

Here, I adopt the taxonomy and nomenclature of the Brazilian Checklist Committee (CBRO 2011). At the present time, this Committee recognizes a total of 1832 bird species in Brazil, representing 95 families distributed in 26 orders. The presence of a number of polytypic species represented by distinct, parapatrically-distributed subspecies was recorded in Acre. For the zoogeographic analyses, I treated all subspecies that could be diagnosed and were considered to be allopatric / parapatric as distinct taxa, following the recommendation of Aleixo (2007). Subspecific identification of species represented by more than one visibly diagnosable taxon in Acre was initially based on analyses of series of specimens deposited at MPEG. Confirmation of descriptions of these subspecies and their geographic distributions were obtained in Pinto (1978), Isler & Isler (1999), Restall *et al.* (2006), and del Hoyo *et al.* (1992, 1994, 1996, 1997, 1999, 2001, 2002, 2003, 2004, 2005, 2006).

Species status

I classified the bird species recorded during the present study as resident or migrant. I considered species to be resident if they breed within the limits of the state of Acre. I identified three groups of residents: native species (native to the Amazon basin), invaders (native to other South American biomes, and which only entered Acre following anthropogenic modifications of the environment), and introduced species (native to other continents).

I inferred a resident status based on gonad size of species represented by museum specimens as well data available in the literature. Some sources, such as Hilty & Brown (1986), Ridgely & Tudor (1994; 2009), Stotz *et al.* (1996), Sick (1997), Schulenberg *et al.* (2007), and the Handbook of the Birds of the World collection provide important information on the reproductive behavior of Amazonian species. Birds classified as migratory are those known to breed outside the Amazon basin. Based on the definition of Hayes (1995), three groups of migratory birds are found in Acre – Nearctic, intratropical, and austral migrants. The Nearctic migrants breed in North

America and migrate to South America during the boreal winter. Intratropical migrants breed in the tropics, in the present case, South America, but migrate regularly to other areas within the same continent (Jahn *et al.*, 2006; Hayes, 1995). This category includes only species that breed in other biomes – e.g., Cerrado, Pantanal, Chaco – and then migrate to the Amazon basin. The austral migrants are the species that breed in southern South America and then migrate northwards during the winter.

Zoogeography and identification of contact/ hybridization zones

I tested whether the Purus River represents an important barrier and is associated with a major biogeographic break in the distribution of resident forest birds in Acre by arbitrarily dividing the state into two portions (west and east of this river), and calculating the similarity in species composition between these areas. Because of their overall high dispersal capabilities, neither migratory species, nor those associated with aquatic habitats (Anatidae, Podicipedidae, Phalacrocoracidae, Anhingidae, Ardeidae, Ciconidae, Aramidae, Heliornithidae, Jacanidae, Sternidae, Rynchopidae, and Alcedinidae), were included in this analysis. I used Microsoft Excel® for the production and analysis of the matrix.

I based the identification of possible contact zones on the selection of all taxa assumed to 1) be sister or closely related species within a genus; or 2) represent subspecies grouped under the same polytypic species, that are parapatrically distributed within the state of Acre, i.e., represented by adjacent populations within a specific area (Haffer 1997; Aleixo 2007). I identified the contact zones using the approach of Haffer (1987, 1997), which first establishes a "core" region of the distribution of each taxon, and then the overall limits of its range. The horizontal or vertical position of the contact zone was defined according to the expansion of the distribution of each taxon, that is, with a north/south or east/west expansion of the geographic range (and vice versa). The general distribution of each taxon estimated based on Pinto (1978), Ridgely & Tudor (1994, 2009), InfoNatura (2007), Schulenberg *et al.* (2007), and the Handbook of the Birds of the World series.

If specimens were available from a purported contact zone, they were analyzed to determine whether or not hybrids could be found within the zone. A hybridization zone can be detected through the presence of hybrid specimens in close proximity to a contact zone. The identification of potential hybrid specimens was based on the visual inspection of plumage characteristics and other external morphological characters. However, it is important to note that any inferred hybrid status is tentative and can only be confirmed through complementary genetic studies.

Checklist compilation

The inventory of the bird species that occur in the Brazilian state of Acre was compiled based on the criteria proposed by Carlos *et al.* (2010), with the records being grouped in two distinct lists:

a) *The primary list:* all the species with confirmed occurrence via vouchered documentation (specimens, photos or audio recording) in the state of Acre;
b) *The secondary list:* species that are reported to occur in the state, but have not been confirmed through observations or specimens, as well as species known to occur in neighboring areas, which are assumed to occur ("probable occurrence") in Acre, based on their distribution pattern and ecological characteristics.

RESULTS

Species richness and composition

A total of 9550 bird records were compiled for the state of Acre. Of these, 4763 are specimens deposited in museums, more than half of which (51.5%, n = 2457) were collected during the past five years (Guilherme 2009). Overall, it was possible to confirm the occurrence of 667 species in the state (Appendix 1), of which 17 have two well-differentiated subspecies with an allopatric or parapatric local distribution (Tables 3 and 4). The five families with the highest number of species are the Thamnophilidae (61 species), Tyrannidae (61), Thraupidae (41), Accipitridae (29), and Furnariidae (26) which together account for 32.6% of the total number of species recorded in the state (Appendix 1). The non-passerines are represented by 300 species, and the passerines, by 367 species. In the case of the passerines, 247 species are sub-oscines (Tyranni), while the other 120 species are oscines (Passeri).

The occurrence of most (79.3%, n = 529) of the species recorded for Acre has been confirmed by the collection of voucher specimens (Appendix 1). The majority of these specimens (84.9%, n = 4045) are deposited at MPEG, and most of the others (11.7%, n = 558) at the MZUSP. The remaining specimens – approximately 3.5% – are found in other museums in Brazil and abroad (Appendix 1).

A total of 113 localities were compiled for the avian taxa of Acre (Guilherme 2009, Figure 3). At six of these sites, more than 300 species have been recorded (Figure 3).

In the case of 22 species, the data from Acre represent the only records for Brazil (Appendix 1). The secondary list (Appendix 2) was prepared based on the

unconfirmed records of occurrence (41 species) and the identification of the species of probable occurrence (n = 49) in the state. As *Hylophilus pectoralis* (Guilherme & Dantas 2011) and *Turdus nudigenis* (Aleixo & Guilherme 2010) were, respectively, misidentified and mistyped, they have been excluded from the list of birds of Acre presented here (Appendix 2). The cumulative number of species recorded in the state since the first publication in the 1950s until the end of this study is shown in Figure 4.

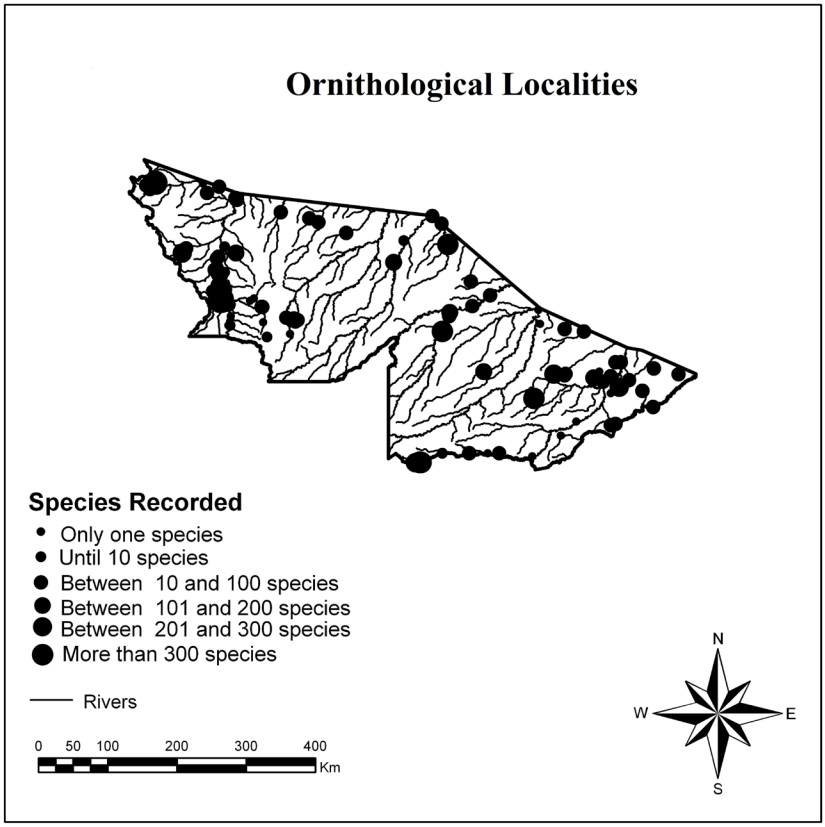

FIGURE 3. Localities where birds were collected and surveyed in the state of Acre between 1951 and 2011. Dot size corresponds to the number of species recorded at each locality as shown in the legend.

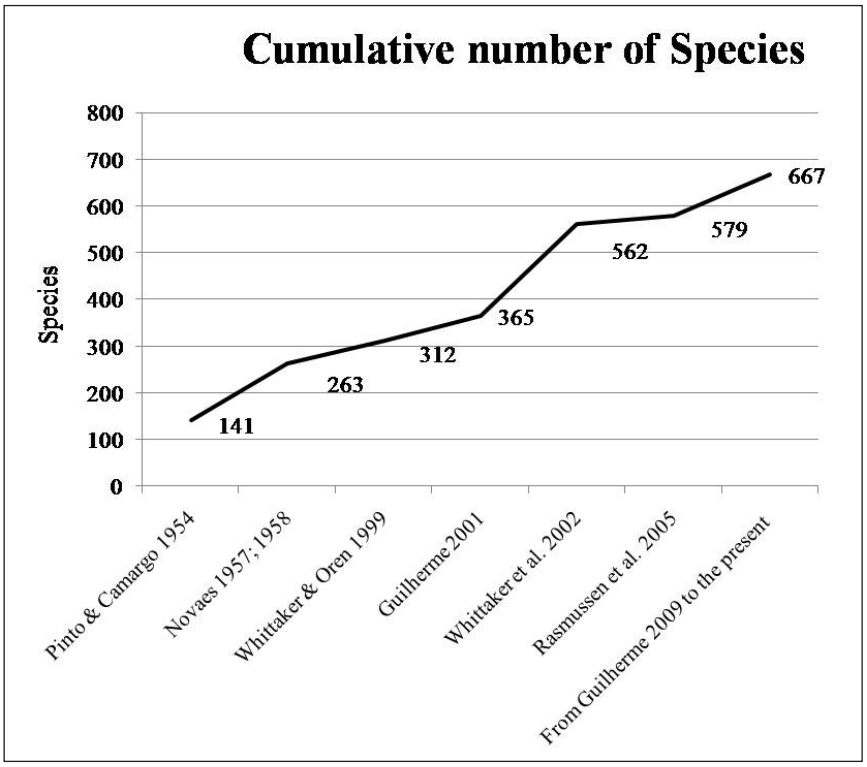

FIGURE 4. Cumulative number of bird species recorded in Acre between 1951 and 2011.

The vast majority of the 667 species recorded for the state – 602 (90,2%) – were classified as residents, whereas five (*Bubulcus ibis*, *Geranoaetus albicaudatus*, *Caracara plancus*, *Vanellus chilensis*, and *Athene cunicularia*) were considered to be invaders, and another five as introduced species (*Columba livia*, *Passer domesticus, Sicalis flaveola, Sporophila maximiliani*, and *Estrilda astrild*; Guilherme 2000, 2011). The last species has adapted well to the region (Silva 2004), and all introduced species now reproduce in the wild independently.

A total of 64 migratory species were identified, of which almost half 46.8% (n = 30) are Nearctic migrants, whereas 23.4% (n = 15) are considered to be intratropical migrants, and 29.6% (n = 19) austral migrants. Two species – *Phoenicoparrus jamesi* (Guilherme *et al.* 2005) and *Heliomaster furcifer* – were considered to be vagrants (Appendix 1).

Endemic species

Acre is located within the Inambari center of endemism (Haffer 1978; Cracraft 1985; Silva *et al.* 2005b). Of the 57 taxa listed as endemic to this center by Cracraft (1985) and the 45 listed by Haffer (1978), 41 were recorded in Acre (Appendix 1). The species *Odontophorus stellatus*, *Phaethornis phillipii*, *Pteroglossus beauharnaesii*, *Simoxenops ucayalae*, *Hemitriccus flammulatus*, and *Ramphotrigon fuscicauda* are not listed as endemic in Appendix 1 because subsequent studies (see del Hoyo 1994, 1999, 2002, 2003, 2004; Perlo 2009) have extended their known ranges beyond the limits of the Inambari center. However, four species were added to this list, including three more recently described taxa (*Nannopsittaca dachilleae*, *Thamnophilus divisorius* and *Cnipodectes superrufus*) and one (*Hypocnemis subflava*) that has been raised to full species status. Therefore, currently 41 Inambari endemic species are known to occur in Acre (Appendix 1).

Endangered species

None of the native species recorded in the present study is included in the Brazilian list of bird species threatened with extinction (Machado *et al.* 2008). On the other hand, *Sporophila maximiliani*, which was introduced into the state by bird fanciers, and is now found naturally in the wild, is the only species listed as endangered by Machado *et al.* (2008). However, the IUCN (*International Union for Conservation of Nature)* red list includes 10 species resident in Acre in the near threatened (NT) category – *Harpia harpyja*, *Morphnus guianensis*, *Primolius couloni*, *Nannopsittaca dachilleae*, *Formicarius rufifrons*, *Grallaria eludens*, *Synallaxis cherriei*, *Simoxenops ucayalae*, *Conothraupis speculigera*, and *Cacicus koepckeae*.

Habitats

Most (77.8%) of the bird species recorded in Acre are found in the dense or open *terra firme* rainforest, with palms and/or bamboo (Appendix 1). With the exception of a small proportion of species that are restricted to bamboo forest (Appendix 1), all other forest species recorded in Acre are associated with forests where palms are present. Approximately 12.9% of the recorded species are associated with aquatic environments, such as *várzea* swamp forest, riverbank habitats, creeks, reservoirs, lakes, and the sandy beaches formed by meandering rivers during the dry season (Appendix 1).

A small, but nevertheless important, proportion of the species (2.1%) is strictly associated with the vegetation that grows on sandy soils, that is, the campinas and campinaranas (Appendix 1). These habitats are located only in the extreme west of the state. Of all bird species associated with this type of habitat in Acre, at least nine (*Patagioenas speciosa*, *Polytmus theresiae, Dendrocolaptes certhia polyzonus*, *Formicivora grisea*, *Schiffornis amazona, Neopipo cinamomea, Xenopipo atronitens*, *Cnemotriccus fuscatus duidae*, and *Tachyphonus phoenicius*) can be considered to be restricted to these habitats, and at least a further twelve (*Crypturellus strigulosus*, *Topaza pyra*, *Frederickena unduligera, Heterocercus linteatus*, *Machaeropterus striolatus*, *Manacus manacus*, *Hemitriccus minimus*, *Hemitriccus griseipectus, Lophotriccus vitiosus, Poecilotriccus latirostris, Ramphotrigon ruficauda*, and *Attila citriniventris*) are partially restricted to them (Guilherme 2009, Guilherme & Borges, 2011, Guilherme & Aleixo, unpubl. data).

Distribution patterns

The majority (79%) of the 667 species of birds found in Acre occur in both of its sub-regions (separated by the Purus River), and hence throughout the state (Appendix 1). A further 16% were recorded only in the central-western sub-region of the state (west of the Purus), and 5% only in its eastern portion (east of the Purus). None of the species are restricted to the central portion of the state - the intermediate region between the Juruá and Purus rivers.

At least five pairs of purported sister taxa were identified with a distribution pattern consistent with classic allopatry (Table 1). In all these cases, one or other of each pair of taxa was found in different areas of the state, e.g., *Crypturellus undulatus undulatus/yapura* and *Lepidothrix coronata coronata/exquisita*.

A total of 15 sets of parapatric purported sister taxa were identified during this study, encompassing 30 taxa, 26 of which are currently treated as subspecies (Table 2). In most cases, one of the parapatric taxa is widely distributed in Acre, whereas the other has a more restricted range (Table 2, Figure 5).

TABLE 1. Sub-areas in the Brazilian state of Acre inhabited by allopatric pairs of diagnosable purported sister / closely related avian taxa. The Central-Eastern and Central-Western areas roughly correspond to the main river basins in the state and are separated by the Purus River.

Taxon	Central-Eastern	Central-Western
Crypturellus undulatus undulatus	X	
C. u. yapura		X
Threnetes leucurus cervinicauda		X
T. l. rufigastra	X	
Myrmothera campanisona minor		X
M. c. cf. modesta	X	
Cnemotriccus fuscatus duidae		X
C. f. cf. beniensis	X	
Lepidothrix coronata coronata		X
L. c. exquisita	X	

TABLE 2. Sub-areas in the Brazilian state of Acre inhabited by parapatric pairs of diagnosable purported sister / closely related avian taxa. The Central-Eastern and Central-Western areas roughly correspond to the main river basins in the state and are separated by the Purus River.

Taxon	Central-Eastern	Central-Western
*Rupornis magnirostris cf. magnirostris**	X	X
R. m. occiduus	X	
*Brotogeris cyanoptera cyanoptera**	X	X
B. c. beniensis	X	
*Thalurania furcata boliviana**	X	X
T. f. cf. jelskii		X
Momotus momota simplex	X	
*M. m. cf. nattereri**	X	X
Galbula dea amazonum	X	
G. d. phainopepla	X	
Capito auratus orosae		X
C. a. insperatus	X	X
Pteroglossus castanotis australis		X
*P. c. castanotis**	X	X
*Thamnophilus aethiops juruanus**	X	X
*T. a. kapouni**	X	X

Taxon	Central-Eastern	Central-Western
*Hypocnemis peruviana**	X	X
Hypocnemis subflava	X	
*Glyphorynchus spirurus castelnaudii**	X	X
G. s. albigularis	X	
Dendrocincla fuliginosa neglecta		X
*D. f. atrirostris**	X	X
*Dendrocolaptes certhia juruanus**	X	X
D. c. polyzonus		X
*Xiphorhynchus ocellatus**	X	X
Xiphorhynchus chunchotambo	X	
Pipra filicauda		X
*Pipra fasciicauda**	X	X
*Arremon taciturnus taciturnus**	X	X
Arremon t. cf. nigrirostris	X	

* Taxon with a wide distribution within the state

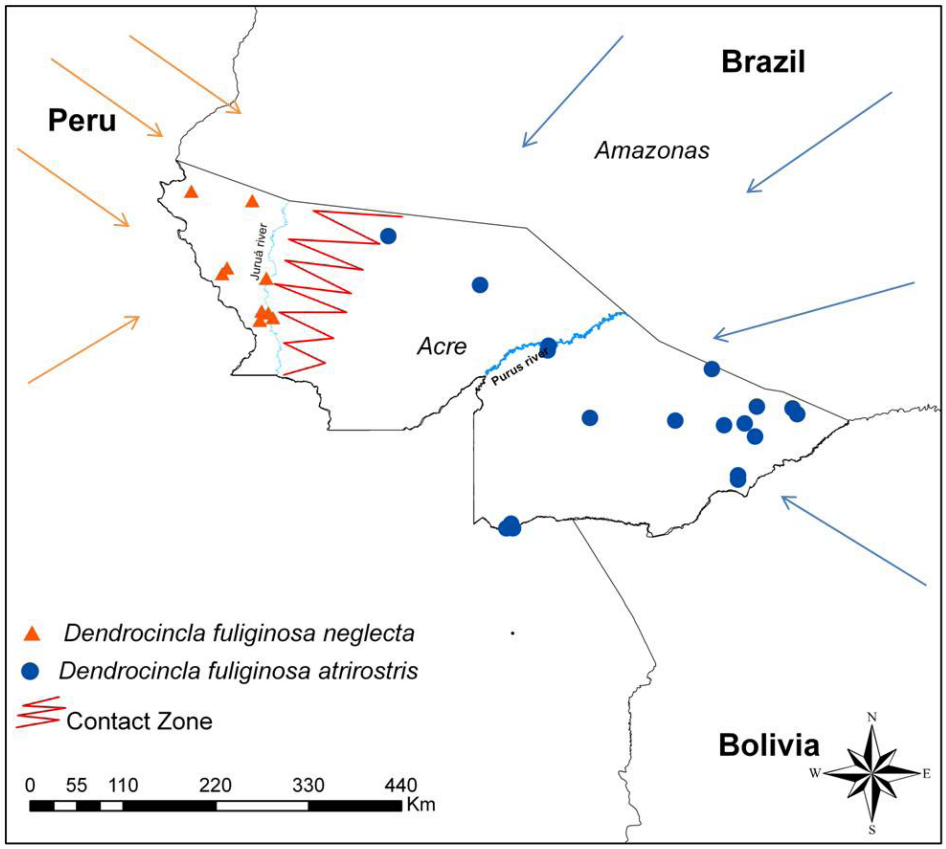

FIGURE 5. Geographic distribution of the parapatric taxa *Dendrocincla fuliginosa neglecta* and *D. f. atrirostris* in western Acre and the proposed zone of secondary contact (see text). The arrows point from the core to the periphery of the ranges of the respective taxa.

Contact and hybridization zones

Two contact zones were identified within the study area (Acre) based on the distribution of parapatric taxa (Table 2). I have denoted these zones as the (a) western contact zone and (b) eastern contact zone (Figures 5, 6, and 7). The western contact zone is based on the presence of the following sister taxa – *Pipra filicauda*/*P. fasciicauda* (Figure 6), *Dendrocincla fuliginosa neglecta*/*D. f. atrirostris* (Figure 5), and *Pteroglossus castanotis castanotis*/*P. c. australis* (Guilherme 2009). The eastern zone is defined by the occurrence of *Xiphorhynchus chunchotambo*/*ocellatus*, *Hypocnemis subflava*/*peruviana* (Figure 7), and *Glyphorhynchus spirurus castelnaudii*/*G. s. albigularis* (Guilherme 2009).

Two possible hybridization zones were identified within the study area, coinciding with the contact zones. The western hybridization zone is defined on the basis of the presence of specimens with intermediate characteristics between *Pteroglossus castanotis castanotis*/*P. c. australis* and *Dendrocolaptes certhia juruanus*/*D. c. polyzonus*, whereas the eastern zone is characterized by the presence of morphologically intermediate specimens between *Brotogeris cyanoptera cyanoptera*/*B. c. beniensis* and *Momotus momota* cf. *nattereri*/*M. m. simplex* (Guilherme 2009).

DISCUSSION

Bird diversity in Acre

The large number of bird species recorded in the Brazilian state of Acre further emphasizes the biological diversity of southwestern Amazonia (Haffer 1990). In fact, the number of species recorded for Acre – 667 – represents more than half of the total recorded for the whole of the Amazon basin (Marini & Garcia, 2005; Mittermeier *et al.* 2003), and if only the fauna of the southern basin (south of the Solimões/Amazon channel) is considered (Stotz *et al.* 1996), 74.4% of the species were recorded in Acre.

The avifauna of Acre is composed primarily of resident species, but also includes migrants and invaders. Five of the nine new species added to the list of Brazilian birds since 2005 were recorded in Acre (Guilherme *et al.* 2005, Guilherme & Aleixo 2008, Aleixo *et al.* 2008, Rego *et al.* 2009, Zimmer *et al.* 2010, CBRO 2011). Another species – *Cacicus koepckeae* – should also be added to this list, based on the recent record from the Chandless River (Buzetti 2008). Of the 1832 bird species known to occur in Brazil (CBRO, 2011), 22 have been recorded only in Acre (Appendix 1), which testifies to the singularity of this state. Acre is located entirely within the Inambari center of endemism, the largest such area in the lowlands of the southern Amazon basin (Silva *et al.* 2005b).

According to Cracraft (1985), the geographic ranges of the 57 bird taxa endemic to the southwestern Amazon basin define the limits of the Inambari center. Almost three quarters (73.6%) of these endemic taxa have been recorded in Acre, with four new species (all described since 1985) being added to the list subsequently (Appendix 1). Acre can be considered to be an excellent sample of the Inambari center, given that it covers only 12% of its area, but contains more that 70% of its endemic species. Given this, Acre is an excellent natural laboratory for the study of historic biogeography.

The migratory species were recorded in both of the geographic sub-regions (Appendix 1). However, some of the species arriving from south-central South America were only observed in eastern Acre (Appendix 1). Austral and intratropical migrants such as *Myiopagis viridicata*, *Tyrannus albogularis*, *Casiornis rufus*, and *Turdus amaurochalinus*, arrived in the state from the southeast (e.g., Bolivian Chaco), where they breed (Davis 1993; Jahn *et al.* 2002, Appendix 1). Some migratory species, in particular tyrannids, tend to occupy the forest edges, secondary vegetation, and open areas (Chesser 1997). As the forest cover of easternmost Acre has been extensively disturbed, the resulting open and regenerating habitats contribute to an increase in the probability of recording other forest edge species such as *Micrococcyx cinereus, Contopus cinereus*, and *Elaenia flavogaster* (Appendix 1). It seems likely that the occurrence of these species will also be confirmed for the central-western sub-region of the state as new surveys are carried out in these areas during the migration season.

A group of species, previously known only from the foothills of the Andes and lowlands in Peru and Bolivia, was recorded in the central eastern sub-region of Acre. For some species, such as *Picumnus subtilis*, *Xiphorhynchus chunchotambo*, and *Cacicus koepckeae*, these records do not represent either migrations or recent shifts in distribution, but rather, these species are residents that had simply not been recorded previously, due to the lack of surveys in the area adjacent to the borders with Peru and Bolivia. Other species, such as *Conothraupis speculigera* and *Pseudocolopteryx acutipennis* nevertheless appear to migrate from the Pacific slope and Andes to the lowlands of Amazonia.

Vagrancy also plays a role in the Acre avifauna. *Phoenicoparrus jamesi*, which is typical of the salt lakes of the Andean altiplano, was observed in Acre on a single occasion, and was considered to be an accidental visitor by Guilherme *et al.* (2005). The nearest record of this species is from the Manu National Park in southwestern Peru, at an altitude of 350 m asl, where it was also considered to be an vagrant (Walker *et al.* 2006), given that this lowland area is equally distant from the natural distribution of the species (del Hoyo *et al.* 1992). Another species considered to be a vagrant here is *Heliomaster*

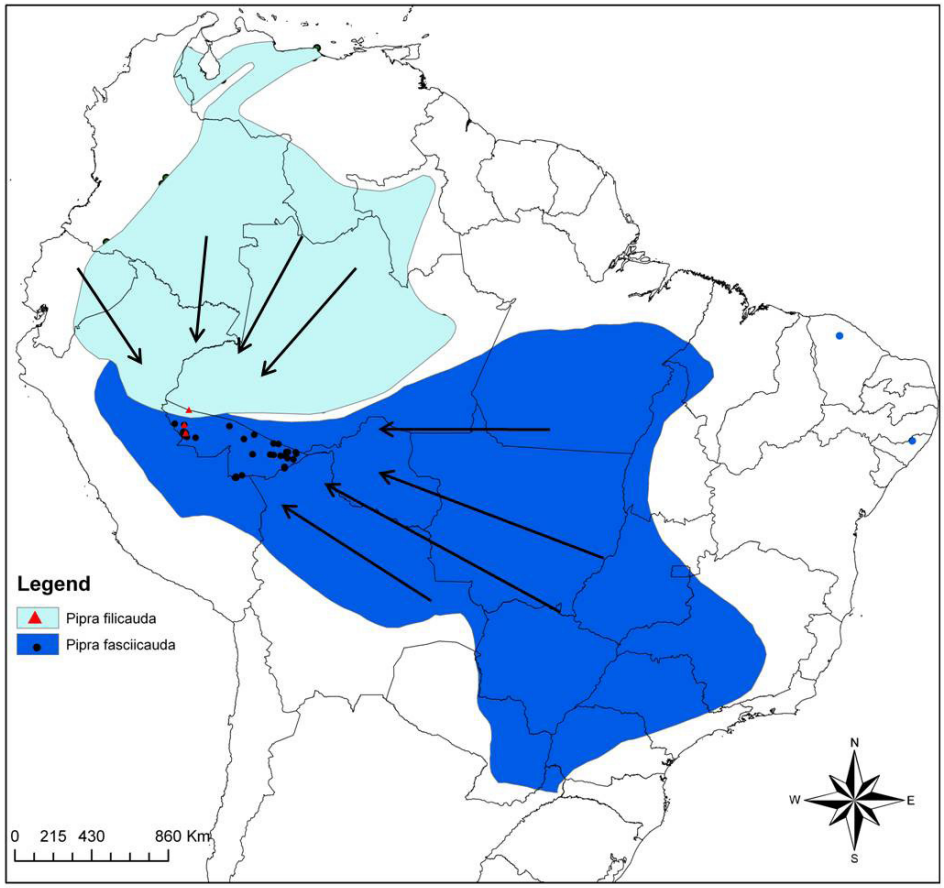

FIGURE 6. Geographic distributions of *Pipra filicauda* and *P. fasciicauda* according to Natureserve (2007). The arrows point from the core to the periphery of the ranges of the respective species. The red triangles and black dots indicate the parapatric occurrence, respectively, of *Pipra filicauda* and *P. fasciicauda* in western Acre.

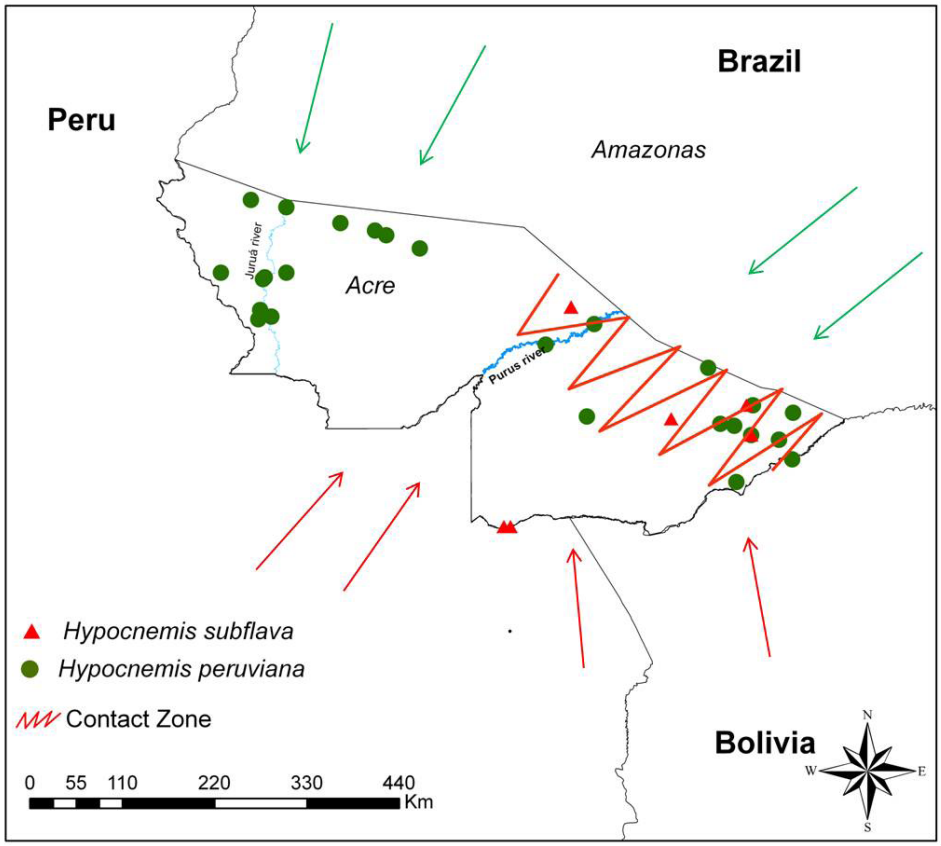

FIGURE 7. Geographic distribution of the parapatric species *Hypocnemis peruviana* and *H. subflava* in eastern Acre showing the estimated "secondary contact zone". The arrows point from the core to the periphery of the ranges of the respective species

furcifer. The only record of this species for Acre is a single specimen (ZUEC – 1565) deposited in the ornithological collection of zoology museum at UNICAMP (Appendix 1). This specimen was found dead on the *Campus* of the Federal University of Acre by herpetologist Adão José Cardoso, in February 1988. The species is considered to be a vagrant because its known range is restricted to southern central South America (del Hoyo *et al*. 1999). Whereas this species might be considered an austral or intratropical migrant, the date on which the specimen was found (during the austral summer) is inconsistent with this classification. Another possibility is that the species is resident in Acre, but is rare and occurs at a low density in the region. However, the lack of records from northern Bolivia, eastern Peru, and other parts of Acre, together with the single records available from Leticia (southeast Colombia) and Napo, in northeastern Ecuador (del Hoyo *et al*., 1999) reinforce the conclusion that the species is a sporadic vagrant in the Amazon basin.

Invasive species were concentrated primarily in the eastern extreme of the state, presumably due to its relatively high human population density and greater area of altered habitats. This part of Acre is connected to the neighboring state of Rondônia by a major highway along which many large cattle ranches occur, which explains why some species, such as *Geranoaetus albicaudatus, Caracara plancus, Vanellus chilensis*, and *Athene cunicularia*, began to colonize the state from the east, even though they have now reached its western portion, towards Cruzeiro do Sul, as well as areas in the southeast, in the direction of the towns of Brasiléia and Assis Brasil, on the border with Bolivia and Peru. A similar situation has arisen in the case of species that have escaped from captivity, such as *Estrilda astrild* (see Silva 2004), or that have been released into urban environments on purpose, such as *Sicalis flaveola* and *Passer domesticus* (Guilherme 2000, 2011). These species were first recorded in the state capital (Rio Branco), but have since colonized practically all the urban centers located along the main highways that cross the state.

Few regional ornithological studies are available that can be used for systematic comparisons with the inventory presented here, although similar studies have been conducted in the Brazilian state of Roraima and the Bolivian department of Pando. Roraima is the only Brazilian state localized within the Amazon basin which has had its avifauna surveyed systematically – including historical records – in recent years (Santos 2005; Naka *et al.* 2006). Santos (2005) and Naka et al (2006) recorded 741 bird species in Roraima, a total 10.3% higher than what I am reporting here for Acre. There are two main factors that may account for this difference. One is the fact that Roraima's area is almost a third (32%) larger than that of Acre, and the other is the fact that Roraima is a more heterogeneous region, with a number of types of habitat not found in Acre, such as dry and montane forests, tepuis, and savannas (Santos 2005; Naka *et al.* 2006).

By contrast, the species richness recorded here for Acre was 25.5% higher than that reported by Remsen and Traylor (1989) for Pando, in Bolivia, although there was a similarity of 91.6% between the species lists of the two territories, which is a result of their geographic and ecological similarities, including the same habitats and similar altitudes (Parker & Remsen 1997; Tobias & Seddon 2007). The larger number of species recorded for Acre may be related to sampling effort, but also the fact that this state is more than twice the size of its Bolivian counterpart (164,221 km^2 *vs* 61,331 km^2).

The number of bird species known to occur in Acre more than doubled over the past two decades, which reflects the increase in sampling effort during this period (Figure 4). However, whereas the number of species already recorded for the state is substantial, it seems likely that the species list will still grow over the next few years. This conclusion is partly supported by some of the species that have been recorded in neighboring areas, such as southwestern Amazonas and the lowlands of Peru and Bolivia, but have yet to be confirmed for Acre (Appendix 2).

Recent surveys in Acre have recorded a number of species that were previously known only for the Peruvian and Bolivian Amazon basin. The records of *Xiphorhynchus chunchotambo*, *Pachyramphus xanthogenys*, *Picumnus subtilis*, *Glyphorhynchus spirurus albigularis*, and *Poecilotriccus albifacies* presented here were the first for Brazil (Guilherme & Aleixo, 2008, Aleixo *et al*. 2008, Rego *et al*. 2009, Guilherme 2009, Zimmer *et al*. 2010). Some of these species were previously known only from the Peruvian and Bolivian Andean region at low to moderate elevations and have only recently been recorded in the adjacent lowlands of the Brazilian Amazon basin (Guilherme & Aleixo 2008, Aleixo *et al.* 2008, Rego *et al.* 2009, Aleixo & Guilherme 2010, Zimmer *et al.* 2010). One other example is *Chrysolampis mosquitus*, which was recorded from the upper Purus in 2007 (Guilherme & Dantas 2008, Guilherme & Dantas 2011a); previously, this species had been recorded two years earlier in Bolivia (Tobias & Seddon 2007).

Overall, the sum of the confirmed species (Appendix 1) with those of likely occurrence (Appendix 2) indicates a potential count of 757 bird species for the Brazilian state of Acre. If this prediction is confirmed even partially, Acre would have one of the richest avifaunas of any Brazilian state, despite its relative reduced area.

Zoogeography of birds in Acre

Acre resembles a butterfly wing in shape, with a constriction in the center of two rounded lobes (Figure 2), with its primary axis in an east-west orientation, rather than north-south. This means that the distribution

of local species is best understood in an east-west, rather than a north-south dimension, with the Purus River forming the principal division within the state. The Purus divides Acre into two main portions, an eastern portion on its right margin, and western portion to its left margin (Figure 2).

Of the resident forest taxa in Acre, almost 80% are widely distributed within the state, being found in both its eastern and western portions. Among other things, this reflects the mostly low-lying terrain (except in the western extreme) and relatively homogeneous habitats found throughout most of the state. This low species turnover would be expected in the absence of major physical barriers, such as rivers or mountains, capable of limiting the dispersal of most taxa. However, some taxa only occur in one of the state's two sub-regions, although this distribution pattern appears not related to the presence of the two main rivers that cross the state, the Purus and the Juruá. This may be primarily due to the fact that these highly meandering rivers arise in lowland Amazonia, and so, taxa can cross them often more easily than they would rivers whose headwaters are in unsuitable habitat (such as dry country or mountains). Genetic studies of primates (Peres *et al.* 1996), rodents (Patton *et al.* 1994; Patton and Silva 1998), birds (Aleixo 2004, Fernandes *et al*. 2012), and amphibians (Gascon *et al.* 1998) have all confirmed that the Juruá is an ineffective zoogeographic barrier for these groups.

Other factors may nevertheless influence the distribution of different taxa in southwestern Amazonia, including interspecific competition, edaphic conditions and habitat characteristics (Tuomisto *et al.* 1995, 2003; Daly & Silveira, 2002; Roig & Martini, 2002; Silveira *et al.* 2002). A closer examination of the geographic distribution of birds within one of the sub-regions (Appendix 1) reveals that the pattern observed in Acre is repeated on the Peruvian side of the border. Species such as *Phlegopsis erythroptera*, *Thamnomanes saturninus*, *Attila citriniventris*, *Pipra filicauda*, and *Dixiphia pipra* have also been recorded only in northeast Peru (Schulenberg *et al.* 2007). Similarly, *Poecilotriccus albifacies*, *Cnipodectes superrufus*, and *Micrococcyx cinereus*, which were only found in eastern Acre (Appendix 1), were also found only in adjacent southeastern Peru (Schulenberg *et al.* 2007).

A similar pattern has also been recorded for palms (Arecaceae) in Acre. Some species, such as *Wettinia augusta*, *Syagrus smithii*, *Socratea salazarii*, *Iriartella stenocarpa*, *Hyospathe elegans*, *Dyctyocaryum ptarianum*, *Bactris riparia*, and *Astrocaryum faranae*, are found only in the western sub-region of Acre (Lorenzi *et al.* 2004). Other species, such as *Astrocaryum aculeatum*, *Astrocaryum murumuru*, and *Bactris elegans* are restricted to the eastern part of the state (Lorenzi *et al.* 2004). Even though practically all these species of palm also occur in areas adjacent to Acre, their east-west distribution within the state is similar to that observed in some bird species (Appendix 1). Some of these palm species are also restricted to specific environments, such as plateaus, swamps, campinas, and campinaranas. This distribution pattern in Acre may be a reflection of the sedimentary history of the Marañon–Ucayali–Acre basin, to the west, and the Madre de Dios basin, to the east. In the western part of the state, relatively ancient formations (e.g., *Fm* Moa, Rio Azul, Divisor and Cruzeiro do Sul) were exposed by the uplift of the Andes, and contrast with the more recent Cenozoic formations in the east parts of the state, e.g., *Fm* Solimões and *Fm* Madre de Dios (Milani & Thomaz Filho, 2000, Campbell *et al*., 2006). In western Acre, the topography and variations in the composition of the soil have played an important role in the formation of distinct ecosystems, which may certainly help to explain the higher number of species of palms and birds (and probably others groups of organisms) restricted to western Acre (Lorenzi *et al.* 2004, Guilherme, 2009).

For most of the species restricted to one of the sub-regions, Acre and the adjacent lowlands of Peru represent the southwestern extreme of their distribution in the Amazon basin. Species such as *Thamnomanes saturninus*, *Pipra filicauda* (Figure 6), and *Dixiphia pipra* are widely distributed in northern Amazonia, ranging south as far as the southwestern extreme of the Amazon lowlands (Ridgely & Tudor, 2009). There are exceptions, however, such as *Thamnophilus divisorius*, which is endemic to western Acre and northeastern Peru. The distribution of this species is associated with an area of moderate altitude, the submontane forests of the Serra do Divisor range. Many of the taxa restricted to the eastern sub-region of Acre are associated with bamboo forests (e.g., *Picumnus subtilis*, *Cnipodectes superrufus*, and *Poecilotriccus albifacies*) or dense rainforest (e.g., *Lepidothrix coronata exquisita*). Eastern Acre encompasses the greatest concentration of these habitats than the western portion of the state. This suggests that habitat-related environmental gradients may play a more important role in the distribution of the species in eastern Acre than the mere presence of a physical barrier such as the Purus River. Other taxa restricted to eastern Acre, such as *Crypturellus undulatus undulatus, Antrostomus sericocaudatus*, and *Herpsilochmus rufimaginatus*, are more widely distributed in the Amazon basin, although this may represent the southwestern extreme of their distribution.

Allopatric/parapatric ranges

Whereas five pairs of purported sister taxa appear to have an allopatric distribution in Acre (Table 1), it seems likely that further ornithological surveys may confirm that these taxa are actually parapatric in the state, and that their apparent allopatric distribution is merely a sampling artifact. A common feature of the taxa considered to be

allopatric in this study is the presence of one of the two forms in each of the two sub-regions of the state (Table 1), which suggests that they are separated by the Purus, which may act as a physical barrier to dispersal. However, a closer examination of the taxa listed in Table 1 indicates that it is more likely that pairs such as *Crypturellus undulatus undulatus/yapura* may in fact be limited by competition. This conclusion is supported by the fact that these medium-sized birds are capable of flying across even the largest of Amazonian rivers (Remsen & Parker 1983; Ayres & Marigo 1995) and that they attract their mates primarily through their vocalizations (Sick, 1997).

However, *Lepidothrix coronata coronata* and *L. c. exquisita* are weak fliers, which tend to be restricted to the interior of the forest. In this specific case, the Purus and the floodplain (várzea forest) associated with it, which the species tends to avoid, may in fact function as a physical barrier to dispersal between the two populations. At the present time, *Lepidothrix c. coronata* is known only from the western sub-region (left margin of the Purus), whereas *L. c. exquisita* is thought to be restricted to the eastern sub-region (right margin).

Most of the species with two or more purported sister or closely related taxa in Acre have a parapatric distribution (Table 2), following a general distribution pattern within the state. This pattern is characterized by the wide distribution of one taxon (marked with an asterisk in Table 2) and a more restricted range for the other. There were two exceptions to this general pattern, however. In the case of *Thamnophilus aethiops juruanus* and *T.a. kapouni*, both subspecies were recorded in both the east and the west of the state, whereas both *Galbula dea amazonum* and *G. d. phainopepla* were only found in eastern Acre. This configuration may reflect the competition between these pairs of taxa within secondary contact zones (Haffer 1997; Price 2008).

It seems possible that the parapatric taxa with a restricted distribution within the state represent forms that have arrived recently from other regions within the Amazon basin (Haffer 1987; 1997). On arriving in a region, competition with the sister / closely related taxon likely restricts the distribution of the new arrival to a peripheral area of the range of its congener / conspecific taxon.

Contact zones

Two principal zones of "secondary contact" were identified on the basis of the distribution of the parapatric taxa within the state of Acre. One is a north-south contact zone (i.e., "vertical contact zone") located in the western part of the state (Figures 5 and 6) whereas the second was a east-west contact zone (i.e., "horizontal contact zone") in eastern Acre (Figure 7). The western contact zone is characterized by the meeting of replacement taxa, one of which is distributed northwards to the northern Solimões (Amazon) basin, whereas the other is distributed eastwards into the southern Amazon basin, as in the case of *Pipra filicauda/fasciicauda* (Haffer 1997, Figure 6), or even beyond the southern boundaries of Amazonia, such as with *Pteroglossus castanotis castanotis/australis* (Pinto 1978), and *Crypturellus undulatus undulatus/yapura* (del Hoyo *et al.* 1992; Pinto 1978). A similar situation is observed in the case of *Dendrocincla fuliginosa neglecta/atrirostris*, in which both forms are found only in the Amazon basin (del Hoyo *et al.* 2003).

A different pattern can be observed in the eastern contact zone, where one of the replacement taxa is widely distributed within the Amazon basin, whereas the other is restricted to the foothills of the Andes and neighboring lowland areas. Examples of this pattern include *Xiphorhynchus ocellatus/X. chunchotambo* (Guilherme & Aleixo 2008), *Hypocnemis peruviana/H. subflava* (Isler *et al.* 2007, Figure 7), and *Glyphorynchus s. castelnaudii/G. s. albigularis*.

Haffer (1997) identified two elongated zones of secondary contact in the southwestern Amazon basin, one adjacent to the right bank of the Solimões River and the other parallel to the first, but farther south, crossing the upper Juruá and middle Purus towards the eastern Amazon basin. The contact zone identified here in eastern Acre (Figure 7) is equivalent to the latter of these zones in Haffer's scheme. Whereas at least one of these contact zones was known to exist in Acre, it was necessary to identify which of the local taxa corroborated its occurrence, given that Haffer, in contrast with other regions of the Amazon basin, did not identify the taxa that supported the proposed contact zone in southwestern Amazonia. Whereas Haffer identified the taxa that configure the contact zones in the regions referred to as the Madeira/Tapajós interfluvium and the Teles Pires River on the upper Tapajós, the present study focused on the region of Brazilian Amazonia for which there were practically no recent ornithological data. Given this scenario, it was possible not only to confirm the existence of one of the contact zones in southwestern Amazonia, but also to provide support for the conclusion that these zones are not related functionally to the configuration of the principal rivers that drain the region, i.e., the Purus and Juruá (Haffer 1997).

Hybridization zones

The hybridization zones identified in the present study were characterized by the presence of inferred hybrid specimens, which supposedly resulted from gene flow between parapatric purported sister / closely related taxa (Haffer 1986, 1992a; Aleixo 2007; Price 2008). Two hybridization zones, corresponding to the contact zones, were identified in the two extremes (eastern and western) of the state.

The hybridization zone of eastern Acre is supported by the observation of transitional forms of the taxa *Brotogeris cyanoptera cyanoptera/beniensis* and *Momotus momota simplex/cf. nattereri*. The existence of the western zone was supported only by the taxa *Pteroglossus castanotis castanotis/australis.* In this case, the specimen MPEG 26747 from the upper Juruá, which was originally classified as *P. c. australis* by Novaes (1957), presents plumage traits and external morphology, such as the bill color and shape, that appear to be intermediate between *P. c. castanotis* and *P. c. australis*. In addition to these two taxa, it seems likely that other transitional forms may exist between *Dendrocolaptes certhia juruanus* and *polyzonus*, given that they both occur within the same region. As the present study did not include the most modern analytical techniques available (e.g., molecular genetics and vocalization analyses), the two principal hybridization zones identified here were considered to be "probable" rather than definitive. Obviously, the confirmation of the status of these zones will depend on the collection of more detailed data, derived from more extensive surveys using alternative scientific approaches.

Haffer (1987, p. 140) presented a map showing a wide hybridization zone that begins in the foothills of the Andes, in northeastern Peru, and extends as far as the Amazonian lowlands, crossing the upper Juruá in Acre, which corresponds exactly to the western hybridization zone identified in the present study. Even though Haffer (1987) did not provide information on the taxa supporting his southwestern Amazonian hybridization zone, the parapatric distribution of taxa such as *P. c. castanotis* and *P. c. australis,* and *Dendrocolaptes certhia juruanus* and *polyzonus* in western Acre provide some additional evidence for the existence of this hybridization zone.

Conservation

Acre is covered almost entirely by Amazonian rainforest (Acre 2000), although 11% of its original forest cover has been lost as a consequence of recent human activities in the region (Souza *et al.* 2006). Even so, Acre is still one of the least deforested of Brazilian Amazonian states (Fearnside 1993). One of the principal reasons for this has almost certainly been the creation and consolidation of a wide network of protected areas, which now covers almost half of the state's territory (Acre 2000).

The identification of taxa that only occur in habitats that are either under-represented or non-existent in the state's protected areas pointed clearly to two main gaps in its conservation coverage: the campinas and campinaranas of westermost Acre and the dense lowland rainforests of the extreme eastern portion of the state.

The campinas and campinaranas of western Acre must be protected not only because these habitats are not represented adequately in any of the state's protected areas, but primarily because some bird species are only found in these habitats (see Guilherme & Borges 2011). The creation of protected areas within the dense rainforest of easternmost Acre is strongly encouraged due to the presence of taxa associated specifically with this type of habitat, such as *Lepidothrix coronata exquisita*. Other taxa with similar distributions include *Brotogeris cyanoptera beniensis*, *Momotus momota simplex*, and *Hemitriccus minor*. These zoogeographic considerations are further emphasized by the fact that eastern Acre dense lowland rainforests are within the most densely-populated part of the state, which has suffered high deforestation rates (Acre 2000).

Priority areas for new ornithological surveys

Birds are considered to be the best known and most adequately sampled vertebrate group in the Amazon basin. Even so, many areas have yet to be explored by ornithologists, and represent gaps in our knowledge on the region's avifauna (Oren & Albuquerque 1991). In Acre, the areas with the best ornithological sampling to date are the Alto Juruá Extractivist Reserve and the Serra do Divisor National Park, located in the western part of the state, and the Rio Acre Ecological Station and Chandless National Park in the eastern sub-region. All other areas are either under-sampled, or have never been visited by ornithologists (Figure 3). The primary factor limiting the number of surveys is the logistical difficulties of visiting these remote areas, which can only be reached only by river or, in some cases, only by plane. The human population density of these areas is extremely low, and there is very little infrastructure.

Given the current situation, the following areas can be considered to be of the highest priority for future ornithological surveys in the Brazilian state of Acre:

Western sub-region

a) Enclaves of campina and campinarana in the municipalities of Cruzeiro do Sul, Mâncio Lima, Porto Walter, and Marechal Taumaturgo;
b) Interfluvium of the Liberdade-Gregório rivers;
c) Interfluvium of the Muru-Tarauacá rivers;
d) Interfluvium of the Envira-Purus rivers;

Eastern sub-region

a) Areas surrounding the town of Santa Rosa do Purus, on the Brazil-Peru border;
b) Interfluvium of the Caeté-Iaco rivers;
c) Dense rainforests of the municipalities of Senador Guiomard, Plácido de Castro, and Acrelândia.

ACKNOWLEDGMENTS

Over the past six years, I have dedicated much of my time to the compilation of the available data on the occurrence of bird species in the Brazilian state of Acre. None of my efforts would have been sufficient without the invaluable help and cooperation of the many institutions and people who were crucial to the success of this study. I am especially grateful to the following institutions – the Federal University of Acre (UFAC), the Goeldi Museum (MPEG), the Brazilian National Research Council (CNPq), and Conservation International–Belém. I am also eternally grateful to the many scientists, curators, technicians, friends, and field assistants who made this study possible. In particular, I would like to thank my doctoral advisor, Dr. José Maria Cardoso da Silva, and Dr. Alexandre Aleixo who provided me with essential logistic support. I am also grateful to the ornithological colleagues whose friendship and enthusiasm for the Amazon prompted them to participate in my expeditions to the campinas of the upper Juruá (Dr. Sérgio Henrique Borges), the bamboo forests of eastern Acre (Dr. Marcos Pérsio Dantas Santos), and the upper Purus river (Sidnei de Melo Dantas). In addition, I would like to thank the Goeldi Museum taxidermists Manoel Santa Brígida and José Nilton Santa Brígida, and the assistant curator, Fátima Lima, for their support and patience. CNPq provided me with important financial resource through a fellowship (2005-2009) and grant 474592/2010-3 (2010-2012). Thomas S. Schulenberg and Daniel F. Lane refereed this manuscript and provided useful comments. Finally, I am grateful to all those people who contributed directly or indirectly to the success of this project.

REFERENCES

Ab'Saber, A. N. 1986. Geomorfologia da região de Carajás. In: J. M. G. Almeida (Ed.), *Carajás: Desafio político, ecologia e desenvolvimento*: 88-124: Editora Brasiliense.

Acre. 2000. *Governo do Estado do Acre. Programa Estadual de Zoneamento Ecológico-Econômico do Estado do Acre – ZEE – Documento Final.* Volume 1. SECTAMA. Rio Branco, Acre, Brasil.

Aleixo, A. 2004. Historical diversification of a terra-firme forest bird superspecies: a phylogeographic perspective on the role of different hypotheses of Amazonian diversification. *Evolution*, 58(6): 1303-1317.

Aleixo, A. 2007. Conceito de espécies e o eterno conflito entre continuidade e operacionalidade: uma proposta de normatização de critérios para o reconhecimento de espécies pelo comitê Brasileiro de Registros Ornitológicos. *Revista Brasileira de Ornitologia*, 15(2): 297-310.

Aleixo A. & Guilherme, E. 2010. Avifauna da Estação Ecológica do Rio Acre, estado do Acre, na fronteira Brasil/Peru: composição, distribuição ecológica e registros relevantes. *Boletim do Museu Paraense Emílio Goeldi. Ciências Naturais,* 5(3):279-309.

Aleixo, A.; Guilherme, E. & Zimmer, K. J. 2008. First records of Yellow-cheeked Becard *Pachyramphus xanthogenys* for Brazil, with comments on the validity of *P. x. peruanus*. *Bulletin of the British Ornithological Club,* 128(4): 263-267.

Alvarez-Alonso, J. & Whitney, B. M. 2003. New distributional records of birds from white-sand forests of the northern Peruvian Amazon, whit implications for biogeography of northern South America. *The Condor*, 105: 552-566.

Anderson, A. B. 1981. White-sand vegetation of Brazilian Amazônia. *Biotropica*, 13(3): 199-210.

Ayres, J. M. & Clutton-Brock, T. H. 1992. River boundaries and species range size in Amazonian Primates. *The American Naturalist*, 140(3): 531-537.

Ayres, J. M. & Marigo, L. C. 1995. Nota sobre o comportamento de um indivíduo de *Crypturellus undulatus* durante a enchente no baixo rio Japurá, Amazonas, Brasil. (Tinamiformes: Tinamidae). *Ararajuba*, 3: 70.

Bates, J. M.; Hackett, S. J. & Goerck, J. M. 1999. High levels of mitochondrial DNA differentiation in two lineages of Antbirds (*Drymophila* and *Hypocnemis*). *The Auk*, 116(4):1093-1106.

Borges, S. H.; Cohn-Haft, M.; Carvalhaes, A. M. P.; Henriques, L. M.; Pacheco, J. F. & Whittaker, A. 2001. Birds of Jaú National Park, Brazilian Amazon: Species Check-list, Biogeography and Conservation. *Ornitologia Neotropical,* 12:109-140.

Buzzetti, D. 2008. *Plano de Manejo do Parque Estadual Chandless. Avaliação Ecológica Rápida. Relatório do Grupo Aves*. SOS Amazônia, Secretaria de Estado do Meio Ambiente e Recursos Naturais do estado do Acre- SEMA-AC.

Campbell, K. E., Frailey, C. D. & Romero-Pittman, L. 2006 The Pan-Amazonian Ucayali Peneplain, late Neogene sedimentation in Amazonia, and the birth of the modern Amazon River system. *Palaeogeography, Palaeoclimate, Palaeoecology*, 239, 166–219.

Capparella, A. P. 1988. Genetic variation in Neotropical birds: Implications for the speciation process. Acta XIX Congressus Internationalis Ornithologici, Ottawa, Ontario.

Carlos, C. J.; Straube, F. C. & Pacheco, J. F. 2010. Conceitos e definições sobre documentação de registros ornitológicos e critérios para elaboração de listas de aves para os estados brasileiros. *Revista Brasileira de Ornitologia*, 18(4): 355-361.

CBRO. 2011. Comitê Brasileiro de Registros Ornitológicos. *Lista das aves do Brasil,* 10ª Edição. Available in: <www.cbro.org.br/CBRO/listabr.htm>. Accessed 24 January 2012..

Chesser, R. T. 1997. Patterns of seasonal and geographical distribution of austral migrant flycatchers (Tyrannidae) in Bolivia. *Ornithological Monographs,* 48:171-204.

Cohn-Haft, M.; Whittaker, A. & Stouffer, C. 1997. A new look at the "species-poor" central Amazon: the avifauna north of Manaus, Brazil. *Ornithological Monographs,* 48:205-235.

Cracraft, J. 1985. Historical biogeography and patterns of differentiation within the South American avifauna: areas of endemism. *Ornithological Monographs,* 36:49-84.

Cunha, R. M. & Duarte, A. F. 2005. Diferenças na climatologia das chuvas entre as regiões leste e oeste do Estado do Acre. II Congresso de Estudantes e Bolsistas do Experimento LBA, Manaus - AM.

Daly, D. C. & Silveira, M. 2002. Aspectos Florísticos da Bacia do Alto Juruá: História da Botânica, peculiaridades, afinidades e importância para a conservação. In: M. C. Cunha e M. B. Almeida (Orgs.), *Enciclopédia da Floresta: O Alto Juruá: Práticas e Conhecimentos das Populações*: 53-63. São Paulo - SP: Companhia das Letras.

Davis, S. E. 1993. Seasonal status, relative abundance, and behavior of the birds of Concepción, Departamento Santa Cruz, Bolivia. *Fieldiana Zoology*, 71:1-33.

Duarte, A. F. 2007. *Hidrometria no Acre: Clima medições e informações meteorológicas*. Vol. 1. EDUFAC. Rio Branco, AC.

Duarte, A. F. 2008. As chuvas, as queimadas e a fumaça da seca de 2008 no Acre. Universidade Federal do Acre - Grupo de Estudos e Serviços Ambientais. . Available in: <http://www.acrebioclima.pro.br/>. Accessed in: 11/03/2012.

Duarte, A. F. & Marcarenhas, M. D. M. 2007. Manifestações do bioclima do Acre sobre a saúde humana no contexto socioeconômico da Amazônia. *Amazônia: Ciência e Desenvolvimento*, 3(5): 149-162.

Endler, J. 1982. Pleistocene forest refuges: fact or fancy? In: G. T. Prance (Ed.), *Biological Diversification in the Tropics*: 179-200. New York: Columbia University Press.

Fearnside, P. M. 1993. Deforestation in Brazilian Amazonia: the effect of population and land tenure. *AMBIO*, 22(8):537-545.

Fernandes, A. M., Wink, M. & Aleixo, A. 2012. Phylogeography of the chestnut-tailed antbird (*Myrmeciza hemimelaena*) clarifies the role of rivers in Amazonian biogeography. Journal of Biogeography, doi: 10.1111/j.1365-2699.2012.02712.x.

Field, R.; Hawkins, B. A.; Cornell, H. V.; Currie, D. J.; Diniz-Filho, J. A. F.; Guégan, J.-F.; Kaufman, D. M.; Kerr, J. T.; Mittelbach, G. C.; Oberdorff, T.; O´Brien, E. M. & Turner, J. R. G. 2009. Spatial species-richness gradients across scales: a meta-analysis. *Journal of Biogeography*, 36:132-147.

Forrester, B. C. 1993. *Birding Brazil – A check-list and site guide:* 1-251. Irvane: John Geddes, Scotland.

Gascon, C.; Lougheed, S. C. & Bogart, J. P. 1998. Patterns of genetic population differentiation in four species of Amazonian frogs: A test of the riverine barrier hypothesis. *Biotropica*, 30(1):104-119.

Gascon, C.; Malcolm, J. R.; Patton, J. L.; Silva, M. N. F.; Bogart, J. P.; Lougheed, S. C.; Peres, C. A.; Neckel, S. & Boag, P. T. 2000. Riverine barriers and the geographic distribution of Amazonian species. *PNAS*, 97(25):13672-13677.

Gentry, A. H. 1988. Tree species richness of upper Amazonian forests. *Proc. Natl. Acad. Sci.*, 85: 156-159.

Governo do Acre 2012. Portal de Informações do Estado do Acre. *Site* oficial do Governo do Estado do Acre. Available in: <http://www.ac.gov.br/>. Accessed in: 12/01/2012.

Guilherme, E. 2000. On the arrival of the House sparrow (*Passer domesticus*) in Southwestern Amazon. *Melopsittacus*, 3(4): 171-172.

Guilherme, E. 2001. Comunidade de Aves do *Campus* e Parque Zoobotânico da Universidade Federal do Acre, Brasil. *Tangara,* 1(2):57-73.

Guilherme, E. 2004. Levantamento Ornitológico em Assis Brasil, Estado do Acre, na fronteira tri-nacional, Brasil, Peru e Bolívia. XII Congresso Brasileiro de Ornitologia, Blumenau - SC.

Guilherme, E. 2007. Levantamento preliminar da avifauna do complexo de florestas públicas estaduais do Mogno e dos rios Liberdade e Gregório, município de Tarauacá, estado do Acre, como subsídio para elaboração de seus planos de manejo. *Atualidades Ornitológicas,* 136:1-8.

Guilherme, E. 2009. *Avifauna do Estado do Acre: Composição, Distribuição Geográfica e Conservação:* 1-729. Tese de Doutorado. Universidade Federal do Pará/Museu Paraense Emílio Goeldi. Belém, Pará, Brasil.

Guilherme, E. 2011. Sobre a ocorrência do canário-da-terra-verdadeiro (*Sicalis flaveola:* Passeriformes, Emberizidae) na Amazônia Sul-Ocidental. *Atualidades Ornitológicas*, 163: 2-23**.**

Guilherme, E. & Aleixo, A. 2008. Primeiros registros de *Xiphorhynchus chunchotambo* (Tschudi, 1884) (Dendrocolaptidae) no Brasil. *Revista Brasileira de Ornitologia,* 16(1):44-46.

Guilherme, E. & Aleixo, A. 2011. Estação Ecológica do Rio Acre. In: R. M. Valente, J. M. C. Silva, F. C. Straube, e J. L. X. Nascimento (Orgs.). *Conservação de Aves Migratórias Neárticas no Brasil.* 104-106. Conservação Internacional, Belém, Pará.

Guilherme, E. & Borges, S. H. 2011. Ornithological records from a campina/campinarana enclave on the upper Juruá river, Acre, Brazil. *The Wilson Journal of Ornithology*, 123(1):24-32.

Guilherme, E. & Dantas, S. M. 2008. First record of Ruby Topaz *Chrysolampis mosquitus* in Acre, Brazil. *Cotinga,* 30:84-85.

Guilherme, E. & Dantas, S. M. 2011a. Avifauna of the upper Purus river, State of Acre, Brazil. *Revista Brasileira de Ornitologia 19(2*): 185-199.

Guilherme, E. & Dantas, S. M. 2011b. Alto rio Purus, foz do rio Chandless. In: R. M. Valente, J. M. C. Silva, F. C. Straube, e J. L. X. Nascimento (Orgs.). *Conservação de Aves Migratórias Neárticas no Brasil.*100-103. Conservação Internacional, Belém, Pará.

Guilherme, E. & Santos, M. P. D. 2009. Birds associated with bamboo forests in eastern Acre, Brazil. *Bulletin of the British Ornithological Club,* 129(4):229-240.

Guilherme, E.; Aleixo, A.; Guimarães, J. O.; Dias, P. R. F.; Amaral, P. P.; Zamora, L. M. & Souza, M. S. 2005. Primeiro registro de *Phoenicoparrus jamesi* (Aves, Phoenicopteriformes) para o Brasil. *Revista Brasileira de Ornitologia*, 13(2): 212-214.

Guilherme, E.; Nobre, H. R. & Gonzaga, L. P. 2003. The first record of the avian near-obligate bamboo specialist dusky-tailed flatbill (*Ramphotrigon fuscicauda*) in the eastern Acre State, Brazil. *Lundiana*, 4(2): 157-159.

Haffer, J. 1969. Speciation in Amazonian forest birds. *Science*, 165(3889): 131-137.

Haffer, J. 1978. Distribution of Amazon forest birds. *Bonner Zoologische Beiträge,* 29:38-78.

Haffer, J. 1986. Superspecies and species limits in vertebrates. *Z. Zool. Syst.-Forsch.*, 24: 169-190.

Haffer, J. 1987. Biogeography of Neotropical birds. In: T. C. Whitmore e G. T. Prance (Eds.), *Biogeography and quaternary history in tropical America*: 105-150. Oxford: Clarendon Press.

Haffer, J. 1990. Avian species richness in tropical South America. *Studies on the_Neotropical Fauna and Environment*, 25(3): 157-183.

Haffer, J. 1992a. Parapatric species of birds. *Bulletin of the British Ornithological*, 112(4): 250-264.

Haffer, J. 1992b. On the "river effect" in some forest birds of southern Amazonia. *Boletim do Museu Paraense Emílio Goeldi, Série Zoologia*, 8(1): 217-245.

Haffer, J. 1997. Contact zones between birds of southern Amazonia. *Ornithological Monographs*, 48: 281-305.

Haffer, J. 2001. Hypotheses to explain the origin of species in Amazonia. In: I. C. G. Vieira, J. M. C. Silva, D. C. Oren e M. A. D'Inacio (Eds.), *Diversidade Biológica e Cultural da Amazônia*: 45-118. Belém: Museu Paraense Emílio Goeldi.

Haffer, J. & Prance, G. T. 2002. Impulsos climáticos da evolução na Amazônia durante o Cenozóico: sobre a teoria dos Refúgios da diferenciação biótica. *Estudos Avançados*, 16(46): 175-206.

Hawkins, B. A.; Porter, E. E. & Diniz-Filho, J. A. F. 2003. Productivity and history as predictors of the latitudinal diversity gradient of terrestrial birds. *Ecology*, 84: 1608-1663.

Hayes, F. E. 1995. Definitions for migrant birds: What is a Neotropical Migrant? *The Auk*, 112(2): 521-523.

Hayes, F. E. & Sewlal, J. A. N. 2004. The Amazon river as a dispersal barrier to passerine birds: effects of river width, habitat and taxonomy. *Journal of Biogeography*, 31: 1809-1818.

Hellmayr, C. H. (1910). The birds of the rio Madeira. *Novitates Zool.*, 17: 257-428.

Hidasi, J. & Bankovics, A. 1997. The Family Pipridae (Aves) in the Ornithological Museum Goiania, Brasil. *Miscnea Zool. Hung.*, 11: 95-99.

Hillebrand, H. 2004. On the generality of the latitudinal diversity gradient. *The American Naturalist*, 163: 192-211.

Hilty, S. L. & Brown, W. L. 1986. *A Guide To The Birds of Colombia*. New Jersey, EUA: Princeton University Press.

Del Hoyo, J., Elliott, A. & Sargatal, J. (eds.).1992. *Handbook of the birds of the world. Vol. 1. Ostrich to Ducks*. Barcelona, Spain: Lynx Edicions.

Del Hoyo, J. Elliott, A. & Sargatal, J. (eds.). 1994. *Handbook of the birds of the world. Vol. 2. New world Vultures to Guineafowl.* Barcelona, Spain: Lynx Edicions.

Del Hoyo, J., Elliott, A. & Sargatal, J. (eds.). 1996. *Handbook of the birds of the world. Vol. 3. Hoatzin to Auks.* Barcelona, Spain: Lynx Edicions.

Del Hoyo, J., Elliott, A. & Sargatal, J. (eds.). 1997. *Handbook of the birds of the world. Vol. 4. Sandgrouse to Cuckoos*. Barcelona, Spain: Lynx Edicions.

Del Hoyo, J., Elliott, A. & Sargatal, J. (eds.). 1999. *Handbook of the birds of the world. Vol. 5. Barn-owls to Hummingbirds*. Barcelona, Spain: Lynx Edicions.

Del Hoyo, J., Elliott, A. & Sargatal, J. (eds.). 2001. *Handbook of the birds of the world. Vol. 6. Mousebirds to Hornbills*. Barcelona, Spain: Lynx Edicions.

Del Hoyo, J., Elliott, A. & Sargatal, J. (eds.). 2002. *Handbook of the birds of the world. Vol. 7. Jacamars to Woodpeckers*. Barcelona, Spain: Lynx Edicions.

Del Hoyo, J., Elliott, A. & Sargatal, J. (eds.). 2003. *Handbook of the birds of the world. Vol. 8. Broadbills to Tapaculos*. Barcelona, Spain: Lynx Edicions.

Del Hoyo, J., Elliott, A. & Christie, D. A. (eds.). 2004. *Handbook of the birds of the world. Vol. 9. Cotingas to Pipits and Wagtails*. Barcelona, Spain: Lynx Edicions.

Del Hoyo, J., Elliott, A. & Christie, D. A. (eds). 2005. *Handbook of the birds of the world. Vol. 10. Cuckoo-Shrikes to Thrushes.* . Barcelona, Spain: Lynx Edicions.

Del Hoyo, J., Elliott, A. & Christie, D. A. (eds). 2006. *Handbook of the birds of the world. Vol. 11. Old World Flycatchers to Old World Warblers.* Barcelona, Spain: Lynx Edicions.

IBGE. 2005. *Potencial Florestal do Estado do Acre - Relatório Técnico*: 1-42. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística.

InfoNatura. 2007. Animals and Ecosystems of Latin America. Version 5.0. Arlington, Virginia (USA): NatureServe. . Available in: http://www.natureserve.org/infonatura - Accessed 10 January 2012.

Isler, M. L.; Alvarez-Alonso, J.; Isler, P. R.; Valqui, T.; Begazo, A. & Whitney, B. M. 2002. Rediscovery of a crytic species and description of a new subsecies in the *Myrmeciza hemimelaena* complex (Thamnophilidae) of the neotropics. *The Auk,* 119(2): 362

Isler, M. L.; Isler, P. R. & Whitney, B. M. (2007). Species limits in Antbirds (Thamnophilidae): the Warbling Antbird (*Hypocnemis cantator*) complex. *The Auk,* 124(1): 11-28.

Jahn, A. E.; Davis, S. E. & Zankys, A. M. S. 2002. Patrones en la migración austral de aves entre temporadas y hábitats en el Chaco boliviano, con notas de observaciones y una lista de espécies. *Ecología en Bolívia*, 37(2): 31-50.

Jirka, S.; McDonald, A. J.; Johnson, M. S.; Feldpausch, T. R.; Couto, E. G. & Riha, S. J. 2007. Relationships between soil hydrology and forest structure and composition in the southern brazilian Amazon. *Journal of Vegetation Science*, 18: 183-194.

Junk, W. J. 1983. As águas da Região Amazônica. In: E. Salati, W. J. Junk, H. O. R. Shubart e A. E. Oliveira (Eds.), *Amazônia: desenvolvimento, integração e ecologia*: 45-100. São Paulo: Ed. Brasiliense/CNPq.

Krebs, C. J. 2001. *Ecology: The Experimental Analysis of Distribution and Abundance*. San Francisco - California: The University of British Columbia.

Lorenzi, H.; Souza, H. M.; Costa, J. T. M.; Cerqueira, L. S. C. & Ferreira, E. J. L. 2004. *Palmeiras brasileiras e exóticas cultivadas*. São Paulo: Instituto Plantarum de estudos da Flora.

Machado, A. B. M.; Drummond, G. M. & Paglia, A. P. 2008. *Livro Vermelho da fauna brasileira ameaçada de extinção***.** 1ª. Ed. - Brasília, DF: MMA. Belo Horizonte, MG: Fundação Biodiversitas.

Marini, M. A. & Garcia, F. I. 2005. Conservação de Aves no Brasil. *Megadiversidade*, 1(1): 95-102.

Mestre, L. A. M. & Bierregaard, R. O. Jr. 2009. The role of Amazonian rivers for wintering ospreys (*Pandion haliaetus*): clues from North American band recoveries in Brazil between 1937 and 2006**.** *Studies on Neotropical Fauna and Environment*, 44:1-7.

Mestre, L. A. M.; Barlow, J.; Thorn, G. & Cochrane, M. A. 2009. Burned forests as a novel habitat for the black-faced cotinga (*Conioptilon mcilhennyi*) in the western Brazilian Amazon: *Ornitologia Neotropical*, 20(3): 467-470.

Mestre, L. A. M.; Thom, G.; Cochrane, M. A. & Barlow, J. 2010a. The birds of Reserva Extrativista Chico Mendes, South Acre, Brazil. *Boletim do Museu Paraense Emílio Goeldi. Ciências Naturais,* 5(3):311-333.

Mestre, L. A. M., Roos, A. L. & Nunes, M. F. 2010b. Análise das recuperações no Brasil de aves anilhadas no exterior entre 1927 e 2006. *Ornithologia*, 4(1): 15-35.

Milani, E. J. & Thomaz Filho, A. 2000. Sedimentary Basins of South America. *In*: Cordani, U. G., Milani, E. J., Thomaz Filho, A. Campos, D. A. (Eds.). *Tectonic Evolution of South America*: 389-449. Rio de Janeiro, 31st. IGC,.

Mittermeier, R. A.; Mittermeier, C. G.; Brooks, D. M.; Pilgrim, J. D.; Konstant, W. R. & Fonseca, G. A. B. 2003. Wilderness and biodiversity conservation. *PNAS*, 100(18): 10309-10313.

Naka, L. N.; Cohn-Haft, M.; Mallet-Rodrigues, F.; Santos, M. P. D. & Torres, M. F. 2006. The avifauna of the Brazilian state of Roraima: bird distribution and biogeography in the Rio Branco basin. *Revista Brasileira de Ornitologia*, 14(3): 197-238.

Novaes, F. C. 1957. Contribuição à ornitologia do noroeste do Acre. *Boletim do Museu Paraense Emilio Goeldi, Nova Série Zoologia,* 9:1-29.

Novaes, F. C. 1958. As aves e as comunidades bióticas no alto rio Juruá, Território do Acre. *Boletim do Museu Paraense Emilio Goeldi, Nova Série Zoologia,*, 14: 1-13.

Novaes, F. C. 1978. Sobre algumas aves pouco conhecidas da Amazônia brasileira II. *Boletim do Museu Paraense Emilio Goeldi, Nova Série Zoologia* , 90: 1-15.

O'Neill, J. P. (1974). *The birds of Balta, a Peruvian dry tropical forest locality with an analysis of their origins and relationships. PhD Dissertation*. Louisiana State University, Baton Rouge, USA.

O'Neill, J. P. 2003. Avifauna de la región de Balta, un poblado cashinahua en el río Curanja. In: R. L. Pitman, N. Pitman e P. Álvarez (Eds.): *Alto Purús: Biodiversidad, Conservación y Manejo:* 97-107. Capítulo 11. Nicholas School of the Environment, Duke University.

Oren, D. C. & Albuquerque, G. A. 1991. Priority áreas for new avian collections in Brazilian Amazonia. *Goeldiana Zoologia,* 6:1-11.

Paynter, R. A., Jr. & Traylor, J. M. A. J. 1991. *Ornithological Gazetteer of Brazil*. Cambridge, Massachusetts: Museum of Comparative Zoology, Harvard University.

Parker, T. A. III. & Remsen, J. J. V. 1987. Fifty-two Amazonian birds species new to Bolivia. *Bulletin of the British Ornithological*, 107(3): 94-107.

Parker, T. A. III; Donahue, P. K. & Schulenberg, T. S. 1994. Birds of the Tambopata Reserve (Explorer's Inn Reserve). In: R. B. Foster, T. A. Parker III, A. H. Gentry, L. H. Emmons, A. Chicchón, T. Schulenberg, L. Rodríguez, G. Lamas, H. Ortega, J. Icochea, W. Wust, M. Romo, J. A. Castillo, O. Phillips, C. Reynal, A. Kratter, P. K. Donahue e L. J. Barkley (Eds.): *The Tambopata-Candamo Reserved Zone of Southeastern Peru: A Biological Assessment Rapid Assessment Program Working Papers nº.6:* 106-124. Conservation Internacional, Washington, D.C.

Patton, J. L. & Silva, M. N. F. 1998. Rivers, Refuges, and Ridges, The geography of speciation of Amazonian Mammals. In: D. J. Howard e S. H. Berlocher (Eds.), *Endless Forms: Species and Speciation*: 202-213. New York: Oxford University.

Patton, J. L.; Silva, M. N. F. & Malcolm, J. R. 1994. Gene genealogy and differentiation among arboreal Spiny Rats (Rodentia: Echimyidae) of the Amazon basin: a test of the riverine barrier hypothesis. *Evolution*, 48(4): 1314-1323.

Peres, C. A. 1990. A Harpy Eagle successfully captures an adult male Red Howler Monkey. *The Wilson Bulletin*, 102(3): 560-561.

Peres, C. A. 1996. Ungulate ectoparasite removal by Black Caracaras and Pale-winged Trumpeters in Amazonian forests. *The Wilson Bulletin*, 108(1): 170-175.

Peres, C. A.; Patton, J. L. & Silva, M. N. F. 1996. Riverine barriers and gene flow in Amazonian saddle-back tamarins. *Folia Primatologica*, 67(3): 113-124.

Perlo, v. B. 2009. *A Field Guide to the Birds of Brazil*. 1-465. Oxford University Press, New York.

Pierpont, N. & Fitzpatrick, J. W. 1983. Specific status and behaviour of *Cymbilaimus sanctaemariae*, the bamboo antshrike, from southwestern Amazonia. *The Auk*, 100: 645-652.

Pinto, O. M. O. 1938. Catálogo das aves do Brasil e lista dos exemplares que as representam no Museu Paulista. 1ª. Parte: Aves não Passeriformes e Passeriformes não Oscines, excluída a Família Tyrannidae e seguintes. *Revista do Museu Paulista*, 22 (1937): 1-556.

Pinto, O. M. O. 1944. *Catálogo das aves do Brasil e lista dos exemplares existentes na coleção do Departamento de Zoologia, 2.a Parte*. *Ordem Passeriformes (continuação): Superfamília Tyrannoidea e Subordem Passeres*. São Paulo: Departamento de Zoologia, Secretaria da Agricultura, Indústria e Comércio.

Pinto, O. M. O. 1978. *Novo Catálogo das Aves do Brasil. Primeira Parte. Aves não Passeriformes e Passeriformes não Oscines, com exclusão da Família Tyrannidae*. São Paulo: Empr. Gráf. Revista dos Tribunais.

Pinto, O. M. O. & Camargo, E. A. 1954. Resultados ornitológicos de uma expedição ao território do Acre pelo Departamento de Zoologia. *Papéis Avulsos do Departamento de Zoologia,* 23:371-418.

Price, T. 2008. *Speciation in birds*. Greenwood Village, Colorado: Roberts and Company.

Rahbeck, C. 2005. The role of spacial and the perception of large-scale species-richness patterns. *Ecology Letters*, 8: 224-239.

Rahbeck, C. & Graves, G. R. 2001. Multiscale assessment of patterns of avian species richness. *PNAS*, 98(8): 4534-4539.

Rasmussen, D. T.; Rehg, J. & Guilherme, E. 2005. Avifauna da Fazenda Experimental Catuaba: Uma pequena reserva florestal no leste do Estado do Acre, Brasil. In: P. M. Drumond (Org.): *Fauna do Acre:* 173-198. EDUFAC, Rio Branco.

Rego, M. A.; Dantas, S. M.; Guilherme, E. & Martuscelli, P. 2009. First records of the Fine-barred Piculet (*Picumnus subtilis*) for Brazil. *Bulletin of the British Ornithological Club,* 129(3):182-185.

Remsen, J. J. V. & Parker, T. A. III. 1983. Contribution of river-created habitats to bird species richness in Amazonia. *Biotropica*, 15(3): 223-231.

Remsen, J. J. V. & Traylor, J. M. A. 1989. *An annotated list of the birds of Bolivia*. 1-79. Buteo Books, Vermillion, South Dakota.

Ridgely, R. S. & Tudor, G. 1994. *The birds of South America:* 2:1-814. University of Texas Press, Austin.

Ridgely, R. S. & Tudor, G. 2009. *Field Guide to the Songbirds of South America. The Passerines*. Austin: University of Texas press.

Roig, H. L. & Martini, A. 2002. Geologia e Geomorfologia. In: M. C. Cunha e M. B. Almeida (Orgs.), *Enciclopédia da Floresta: O Alto Juruá: Práticas e Conhecimentos das Populações:* 43-50. São Paulo - SP: Companhia das Letras.

Santos, M. P. D. 2005. *Avifauna do Estado de Roraima: Biogeografia e Conservação*. Tese de Doutorado. Universidade Federal do Pará/ Museu Paraense Emílio Goeldi.

Schulenberg, T. S.; Stotz, D. F.; Lane, D. F.; O'Neill, J. P. & Parker III, T. A. 2007. *Birds of Peru:* 1-656. Princeton University Press, New Jersey.

Sick, H. 1985. *Ornitologia Brasileira, uma introdução*. Vols. 1 and 2. Brasília: Ed. Universidade de Brasília.

Sick, H. 1997. *Ornitologia Brasileira:* 1-862. Editora Nova Fronteira, Rio de Janeiro.

Sick, H. 1967. Rio e enchentes na Amazônia como obstáculo para a avifauna. *Atas do Simpósio sôbre a Biota Amazônica (Zoologia)*, 5: 495-520.

Silva, E. G. 2004. Ocorrência do passarinho africano *Estrilda astrild* (Passeriformes: Estrildidae) em Rio Branco, Estado do Acre - Brasil. In*:* R. Cintra (Ed.), *História natural, ecologia e conservação de algumas espécies de plantas e animais da Amazônia*: 255-256. Manaus - AM: EDUA/INPA.

Silva, J. M. C.; Rylands, A. B.; Silva, J. S. J.; Gascon, C. & Fonseca, G. A. B. 2005a. Primate diversity patterns and their conservation in Amazonia. In: Purvis, A., Gittleman, J. L. e Brooks, T. (Eds.), *Phylogeny and Conservation*: 337-364: Cambridge, Cambridge University Press.

Silva, J. M. C., Rylands, A. B., & Fonseca, G. A. B. 2005b. O destino das áreas de endemismo da Amazônia. *Megadiversidade*, 1(1): 124-131.

Silveira, M. 2003. Vegetação e Flora das Campinaranas do Sudoeste Amazônico (JU-008). *Relatório Técnico*. Available in: <http://www.nybg.org/bsci/acre/pdfs/VegetacaoeFloraCampinaranas.pdf>. Accessed 12 March 2012.

Silveira, M.; Torrezan, J. M. D. & Daly, D. C. 2002. Vegetação e diversidade arbórea da região do alto Juruá. In*:* M. C. Cunha e A. C. Almeida (Eds.), *Enciclopédia da Floresta: O Alto Juruá: Práticas e Conhecimentos das Populações*: 65-75. São Paulo - SP: Companhia das Letras.

Snethlage, E. 1910. Sobre a distribuição da avifauna campestre na Amazônia. *Boletim do Museu Goeldi*, 6: 226-235.

Souza, C. J.; Veríssimo, A.; Costa, A. S.; Reis, R. S.; Balieiro, C. & Ribeiro, J. 2006. *Dinâmica do desmatamento no Estado do Acre (1988-2004)*. Belém, PA. IMAZON.

Stattersfield, A. J.; Crosby, M. J.; Long, A. J. & Wege, D. C. 1998. *Endemic Bird Areas of The World - Priorities for Biodiversity Conservation*. Cambridge - UK: BirdLife International.

Stotz, D. F. 1990. Corrections and additions to the Brazilian avifauna. *The Condor*, 92: 1078-1079.

Stotz, D. F.; Fitzpatrick, J. W.; Parker III, T. A. & Moskovits, D. K. 1996. *Neotropical birds: ecology and conservation:* 1-481. The University of Chicago Press, Chicago.

Teixeira, D. M., Nacinovic, J. B., & Marti, F. M. 1994. Notes on the Black-throated Antwren *Myrmeciza atrothorax* and Spot-breasted Antwren *M. stictothorax* in Brazil. *Bulletin of the British Ornithological Club*, 114(1): 20-24.

Terborgh, J. W.; Fitzpatrick, J. W. & Emmons, L. 1984. Annotated checklist of bird and mammal species of Cocha Cashu Biological Station, Manu National Park, Peru. *Fieldiana Zoology,* 21:1-29.

Tobias, J. A. & Seddon, N. 2007. Nine bird species new to Bolivia and notes on other significant records. *Bulletin of the British Ornithological Club,* 127(1):49-84.

Tobias, J. A. & Brightsmith, D. J. 2007. Distribution, ecology and conservation status of the Blue-headed Macaw *Primolius couloni*. *Biological conservation*, 139(1-2): 126-138.

Tobias, J. A.; Lebbin, D. J.; Aleixo, A.; Andersen, M. J.; Guilherme, E.; Hosner, P. A. & Seddon, N. 2008. Distribution, behavior, and conservation status of the Rufous Twistwing (*Cnipodectes superrufus*). *The Wilson Journal of Ornithology*, 120(1): 38-49.

Toivonen, T.; Mäki, S., & Kalliola, R. 2007. The riverscape of western Amazonia - a quantitative approach to the fluvial biogeography of the region. *Journal of Biogeography,* 34: 1374-1387.

Tuomisto, H.; Ruokolainen, K. & Yli-Halla, M. 2003. Dispersal, Environmental, and Floristic Variation of Western Amazonian. *Science*, 299(5604): 241-244.

Tuomisto, H.; Ruokolainen, K.; Kalliola, R.; Linna, A.; Danjoy, W. & Rodriguez, Z. 1995. Dissecting Amazonian biodiversity. *Science,* 269: 63-66.

Valente, R. M. 2006. *Padrões espaciais em comunidades de aves amazônicas*. Tese de Doutorado, Universidade Federal do Pará/ Museu Paraense Emílio Goeldi. Belém - Pará.

Vanzolini, P. E. 1952. Relatório de uma expedição científica ao Território Federal do Acre no ano de 1951. *Papéis Avulsos do Departamento de Zoologia*, XI(1): 1-20.

Voss, R. S. & Emmons, L. H. 1996. Mammalian diversity in Neotropical lowland rainforests: a preliminary assessment. Bulletin of the American Museum of Natural History, 230: 1-115.

Walker, B.; Stotz, D. F.; Pequeño, T. & Fitzpatrick, J. W. 2006. Birds of the Manu Biosphere Reserve. *Fieldiana (Zoology),* 110:23-49.

Wallace, A. R. 1852. On the monkeys of the Amazon. *Proc. Zool. Soc. Lond.*, 20: 107-110.

Whitney, B. M. & Oren, D. C. 2001a. Primeiro registro de *Nannopsittaca dachilleae* no Brasil. *Nattereria*, 2: 26.

Whitney, B. M. & Oren, D. C. 2001b. Documentação da ocorrência de *Eubucco tucinkae* no Brasil. *Nattereria*, 2: 27.

Whitney, B. M. & Pacheco, J. F. 2001. Evidência material para a presença de *Vireo flavoviridis* (Cassin, 1851) no Brasil**.** *Nattereria*, 2:36-37.

Whitney, B. M.; Oren, D. C. & Brumfield, R. T. 2004. A new species of *Thamnophilus* antshrike (Aves: Thamnophilidae) from the Serra do Divisor, Acre, Brazil. *The Auk,* 121(4): 1031-1039.

Whittaker, A. & Oren, D. C. 1999. Important ornithological records from the Rio Juruá, western Amazonia, including twelve additions to the Brazilian avifauna. *Bulletin of the British Ornithological Club,* 119:235-260.

Whittaker, A.; Oren, D. C.; Pacheco, J. F.; Parrini, R. & Minns, J. C. 2002. Aves registradas na Reserva extrativista do alto Juruá. In: M. C. Cunha e M. B. Almeida (Orgs.): *Enciclopédia da Floresta.* O Alto Juruá: práticas e conhecimentos das populações: 81-99. Companhia das Letras, São Paulo.

Zimmer, K. J.; Whittaker, A.; Guilherme, E. & Martuscelli, P. 2010. Documented records of white-cheeked Tody-Tyrant *Poecilotriccus albifacies* from Acre, Brazil. *Bulletin of the British Ornithological Club* 130(3):255-259.

APPENDIX 1

List of the bird species confirmed for the Brazilian state of Acre based on vouchered material (specimens, recordings, and pictures).

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Tinamidae (12)						
Tinamus tao	AF, BF, PF, SF	A	R	V, O	2, 5, 11, 13, 17, 20, 25, 48	
Tinamus major	AF, BF, PF, DF	A	R	V, O, S	2, 5, 20, 27, 28, 36, 48	MPEG
Tinamus guttatus	AF, BF, PF, SF	A	R	V, O, S	8, 13, 20, 25, 27, 28, 36	MPEG
Crypturellus cinereus	AF, BF, PF, SF	A	R	V, O, S	2, 5, 11, 13, 17, 20, 25, 27, 28	MPEG, MZUSP
Crypturellus soui	AF, BF, PF, SF	A	R	V, O, S	2, 5, 11, 17, 19, 20, 25, 27, 36, 48	MPEG, MZUSP
Crypturellus obsoletus	AF, PF	A	R	V	2, 5, 20, 25, 48	
Crypturellus undulatus	AF, BF, PF, SF, CAM	A*	R	V, O, S	2, 5, 8, 11, 13, 17, 19, 20, 25, 35, 36, 48	MPEG, MZUSP
Crypturellus strigulosus	BF, PF, SF, CAM	A	R	V	8, 20, 25	
Crypturellus atrocapillus (a)	AF, BF, PF, SF	A	R	V	2, 5, 11, 20, 25, 47, 48	
Crypturellus variegatus	BF, PF, CAM	A	R	V, O, S	2, 20, 25, 27, 48	MPEG
Crypturellus cf. brevirostris	BF, PF	A	R	V, S	5, 20	MPEG
Crypturellus bartletti	AF, BF, PF	A; Inamb.	R	V, O, S	2, 5, 11, 20, 27, 28, 48	MPEG, MZUSP
Anhimidae (1)						
Anhima cornuta	BF, AF	W	R	O, P	5, 11, 20, 48	
Anatidae (6)						
Dendrocygna viduata	AR, L, R	A	R	V, O, S, P	20, 48	MPEG, UFAC
Dendrocygna autumnalis	AR, L, R	A	R	O	5, 20, 48	
Cairina moschata	AR, L, R	A	R	O	2, 5, 19, 20, 48	
Nomonyx dominica	L, R	W	R	O	20, 48	
Amazonetta brasiliensis	L, R	A	R	O, P	20, 25, 48	
Anas discors	AR, L, R	W	N	O	20, 26, 48	
Cracidae (4)						
Ortalis guttata	AF, BF, PF, DF, SF	A	R	V, O, S, P	2, 5, 11, 13, 17, 18, 19, 20, 25, 27, 36, 48	MPEG, MZUSP
Penelope jacquacu	AF, BF, PF, DF	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 25, 27, 36, 48	MPEG
Aburria cumanensis	AF	A	R	V, O, S	2, 5, 11, 20, 25, 48	UFAC, MZUSP
Pauxi tuberosa	AF, BF, PF, DF, SF	A	R	V, O, S, P	2, 5, 20, 25 , 48	MPEG, MZUSP

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Odontophoridae (2)						
Odontophorus stellatus	AF, BF, PF, DF	A	R	V, O, S	2, 5, 11, 19, 20, 25, 27, 28	MPEG
Odontophorus gujanensis	AF, BF, PF, DF, SF	A	R	V	13, 20, 48	
Podicipedidae (1)						
Tachybaptus dominicus	L, R	A	R	O, S, P	13, 20, 48	MPEG
Phalacrocoracidae (1)						
Phalacrocorax brasilianus	AR, L, R	A	R	O, P	2, 11, 20, 36, 48	
Anhingidae (1)						
Anhinga anhinga	AR, L, R	A	R	S, P	20, 36, 48	UFAC, MZUSP
Ardeidae (11)						
Trigrisoma lineatum	AR, L, R, AF	A	R	O, S, P	5, 13, 11, 20, 25, 48	MPEG, MZUSP
Agamia agami	AR, L, R	A	R	O	20, 48	
Cochlearius cochlearius	AR, L, R, AF	A	R	O, S	20, 48	MPEG
Nycticorax nycticorax	AR, L, R	A	R	O, S	5, 20, 48	MPEG
Butorides striata	AR, L, R, AF	A	R	O, S	2, 5, 11, 13, 17, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Bubulcus ibis	P, AR, L	A	R, In	O, P	5, 11, 13, 20, 36, 48	
Ardea cocoi	AR, L, R, AF	A	R	O, S, P	2, 5, 11, 13, 17, 19, 20, 48	MPEG
Ardea alba	AR, L, R	A	R	O, S, P	5, 11, 13, 17, 20, 36, 48	MPEG
Pilherodius pileatus	AR, L, R, AF	A	R	O, P	2, 5, 11, 20, 25, 27, 36, 48	
Egretta thula	AR, L, R	A	R	O, P	2, 11, 13, 19, 20, 36, 48	
Egretta caerulea	AR, L, R	A	R	O, S, P	20, 48	MPEG
Threskiornithidae (1)						
Mesembrinibis cayennensis	AR, L, R, AF	A	R	O, S, P	2, 5, 13, 20, 48	MPEG
Ciconiidae (3)						
Ciconia maguari	AR, L, R	A	R	O	5, 20, 36, 48	
Jabiru mycteria	AR, L, R	A	I	O	5, 20, 25, 48	
Mycteria americana	AR, L, R	A	I	O, S	5, 11, 20, 48	UFAC
Phoenicopteridae (1)						
Phoenicoparrus jamesi (a)	OA	E	Va	S	15, 20	MPEG
Cathartidae (4)						
Cathartes aura	FE, P, OA, AA	A	R	O, P	5, 13, 17, 19, 20, 25, 36, 48	
Cathartes melambrotus	FE, P, OA, AA	A	R	O, S, P	2, 5, 13, 17, 19, 20, 25, 36, 48	MPEG

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Coragyps atratus	FE, P, OA, AA	A	R	O, S, P	2, 5, 13, 17, 19, 20, 25, 36, 48	MPEG
Sarcoramphus papa	FE, OA	A	R	O, P	2, 5, 18, 19, 20, 25, 27, 36, 48, 18, 36	
Pandionidae (1)						
Pandion haliaetus	AR, L, R, AF	A	N	O, S, P	5, 20, 24, 25, 48	MPEG
Accipitridae (29)						
Leptodon cayanensis	FE	W	R	O, P	5, 20, 48	
Chondrohierax uncinatus	BF, PF	W	R	O	20, 48	
Elanoides forficatus	AF, BF, PF, P, OA	A	R, I	O, P	5, 11, 13, 17, 20, 25, 36, 48	
Gampsonyx swainsonii	FE, P	A	R	O, S, P	8, 13, 20, 36, 48	MPEG, UFAC
Rostrhamus sociabilis	L, R	E	R	O, S, P	17, 20	UFAC
Helicolestes hamatus	FE, P, OA, AA	W	R	O, S, P	5, 20, 48	MPEG, UFAC
Harpagus bidentatus	AF, BF, PF, SF	A	R	O, S, P	5, 2, 8, 20, 25, 27, 28, 36, 48	MPEG
Ictinia plumbea	FE, SF, P, AO, AA	A	R	O, S, P	5, 11, 13, 17, 20, 25, 36, 48	MPEG
Accipiter superciliosus	AF, PF	W	R	O, S	5, 19, 20, 48	MPEG
Accipiter bicolor	BF, DF, SF	A	R	O, P	20, 36, 48	
Geranospiza caerulescens	PF, DF, P	A	R	O, S	20, 25, 36 48	MPEG
Buteogallus schistaceus	AF, BF, PF, SF, P, OA	A	R	O, S, P	2, 5, 11, 13, 20, 36, 48	MPEG, MZUSP
Leucopternis kuhli	PF, DF, SF	A	R	O, S	20, 27, 48	MPEG
Pseudastur albicollis	AF, PF	A	R	O	2, 20, 25, 48	
Urubitinga urubitinga	FE	A	R	V, O, S, P	2, 5, 11, 13, 20, 25, 48	MPEG
Heterospizias meridionalis	PF	W	R	O	20, 48	
Busarellus nigricollis	AF, PF, P	A	R	O, S	5, 13, 20, 48	MPEG
Percnohierax leucorrhous	AF	E	R	O	2, 20	
Rupornis magnirostris	FE, P, AO, AA	A*	R	V, O, S, P	2, 5, 11, 13, 17, 20, 25, 35, 36, 48	MPEG, MZUSP, UFAC
Geranoaetus albicaudatus	BF, PF, P	A	R, In	V, O, S, P	5, 13, 20, 36, 48	MPEG
Buteo nitidus	FE, P, OA, AA	A	R	V, O, S, P	11, 13, 17, 19, 20, 25, 36, 48	MPEG
Buteo swainsoni	PF	W	N	O	20, 26	
Buteo brachyurus	BF, PF, SF, P	A	R	V, O, P	20, 36, 48	
Buteo albonotatus	AF, BF, PF, SF, P	A	R	V, O, S	20, 36, 47	MPEG
Morphnus guianensis	BF, PF	A	R	V, O	20, 36, 48	
Harpia harpyja	AF, PF, DF, SF	A	R	V, O	5, 20, 32, 48	
Spizaetus tyrannus	AF, BF, PF, SF	A	R	V, O, S	5, 11, 20, 25, 48	MZUSP

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Spizaetus melanoleucus	AF, PF, DF, SF, P	A	R	O, S	11, 20, 48	UFAC
Spizaetus ornatus	AF, BF, PF, SF, CAM	A	R	V, O	2, 5, 11, 20, 25, 48	
Falconidade (11)						
Daptrius ater	FE, AF, P	A	R	V, O, P	2, 5, 11, 13, 20, 25, 33, 48	
Ibycter americanus	AF, BF, PF, DF, SF	A	R	V, O, S, P	2, 5, 11, 13, 20, 25, 35, 36, 48	MZUSP
Caracara plancus	P	A	R, In	V, O, S, P	20, 25, 48	MPEG
Milvago chimachima	FE, P	A	R	O, V	13, 20, 25, 48	
Herpetotheres cachinnans	FE, P	A	R	O, V	5, 11, 13, 17, 19, 20, 25, 48	
Micrastur ruficollis	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 13, 20, 25, 36, 48	MPEG; MZUSP, UFAC
Micrastur gilvicollis	AF, BF, PF, DF, SF	A	R	V, O, S	5, 11, 13, 17, 20, 25, 48	MPEG; MZUSP
Micrastur mirandollei	BF, PF, SF	A	R	V, O, S	2, 5, 20, 48	MPEG
Micrastur semitorquatus	AF, BF, PF, SF	A	R	V, O	2, 5, 11, 20, 25, 48	
Micrastur buckleyi	AF, BF, PF	A	R	O, V	11, 20, 48	
Falco rufigularis	FE, P, CAM	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 25, 48	MPEG
Aramidae (1)						
Aramus guarauna	AR, L, R, W	A	R	O, S	20, 48	UFAC
Psophiidae (1)						
Psophia leucoptera	AF, BF, PF, DF, SF	A; Inamb.	R	V, O, S	2, 5, 8, 11, 13, 20, 25, 36, 48	MPEG; MZUSP
Rallidae (9)						
Aramides cajanea	AF, W	A	R	V, O, S, P	2, 5, 8, 11, 17, 19, 20, 25, 27, 36, 48	MPEG
Anurolimnas castaneiceps	AF, W	A	R	V, O, S	5, 20, 25, 48	MPEG
Laterallus viridis	AF, W	A	R	O, S	20, 27, 48	MPEG
Laterallus fasciatus	AF, W	A	R	O, S	5, 20, 27, 48	MPEG; MZUSP
Laterallus melanophaius	AF, W	A	R	V, O, S	19, 20, 48	MPEG
Laterallus exilis	AF, W	A	R	V, O, S	5, 19, 20, 48	MPEG, UFAC
Neocrex erythrops	AF, W	A	R	O	17, 20, 48	
Gallinula galeata	AF, W	A	R	O, P	20, 48	
Porphyrio martinica	AF, W	A	R	V, O, S, P	11, 13, 17, 20, 36, 48	MPEG, UFAC
Heliornithidae (1)						
Heliornis fulica	AF, AR, L, R	A	R	O	2, 11, 20, 25, 48	
Eurypygidae (1)						
Eurypyga helias	AF, AR, L, R	A	R	O, S, P	2, 5, 8, 11, 20, 25, 27, 48	MPEG

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Charadriidae (4)						
Vanellus cayanus	AR, L, R	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 27, 48	MPEG
Vanellus chilensis	OA, P, AR, L, A	E	R, In	V, O, S, P	5, 11, 20, 25	MPEG
Pluvialis dominica	BF	A	N	O, S, P	20, 35, 48	MZUSP
Charadrius collaris	BF, W	A	R	O, S, P	5, 11, 17, 19, 20, 27, 48	MPEG
Scolopacidae (11)						
Gallinago paraguaiae	BF, W, R	A	A	O	17, 20, 48	
Tringa melanoleuca	BF	W	N	O	20, 48	
Tringa flavipes	BF, W, R	A	N	O, S, P	5, 11, 13, 20, 35, 48	MPEG, MZUSP
Tringa solitaria	BF, W, R	A	N	O, S, P	2, 11, 17, 20, 25, 27, 35, 48	MPEG, MZUSP
Actitis macularius	BF, W, R	A	N	O, S, P	2, 5, 11, 20, 27, 48	MPEG
Calidris minutilla	BF, W, R	W	N	O	20, 48	
Calidris bairdii	BF, W	W	N	O	20, 48	
Calidris melanotos	BF, W	A	N	O, S, P	11, 20, 27, 35, 48	MPEG, MZUSP
Calidris himantopus	BF, W	W	N	O	20, 48	
Tryngites subruficollis	BF, W	W	N	O, S	20, 35, 48	MPEG, MZUSP
Phalaropus tricolor	BF, W	W	N	O	20, 48	
Jacanidae (1)						
Jacana jacana	W, R	A	R	V, O, S, P	5, 11, 13, 17, 19, 20, 25, 35, 36, 48	MPEG, MZUSP
Laridae (1)						
Leucophaeus atricilla	BF	W	N	O	20, 48	
Sternidae (2)						
Sternula superciliaris	BF, AR	A	R	O, S	5, 11, 20, 27, 48	MPEG
Phaetusa simplex	BF, AR	A	R	O, P	5, 11, 20, 48	
Rynchopidae (1)						
Rhynchops niger	BF, AR	A	R	O, S, P	5, 11, 20, 48	MPEG
Columbidae (11)						
Columbina talpacoti	FE, OA, AA	A	R	V, O, S, P	5, 8, 11, 13, 17, 20, 25, 35, 36, 48	MPEG
Columbina picui	FE, OA	A	R	O	20, 48	
Claravis pretiosa	PF, DF	A	R	V, O	20, 25, 35, 48	
Columbia livia	AA	A	R	O, V	20	
Patagioenas speciosa	CAM	W	R	O	20	

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Patagioenas cayennensis	AF, BF, PF	A	R	V, O	13, 20, 48	
Patagioenas plumbea	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 8, 11, 13, 18, 20, 25, 35, 36, 48	MPEG, MZUSP
Patagioenas subvinacea	AF, BF, PF, DF, SF, CAM	A	R	V, O	2, 5, 11, 13, 19, 20, 25, 48	
Leptotila verreauxi	AF, BF, PF, DF, CAM	A	R	V, O, S	5, 8, 11, 20, 36, 48	MPEG, MZUSP
Leptotila rufaxilla	AF, BF, PF, DF, CAM, AO	A	R	V, O, S, P	2, 5, 8, 11, 13, 17, 19, 20, 25, 27, 48	MPEG, UFAC
Geotrygon montana	AF, BF, PF, DF, SF, CAM	A	R	V, O, S	2, 5, 8, 11, 13, 17, 19, 20, 25, 27, 28, 35, 36, 48	MPEG, UFAC
Psittacidae (23)						
Ara ararauna	AF, PF, SF	A	R	V, O	2, 11, 19, 20, 48	
Ara macao	AF, PF, DF, SF	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 25, 48	MPEG
Ara chloropterus	AF, PF, SF	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 25, 27, 28, 48	MPEG
Ara severus	FE, OA, P, CAM, AA	A	R	V, O, S, P	2, 5, 11, 13, 17, 19, 20, 25, 48	MPEG
Orthopsittaca manilata	AF, PF, DF	A	R	V, O, S, P	2, 11, 13, 20, 48	MPEG
Primolius couloni	FE, BF, PF, OA, CAM	A;Inamb.	R	V, O, S, P	2, 5, 6, 13, 20, 25, 30, 41, 47, 48	MPEG; UFAC
Aratinga leucophthalma	FE, OA, P, CAM, AA	A	R	V, O, S	2, 5, 11, 13, 19, 20, 25, 48	MPEG, UFAC
Aratinga weddellii	FE, OA, P, CAM, AA	A	R	V, O, S, P	2, 5, 8, 11, 17, 18, 19, 20, 25, 36, 48	MPEG, MZUSP, UFAC
Pyrrhura roseifrons	AF, PF, SF, OA, CAM	A	R	V, O, S	2, 20, 25, 27, 28, 48	MPEG
Pyrrhura rupicola (a)	AF, PF, DF, SF, OA, CAM	A; Inamb.	R	V, O, S, P	2, 6, 11, 20, 25, 47, 48	MPEG
Forpus modestus	FE, OA, CAM	A	R	V, O, S, P	5, 17, 20, 35, 36, 48	MPEG, MZUSP
Brotogeris cyanoptera	FE, CAM, OA, AA	A*	R	V, O, S, P	2, 5, 11, 13, 18, 19, 20, 25, 35, 36, 48	MPEG, MZUSP, UFAC
Brotogeris sanctithomae	FE, AA, OA	A	R	V, O, S, P	5, 17, 18, 19, 20, 27, 36, 48	MPEG, UFAC, MZUSP
Nannopsittaca dachilleae (a)	AF, SF	A; Inamb.	R	V, O, S	2, 20, 43	MPEG
Touit huetii	AF, PF	W	R	V, O, S	5, 20, 47, 48	MPEG
Touit purpuratus	DF, CAM	W	R	O, V	Guilherme and Aleixo, unpub. data	
Pionites leucogaster	AF, PF, OA, CAM	A	R	V, O, S, P	2, 5, 11, 13, 20, 25, 27, 35, 48	MPEG, MZUSP
Pyrilia barrabandi	AF, BF, PF, CAM	A	R	O, S, P	2, 5, 11, 20, 48	MZUSP
Pionus menstruus	AF, PF, DF, SF, CAM, OA	A	R	V, O, S, P	2, 5, 11, 13, 17, 20, 25, 36, 48	MPEG, UFAC
Amazona festiva	AF	A	R	O	20, 48	
Amazona ochrocephala	FE, AF, PF, DF, SF, AA	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 25, 27, 36, 48	MPEG, UFAC, MZUSP
Amazona amazonica	PF	A	R	O	20, 36, 48	
Amazona farinosa	FE, BF, PF, DF, SF, CAM, OA	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 35, 48	MPEG, MZUSP, UFAC

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Opisthocomidae (1)						
Opisthocomus hoazin	AF, W, AR	A	R	V, O, S, P	2, 5, 11, 18, 19, 20, 48	MPEG, UFAC
Cuculidae (12)						
Micrococcyx cinereus	AF, BF, PF	E	A	O, S	20, 36	MPEG
Coccyzus erythrophthalmus	BF, PF	W	N	O, S	20, 47	MPEG
Coccyzus melacoryphus	BF, PF, SF	A	R	V, O, S	5, 2027, 36, 48	MPEG
Piaya cayana	BF, PF, SF	A	R	V, O, S, P	2, 5, 11, 13, 17, 19, 20, 25, 27, 35, 48	MPEG, MZUSP, UFAC
Piaya melanogaster	BF, PF, DF, SF	A	R	V, O, S	5, 11, 13, 20, 25, 27, 48	MPEG
Coccycua minuta	FE, AF, BF, PF, DF, SF	A	R	V, O, S	5, 11, 13, 17, 20, 36, 48	MPEG
Crotophaga major	FE, AF, W, AR	A	R	V, O, S	5, 8, 11, 13, 17, 19, 20, 25, 27, 28, 36, 48	MPEG, UFAC
Crotophaga ani	FE, P, AA, OA	A	R	V, O, S, P	5, 8, 11, 13, 17, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP, UFAC
Tapera naevia	PF, SF	A	R	O	25, 20, 48	
Dromococcyx phasianellus	AF, BF	A	R	V, O, S	2, 6, 13, 20, 48	MPEG
Dromococcyx pavoninus(b)	BF	A	R	V, O, S	2, 5, 13, 20, 48	MPEG
Neomorphus geoffroyi	PF	W	R	O	20, 48	
Tytonidae (1)						
Tyto alba	PF, SF, P, AA	A	R	V, O, S	5, 20, 25, 36, 48	MPEG
Strigidae (11)						
Megascops choliba	FE, AF, BF, PF, DF, SF, AA	A	R	V, O, S	2, 5, 11, 13, 17, 19, 20, 25, 36, 48	MPEG, UFAC
Megascops usta	AF, BF, PF, DF, SF, CAM, AA	A	R	V, O, S	2, 5, 8, 11, 13, 17, 19, 20, 25, 27, 48	MPEG
Lophostrix cristata	AF, PF, SF	A	R	V, O, S	2, 5, 11, 13, 20, 27, 36, 48	MPEG
Pulsatrix perspicillata	AF, BF, PF, SF	A	R	V, O, S	5, 13, 20, 25, 35, 48	MZUSP
Strix virgata	AF, PF, SF	A	R	V, O, S	2, 5, 20, 48	MPEG
Strix huhula	AF,PF	A	R	V, O, S	20, 48	MPEG
Glaucidium hardyi	AF, BF, PF, SF	A	R	V, O	2, 5, 11, 20, 25, 48	
Glaucidium brasilianum	AF, BF, PF, DF	A	R	V, O, S	2, 5, 11, 13, 19, 20, 25, 35, 36, 48	MPEG, MZUSP
Athene cunicularia	P, AA	A	R, In	V, O, S, P	5, 13, 20, 25	MPEG, UFAC
Asio clamator	AF, BF, PF, P	A	R	V, O, S	5, 11. 13, 20, 36	UFAC
Asio stygius	PF	W	R	V	20, 48	
Nyctibidae (4)						
Nyctibius grandis	AF, BF, PF, SF	A	R	V	2, 5, 11, 13, 20, 25, 48	
Nyctibius aethereus	PF, CAM	W	R	V	20, 47, 48	

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Nyctibius griseus	AF, BF, PF, DF	A	R	V, O, S, P	2, 5, 11, 20, 25, 36, 48	MPEG
Nyctibius leucopterus	AF, SF	W	R	O, V	3, 20, 48	
Caprimulgidae (12)						
Lurocalis semitorquatus	AF, PF, CAM	A	R	O, V	2, 5, 20, 36, 48	
Chordeiles rupestris	AF, AR	W	R	V, O, S, P	27, 20, 48	MPEG
Chordeiles nacunda	P, AO, R	A	I	O, S	17, 20	MPEG
Nyctiphrynus ocellatus	AF, BF, PF, SF	A	R	V, O, S, P	2, 5, 11, 20, 35, 36, 48	MZUSP
Antrostomus rufus	SF	W	R	V, S	20	MPEG
Antrostomus sericocaudatus	AF	E	R	V	2, 5, 20	
Hydropsalis maculicauda	AF, FE	A	R	S	17, 19, 20	MPEG
Hydropsalis nigrescens	PF, SF, CAM	W	R	V, O	20, 48	
Hydropsalis parvula	AF, BF, PF, P, AA	A	R	S	5, 11, 20	MPEG
Hydropsalis albicollis	FE, OA, P, CAM, BF	A	R	V, O, S, P	5, 2, 11, 20, 25, 36, 48	MPEG, MZUSP, UFAC
Hydropsalis climacocerca	FE, BF	A	R	V, O, S	2, 5, 11, 19, 20, 27, 48	MPEG, MZUSP
Hydropsalis torquata	BF	E	R	S	20, 35	MZUSP
Apodidae (10)						
Streptoprocne zonaris	AF, PF	W	R	O	20, 48	
Chaetura spinicaudus	AF, BF, PF	E	R	O	2, 20, 36	
Chaetura cinereiventris	AF, PF, P	A	R	O, S	2, 5, 20, 35, 48	MPEG, MZUSP
Chaetura egregia	AF, PF	A	R	O, S	5, 20, 25, 35, 47, 48	MZUSP
Chaetura pelagica	AF, PF, DF, SF	A	R	O, P	20, 47, 48	
Chaetura viridipennis	AF, PF, DF, SF, P	A	R	O, S	5, 20, 35, 36, 47, 48	AMNH, MPEG, MZUSP
Chaetura meridionalis	AF	E	A	O	2, 20	
Chaetura brachyura	AF, BF, PF, DF, SF, OA	A	R	O, S, P	2, 5, 11, 13, 20, 25, 36, 47, 48	LSUMZ
Thachornis squamata	AF, BF, PF, CAM, OA	A	R	O, P	8, 13, 17, 20, 36, 47, 48	
Panyptila cayennensis	AF	A	R	V, O	2, 20, 11, 20, 48	
Trochilidae (25)						
Glaucis hirsutus	AF, BF, PF, DF, OA, CAM, AA	A	R	V, O, S	2, 5, 9, 11, 13, 17, 19, 20, 25, 35, 36, 48	MPEG, MZUSP, UFAC
Threnetes leucurus	AF, BF, PF	A*	R	V, O, S	5, 8, 11, 19, 20, 25, 48	MPEG, MZUSP
Phaethornis ruber	AF, BF, PF, DF, CAM	A	R	V, O, S, P	2, 5, 11, 13, 17, 18, 19, 20, 25, 36, 48	MPEG, MZUSP
Phaethornis hispidus	AF, BF, PF, DF, SF	A	R	V, O, S, P	2, 5, 11, 13, 17, 19, 20, 25, 48	MPEG, MZUSP, UFAC

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Phaethornis philippii	BF, PF, DF, SF, CAM	A	R	V, O, S	8, 20, 25, 27, 36, 48	MPEG
Phaethornis bourcieri	AF, BF, PF, DF, SF	A	R	V, O, S	11, 13, 19, 20, 48	MPEG
Phaethornis malaris	AF, BF, PF, SF	A	R	V, O, S	11, 19, 20, 25, 48	MPEG
Campylopterus largipennis	AF, BF, PF,DF	A	R	V, O, S	2, 5, 18, 20, 48	MPEG
Florisuga melivora	AF, PF, SF	A	R	V, O, S, P	2, 20, 48	MPEG
Anthracothorax nigricollis	AF, BF, PF, AA, OA, CAM	A	R	V, O, S	17, 20, 25, 35, 36, 48	MPEG, MZUSP, UFAC
Topaza pyra	AF, SF, CAM	W	R	O, S	8, 20	MPEG
Chrysolampis mosquitus	FE	E	I	O	9, 11, 20	MPEG
Chlorostilbon notatus	AF	W	R	O, S	20, 27, 48	MPEG
Chlorostilbon mellisugus	AF,PF	W	R	O, S	5911, 13, 20, 48	MPEG
Thalurania furcata	FE, SF, BF, PF, AA	A*	R	O, S	2, 5, 9, 11, 13, 17, 19, 20, 25, 27, 28, 48	MPEG, UFAC
Hylocharis sapphirina	AF	W	R	O	20, 48	
Hylocharis cyanus(b)	BF, PF, DF, SF, CAM	A; Inamb.	R	O, S	11, 20, 25, 35, 48	MPEG, MZUSP
Polytmus theresiae	CAM	W	R	O	Guilherme and Aleixo, unpb. data.	
Chrysuronia oenone	AF, SF, CAM	W	R	O, S	8, 20, 48	MPEG
Amazilia fimbriata	PF	W	R	O	20, 48	
Amazilia lactea	FE, AF, DF, AA, OA, CAM	A; Inamb. (a)	R	V, O, S, P	2, 9, 11, 13, 17, 18, 20, 25, 35, 36	MPEG, UFAC
Heliothryx auritus	AF, PF, SF	A	R	O	2, 20, 25, 48	
Heliodoxa aurescens	AF, SF	A	R	O	2, 20	
Heliomaster longirostris	AF, PF, DF, SF, CAM	A	R	O, S	8, 20, 35, 48	MPEG
Heliomaster furcifer	AA	E	Va	S		ZUEC
Calliphlox amethystina	AF	W	R	O	20, 48	
Trogonidae (7)						
Trogon viridis	AF, BF, PF, DF, SF	A	R	V, O, S	2, 8, 13, 19, 20, 25, 36, 48	MPEG
Trogon curucui	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 13, 17, 18, 19, 20, 36, 48	MPEG
Trogon violaceus	AF, BF, PF, DF, CAM	A	R	V, O, S	2, 5, 13, 20, 27, 48	MPEG
Trogon collaris	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 13, 18, 19, 20, 25, 35, 36, 48	MPEG, MZUSP
Trogon rufus	AF, PF, SF, CAM	A	R	V, O, S	2, 8, 11, 13, 20, 27, 48	MPEG
Trogon melanurus	AF, BF, PF, DF, SF, CAM	A	R	V, O, S, P	2, 5, 8, 13, 17, 19, 20, 25, 27, 36, 48	MPEG, MZUSP, UFAC
Pharomachrus pavoninus	BF, PF, DF, SF, CAM	W	R	S	20	MPEG
Alcedinidae (5)						
Megaceryle torquata	AF, AR, L, A, W	A	R	V, O, S, P	2, 5, 13, 17, 19, 20, 35, 48	MPEG

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Chloroceryle amazona	AF, AR, L, A, W	A	R	V, O, S, P	2, 5, 13, 19, 20, 25, 35, 36, 48	MPEG
Chloroceryle americana	AF, AR, L, A, W	A	R	V, O, S	2, 13, 17, 19, 20, 36, 48	MPEG
Chloroceryle inda	AF, BF, PF, SF	A	R	O, S	5, 13, 20, 25, 48	MPEG
Chloroceryle aenea	AF, BF, PF, DF, SF	A	R	O, S	2, 13, 17, 19, 20, 25, 36, 48	MPEG, MZUSP
Momotidae (3)						
Electron platyrhynchum	AF, BF, PF, DF	A	R	V, O, S	2, 5, 11, 13, 17, 19, 20, 25, 35, 36, 48	MPEG, MZUSP
Baryphthengus martii	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 13, 18, 20, 25, 27, 36, 48	MPEG
Momotus momota	AF, BF, PF, DF, SF, CAM	A*	R	V, O, S	2, 5, 8, 11, 13, 17, 19, 20, 25, 27, 28, 36, 48	MPEG, UFAC
Galbulidae (8)						
Galbalcyrhynchus purusianus	AF	A; Inamb.	R	V, O, S, P	2, 5, 11, 20, 48	MPEG, MZUSP
Brachygalba albogularis	AF, BF, PF, DF, SF	A; Inamb.	R	V, O, S, P	2, 11, 17, 20, 47, 48	MPEG, MZUSP
Galbula albirostris	PF, SF	W	R	O	20, 48	
Galbula cyanicollis	AF, CAM	W	R	O, S	5, 8, 20, 27	MPEG
Galbula cyanescens	AF, BF, PF, DF, SF	A; Inamb.	R	V, O, S, P	2, 5, 6, 11, 13, 17, 20, 25, 35, 36, 48	MPEG, MZUSP
Galbula leucogastra	PF	W	R	O	5, 20, 48	
Galbula dea	FE, CAM	A	R	V, O, S, P	2, 5, 11, 13, 20, 25, 35, 36, 48	MPEG, MZUSP
Jacamerops aureus	AF, PF, SF	W	R	V, O, S	2, 11, 20, 25, 27, 48	MPEG
Bucconidae (15)						
Notharchus hyperrhynchus	AF, PF, SF	A	R	V, O	2, 5, 11, 13, 20, 25, 48	
Nothrarcus ordii	AF, PF, SF, CAM	W	R	V, O, S	38, 20	MPEG
Notharchus tectus	AF,SF	W	R	O	5, 20	
Bucco macrodactylus	AF, BF, PF, DF	A	R	V, O, S, P	2, 8, 11, 13, 17, 18, 20, 35, 48	MPEG, MZUSP, UFAC
Bucco tamatia	AF, PF, SF	A	R	V, O, S	11, 13, 20, 48	MPEG
Bucco capensis	AF, BF, PF, DF	A	R	V, O, S	2, 13, 20	MPEG, UFAC, MZUSP
Nystalus striolatus	AF, BF, PF, DF, SF	A	R	O, S	2, 5, 8, 11, 20, 25, 35, 48	MPEG, MZUSP
Malacoptila semicincta	AF, BF, PF, DF, SF	A; Inamb.	R	V, O, S	2, 5, 11, 13, 19, 20, 25, 27, 48	MPEG
Nonnula rubecula	AF, PF, SF	W	R	O, S	20	MPEG
Nonnula sclateri (b)	BF, DF	A; Inamb.	R	V, O, S	2, 11, 20, 27, 28, 47, 48	MPEG
Nonnula ruficapilla (b)	AF, BF, PF, SF	A; Inamb. (b)	R	V, O, S	2, 5, 11, 13, 20, 25, 48,	MPEG, MZUSP
Monasa nigrifrons	FE, AF, BF, PF, DF, CAM	A	R	V, O, S, P	2, 5, 8, 11, 13, 17, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Monasa morphoeus	AF, BF, PF, DF	A	R	V, O, S	2, 5, 11, 13, 20, 25, 27, 35, 36, 48	MPEG, MZUSP

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Monasa flavirostris(b)	FE, BF	A	R	O, S, P	2, 13, 20, 25, 36, 48	MPEG
Chelidoptera tenebrosa	FE	A	R	O, S, P	2, 5, 11, 13, 17, 19, 20, 27, 35, 36, 48	MPEG, MZUSP
Capitonidae (3)						
Capito auratus	FE, AF, BF, PF, DF, SF, CAM	A*	R	O, S, P	2, 5, 11, 17, 20, 25, 27, 35, 48	MPEG, MZUSP, UFAC
Eubucco richardsoni	AF, PF, DF	A	R	V, O, S	2, 5, 6, 11, 20, 25, 48	MPEG
Eubucco tucinkae (a)	AF, BF, PF, DF, SF	A; Inamb.	R	O, S	2, 19, 20, 44, 48	MPEG
Ramphastidae (8)						
Ramphastos tucanus	AF, BF, PF, DF, SF, CAM	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 25, 27, 28, 36, 48	MPEG, UFAC
Ramphastos vitellinus	AF, PF	A	R	V, O, S	2, 5, 11, 13, 19, 20, 25, 27, 48	MPEG, UFAC
Aulacorhynchus atrogularis (a)	AF, BF, PF, SF	A	R	V, O, S, P	2, 56, 8, 11, 20, 25, 47, 48	MPEG
Selenidera reinwardtii	AF, BF, PF, DF	A; Inamb. (c)	R	V, O, S	5, 11, 20, 25, 27, 48	MPEG
Pteroglossus inscriptus	BF, PF, DF, SF	A	R	V, O, S	2, 5, 13, 20, 25, 35, 36, 48	MPEG, MZUSP
Pteroglossus mariae	AF, BF, PF, DF, SF	A; Inamb.	R	V, O, S	2, 8, 11, 13, 19, 20, 25, 27, 36, 48	MPEG
Pteroglossus castanotis	AF, BF, PF, DF, SF, OA, CAM, AA	A*	R	V, O, S, P	2, 5, 11, 13, 17, 19, 20, 27, 35, 36, 48	MPEG, MZUSP, CPJH
Pteroglossus beauharnaesii	AF, BF, PF, DF, SF	A	R	V, O, S, P	2, 5, 11, 18, 20, 25, 36, 48	MPEG, UFAC
Picidae (18)						
Picumnus aurifrons	PF, SF	W; Inamb. (d)	R	O	5, 20, 48	
Picumnus rufiventris (b)	BF, DF	A	R	O, S	2, 11, 17, 20, 35, 48	MPEG, MZUSP, UFAC
Picumnus subtilis (a)	BF	E	R	O, S, P	11, 20, 37	MZUSP, UFAC
Melanerpes cruentatus	FE, CAM, OA, P, AA	A	R	V, O, S	2, 5, 8, 11, 13, 17, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP, UFAC
Veniliornis passerinus	AF, BF, PF, DF	A	R	V, O, S, P	2, 5, 11, 13, 17, 20, 25, 48	MPEG, MZUSP
Veniliornis affinis	AF, BF, DF	A	R	V, O, S, P	2, 5, 20, 25, 35, 36, 48	MPEG, MZUSP
Piculus leucolaemus	AF, BF, PF	A	R	V, O, S	2, 20, 25, 36, 48	MPEG
Piculus flavigula	AF, PF, SF, CAM	A	R	V, O, S	2, 20, 25, 48	MPEG
Piculus chrysochloros	AF, PF, DF, SF, CAM	A	R	V, O, S	2, 5, 8, 20, 35, 48	MPEG
Colaptes punctigula	FE, AF, BF, PF, DF, SF	A	R	V, O, S	5, 8, 11, 13, 17, 20, 36, 48	MPEG, MZUSP
Celeus grammicus	AF, BF, PF, SF, CAM	A	R	V, O, S	2, 8, 11, 20, 25, 27, 48	MPEG
Celeus elegans	AF, BF, PF	A	R	V, O, S	5, 8, 13, 20, 27, 48	MPEG
Celeus flavus	AF, BF, PF, DF, SF	A	R	V, O, S, P	2, 11, 17, 19, 20, 25, 27, 48	MPEG
Celeus spectabilis (a), (b)	BF	A	R	V, O, S, P	2, 11, 13, 20, 25, 47	MPEG, MZUSP
Celeus torquatus	BF, PF, SF	A	R	V, O, S, P	2, 5, 11, 13, 20, 25, 36, 48	MPEG
Dryocopus lineatus	AF, BF, PF, DF, SF	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 25, 36, 48	MPEG

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Campephilus rubricollis	FE, OA, CAM, P, AA	A	R	V, O, S	2, 5, 11, 13, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Campephilus melanoleucos	FE, OA, P, CAM, AA	A	R	V, O, S, P	2, 5, 8, 11, 13, 17, 19, 20, 25, 35, 36, 48	MPEG, MZUSP
Thamnophilidae (61)						
Terenura humeralis	PF, SF	W	R	V, O, S	5, 20, 48	MPEG
Pygiptila stellaris	AF, BF, PF, SF	A	R	V, O, S	5, 11, 20, 27, 48	MPEG
Microrhopias quixensis (b)	AF, BF, PF, DF	A	R	V, O, S	2, 5, 20, 25, 36, 48	MPEG, MZUSP
Myrmeciza hemimelaena	AF, BF, PF, DF, SF, CAM	A	R	V, O, S, P	2, 5, 8, 11, 13, 17, 19, 20, 25, 35, 36, 48	MPEG, MZUSP, UFAC
Myrmeciza atrothorax	AF, PF, SF	A	R	V, O, S	2, 5, 8, 11, 13, 17, 19, 20, 40, 48	MNRJ, MPEG, MZUSP
Myrmeciza melanoceps	AF	W	R	S	20, 27	MPEG
Myrmeciza goeldii (b)	AF, BF, SF	A; Inamb.	R	V, O, S	2, 5, 11, 13, 17, 20, 25, 47, 48	MPEG, MZUSP
Myrmeciza hyperythra	BF, PF, SF	A	R	V, O, S	2, 5, 13, 17, 20, 25, 27, 35, 48	MPEG
Myrmeciza fortis	AF, BF, DF	A	R	V, O, S	2, 5, 11, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Neoctantes niger	AF, BF, PF, CAM	A	R	V, O, S	20, 25, 47, 48	MPEG, MZUSP
Epinecrophylla leucophthalma	AF, BF, PF, DF	A	R	V, O, S	2, 5, 11, 13, 20, 25, 27, 25	MPEG
Epinecrophylla haematonota	BF, PF, DF, SF, CAM	A	R	V, O, S	2, 13, 19, 20, 27, 36, 48	MPEG
Epinecrophylla ornata (b)	AF, BF, PF, SF	A	R	V, O, S	2, 511, 13, 19, 20, 25, 36	MPEG, MZUSP
Myrmotherula brachyura	AF, PF, SF, CAM	A	R	V, O, S	2, 5, 20, 25, 27, 48	MPEG
Myrmotherula ignota	AF, BF, PF, SF	W	R	V, O	20, 48	
Myrmotherula sclateri	AF, BF, PF, DF, SF, CAM	A	R	V, O, S	2, 56, 20, 25, 48	MPEG
Myrmotherula multostriata	AF, PF, SF	W	R	V, O, S	20, 48	MPEG
Myrmotherula hauxwelli	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 13, 18, 19, 20, 25, 27, 36, 48	MPEG, UFAC
Myrmotherula axillaris	AF, BF, PF, DF, SF	A	R	V, O, S, P	2, 5, 8, 11, 13, 17, 19, 20, 25, 27, 36, 48	MPEG
Myrmotherula longipennis	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 13, 18, 19, 20, 25, 27, 28, 36, 48	MPEG, MZUSP
Myrmotherula iheringi (b)	AF, BF, PF, SF	A; Inamb. (e)	R	V, O, S	2, 5, 8, 13, 20, 27, 36, 48	MPEG, MZUSP
Myrmotherula menetriesii	AF, BF, PF, DF, SF	A	R	V, O, S	2, 13, 20, 25, 36, 48	MPEG, UFAC
Formicivora grisea	CAM	W	R	O, S	20, Guilherme & Aleixo unpubl. data	MPEG
Thamnomanes ardesiacus	AF, BF, PF, DF	A	R	V, O, S	5, 8, 11, 18, 19, 20, 25, 48	MPEG
Thamnomanes saturninus	AF, PF, SF, CAM	W	R	V, O, S	19, 20, 27, 28, 48	MPEG
Thamnomanes schistogynus	AF, BF, PF, DF, SF	A; Inamb.	R	V, O, S, P	2, 5, 6, 11, 13, 17, 18, 19, 20, 25, 27, 28, 36, 48	MPEG, MZUSP, UFAC
Dichrozona cincta	AF, PF, SF	A	R	V, O, S, P	2, 5, 20, 48	MPEG
Herpsilochmus rufimarginatus	PF	E	R	V, O, S	2, 5, 20	MPEG

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Thamnophilus doliatus	FE, OA, CAM, AA	A	R	V, O, S, P	5, 11, 13, 17, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Thamnophilus schistaceus	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 13, 17, 18, 20, 25, 27, 28, 35, 36, 48	MPEG, MZUSP
Thamnophilus murinus	AF, BF, PF, DF, SF	A	R	V, O, S	2, 8, 13, 17, 20, 48	MPEG
Thamnophilus aethiops	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 8, 11, 13, 19, 20, 25, 27, 28, 48	MPEG, MZUSP, UFAC
Thamnophilus amazonicus	AF, SF	W	R	V, P	20, 48	
Thamnophilus divisorius (a)	SF	W; Inamb.	R	V, O, S	20, 46	MPEG
Cymbilaimus lineatus	AF, BF, PF, DF, SF, CAM	A	R	V, O, S	2, 5, 11, 13, 19, 20, 25, 36, 48	MPEG
Cymbilaimus sanctaemariae (b)	AF, BF	A	R	V, O, S, P	2, 5, 11, 13, 20, 34, 47, 48, 49	LSUMZ, MPEG
Taraba major	FE, BF, PF, DF, SF, W	A	R	V, O, S	2, 5, 11, 13, 18, 20, 27, 28, 35, 48	MPEG, MZUSP
Frederickena unduligera	AF, BF, PF, SF, CAM	A	R	V, O, S	20, 27, 36, 48	MPEG
Sclateria naevia	AF, BF, PF, DF, SF	A	R	V, O, S	2, 20, 27, 35, 48	MPEG, MZUSP, UFAC
Schistocichla schistacea	BF, PF, SF	W	R	V, O, S	19, 20, 27, 48	MPEG
Schistocichla humaythae	BF, PF, SF	A	R	V, O, S	20, 25, 36, 48	MPEG
Hypocnemoides maculicauda	AF, BF, PF, SF	A	R	V, O, S	5, 20, 27, 28, 48	MPEG
Hylophylax naevius	AF, BF, PF, SF	A	R	V, O, S	2, 5, 11, 13, 18, 19, 20, 25, 48	MPEG, UFAC
Hylophylax punctulatus	AF	W	R	V, S	5, 20	MPEG
Percnostola lophotes (a), (b)	BF	A; Inamb.	R	V, O, S, P	2, 5, 13, 20, 25, 47, 48	MPEG, MZUSP
Myrmoborus leucophrys	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 13, 17, 20, 25, 27, 48	MPEG, MZUSP, UFAC
Myrmoborus myotherinus	AF, BF, PF, DF, SF, CAM	A	R	V, O, S, P	2, 5, 8, 11, 13, 19, 20, 25, 27, 36, 48	MPEG, MZUSP
Cercomacra cinerascens	AF, BF, PF, DF, SF	A	R	V, O, S	2, 11, 13, 20, 25, 35, 48	MPEG, MZUSP
Cercomacra nigrescens	AF, BF, PF, SF	A	R	V, O, S	2, 5, 8, 11, 20, 35, 48	MPEG, MZUSP
Cercomacra serva	BF, PF, SF, CAM	A	R	V, O, S	2, 5, 20, 25, 48	MPEG
Cercomacra manu (b)	BF	A	R	V, O, S	2, 5, 11, 13, 20, 47, 48	MPEG
Drymophila devillei (b)	BF	A	R	V, O, S	2, 4, 5, 13, 20, 25, 36, 47, 48	MPEG, MZUSP
Hypocnemis peruviana	AF, BF, PF, DF, SF	A	R	V, O, S, P	8, 11, 13, 17, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP, UFAC
Hypocnemis subflava (a), (b)	BF	E; Inamb.	R	V, O, S	2, 13, 20, 23, 25	MPEG
Hypocnemis hypoxantha	AF, BF, PF, SF, CAM	A	R	V, O, S	4, 19, 20, 48	MPEG
Willisornis poecilinotus	AF, BF, PF, DF, SF, CAM	A	R	V, O, S	2, 5, 8, 11, 13, 19, 20, 25, 27, 48	MPEG
Phlegopsis nigromaculata	AF, BF, DF	A	R	V, O, S	2, 5, 11, 13, 17, 19, 20, 25, 27, 28, 36, 48	MPEG, MZUSP, UFAC
Phlegopsis erythroptera	PF	W	R	V, O, S	19, 20, 48	MPEG
Gymnopithys salvini	AF, BF, PF, DF, SF, CAM	A; Inamb.	R	V, O, S	2, 5, 11, 13, 19, 20, 25, 27, 28, 36, 48	MPEG, UFAC
Rhegmatorhina melanosticta	BF, PF, SF	A; Inamb. (f)	R	V, O, S	2, 5, 13, 19, 20, 25, 27, 36, 48	MPEG

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Conopophagidae (2)						
Conopophaga aurita	AF, PF, SF, CAM	W	R	V, O, S	8, 20	MPEG
Conopophaga peruviana	BF, PF, DF, SF	A	R	V, O, S	20, 25, 27, 47, 48	MPEG
Grallariidae (3)						
Grallaria eludens (a)	BF, PF, SF	W; Inamb.	R	V, O	20, 47, 48	
Hylopezus berlepschi	AF, BF, PF, DF	A	R	V, O, S	2, 5, 11, 20, 47	MPEG, UFAC
Myrmothera campanisona	AF, BF, PF	A*	R	V, O, S	2, 5, 13, 20, 25, 27, 48	MPEG
Rhinocryptidae (1)						
Liosceles thoracicus	BF, PF	A	R	V, O, S	2, 5, 19, 20, 25, 48	MPEG
Formicariidae (4)						
Formicarius colma	AF, BF, PF, DF, CAM	A	R	V, O, S	2, 5, 11, 13, 19, 20, 25, 27, 35, 36, 48	MPEG
Formicarius analis	AF, BF, PF	A	R	V, O, S	2, 5, 11, 13, 17, 19, 20, 25, 27, 36, 48	MPEG, MZUSP
Formicarius rufifrons (a)	AF, BF, PF	A; Inamb.	R	V	2, 20, 47, 48	
Chamaeza nobilis	PF	W	R	V	Aleixo & Guilherme unpbl. data.	
Scleruridae (4)						
Sclerurus mexicanus	BF, PF	A	R	V, O, S	2, 5, 20, 25, 48	MPEG
Sclerurus rufigularis	PF, SF	W	R	V, O, S	20, 48	MPEG
Sclerurus caudacutus	BF, PF, DF	A	R	V, O, S	2, 5, 11, 13, 19, 20, 27, 48	MPEG
Sclerurus albigularis	BF, PF	A	R	V, O, S	2, 13, 20, 47, 48	MPEG
Dendrocolaptidae (20)						
Dendrocincla fuliginosa	AF, BF, PF, DF, SF, CAM	A*	R	V, O, S	2, 5, 11, 13, 20, 2527, 36, 48	MPEG, MZUSP
Dendrocincla merula	AF, BF, PF, DF	A	R	V, O, S	5, 8, 11, 13, 17, 20, 25, 36, 48	MPEG, MZUSP, UFAC
Deconychura longicauda	BF, PF, DF	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 25, 35, 36, 48	MPEG
Sittasomus griseicapillus	AF, BF, PF, DF, CAM	A	R	V, O, S	2, 5, 11, 13, 17, 19, 20, 25, 36, 48	MPEG, MZUSP, UFAC
Certhiasomus stictolaemus	BF, PF, CAM	A	R	V, O, S	2, 5, 17, 20, 48	MPEG
Glyphorynchus spirurus	AF, BF, PF, DF, SF, CAM	A*	R	V, O, S	2, 8, 11, 13, 19, 20, 25, 36, 48	MPEG
Xiphorhynchus chunchotambo (a)	AF, BF, PF	E	R	V, O, S	5, 7, 11, 13, 20, 25	MPEG, UFAC
Xiphorhynchus ocellatus	BF, PF	A	R	V, O, S	7, 20, 27, 28, 35, 36	MPEG
Xiphorhynchus elegans	AF, BF, PF, DF, CAM	A	R	V, O, S, P	2, 5, 8, 11, 19, 20, 25, 27, 35, 36, 48	MPEG
Xiphorhynchus obsoletus	AF, SF	A	R	V, O, S	5, 20	MPEG
Xiphorhynchus guttatus	AF, BF, PF, DF	A	R	V, O, S, P	2, 5, 8, 11, 13, 17, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP, UFAC
Campylorhamphus trochilirostris (b)	AF, BF, PF, SF	A	R	V, O, S	2, 5, 13, 20, 25, 48	MPEG

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Dendroplex picus	AF, BF, PF, SF, OA, P, CAM, AA	A	R	V, O, S, P	5, 11, 13, 17, 20, 35, 36, 48	MPEG, UFAC
Lepidocolaptes albolineatus	BF, PF, SF	A	R	V, O, S	2, 5, 11, 13, 20, 27, 48	MPEG
Nasica longirostris	AF, PF	A	R	V, O	2, 5, 27, 28, 48	
Dendrexetastes rufigula	AF, BF, PF, SF, CAM	A	R	V, O, S	2, 5, 8, 11, 20, 25, 48	MPEG
Dendrocolaptes certhia	AF, BF, PF, DF, SF, CAM	A	R	V, O, S	2, 5, 8, 20, 25, 27, 35, 48	MPEG, MZUSP
Dendrocolaptes picumnus	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 20, 25, 27, 28, 36, 48	MPEG, MZUSP
Xiphocolaptes promeropirhyunchus	BF, PF, SF	A	R	V, O	2, 5, 20, 25, 36, 48	MPEG
Hylexetastes stresemanni	BF, PF, DF, CAM	A; Inamb.	R	V, O, S	2, 5, 20, 25, 35, 48	MPEG
Furnariidae (26)						
Xenops tenuirostris	BF, PF	A	R	V, O	2, 20, 25, 36, 48	
Xenops minutus	AF, BF, PF, DF, SF, CAM	A	R	V, O, S	2, 5, 8, 11, 13, 17, 19, 20, 25, 36, 48	MPEG, UFAC
Xenops rutilans	BF, PF, SF	A	R	V, O	20, 48	
Berlepschia rikeri	AF, SF, CAM	W	R	O	8, 20	
Microxenops milleri	BF, PF, SF	W	R	O	20, 48	MPEG
Furnarius leucopus	AF, DF, AR, L, R	A	R	V, O, S, P	2, 5, 8, 11, 13, 17, 18, 19, 20, 25, 35, 36, 48	MPEG
Ancistrops strigilatus	AF, BF, PF	A	R	V, O, S	2, 20, 36	MPEG
Hyloctistes subulatus	AF, BF, PF	A	R	V, O, S	2, 20, 48	MPEG, UFAC
Automolus ochrolaemus	AF, BF, PF, DF	A	R	V, O, S	2, 5, 11, 13, 19, 20, 25, 27, 36, 48	MPEG, UFAC
Automolus infuscatus	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 13, 19, 20, 25, 27, 36, 48	MPEG
Automolus melanopezus (b)	AF, BF	A	R	V, O, S, P	2, 5, 13, 20, 25, 36, 48	MPEG, MZUSP, UFAC
Automolus rubiginosus	BF, PF, SF	A	R	V, O, S	2, 13, 20, 25, 29, 36, 48	MPEG
Automolus rufipileatus	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 13, 20, 27, 28, 48	MPEG, MZUSP
Anabazenops dorsalis (b)	BF	A	R	O, V	2, 5, 20, 48	
Philydor ruficaudatus	BF, PF, SF	A	R	V, O, S, P	11, 20, 25, 27, 36, 48	MPEG
Philydor erythrocercum	BF, PF, DF, CAM	A	R	V, O, S	5, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Philydor erythropterum	AF, BF, PF, DF	A	R	V, O, S	2, 8, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Philydor rufum	AF	A	R	V, O, S	2, 20, 48	MPEG
Philydor pyrrhodes	BF, PF, DF, SF	A	R	V, O, S	5, 11, 20, 25, 48	MPEG, MZUSP
Simoxenops ucayalae (b)	BF, SF	A	R	V, O, S	2, 5, 6, 13, 20, 25, 47, 48	MPEG, MZUSP
Synallaxis albigularis	AF	W	R	O, V	20, 48	
Synallaxis rutilans	BF, PF, DF, CAM	A	R	V, O, S	2, 13, 20, 25	MPEG, UFAC
Synallaxis cherriei (b)	BF	A	R	V, O, S	2, 13, 20, 48	MPEG

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Synallaxis gujanensis	AF, SF	W	R	V, O, S	5, 20, 25, 48	MZUSP
Metopothrix aurantiacus	AF	A	R	V, O, S	2, 20, 48	MPEG
Cranioleuca gutturata	BF, PF, SF	A	R	V, O, S	5, 20, 35, 48	MPEG, MZUSP
Pipridae (14)						
Neopelma sulphureiventer	AF, BF, PF, SF	A; Inamb.	R	V, O, S, P	2, 5, 11, 13, 19, 20, 25, 47, 48	MPEG, MZUSP
Tyranneutes stolzmanni	AF, BF, PF, SF, CAM	W	R	V, O, S	11, 20, 25, 48	MPEG
Pipra filicauda	AF, DF	W	R	O, S	20, 27, 28, 48	MPEG
Pipra fasciicauda	AF, BF, PF, DF	A	R	V, O, S, P	2, 5, 11, 13, 17, 19, 20, 25, 27, 36, 48	MPEG, MZUSP, UFAC
Pipra rubrocapilla	BF, PF, DF, CAM	A	R	V, O, S	8, 11, 13, 19, 20, 25, 35, 36, 48	MPEG, MZUSP
Pipra chloromeros (a)	AF, BF, PF	A; Inamb.	R	V, O, S	2, 20, 47, 48	MPEG
Lepidothrix coronata	AF, BF, PF, DF, SF, CAM	A; Inamb. (h)	R	V, O, S	2, 5, 17, 19, 20, 22, 25, 27, 35, 36, 48	CPJH, MPEG, MZUSP, UFAC
Manacus manacus	AF, BF, PF, SF, CAM	W	R	V, O, S	8, 19, 20, 48	MPEG, UFAC
Heterocercus linteatus	CAM	W	R	O	20	
Machaeropterus striolatus	AF, BF, PF, SF, CAM	A	R	V, O, S	8, 20, 47, 48	MPEG
Machaeropterus pyrocephalus	AF, BF, PF, DF, SF, CAM	A	R	V, O, S	17, 20, 25, 36, 47, 48	MPEG, MZUSP, UFAC
Dixiphia pipra	AF, BF, PF, CAM	W	R	V, O, S	8, 19, 20, 27, 48	MPEG
Xenopipo atronitens	CAM	W	R	O, S	8, 20	MPEG
Chiroxiphia pareola	PF, SF, CAM	A	R	O, V	5, 20, 25, 48	
Tityridae (17)						
Onychorhynchus coronatus	BF, PF, DF, SF, CAM	A	R	V, O, S	2, 5, 11, 13, 17, 20, 25, 36, 48	MPEG, UFAC
Terenotriccus erythrurus	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 13, 20, 25, 27, 36, 48	MPEG, MZUSP
Myiobius barbatus	AF, PF, SF, CAM	W; Inamb. (g)	R	V, O, S	20, 27, 48	MPEG
Myiobius atricaudus	AF, SF	W	R	V, O, S	20, 48	MPEG
Schiffornis major	AF, BF, PF	A	R	V, O, S	13, 17, 20, 27, 48	MPEG
Schiffornis amazona	PF, CAM	W	R	V, O, S	8, 20, 48	MPEG, UFAC
Laniocera hypopyrrha	AF, BF, PF, DF, CAM	A	R	V, O, S	8, 11, 13, 20, 36, 48	MPEG
Iodopleura isabellae	PF, DF, SF, CAM	A	R	V, O, S, P	5, 8, 20, 25, 47, 48	MPEG
Tityra inquisitor	AF, BF, PF	A	R	V, O, S	2, 5, 19, 20, 25, 48	MPEG
Tityra cayana	AF, BF, PF, DF	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 25, 48	FU
Tityra semifasciata	AF, BF, PF, DF	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 25, 35, 36, 48	MPEG, MZUSP
Pachyramphus xanthogenys (a)	BF, PF	E	R	V, O, S	1, 2, 20	MPEG

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Pachyramphus rufus	BF, PF	E	R	O	20, 36	
Pachyramphus castaneus	BF, PF	W	R	O, V	5, 2048	
Pachyramphus polychopterus	BF, PF, DF	A	R	V, O, S	2, 5, 11, 13, 20, 25, 35, 36, 48	MPEG, MZUSP, UFAC
Pachyramphus marginatus	AF, BF, PF	A	R	V, O, S	2, 5, 11, 20, 25, 35	MPEG, MZUSP
Pachyramphus minor	BF, PF, DF, CAM	A	R	V, O, S	2, 11, 20, 27, 28, 35, 36, 48	MPEG, MZUSP
Cotingidae (8)						
Lipaugus vociferans	AF, BF, PF, DF, SF, CAM	A	R	V, O, S	2, 5, 11, 13, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Porphyrolaema porphyrolaema	BF, PF	W	R	V, O	20, 48	
Gymnoderus foetidus	AF, BF, PF, DF	A	R	V, O, S, P	2, 5, 11, 20, 25, 48	MPEG
Conioptilon mcilhennyi (a)	AF, BF, PF, DF	A; Inamb.	R	V, O, S, P	2, 5, 11, 20, 25, 31 47, 48	MPEG
Cotinga maynana	BF, PF, SF	W	R	V, O	20, 48	
Cotinga cayana	AF, BF, PF	W	R	V, O, S	5, 20, 25, 48	MPEG
Querula purpurata	AF, BF, PF, DF, SF, CAM	A	R	V, O, S	2, 5, 11, 13, 20, 36, 47, 48	MPEG
Cephalopterus ornatus	AF, SF	W	R	O, S	20, 48	MPEG
***Incertae sedis* (4)**						
Platyrinchus coronatus	AF, PF, SF	W	R	V, O, S	5, 11, 20, 25, 48	MPEG
Platyrinchus platyrhynchos	PF, CAM	A	R	V, O, S	2, 20, 25, 48	MPEG
Piprites chloris	AF, BF, PF, SF	A	R	V, O, S	2, 5, 11, 13, 20, 25, 36, 48	MPEG, MZUSP
Neopipo cinamomea	SF, CAM	W	R	O, S	6, 20, Guilherme & Aleixo unpubl. data	MPEG
Rhynchocyclidae (23)						
Cnipodectes subbrunneus	AF, BF, PF, SF, CAM	W	R	V, O, S, P	8, 11, 20, 27, 48	MPEG
Cnipodectes superrufus (a), (b)	BF	E; Inamb.	R	V, O, S, P	2, 13, 20, 42	MPEG
Mionectes oleagineus	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 8, 13, 18, 20, 25, 48	MPEG, UFAC
Mionectes amazonus	PF	W; Inamb.	R	S	20	MPEG
Leptopogon amaurocephalus	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 8, 11, 17, 18, 19, 20, 25, 36, 48	MPEG, MZUSP, UFAC
Corythopis torquatus	AF, BF, PF, DF, SF	A	R	V, O, S	2, 11, 13, 17, 19, 20, 25, 48	MPEG
Rhynchocyclus olivaceus	AF, BF, PF, DF, SF	A	R	S, O, V, P	2, 11, 13, 17, 20, 48	MPEG
Tolmomyias sulphurescens	BF, PF	W	R	O, V	11, 20, 48	
Tolmomyias assimilis	FE, CAM	A	R	V, O, S	2, 5, 13, 20, 48	MPEG
Tolmomyias poliocephalus	FE, BF, PF	A	R	V, O, S	2, 5, 11, 20, 25, 48	MPEG
Tolmomyias flaviventris	FE, OA, P, CAM	A	R	V, O, S	2, 20, 25, 48	MPEG, MZUSP
Todirostrum maculatum	AF, BF, PF, SF, OA, P, CAM	A	R	V, O, S	2, 5, 11, 17, 19, 20, 25, 27, 48	MPEG

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Todirostrum chrysocrotaphum	AF, BF, PF	A	R	V, O, S, P	2, 5, 20, 25, 36, 48	CPJH, MPEG, UFAC
Poecilotriccus albifacies (a), (b)	BF	E; Inamb.	R	V, O, S, P	20, 49	MZUSP
Myiornis ecaudatus	BF, PF, DF, CAM	A	R	V, O, S	5, 20, 25, 35, 36, 48	MPEG, MZUSP
Hemitriccus minor	BF, PF	E	R	V, O, S	17, 20, 25	MPEG
Hemitriccus flammulatus (b)	AF, BF	A	R	V, O, S	2, 5, 11, 13, 14, 17, 19, 20, 25, 36, 48	MPEG, MZUSP, UFAC
Hemitriccus griseipectus	PF, BF, DF, SF, CAM	A	R	V, O, S	8, 20, 25, 27, 35, 48	MPEG, UFAC
Hemitriccus iohannis	BF, PF	A	R	V, O, S	6, 20, 48	CPJH
Hemitriccus minimus	BF, PF, SF, CAM	W	R	V, O, S	3, 8, 13, 20, 25	MPEG
Poecilotriccus latirostris	BF, PF, SF	W	R	V, O	20, 48	
Lophotriccus vitiosus	PF, CAM	W	R	V, O, S	20, 27, 48	MPEG
Lophotriccus eulophotes (b)	BF, PF	A; Inamb.	R	V, O, S, P	2, 5, 11, 13, 20, 36, 47, 48	MPEG, UFAC
Tyrannidae (61)						
Zimmerius gracilipes	FE, SF, P, CAM	A	R	V, O, S	2, 5, 11, 20, 25, 48	MPEG
Inezia inornata	AF, BF, PF	A	I	V, O, S	6, 20, 48	CPJH, UFAC
Ornithion inerme	AF, BF, PF, SF, CAM	A	R	V, O	2, 5, 11, 13, 20, 25, 48	
Camptostoma obsoletum	FE, SF, OA, P, CAM	A	R	V, O	5, 13, 17, 20, 25, 48	
Elaenia flavogaster	BF, PF	E	A	O, S	20, 25, 35	MZUSP
Elaenia spectabilis	AF, BF, PF, SF, OA, P, CAM	A	A	V, O, S	11, 19, 20, 27, 48	MPEG, UFAC
Elaenia albiceps	FE, PF, OA, P, CAM	A	A	V, O	20, 36, 48	
Elaenia parvirostris	FE, OA, P, CAM	A	A	V, O, S	20, 25, 48	MPEG, UFAC
Myiopagis gaimardii	AF, BF, PF, SF, OA, P, CAM, AA	A	R	V, O, S	2, 5, 8, 11, 13, 20, 25, 36, 48	MPEG
Myiopagis caniceps	AF, BF, PF, SF	A	R	V, O	2, 5, 20, 25, 36, 48	
Myiopagis flavivertex	AF, SF	A	R	V, O	20, 27, 28	MPEG
Myiopagis viridicata	BF, PF	E	A	S	17, 20	MPEG
Tyrannulus elatus	AF, BF, PF, DF, SF, CAM	A	R	V, O, S	2, 5, 8, 11, 17, 20, 25, 27, 48	MPEG, UFAC
Phaeomyias murina	AF, PF, OA, P, CAM, AA	A	R	V, O, S, P	20, 48	MPEG, UFAC
Pseudocolopteryx acutipennis	PF	E	I	O	5, 20	
Attila cinnamomeus	AF, DF	W	R	V, O, S	11, 20, 27, 48	MPEG
Attila citriniventris	BF, PF, CAM	W	R	V, O, S	8, 20, 48	MPEG
Attila bolivianus	AF, BF, PF	A	R	V, O, S	2, 5, 11, 20, 27, 48	MPEG
Attila spadiceus	AF, BF, PF	A	R	V, O, S	2, 5, 11, 19, 20, 25, 48	MPEG, UFAC
Legatus leucophaius	FE, AO, P, CAM	A	R	V, O, S	2, 5, 11, 13, 17, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Ramphotrigon megacephalum (b)	AF, BF, PF, SF	A	R	V, O, S	2, 5, 11, 13, 20, 25, 48	MPEG, MZUSP
Ramphotrigon ruficauda	BF, PF, DF, SF	A	R	V, O, S	5, 8, 11, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Ramphotrigon fuscicauda (b)	BF, PF, DF, SF	A	R	V, O, S, P	2, 5, 11, 13, 14, 20, 25, 36, 47, 48	MPEG, MZUSP
Myiarchus tuberculifer	FE, OA, P, CAM	A	R	V, O, S	2, 5, 11, 20, 25, 36, 48	MPEG
Myiarchus swainsoni	FE	A	A	O	13, 17, 20, 25, 35, 36, 48	MZUSP
Myiarchus ferox	FE, OA, P, CAM, AA	A	R	V, O, S	2, 5, 11, 13, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Myiarchus tyrannulus	AF, BF, PF, DF	A	R	V, O, S	5, 27, 20, 35	MPEG, MZUSP
Sirystes sibilator	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 20, 25, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Rhytipterna simplex	BF, PF, CAM	A	R	V, O, S	2, 5, 11, 20, 25, 35, 48	MPEG, MZUSP
Casiornis rufus	FE	E	I	S	20	MPEG
Pitangus sulphuratus	FE, AO, P, CAM, AA	A	R	V, O, S, P	2, 5, 11, 13, 17, 19, 20, 25, 35, 36, 48	MPEG, MZUSP
Philohydor lictor	FE, OA, P, CAM, AA	A	R	V, O, S, P	5, 20, 25, 35, 36, 48	MZUSP
Myiodynastes luteiventris	FE	W	N	V, O	20, 47, 48	
Myiodynastes maculatus	FE, OA, P, CAM, AA	A	R	V, O, S, P	2, 5, 13, 17, 18, 19, 20, 25, 36, 48	MPEG
Tyrannopsis sulphurea	FE, PF, SF, OA, P, CAM	A	R	V, O, S, P	20, 36, 48	MPEG, UFAC
Megarhynchus pitangua	FE, OA, P, CAM, AA	A	R	V, O, S, P	2, 5, 11, 13, 17, 18, 19, 20, 25, 27, 36, 48	MPEG, UFAC
Myiozetetes cayanensis	FE, AO, P, CAM, AA, AR, R	A	R	V, O, S, P	5, 11, 13, 17, 19, 20, 25, 36, 48	MPEG, UFAC
Myiozetetes similis	FE, AO, P, CAM, AA, AR, R	A	R	V, O, S, P	2, 5, 11, 13, 17, 19, 20, 27, 36, 48	MPEG, UFAC
Myiozetetes granadensis	AF, FE, CAM	A	R	V, O, S, P	2, 5, 8, 20, 48	MPEG
Myiozetetes luteiventris (a)	FE, AO, P, CAM, AA	A	R	V, O, S	2, 5, 20, 25, 35, 48	MPEG, MZUSP
Tyrannus albogularis	FE, OA, P, CAM, AA	E	I	O, S	11, 20	MPEG, UFAC
Tyrannus melancholicus	FE, OA, P, CAM, AA	A	R	V, O, S, P	2, 5, 11, 13, 17, 19, 20, 25, 27, 35, 36, 48	MPEG, UFAC
Tyrannus savana	FE, OA, P, CAM, AA	A	A	O, S, P	2, 5, 11, 17, 20, 25, 35, 48	MZUSP
Tyrannus tyrannus	FE	A	N	O, S	2, 5, 10, 18, 20, 25, 47, 48	MPEG
Griseotyrannus aurantioatrocristatus	FE, OA, P, CAM, AA	A	R	V, O, S	2, 5, 20, 36, 48	MPEG, MZUSP
Empidonomus varius	FE, OA	W	R	O, V, S	5, 13, 20, 25, 48	UFAC
Conopias trivirgatus	AF, PF, SF	A	R	O, V	2, 5, 20, 47, 48	
Conopias parvus	AF, PF, SF, CAM	A	R	O, V, P	3, 20, 47, 48	
Colonia colonus	FE, AR	A	R	O	2, 25, 11, 20, 48	
Myiophobus fasciatus	PF, SF, OA, P, CAM	A	A	V, O, S	2, 5, 11, 19, 20, 35, 48	MPEG, MZUSP
Sublegatus modestus	AF, PF, SF, OA, P, CAM	A	A	O, S	13, 17, 20, 35, 48	MZUSP
Pyrocephalus rubinus	FE, AO, P, CAM	A	A	O, S, P	2, 5, 11, 17, 20, 25, 27, 35, 36, 48	MPEG, MZUSP, UFAC

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Fluvicola albiventer	FE, AR	A	A	O, S	20, 35, 48	MZUSP
Ochthornis littoralis	FE, AR	A	R	O, S, P	2, 5, 11, 17, 18, 19, 20, 27, 35, 48	MPEG, MZUSP, UFAC
Cnemotriccus fuscatus	AF, BF, PF, SF, CAM	A	R, A	V, O, S, P	20, 36	MPEG
Lathrotriccus euleri	AF, BF, PF	A	A	O, S	2, 5, 13, 20, 25, 27, 48	MPEG
Empidonax alnorum	FE	A	N	V, O, S	25, 20, 47, 48	MPEG, UFAC
Contopus cooperi	FE	A	N	V, O	20, 25, 48	
Contopus virens	FE	A	N	V, O, S	2, 5, 8, 20, 25, 48	MPEG
Contopus cinereus	FE	A	N	V, O, S	20	MPEG
Muscisaxicola fluviatilis	FE, AR	W; Inamb.	R	O	5, 20, 48	
Vireonidae (7)						
Cyclarhis gujanensis	AF, BF, PF, DF, SF, AA	A	R	V, O, S	2, 5, 11, 13, 17, 19, 20, 25, 35, 48	MZUSP
Vireolanius leucotis	BF, PF, SF	A	R	V, O, S	2, 5, 11, 20, 25, 48	MPEG
Vireo olivaceus	AF, BF, PF, DF, SF	A	R, A	V, O, S, P	2, 11, 13, 17, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Vireo flavoviridis	AF, BF, PF	A	N	V, O, S	2, 8, 20, 45, 47, 48	MPEG
Hylophilus thoracicus	BF, PF, DF	A	R	V, O, S	2, 5, 20, 25, 35, 36, 48	MZUSP
Hylophilus hypoxanthus	AF, BF, P F, SF, CAM	A	R	O	2, 5, 11, 20, 25, 48	
Hylophilus ochraceiceps	AF, BF, PF, SF	A	R	V, O, S	2, 20, 25, 27, 48	MPEG
Corvidae (1)						
Cyanocorax violaceus	AF, BF, PF, SF	A	R	V, O, S, P	2, 5, 8, 11, 19, 20, 27, 28, 36, 48	MPEG
Hirundinidae (10)						
Pygochelidon cyanoleuca	FE, AR, L	W	R	V, O	25, 20, 47, 48	
Atticora fasciata	FE, AR, L, A	A	R	V, O, S, P	2, 5, 11, 17, 19, 20, 27, 35, 48	MPEG, MZUSP, UFAC
Atticora tibialis	FE, AR	A	R	V, O, S	20, 35, 48	MZUSP
Stelgidopteryx ruficollis	FE, AR, L, A, OA, AA	A	R	V, O, S, P	2, 5, 11, 13, 17, 19, 20, 27, 35, 36, 48	MPEG, MZUSP, UFAC
Progne tapera	AA, FE, AR, L, A, OA	A	R	V, O, S, P	2, 5, 11, 17, 19, 20, 25, 27, 48	MPEG
Progne subis	FE, OA, AA	A	N	O	20, 25, 48	
Progne chalybea	AA, AR, L , OA	A	R	V, O, S, P	2, 5, 11, 17, 19, 20, 27, 35, 36, 48	MPEG
Tachycineta albiventer	AR, L, A	A	R	V, O, S, P	2, 5, 11, 13, 17, 19, 20, 25, 27, 35, 48	MPEG
Riparia riparia	FE, AR, L	W	R	V, O	20, 47, 48	
Hirundo rustica	FE, AR, L , OA	A	N	V, O, S	20, 35, 47	MZUSP
Troglodytidae (6)						
Microcerculus marginatus	AF, BF, PF, DF, SF, CAM	A	R	V, O, S	2, 5, 11, 13, 20, 25, 27, 48	MPEG

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Troglodytes musculus	FE, OA, CAM, AA	A	R	V, O, S	5, 11, 13, 17, 20, 25, 35, 36, 48	MPEG, MZUSP
Campylorhynchus turdinus	FE, AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 13, 19, 20, 25, 35, 48	MPEG, MZUSP
Pheugopedius genibarbis	FE, AF, BF, PF, DF	A	R	V, O, S	2, 5, 8, 11, 13, 17, 19, 20, 25, 36, 48	MPEG, MZUSP, UFAC
Cantorchilus leucotis	FE, AF, BF, PF, SF	A	R	V, O, S, P	5, 20, 27, 36, 48	MPEG, MZUSP, UFAC
Cyphorhinus arada	AF, BF, PF, DF, SF	A; Inamb. (i)	R	V, O, S	13, 20, 27, 28, 35, 48	MPEG
Donacobiidae (1)						
Donacobius atricapilla	AF, W	A	R	V, O, S	5, 11, 17, 20, 35, 36, 48	MZUSP
Polioptilidae (2)						
Ramphocaenus melanurus	AF, BF, PF	A	R	V, O, S	2, 5, 11, 13, 20, 25, 48	MPEG, MZUSP
Polioptila plumbea	BF, PF, DF, SF, CAM	A	R	V, O	2, 5, 11, 20, 48	
Turdidae (8)						
Catharus minimus	PF	E	N	S	20, 29	MPEG
Catharus swainsoni	BF, PF, DF, CAM	A	N	O, S	8, 17, 18, 20, 25, 48	MPEG, MZUSP
Turdus amaurochalinus	FE, AA, OA	E	A	O, S	17, 18, 20, 35, 36	MPEG, MZUSP
Turdus ignobilis	FE, OA, CAM, AA	A	R	V, O, S, P	2, 5, 8, 11, 13, 17, 20, 25, 35, 48	MPEG, MZUSP, UFAC
Turdus lawrencii	AF, PF, SF	A	R	V, O, S	2, 8, 20, 48	MPEG
Turdus hauxwelli	AF, BF, PF, DF	A	R	V, O, S, P	2, 58, 11, 13, 17, 19, 20, 25, 27, 48	MPEG, UFAC
Turdus albicollis	BF, PF, DF, SF, CAM	A	R	V, O, S	5, 19, 20, 25, 36, 48	MPEG
Turdus sanchezorum	AF, PF	E	R	S, O	20	MPEG
Coerebidae (1)						
Coereba flaveola	FE, AF, PF, CAM	A	R	O, V	2, 20, 13, 48	
Thraupidae (41)						
Saltator grossus	BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 13, 17, 20, 25, 36, 48	MPEG
Saltator maximus	FE, CAM, OA, CAM, AA	A	R	V, O, S, P	2, 5, 8, 11, 13, 17, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP, UFAC
Saltator coerulescens	FE, OA, CAM, AA	A	R	V, O, S, P	2, 11, 17, 20, 27, 28, 35, 36, 48	MPEG, MZUSP, UFAC
Pakerthraustes humeralis	BF, PF	W	R	V, O	5, 20, 48	
Conothraupis speculigera (a)	FE	W	I	O, S	19, 20, 39, 47	MPEG, MZUSP
Lamprospiza melanoleuca	FE, AF, PF, DF, CAM	A	R	V, O, S	2, 5, 13, 20, 25, 47, 48	MPEG
Nemosia pileata	AF, BF, PF	W	R	V, O	5, 20, 48	
Thlypopsis sordida	PF	W	R	O	20, 48	
Tachyphonus phoenicius	CAM	W	R	O	Guilherme & Aleixo unpubl. data	UFAC
Ramphocelus nigrogularis	AF, FE	A	R	V, O, S, P	2, 5, 8, 11, 18, 19, 20, 27, 30, 48	LSUMZ, MPEG

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Ramphocelus carbo	FE, CAM, OA, AA	A	R	V, O, S, P	2, 5, 8, 11, 13, 17, 19, 20, 25, 27, 28, 35, 36, 48	MPEG, MZUSP, UFAC
Lanio luctuosus	AF, BF, PF, DF	A	R	V, O, S, P	2, 5, 11, 13, 17, 20, 25, 27, 28, 35, 36, 48	MPEG, MZUSP
Lanio cristatus	BF, PF, DF	A	R	V, O, S	20, 25, 35, 36, 48	MZUSP
Lanio rufiventer	AF, BF, PF, SF	W, Inamb.	R	V, O, S	5, 20, 48	MPEG
Lanio versicolor	AF, BF, PF, SF	A	R	V, O, S	2, 11, 18, 19, 20, 25, 36, 48	MPEG
Lanio surinamus	AF, BF, PF, DF, CAM	W	R	V, O, S	11, 20, 27, 48	MPEG
Lanio penicillatus	AF	A	R	V, O, S	20, 25, 27, 28, 36, 48	MPEG
Tangara gyrola	AF, BF, PF, SF	A	R	V, O	2, 11, 20, 48	
Tangara schrankii	AF, BF, PF, DF, SF	A	R	V, O, S, P	2, 5, 11, 13, 20, 25, 27, 28, 35, 36, 48	MPEG, MZUSP
Tangara mexicana	AF, BF, PF, DF, SF	A	R	V, O, S, P	5, 11, 13, 17, 20, 27, 28, 36, 48	MPEG, UFAC
Tangara chilensis	AF, BF, PF, DF, SF	A	R	V, O, S, P	2, 5, 8, 11, 13, 19, 20, 27, 28, 35, 36, 48	MPEG, MZUSP, UFAC
Tangara velia	AF, BF, PF, SF	A	R	V, O, S	5, 8, 13, 20, 25, 36, 48	MPEG
Tangara callophrys	AF, BF, PF, DF, SF	A	R	V, O, S	11, 20, 25, 48	MPEG
Tangara xanthogastra	AF, BF, PF, SF	A	R	V, O, S	20, 36, 48	MZUSP
Tangara episcopus	FE, CAM, OA, AA	A	R	V, O, S, P	2, 5, 11, 13, 17, 19, 20, 25, 35, 36, 48	MPEG, MZUSP
Tangara palmarum	AF, FE, CAM, OA, AA	A	R	V, O, S, P	2, 5, 8, 11, 13, 17, 19, 20, 25, 35, 36, 48	MPEG, MZUSP, UFAC
Tangara nigrocincta	AF, PF, DF, SF	A	R	V, O, S	2, 5, 8, 13, 19, 20, 25, 35, 48	MPEG, MZUSP
Cissopis leverianus	FE	A	R	V, O, S, P	2, 11, 19, 20, 27, 35, 36, 48	MPEG, MZUSP
Schistochlamys melanopis	P, OA	E	R	O, S, P	20, 36	UFAC
Paroaria gularis	AF, FE, AR	A	R	V, O, S, P	2, 5, 11, 19, 20, 27, 35, 36, 48	MPEG, MZUSP
Tersina viridis	FE, AF, PF, SF	A	R	V, O, S	2, 5, 11, 19, 20, 48	MPEG
Dacnis lineata	AF, PF, DF	A	R	V, O, S	2, 5, 19, 20, 25, 36, 48	MPEG
Dacnis flaviventer	AF, PF, SF	A	R	V, O, S	11, 20, 27, 28, 48	MPEG
Dacnis cayana	AF, BF, PF, DF	A	R	V, O, S	2, 5, 13, 17, 19, 20, 25, 36, 48	MPEG
Cyanerpes nitidus	AF, BF, PF, SF	W	R	V, O, S	8, 20, 48	MPEG
Cyanerpes caeruleus	AF, BF, PF, SF, CAM	W	R	V, O, S	8, 20, 48	MPEG
Cyanerpes cyaneus	AF, BF, PF, SF	A	R	V, O	13, 19, 20, 48	
Chlorophanes spiza	AF, BF, PF	A	R	V, O, S	5, 11, 20, 25, 27, 48	MPEG
Hemithraupis guira	BF, PF, DF, SF	A	R	V, O, S	2, 5, 11, 13, 20, 25, 35, 48	MPEG, MZUSP
Hemithraupis flavicollis	AF, BF, PF, SF	A	R	V, O	5, 20, 25, 36, 48	
Conirostrum speciosum	AF	E	R	V, O	11, 20	

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Emberizidae (13)						
Ammodramus aurifrons	FE, OA, P, CAM, AA	A	R	V, O, S, P	2, 5, 11, 13, 17, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Sicalis flaveola	OA, AA	A	R	V, O, P	16, 20, 21, 48	
Volatinia jacarina	FE, OA, P, CAM, AA	A	R	V, O, S	5, 11, 13, 17, 20, 25, 36, 48	MPEG, UFAC
Sporophila schistacea	FE	A	R	O, S	20, 47	MZUSP
Sporophila bouvronides	FE, OA, P, CAM, AA	A	I	V, O, S, P	18, 20, 47, 48	MPEG, UFAC
Sporophila lineola	FE, OA, P, CAM	A	I	V, O, S	17, 20, 25	UFAC
Sporophila luctuosa (a)	FE, OA, P, CAM	W	I	V, O, S	20, 47, 48	MPEG
Sporophila caerulescens	FE, OA, P, CAM	A	I	V, O, S, P	2, 5, 11, 17, 20, 35, 48	MZUSP
Sporophila castaneiventris	FE, OA, P, CAM, AA	A	R	V, O, S, P	5, 11, 17, 18, 19, 20, 27, 35, 36, 48	MPEG, MZUSP, UFAC
Sporophila angolensis	FE, OA, P, CAM, AA	A	R	V, O, S, P	5, 11, 13, 17, 19, 20, 25, 36, 48	MPEG, UFAC
Sporophila maximiliani	OA	W	R	O	20	
Tiaris sp.	FE	E	I	V	2, 20	
Arremon taciturnus	BF, PF, DF	A	R	V, O, S	2, 5, 18, 19, 20, 25, 36, 48	MPEG, UFAC
Cardinalidae (3)						
Habia rubica	AF, BF, PF, DF, SF	A	R	V, O, S	2, 5, 13, 20, 25, 36, 48	MPEG
Piranga rubra	PF	W	N	O	20, 48	
Piranga olivacea	AF, BF, PF	A	N	V, O, S	20, 47, 48	MPEG
Cyanoloxia cyanoides	BF, PF, DF	A	R	V, O, S	2, 5, 11, 13, 20, 25, 36, 48	MPEG, MZUSP, UFAC
Parulidae (2)						
Wilsonia canadensis	AF	W	N	O	20	
Phaeothlypis fulvicauda	AF, BF, PF, DF, SF	A	R	V, O, S, P	2, 5, 11, 13, 20, 25, 48	MPEG
Icteridae (16)						
Psarocolius angustifrons	AF, BF, PF, OA, CAM	A	R	V, O, S, P	2, 5, 11, 18, 20, 48	MPEG
Psarocolius viridis	BF, PF, SF, OA, CAM	W	R	V, O, S	8, 2027, 48	MPEG
Psarocolius decumanus	AF, BF, PF, DF, SF, OA, CAM	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 25, 35, 36, 48	MPEG, MZUSP
Psarocolius bifasciatus	AF, BF, PF, DF, SF, OA, CAM	A	R	V, O, S, P	2, 5, 8, 11, 13, 19, 20, 25, 35, 36, 48	MPEG, MZUSP
Procacicus solitarius	AF, BF, PF, OA, CAM	A	R	V, O, S	2, 5, 8, 19, 20, 48	MPEG, MZUSP
Cacicus haemorrhous	BF, PF	A	R	O	20, 36, 48	
Cacicus oseryi	AF, BF, PF, SF	A	R	V, O, S	2, 5, 8, 20, 47, 48	MPEG
Cacicus latirostris	AF, BF, PF, SF	W	R	V, O, S	11, 20, 47, 48	MPEG
Cacicus cela	FE, OA, CAM, AA	A	R	V, O, S, P	2, 5, 8, 11, 13, 17, 19, 20, 25, 27, 28, 35, 36, 48	MPEG, MZUSP, UFAC

Families and species[1]	Habitat[2]	Distribution/ Endemism[3]	Status[4]	Type of record[5]	References[6]	Institution[7]
Cacicus koepckeae (a)	AF	E; Inamb.	R	O	5, 20	
Icterus cayanensis	AF, PF, SF, CAM	A	R	V, O, S	2, 8, 5, 20, 48	MPEG
Icterus croconotus	AF, PF, SF, OA, CAM	A	R	V, O, S, P	2, 5, 20, 36, 48	MPEG
Lampropsar tanagrinus	AF,PF	A	R	V, O, S	20, 25, 27, 48	MPEG
Molothrus oryzivora	FE, AR, L, OA, CAM	A	R	V, O, S, P	2, 5, 11, 13, 19, 20, 25, 27, 35, 36, 48	MPEG, MZUSP
Molothrus bonariensis	FE, OA, AA, CAM	A	R	V, O, S	2, 5, 17, 20, 48	MPEG
Sturnella militaris	AA, CAM, AA, OA, P	A	R	V, O, S, P	5, 11, 13, 17, 18, 19, 20, 25, 30, 35, 36	MPEG, MZUSP, UFAC
Fringillidae (6)						
Euphonia chlorotica	FE, CAM, AA	A	R	O, V	2, 19, 20	
Euphonia laniirostris	AF, BF, PF	A	R	V, O, S	2, 11, 20, 25, 27, 48	MPEG
Euphonia chrysopasta	AF, BF, PF, DF, SF, CAM	A	R	V, O, S, P	5, 11, 13, 20, 35, 48	MPEG, MZUSP
Euphonia minuta	AF, PF	A	R	V, O, S	2, 20, 25, 48	MPEG
Euphonia xanthogaster	AF, BF, PF	A	R	V, O, S	2, 5, 17, 20, 27, 48	MPEG
Euphonia rufiventris	AF, PF, CAM	A	R	V, O, S	2, 5, 11, 20, 25, 48	MPEG
Estrildidae (1)						
Estrilda astrild	AA	E	R, In	V, O, S	20, 38	UFAC
Passeridae (1)						
Passer domesticus	AA	A	R, In	V, O	16, 20	

[1]Families and species - Nomenclature and taxonomy follow CBRO (2011)

(a) – Species known to occur in Brazil based solely on records from the state of Acre;

(b) – Species associated with the bamboo forests of the state of Acre.

[2]Habitat

AF – Alluvial open rainforest; BF – Bamboo forest (*terra firme* rainforest); PF – Open rainforest with palms; SF – Dense submontane rainforest; DF – Dense rainforest; FE – Forest edge; CAM – Campinas and campinaranas (white sand forest); R – Reservoirs; L – Lakes; AR – Associated with rivers; OA – Open area; AA – Anthropogenic area; W – Wetlands; FB – Fluvial beach; P – Pasture.

[3]Distribution/ Endemism

A – Occurs throughout the state of Acre; E – Recorded only in the eastern sub-region (right margin of the Purus River); W – Recorded only in the western sub-region (left margin of the Purus River); Inamb – Species restricted to the Inambari area of endemism.

* Species represented by more than one subspecies in Acre. In this case, at least one of the subspecies occurs only in one of the sub-regions of the state (see Tables 1 and 2).

(a) Only the subspecies *Amazilia lactea bartletii* is endemic to the Inambari center;

(b) Only the subspecies *Nonnula r. ruficapilla* is endemic to the Inambari center;

(c) Only the subspecies *Selenidera reinwardtii langsdorffii* is endemic to the Inambari center;
(d) Only the subspecies *Picumnus aurifrons juruanus* is endemic to the Inambari center;
(e) Only the subspecies *Myrmotherula iheringi heteroptera* is endemic to the Inambari center;
(f) Only the subspecies *Rhegmatorhina melanosticta purusiana* is endemic to the Inambari center;
(g) Only the subspecies *Myiobius barbatus amazonicus* is endemic to the Inambari center;
(h) Only the subspecies *Lepidothrix coronata exquisita* is endemic to the Inambari center;
(i) Only the subspecies *Cyphorhinus arada modulator* is endemic to the Inambari center.

[4]Status
R – Resident, N – Nearctic migrant; In – Invader; Va - Vagrant; I – Intratropical migrant; A – Austral migrant.

[5] Type of record
V – Vocalization (from the MPEG collection or the personal archives of the person responsible for the record – see references); O – Observation, S – Museum specimen; P – Photograph available on the wikiaves site (www.wikiaves.com.br).

[6] References:
1: Aleixo *et al.* (2008); 2: Aleixo and Guilherme (2010); 3: Alvarez-Alonso and Whitney (2003); 4: Bates *et al.* (1999); 5: Buzzetti (2008); 6: Forrester (1993); 7: Guilherme and Aleixo (2008); 8: Guilherme and Borges (2011); 9: Guilherme and Dantas (2008); 10: Guilherme and Aleixo (2011); 11: Guilherme and Dantas, (2011a); 12: Guilherme and Dantas, (2011b); 13: Guilherme and Santos, 2009; 14: Guilherme *et al.* (2003); 15: Guilherme *et al.* (2005); 16: Guilherme (2000); 17: Guilherme (2001); 18: Guilherme (2004); 19: Guilherme (2007); 20: Guilherme (2009); 21: Guilherme (2011); 22: Hidasi and Bankovics (1997); 23: Isler *et al.* (2007); 24: Mestre and Bierregaard (2009); 25: Mestre *et al.*(2010a); 26: Mestre *et al.* (2010b); 27: Novaes (1957); 28: Novaes (1958); 29: Novaes (1978); 30: Parker and Remsen (1987); 31: Mestre *et al.* (2009); 32: Peres (1990); 33: Peres (1996); 34: Pierpont and Fitzpatrick (1983); 35: Pinto and Camargo (1954): 36: Rasmussen *et al.* (2005); 37: Rego *et al.* (2009); 38: Silva (2004); 39: Stotz (1990); 40: Teixeira *et al.* (1994); 41: Tobias and Brightsmith (2007); 42: Tobias *et al.* (2008); 43: Whitney and Oren (2001a); 44: Whitney and Oren (2001b); 45: Whitney and Pacheco, (2001); 46: Whitney *et al.* (2004); 47: Whittaker and Oren (1999); 48: Whittaker *et al.* (2002); 49: Zimmer *et al.* (2010).

[7] Institution housing Acre specimen(s) of the respective species:

AMNH - American Museum of Natural History; CPJH – Private collection of Prof. José Hidasi (Goiânia); FU - Florida Museum of Natural History; LSUMZ - Louisiana State University Museum of Natural Sciences; MNRJ – Museu Nacional do Rio de Janeiro; MPEG – Coleção Ornitológica Dr. Fernando C. Novaes - Museu Paraense Emílio Goeldi; MZUSP – Museu de Zoologia da Universidade de São Paulo; UFAC – Laboratório de Ornitologia da Universidade Federal do Acre, ZUEC – Coleção Ornitológica do Museu de Zoologia da Universidade Estadual de Campinas, São Paulo.

APPENDIX 2

Secondary (hypothetical) list of birds for the Brazilian state of Acre. Includes species for which vouchered records for the state are lacking as well as those recorded from nearby localities in neighboring Brazilian states and countries. Taxonomy and nomenclature follow CBRO (2011).

Family/Species	Locality	Source	Comments
Tinamidae			
Crypturellus tataupa	Acre	Aleixo & Whittaker (in litt.)	Requires confirmation
Anatidae			
Dendrocygna bicolor	Peru	Walker *et al*. 2006	Probable occurrence
Neochen jubata	Peru	Walker *et al*. 2006	Probable occurrence
Cracidae			
Nothocrax urumutum	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Crax globulosa	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Podicipedidae			
Podilymbus podiceps	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Ardeidae			
Zebrilus undulatus	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Ixobrychus exilis	Peru	Walker *et al*. 2006	Probable occurrence
Threskiornithidae			
Cercibis oxycerca	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Phimosus infuscatus	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Platalea ajaja	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Cathartidae			
Cathartes burrovianus	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Vultur gryphus	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Accipitridae			
Circus buffoni	Peru, Bolivia	Walker *et al*. 2006; Tobias & Seddon 2007	Probable occurrence
Accipiter poliogaster	Acre	Whittaker & Oren 1999	Requires confirmation
Accipiter striatus	Acre	Guilherme 2001	Requires confirmation
Falconidae			
Falco sparverius	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Falco femoralis	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Falco deiroleucus	Peru	Walker *et al*. 2006	Probable occurrence
Falco peregrinus	Peru, Amazonas	Walker *et al*. 2006; Aleixo & Poletto 2006	Probable occurrence
Rallidae			
Aramides calopterus	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Amaurolimnas concolor	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Pardirallus nigricans	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Porphyrio flavirostris	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Recurvirostridae			
Himantopus mexicanus	Peru	Walker *et al*. 2006	Probable occurrence
Scolopacidae			
Bartramia longicauda	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Calidris fuscicollis	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Columbidae			
Geotrygon saphirina	Peru	Walker *et al*. 2006	Probable occurrence

Family/Species	Locality	Source	Comments
Psittacidae			
Deroptyus accipitrinus	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Cuculidae			
Neomorphus pucheranii	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Nyctibidae			
Nyctibius bracteatus	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Caprimulgidae			
Hydropsalis leucopyga	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Chordeiles minor	Peru, Bolívia	Walker *et al.* 2006; Tobias & Seddon 2007	Probable occurrence
Trochilidae			
Phaethornis stuarti	Peru	Walker *et al.* 2006	Probable occurrence
Lophornis chalybeus	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Discosura langsdorffi	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Amazilia versicolor	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Bucconidae			
Micromonacha lanceolata	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Capitonidae			
Capito aurovirens	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Thamnophilidae			
Myrmeciza castanea	Peru	Alvarez-Alonso & Whitney 2003	Probable occurrence
Epinecrophylla erythrura	Acre	Whitney *et al.* 1998 (in litt.)	Requires confirmation
Myrmotherula sunensis	Acre	Forrester 1993	Requires confirmation
Megastictus margaritatus	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Herpsilochmus sp.	Amazonas	Aleixo 2003 (in litt.)	Probable occurrence
Sakesphorus sp.	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Hypocnemoides melanopogon	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Dendrocolaptidae			
Campylorhamphus procurvoides	Acre	Rasmussen *et al.* 2005; Whittaker *et al.* 2002	Requires confirmation
Dendroplex kienerii	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Furnariidae			
Synallaxis cabanisi	Peru	Walker *et al.* 2006	Probable occurrence
Cranioleuca vulpecula	Bolivia	Tobias & Seddon 2007	Probable occurrence
Cranioleuca vulpina	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Thripophaga fusciceps	Peru	Walker *et al.* 2006	Probable occurrence
Cotingidae			
Xipholena punicea	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Rhynchocyclidae			
Hemitriccus striaticollis	Amazonas	Poletto & Aleixo 2005	Probable occurrence
Poecilotriccus capitalis	Acre	Rasmussen *et al.* 2005	Requires confirmation
Tyrannidae			
Elaenia pelzelni	Bolívia	Tobias & Seddon 2007	Probable occurrence
Elaenia strepera	Peru	Walker *et al.* 2006	Probable occurrence
Elaenia gigas	Peru	Walker *et al.* 2006	Probable occurrence
Capsiempis flaveola	Peru	Walker *et al.* 2006	Probable occurrence
Machetornis rixosa	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Rhytipterna immunda	Bolivia	Tobias & Seddon 2007	Probable occurrence

Family/Species	Locality	Source	Comments
Sublegatus obscurior	Peru	Walker *et al*. 2006	Probable occurrence
Aurundinicola leucocephala	Acre	Ridgely & Tudor, 1994	Requires confirmation
Knipolegus hudsoni	Bolivia	Tobias & Seddon 2007	Probable occurrence
Satrapa icterophrys	Peru	Walker *et al*. 2006	Probable occurrence
Vireonidae			
Hylophilus pectoralis[1]	Acre	Guilherme & Dantas 2011	Excluded
Hylophilus semicinereus	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Hirundinidae			
Tachycineta leucorrhoa	Peru	Walker *et al*. 2006	Probable occurrence
Progne elegans	Peru	Walker *et al*. 2006	Probable occurrence
Petrochelidon pyrrhonota	Peru, Bolivia	Walker *et al*. 2006; Tobias & Seddon 2007	Probable occurrence
Troglodytidae			
Microcerculus bambla	Acre	Ridgely & Tudor, 1994	Requires confirmation
Odontorchilus sp.	Acre	Whitney *et al.* 1998 (in litt.)	Requires confirmation
Pheugopedius coraya	Acre	Ridgely & Tudor, 1994	Requires confirmation
Cantorchilus griseus	Acre	Ridgely & Tudor, 1994	Requires confirmation
Henicorhina leucosticta	Acre	Rasmussen *et al.* 2005	Requires confirmation
Polioptilidae			
Polioptila sp.	Amazonas	Aleixo & Poletto (in litt.)	Probable occurrence
Turdidae			
Catharus fuscescens	Acre	Ridgely & Tudor 1994	Probable occurrence
Turdus nudigenis[2]	Acre	Aleixo & Guilherme 2010	Excluded
Thraupidae			
Tangara cyanicollis	Acre	Whitney *et al.* 1998 (in litt.)	Requires confirmation
Pipraeidea melanonota	Acre	Ridgely & Tudor 1994	Requires confirmation
Dacnis albiventris	Peru	Walker *et al*. 2006	Probable occurrence
Conirostrum margaritae	Bolivia	Tobias & Seddon 2007	Probable occurrence
Emberizidae			
Sporophila hypoxantha	Bolivia	Tobias & Seddon 2007	Probable occurrence
Sporophila ruficollis	Bolivia	Tobias & Seddon 2007	Probable occurrence
Sporophila americana	Acre	Ridgely & Tudor 1994	Probable occurrence
*Sporophila nigricollis**	Acre	Ridgely &Tudor 1994	Probable occurrence
Parulidae			
Dendroica striata	Acre	Ridgely & Tudor 1994	Requires confirmation
Oporornis agilis	Acre	Ridgely & Tudor 1994	Requires confirmation
Geothlypis aequinoctialis	Acre	Forrester, 1993	Requires confirmation
Basileuterus culicivorus	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation
Icteridae			
Agelasticus xanthophthalmus	Peru	Walker *et al.* 2006	Probable occurrence
Fringillidae			
Chlorophonia cyanea	Acre	Whittaker *et al.* 2002, Supplement	Requires confirmation

[1, 2] - The species *Turdus nudigenis* and *Hylophilus pectoralis* were, respectively, mistyped (Aleixo and Guilherme 2010) and misidentified (Guilherme and Dantas 2011), and are thus excluded from the checklist of Acre birds.
* Two photographs taken in Tarauacá (in December, 2010) were attributed to *Sporophila nigricollis* on the Wikiaves site. As I was not sure to determine whether this specimen represents *S. nigricollis* or *Sporophila luctuosa*, *S. nigricollis* was maintained in the secondary list until further documentary evidence is collected.

Revista Brasileira de Ornitologia, 20(4), 443-446
Dezembro de 2012 / December 2012

ARTIGO/ARTICLE

First record of *Augastes scutatus* for Bahia refines the location of a purported barrier promoting speciation in the Espinhaço Range, Brazil

Marcelo Ferreira de Vasconcelos[1,3], Anderson Vieira Chaves[2] and Fabrício Rodrigues dos Santos[2]

[1] Pontifícia Universidade Católica de Minas Gerais. Pós-graduação em Zoologia de Vertebrados and Museu de Ciências Naturais. Avenida Dom José Gaspar, 500, Prédio 41, Coração Eucarístico, CEP 30535-610, Belo Horizonte, MG, Brasil.
[2] Universidade Federal de Minas Gerais. Departamento de Biologia Geral, Instituto de Ciências Biológicas. Caixa Postal 486, CEP 31270-901, Belo Horizonte, MG, Brasil.
[3] Corresponding author: mfvasconcelos@gmail.com.

Received on 13 October 2011. Accepted on 19 August 2012.

ABSTRACT: First record of *Augastes scutatus* for Bahia refines the location of a purported barrier promoting speciation in the Espinhaço Range, Brazil. We present the first records of *Augastes scutatus* for the state of Bahia, whose range now is only 150 km away from that of its purported allospecies (*A. lumachella*). Based on geological evidence and vegetation cover, we suggest that the possible vicariant barrier that led to the speciation of these allospecies would be represented by the Caetité plateau (covered mainly by Cerrado) and the lowland areas of the Contas river valley (covered mainly by Caatinga), both in southern Bahia. Possibly, the isolation of those two species in different sectors of the Espinhaço Range (northern and southern parts) is related to climatic changes of the Plio-Pleistocene, which should led populations of an ancestral lineage to take refuge in these higher areas during one or more interglacial periods.

KEY-WORDS: *Augastes*; biogeography; *campos rupestres*; geographical barrier; vicariance.

INTRODUCTION

The genus *Augastes* Gould, 1849 is represented by three species: *A. scutatus* (Temminck, 1824), *A. lumachella* (Lesson, 1838) and *A. geoffroyi* (Bourcier, 1843) (Schuchmann 1999). *Augastes scutatus* and *A. lumachella* are considered possible allospecies, both restricted to the *campos rupestres* vegetation in the highlands of the Espinhaço Range, eastern Brazil (Silva 1995, Sick 1997, Vasconcelos 2008). *Augastes scutatus* is known to be restricted to the central and southern portions of the Espinhaço Range (in Minas Gerais state), while *A. lumachella* is distributed in the northern section of this mountain range (Chapada Diamantina region and northern mountains in Bahia state; Ruschi 1962, 1963, Grantsau 1967, 1988, Silva 1995, Sick 1997, Schuchmann 1999, Vasconcelos 2008, Souza *et al*. 2009). Both species of *Augastes* endemic to the Espinhaço Range are tightly linked to the *campos rupestres* flora (see Vasconcelos 2011), feeding on nectar and using material to build nests from various plant species endemic or typical of this vegetation type (Ruschi 1962, Grantsau 1967, 1988, Vasconcelos & Lombardi 2001, Vasconcelos *et al*. 2001, Machado *et al.* 2003, 2007, Rodrigues 2011). *Augastes geoffroyi* ranges in the Andean region, from Bolivia to Colombia and Venezuela (Ruschi 1963, Fjeldså & Krabbe 1990, Schuchmann 1999). Nevertheless, there are doubts whether this species should be considered a representant of the genus *Augastes* or the genus *Schistes* (Schuchmann 1999), thus its evolutionary affinities still needs to be better studied under a phylogenetic perspective (see Abreu 2006).

The mountains of the Espinhaço Range consist of an ancient unit belonging to the predominantly quartzitic Espinhaço Supergroup, which was deposited in a continental rift (starting around 1,752 million years ago) and later metamorphosed and uplifted in the Brasiliano orogeny, between 650 and 550 million years ago (Schobbenhaus 1996, Barbosa *et al*. 2003, Pedreira & De Waele 2008). With the tectonic events that resulted in the fragmentation of Gondwanaland in the Mesozoic, the region suffered differential movement and sag, with uplift of neighboring blocks. This movement was continued, but with less intensity, throughout the Cenozoic (Saadi 1993, 1995, Uhlein *et al.* 1995, Horn *et al.* 1996, Potter 1997, Ab'Sáber 2000, Cruz & Alkmim 2007, Knauer 2007, Caxito *et al*. 2008).

Considering both putative allospecies in eastern Brazilian mountains (*A. scutatus* and *A. lumachella*), Silva

(1995) suggested that a vicariant event in the Espinhaço Range region would be the responsible for their speciation. Meanwhile, until recently, there was a gap of more than 300 km between the ranges of these two species of *Augastes* in the Espinhaço Range (between Grão Mogol, Minas Gerais, and the southern Chapada Diamantina, Bahia). Thus, it was not possible to infer what would be the geographical barrier that led to this probable vicariant event. Later, Vasconcelos (2008) collected specimens of *A. scutatus* in the extreme northern Minas Gerais (Serra do Pau D'Arco), and this gap was reduced to 180 km. Here, we report on the northernmost record to date for *A. scutatus*, which provides insights on the purported vicariant barrier responsible for the speciation of both *Augastes* species in eastern Brazil.

MATERIAL AND METHODS

Between 4 and 7 January 2011, we collected bird specimens at Morro do Chapéu (between 14°52'44"S/ 42°30'15"W and 14°54'11"S / 42°31'33"W), a mountain located in Jacaraci municipality, southern Bahia state. Specimens were collected with air-compressed carbines, prepared as study skins and deposited at the ornithological collections of the Department of Zoology of the Universidade Federal de Minas Gerais (DZUFMG) and of the Museu de Ciências Naturais da Pontifícia Universidade Católica de Minas Gerais (MCNA), both in Belo Horizonte, Minas Gerais, Brazil.

RESULTS AND DISCUSSION

On 5 January, a male of *A. scutatus* (DZUFMG 6668) was collected in a *campo rupestre* area at Morro do Chapéu (14°53'44"S; 42°30'59"W; elevation: 1,325 m). On the next day, another male (MCNA 1314) was collected on the mountain-top (14°54'00"S; 42°31'05"W; elevation: 1,430 m). These are the first records of this species in Bahia state, narrowing the gap between its range and that of its northern supposed allospecies (*A. lumachella*) to only about 150 km (Figure 1).

Other species of plants and amphibians also share a similar pattern of distribution of these two putative hummingbird allospecies, whereby a species occurs in the central-southern portion (in Minas Gerais state) while the other is distributed in the northern section (in Chapada Diamantina region, Bahia state) of the Espinhaço Range (Harley 1995, Lugli & Haddad 2006a, b, Leite *et al.* 2008). Some authors (e.g., Rapini *et al.* 2008, Ribeiro *et al.* 2008) admit that the disjunction between the *campos rupestres* of Minas Gerais and Bahia would be of 300 km, with a lowland barrier imposed by the valleys of the Contas, Pardo and Jequitinhonha rivers, all covered with xerophytic Caatinga and other semi-deciduous forest vegetations. These dry valleys would promote the vicariance of these taxa inside the Espinhaço Range and also prevent floristic and faunistic exchange between the central-southern (Minas Gerais) and northern (Bahia) sections of this mountain range (e.g., Harley 1988, Borba *et al.* 2001, Lugli & Haddad 2006a, b, Rapini *et al.* 2008, Ribeiro *et al.* 2008). Nevertheless, the recent records of *A. scutatus* in southern Bahia show that this possible disjunction is only half (c. 150 km) of the original presumed distance, and would include only the Contas River valley.

It is also important to stress that there is a small plateau in the Caetité region (between 800 and 1,100 m), north of Jacaraci, which could represent a stepping-stone linking both sections of the Espinhaço highlands (Figure 1). Meanwhile, this plateau is predominantly covered by typical Cerrado (savannah), and there are only small patches of rocky outcrops around the village of Brejinho das Ametistas (with less than 3 ha each) with several typical Caatinga plants (including several cacti), but only a few typical montane plant species, such as *Vellozia* sp. (M. F. V. *pers. obs.*). A survey conducted in this area by M. F. V. (between 29 April and 5 May 2008) failed to record any *Augastes*. Thus, these small patches of rocky outcrops in the Caetité plateau probably do not represent suitable habitat for any species of *Augastes*, especially because they lack several plants typical of the habitats used by those two hummingbirds. Also, the lithology of the Caetité plateau is completely different from that of the Espinhaço Range. It is predominantly composed by Cenozoic sedimentary rocks of the last 60 million years that have been deposited in topographically lower areas in relation to the adjacent Espinhaço mountains (Schobbenhaus 1996, Barbosa *et al.* 2003, Cruz & Alkmim 2007, Caxito *et al.* 2008). Thus, during the Cenozoic, the plateau in the Caetité region was not represented by high mountains, and, even with present altitudes above 1,000 m, it does not have any representative area of *campos rupestres* typical of the Espinhaço Range that could maintain viable populations of plants and animals associated to this vegetation type (see Vasconcelos 2011). Thus, this region, together with the Contas lowland river valley, originally covered by Caatinga vegetation, is not suitable for the modern occurrence and dispersal of both species of *Augastes* in the Espinhaço Range, as well as several other typical *campo rupestre* plants and amphibians from central-southern (Minas Gerais) and northern (Bahia) sections of this mountain range.

The possible vicariance between the two species of *Augastes* may be related to climate changes during the Pio-Pleistocene. In this context, it is possible that during global cooling events, taxa of plants and animals typical of the *campos rupestres*, which are currently restricted to the mountain-tops, may have survived at lower altitudes (see Harley 1988, Safford 2007). In this case, an ancestral lineage of the two species of *Augastes* would be formerly distributed in a wider area. During one or more warming cycles, this

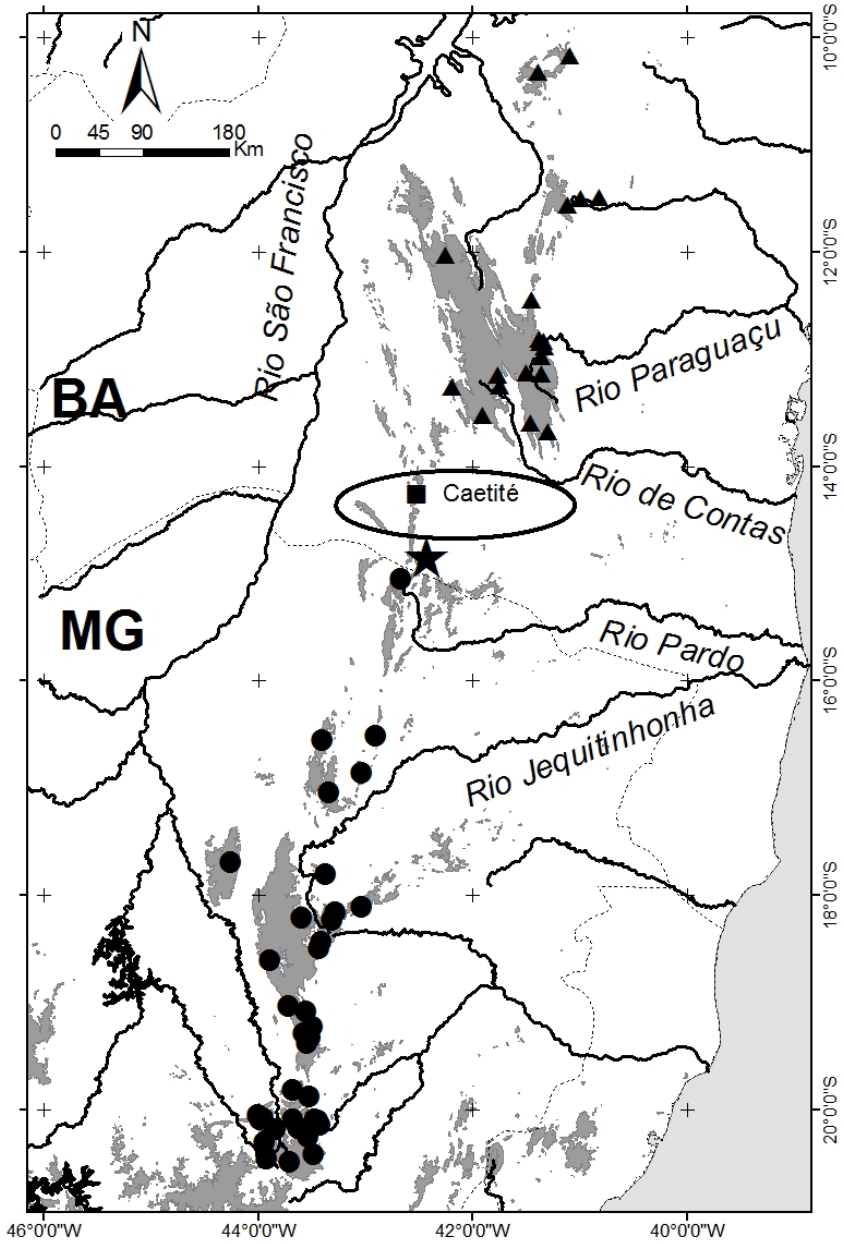

FIGURE 1: Occurrence of *Augastes scutatus* (circles) and *Augastes lumachella* (triangles), showing the first record of *A. scutatus* for Bahia (star) and a gap of 150 km between the ranges of both species. The plateau around Caetité, represented by Cenozoic sedimentary rocks, together with the lowlands of the Contas river hydrographic basin are the possible vicariant barrier for the genus in the Espinhaço Range (ellipse). Areas above 1,000 m are shaded. Brazilian states: BA = Bahia; MG = Minas Gerais.

lineage would have been forced to accompany the retraction of the *campos rupestres* palaeovegetation toward the summit and ridges of the Espinhaço mountains. Thus, ancestral populations would have been trapped in "islands" of *campos rupestres* on the Espinhaço Range mountain-tops, with one population isolated in a southern area and another in the northern region, respectively originating *A. scutatus* and *A. lumachella*. Even if we consider potential dispersal among ridges located in the southern and northern portions of Espinhaço Range, these two populations would have been unable to cross areas of unsuitable habitats, such as those represented by the Caetité plateau and the Contas River lowlands. All these hypotheses can be evaluated once a phylogeography /phylogeny is available for *A. scutatus* and *A. lumachella* and the genus *Augastes* as a whole, as well as other *campo rupestre* bird species with wider distributions throughout the Espinhaço Range, such as *Polystictus superciliaris* and *Embernagra longicauda*.

ACKNOWLEDGEMENTS

We are grateful to J. E. dos Santos Júnior for technical support in the fieldwork. P. T. A. Castro helped with the interpretation of geological papers and provided important information on the geology of the Espinhaço Range. D. Hoffmann kindly prepared the map that illustrate figure 1. V. Q. Piacentini and A. Aleixo made important suggestions to early versions of the manuscript. This study was made possible through research grants from CNPq, FAPEMIG, Vale and CAPES.

REFERENCES

Abreu, C. R. M. 2006. *Revisão taxonômica de Augastes scutatus (Temminck, 1824) (Aves: Trochilidae)*. M. Sc. dissertation. Rio de Janeiro: Universidade Federal do Rio de Janeiro.

Ab'Sáber, A. N. 2000. Summit surfaces in Brazil. *Revista Brasileira de Geociências*, 30: 515-516.

Barbosa, J. S. F.; Sabaté, P. & Marinho, M. M. 2003. O Cráton do São Francisco na Bahia: uma síntese. *Revista Brasileira de Geociências*, 33: 3-6.

Borba, E. L.; Felix, J. M.; Solferini, V. N. & Semir, J. 2001. Fly-pollinated *Pleurothallis* (Orchidaceae) species have high genetic variability: evidence from isozyme markers. *American Journal of Botany*, 88: 419-428.

Caxito, F. A.; Santos, Y. L. O. P.; Uhlein, A.; Pedreira, A. J. & Faulstich, F. R. L. 2008. A geologia entre Macaúbas e Canatiba (Bahia) e a evolução do Supergrupo Espinhaço no Brasil oriental. *Geonomos*, 16: 11-20.

Cruz, S. C. P. & Alkmim, F. F. 2007. A história de inversão do aulacógeno do Paramirim contada pela sinclinal de Ituaçu, extremo sul da Chapada Diamantina (BA). *Revista Brasileira de Geociências*, 37: 92-110.

Fjeldså, J. & Krabbe, N. 1990. *Birds of the high Andes*. Copenhagen: Zoological Museum, University of Copenhagen and Svendborg, Apollo Books.

Grantsau, R. 1967. Sôbre o gênero *Augastes*, com a descrição de uma subespécie nova (Aves, Trochilidae). *Papéis Avulsos de Zoologia, Museu de Zoologia da Universidade de São Paulo*, 21: 21-31.

Grantsau, R. 1988. *Os beija-flores do Brasil*. Rio de Janeiro: Editora Expressão e Cultura.

Harley, R. M. 1988. Evolution and distribution of *Eriope* (Labiatae), and its relatives, in Brazil, p. 71-120. In: Vanzolini, P. E. & Heyer, W. R. (eds.). Proceedings of a workshop on Neotropical distribution patterns. Rio de Janeiro: Academia Brasileira de Ciências.

Harley, R. M. 1995. Introduction, p. 1-42. In: Stannard, B. L.; Harvey, Y. B. & Harley, R. M. (eds.). Flora of the Pico das Almas, Chapada Diamantina – Bahia, Brazil. Kew: Royal Botanic Gardens.

Horn, A. H.; Morteani, G. & Ackermand, D. 1996. Significado da ocorrência de fosfatos e boratos de alumínio no contato entre os Supergrupos Rio Paraúna e Espinhaço na região de Diamantina, Minas Gerais, Brasil. *Geonomos*, 4: 1-10.

Knauer, L. G. 2007. O Supergrupo Espinhaço em Minas Gerais: considerações sobre sua estratigrafia e seu arranjo estrutural. *Geonomos*, 15: 81-90.

Leite, F. S. F.; Juncá, F. A. & Eterovick, P. C. 2008. Status do conhecimento, endemismo e conservação de anfíbios anuros da Serra do Espinhaço, Brasil. *Megadiversidade*, 4: 158-176.

Lugli, L. & Haddad, C. F. B. 2006a. A new species of the *Bokermannohyla pseudopseudis* group from central Bahia, Brazil (Amphibia, Hylidae). *Herpetologica*, 62: 453-465.

Lugli, L. & Haddad, C. F. B. 2006b. New species of *Bokermannohyla* (Anura, Hylidae) from central Bahia, Brazil. *Journal of Herpetology*, 40: 7-15.

Machado, C. G.; Coelho, A. G.; Santana, C. S. & Rodrigues, M. 2007. Beija-flores e seus recursos florais em uma área de campo rupestre da Chapada Diamantina, Bahia. *Revista Brasileira de Ornitologia*, 15: 267-279.

Machado, C. G.; Moreira, T. A.; Nunes, C. E. C. & Romão, C. O. 2003. Use of *Micranthocereus purpureus* (Guerke) F. Ritter, 1968 (Cactaceae) hairs in nests of *Augastes lumachellus* Lesson, 1839 [*sic*] (Trochilidae, Aves). *Sitientibus, Série Ciências Biológicas*, 3: 131-132.

Pedreira, A. J. & De Waele, B. 2008. Contemporaneous evolution of the Palaeoproterozoic-Mesoproterozoic sedimentary basins of the São Francisco-Congo Craton, p. 33-48. In: Pankhurst, R. J.; Trouw, R. A. J.; Brito Neves, B. B. & De Wit, M. J. (eds.). West Gondwana: Pre-Cenozoic correlations across the South Atlantic region. London: Geological Society (Special Publications 294).

Potter, P. E. 1997. The Mesozoic and Cenozoic paleodrainage of South America: a natural history. *Journal of South American Earth Sciences*, 10: 331-344.

Rapini, A.; Ribeiro, P. L.; Lambert, S. & Pirani, J. R. 2008. A flora dos campos rupestres da Cadeia do Espinhaço. *Megadiversidade*, 4: 16-24.

Ribeiro, P. L.; Borba, E. L.; Smidt, E. C.; Lambert, S. M.; Schnadelbach, A. S. & van den Berg, C. 2008. Genetic and morphological variation in the *Bulbophyllum exaltatum* (Orchidaceae) complex occurring in the Brazilian "campos rupestres": implications for taxonomy and biogeography. *Plant Systematics and Evolution*, 270: 109-137.

Rodrigues, L. C. 2011. *Beija-flores e seus recursos florais em uma área de campo rupestre: composição de espécies, sazonalidade e rede de interações*. Ph. D. dissertation. Belo Horizonte: Universidade Federal de Minas Gerais.

Ruschi, A. 1962. Algumas observações sôbre *Augastes lumachellus* (Lesson) e *Augastes scutatus* (Temminck). *Boletim do Museu de Biologia Prof. Mello Leitão, Série Biologia*, 31: 1-24.

Ruschi, A. 1963. A atual distribuição geográfica das espécies e sub-espécies do gênero *Augastes*, com a descrição de uma nova subespécie: *Augastes scutatus soaresi* Ruschi e a chave artificial e analítica para o reconhecimento das mesmas. (Trochilidae – Aves). *Boletim do Museu de Biologia Prof. Mello Leitão, Série Divulgação*, 4: 1-4.

Saadi, A. 1993. Neotectônica da Plataforma Brasileira: esboço e interpretação preliminares. *Geonomos*, 1: 1-15.

Saadi, A. 1995. A geomorfologia da Serra do Espinhaço em Minas Gerais e de suas margens. *Geonomos*, 3: 41-63.

Safford, H. D. 2007. Brazilian páramos IV. Phytogeography of the campos de altitude. *Journal of Biogeography*, 34: 1701-1722.

Schobbenhaus, C. 1996. As tafrogêneses superpostas Espinhaço e Santo Onofre, estado da Bahia: revisão e novas propostas. *Revista Brasileira de Geociências*, 26: 265-276.

Schuchmann, K. L. 1999. Family Trochilidae (hummingbirds), p. 468-680. In: del Hoyo, J.; Elliott, A. & Sargatal, J. (eds.). Handbook of the birds of the world, Barn-owls to hummingbirds, v. 5. Barcelona: Lynx Edicions.

Sick, H. 1997. *Ornitologia brasileira*. Rio de Janeiro: Editora Nova Fronteira.

Silva, J. M. C. 1995. Biogeographic analysis of the South American Cerrado avifauna. *Steenstrupia*, 21: 49-67.

Souza, E. A.; Nunes, M. F. C.; Simão, I.; Souza, A. E. B. A.; Las Casas, F. M. G.; Rodrigues, R. C. & Fonseca-Neto, F. P. 2009. Ampliação de área de ocorrência do beija-flor-de-gravatinha-vermelha *Augastes lumachella* (Lesson, 1838) (Trochilidae). *Ornithologia*, 3: 145-148.

Uhlein, A.; Trompette, R. & Egydio-Silva, M. 1995. Rifteamentos superpostos e tectônica de inversão na borda sudeste do Cráton do São Francisco. *Geonomos*, 3: 99-107.

Vasconcelos, M. F. 2008. Mountaintop endemism in eastern Brazil: why some bird species from campos rupestres of the Espinhaço Range are not endemic to the Cerrado region? *Revista Brasileira de Ornitologia*, 16: 348-362.

Vasconcelos, M. F. 2011. O que são campos rupestres e campos de altitude nos topos de montanha do Leste do Brasil? *Revista Brasileira de Botânica*, 34: 241-246.

Vasconcelos, M. F. & Lombardi, J. A. 2001. Hummingbirds and their flowers in the campos rupestres of southern Espinhaço Range, Brazil. *Melopsittacus*, 4: 3-30.

Vasconcelos, M. F.; Vasconcelos, P. N. & Fernandes, G. W. 2001. Observations on a nest of Hyacinth Visorbearer *Augastes scutatus*. *Cotinga*, 16: 57-61.

Associate Editor: Caio Graco Machado

Revista Brasileira de Ornitologia, 20(4), 447-450
Dezembro de 2012 / December 2012

ARTIGO/ARTICLE

Records of the Crowned Eagle (*Urubitinga coronata*) in Moxos plains of Bolivia and observations about breeding behavior

Igor Berkunsky[1,2,6], Gonzalo Daniele[2,3], Federico P. Kacoliris[2,3], Sarah I. K. Faegre[4], Facundo A. Gandoy[3], Lyliam González[5] and José A. Díaz Luque[2]

[1] Grupo Ecología Matemática. Instituto Multidisciplinario sobre Ecosistemas y Desarrollo Sustentable, Universidad Nacional del Centro de la Provincia de Buenos Aires. Campus Universitario, Paraje Arroyo Seco (B7000GHG) Tandil. Argentina.
[2] Proyecto de conservación de la Paraba Barba Azul, World Parrot Trust. Casilla correos 101. Trinidad, Beni. Bolivia.
[3] Facultad de Ciencias Naturales y Museo, Universidad Nacional de la Plata. Paseo del Bosque s/n (B1900FWA) La Plata. Argentina.
[4] Rota Avian Behavioral Ecology Program, University of Washington. P.O. Box 1298. Rota, MP 96951, USA.
[5] Paraíso Travel. Calle 6 de Agosto Nº 138, Trinidad, Beni. Bolivia.
[6] Corresponding author. Email: igorberkunsky@gmail.com

Received on 7 June 2012. Accepted on 13 September 2012.

ABSTRACT: The Crowned Eagle (*Urubitinga coronata*, Accipitridae) is a globally endangered raptor, endemic to central and southern South America. Little is known about this species in Bolivia and no nesting or prey data have been reported for the country until now. Between 2007 and 2011, we detected Crowned Eagles in four different locations in Moxos Savannahs of Beni Department, Bolivia. We observed an active nest of Crowned Eagle on 23 November 2007. The nest contained a nestling and it was placed on a living tree approximately 13 m in height and approximately 8 m above the ground. This nest was empty during September and October 2008, but contained another nestling on 15 November 2009. These represent the first breeding records for the Crowned Eagle in Bolivia. Prey remains at the nest observed included two nine-banded armadillos (*Dasypus novemcinctus*) and two six-banded armadillos (*Euphractus sexcinctus*). The minimum number of individual Crowned Eagles in the surveyed area was seven. Our observations of family groups, juveniles and two nestlings confirm the breeding of Crowned Eagles in the Moxos plains. Ectoparasites and uncontrolled burns may threaten the northwestern Bolivian population of the endangered Crowned Eagle.

KEY-WORDS: *Buteogallus coronatus*; conservation; Crowned Solitary Eagle; diet; *Harpyhaliaetus coronatus*; Moxos savannas; nesting.

INTRODUCTION

The Crowned Eagle (*Urubitinga coronata,* Accipitridae) is a large raptor (approximately 2.9 kg) endemic to central and southern South America, including Brazil, Bolivia, Paraguay and Argentina (Collar *et al.* 1992, Thiollay 1994, Ferguson-Lees & Christie 2001, BirdLife International 2012). This rare eagle occurs in low densities in open and semi-open habitats, in open woodland, savannah, brushy steppe, dry scrub, lowland, and open or lightly wooded foothills up to 1,200 m (Thiollay 1994, Ferguson-Lees & Christie 2001, Barcellos & Accordi 2006, Monteiro Granzinolli *et al.* 2006). This species is considered globally endangered due to its small, fragmented population, and the severity of the threats it faces strongly suggest a significant and continuing decline in numbers (Sarasola & Maceda 2006, BirdLife International 2012, IUCN 2012).

The national conservation status of the Crowned Eagle in Bolivia is Endangered (Balderrama *et al.* 2009). The presence of the species in Bolivia was confirmed in a few sites in two separated regions: southeastern Santa Cruz (Kratter *et al.* 1993, Aráujo *et al.* 2001, Quiroga & Malo 2006, Vidoz *et al.* 2010a, Vidoz *et al.* 2010b), and Beni Department (Rocha 1990, Brace *et al.* 1997, Maillard *et al.* 2008, Kingsbury & McNeill 2010). In Bolivia the Crowned Eagle occurs in lowlands, generally between 200-400m, inhabiting flooded savannahs and dry and semi-deciduous forest (*i.e.* Chaco and Chiquitanía) of Beni and Santa Cruz Departments of Bolivia (Hennessey *et al.* 2003). While some aspects of the natural history, breeding biology, and population demographics are known for this species in Argentina and Brazil (Bellocq *et al.* 1998, Sarasola & Maceda 2006, Monteiro Granzinolli *et al.* 2006), virtually no information exists about the populations in Bolivia (Balderrama *et al.* 2009). Furthermore, no nesting or prey data have been reported for Bolivia.

The Crowned Eagle has been recorded in the Moxos savannas at three localities: Estación Biológica del Beni (14º40'S; 66º16'W; Rocha 1990, Brace *et al.* 1997); Near to Río Ipuru-puru (14º10'S; 64º57'W; Maillard *et al.* 2008); and Estancia San Lorenzo (13º45'S; 66º06'W; Kingsbury & McNeill 2010). The Moxos savannahs population of Crowned Eagle is the northwestern most population in its geographical distribution range. More than 600 km separate localities in the Moxos savannahs from the closest localities in Santa Cruz department (Balderrama *et al.* 2009).

Here we present three new localities and we confirm one historical locality for the species on the Moxos savannahs. We also report the first breeding and prey records for the Crowned Eagle in Bolivia.

MATERIAL AND METHODS

Moxos savannahs, Llanos de Mojos or Pampas del Beni is a wide savannah plain of edaphic associations. The region has a poor drainage, and in the wet season is susceptible to flooding. This combination of grasslands includes a mosaic of other habitats including carandam palm (*Copernicia alba*) groves, semi-deciduous woodlands, gallery forest and motacú palm (*Attalea phalerata*) groves on higher, unflooded terrain, islands that may be natural or the work of pre-Columbian aboriginals (Denevan 1980).

For every observation of Crowned Eagles in the area we recorded the date, time, location (coordinates), number of individuals, their ages (only as adult, juvenile or nestling), whether the birds were perched or flying, other behaviors, and type of prey, if any.

RESULTS AND DISCUSSION

Between 2007 and 2011, we observed Crowned Eagles in four different locations in Moxos Savannahs of Beni Department, Bolivia (Figure 1):

A. "Río Ipuru-puru" (14º07'S; 64º57'W). September 2008. An adult individual was observed by L.

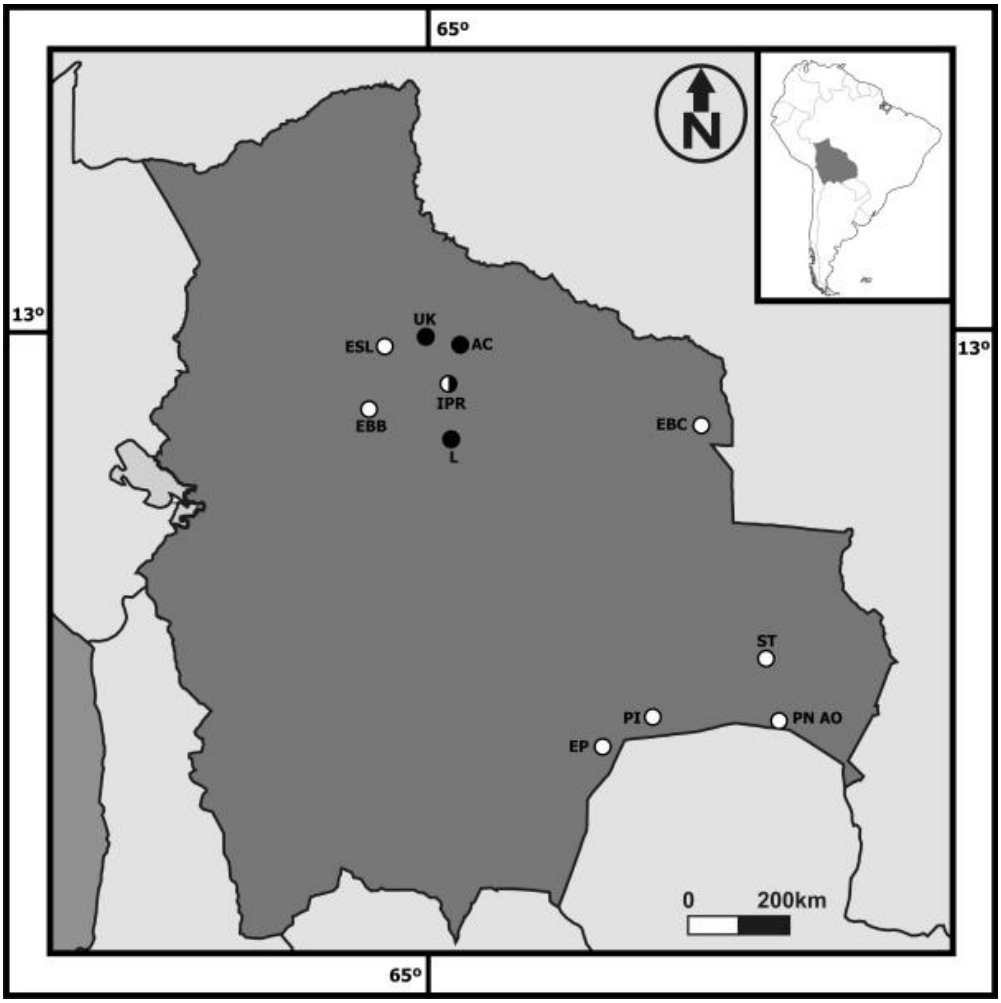

FIGURE 1. Map of the Crowned Eagle records for Bolivia. Historic records (white dots): ESL Estancia San Lorenzo (Kingsbury & McNeill 2010), EBB Estación Biológica del Beni (Rocha 1990, Brace *et al.* 1997), ST Área Protegida Municipal Santiago Tucavaca (Aráujo 2001), EP Estancia Perforación (Kratter *et al.* 1993), PN AO Parque Nacional and ANMI Otuquis (Quiroga & Malo 2006), EBC Estación Biológica Caparú (Vidoz *et al.* 2010a) and PI Palmar de Islas (Vidoz *et al.* 2010b) and records from this work (black dots): UK Urkupinia, AC Arroyo Colorado, IPR Ipuru Puru, and L Loreto.

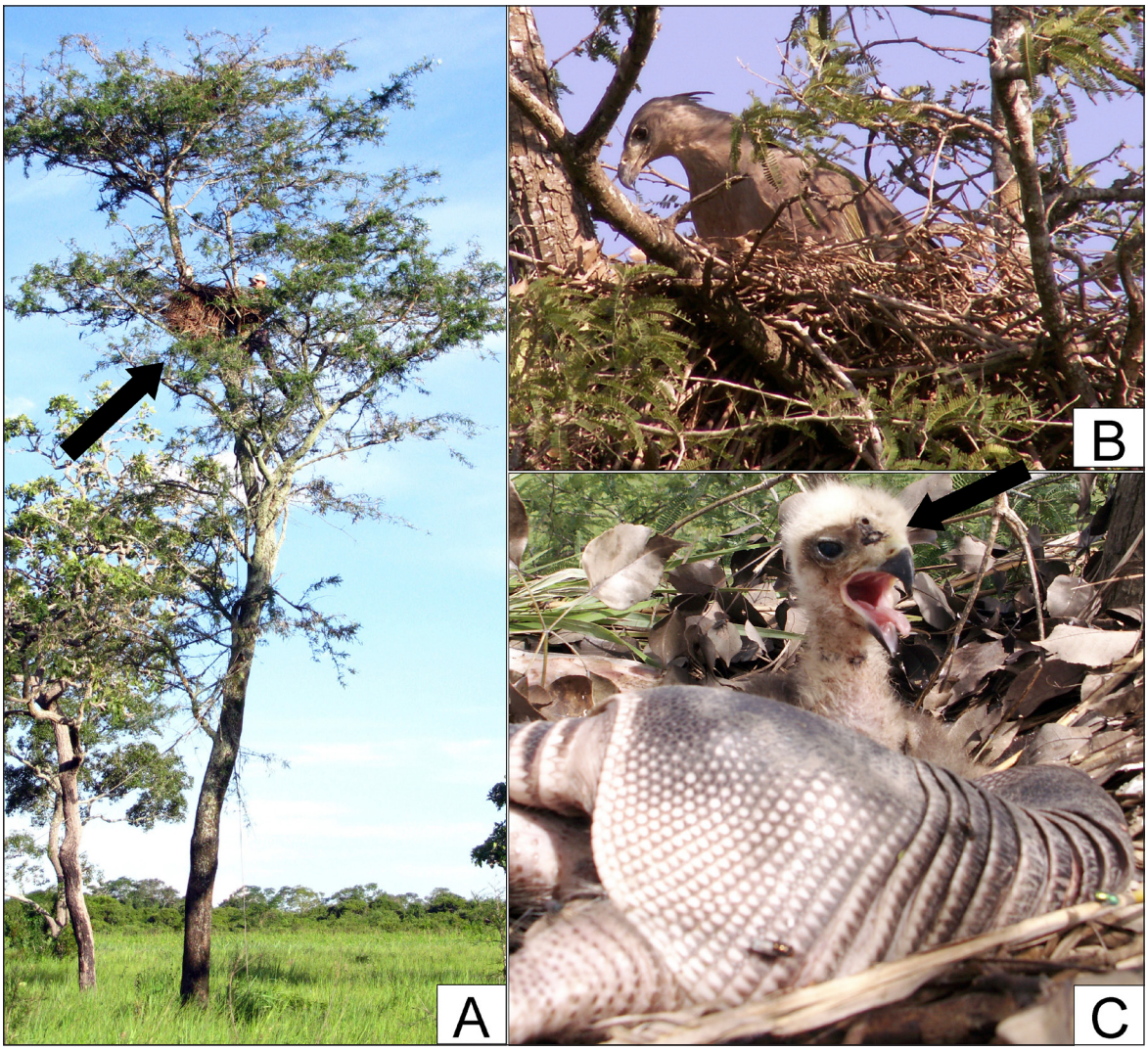

FIGURE 2. Nest tree (A), adult female at nest (B) and nestling (C) of Crowned Eagle (*Photographs by S. K. I. F)*. Note botfly on nestling's head

G. between the entrance of Estancia Cutal and the road San Pedro – Trinidad. Vidoz reported an individual 5.6 km south from this place in 29 July 2005 (Maillard *et al.* 2008). In September 2010, L. G. observed an adult and a juvenile perched near the main road.

B. "Arroyo Colorado" (13º48'S; 64º35'W). On 23 November 2007 we found a nesting pair with a nestling at "Estancia Palma Sola." We revisited the nest on 1 December 2007 and 7 January 2008. The nest was empty during September and October 2008 and we did not detect any Crowned Eagle on the territory during that season. On 28 October 2009 we found an adult eagle perched in a tree (*Anadenanthera colubrine*) (13º84'S; 64º54'W) just a few meters from the previous year's nest tree. On 15 November 2009, we visited the nest and found that it was reoccupied and contained one nestling.

C. "Urkupinia" (13º43'S; 65º07'W). On 28 September 2010 we observed one sub-adult perched in a carandam palm and a Southern Caracara (*Caracara plancus*) attacking it. On 21 September 2011 we observed one sub-adult eagle in the same area. The individual was perched in a carandam palm.

D. "Loreto" (15º06'S; 64º41'W). On 26 August 2011 we observed a juvenile Crowned Eagle flying over the road near the town of Loreto.

Breeding behavior

The nest was located approximately 2 km east of the Estancia Palma Sola (13º48'S; 64º35'W) in a natural savanna next to a stream (locally named Arroyo Colorado). Vegetation surrounding the nest tree was a savannah with scattered trees with an average height of 8 m. The nest was a large platform of sticks placed 9.4 m high in a 13.5 m non-identified thorny tree in a *Curatella americana* open woodland (Figure 1a). Between 23 November 2007 and 7 January 2008 the nest contained one nestling. On the first and second visits to the nest we observed that the nestling was infested with botflies (Diptera, Oestridae). We also noted that the nestling had a deformed bill in which the upper mandible grew towards the right.

We found four prey items in the nest: two nine-banded armadillos (*Dasypus novemcinctus*; one individual on 23 November 2007 and another individual on

1 December 2007) and two six-banded armadillos (*Euphractus sexcinctus* one individual on 23 November 2007 and another individual on 7 January 2008). Reported prey of Crowned Eagles in other countries include terrestrial vertebrates such as armadillos (Dasypodidae), skunks (Mustelidae), opposums (Didelphidae), tinamous (Tinamidae), domestic chickens (*Gallus domesticus*), some reptiles, dead animals and fishes (Collar *et al.* 1992, Bellocq *et al.* 2002, Maceda *et al.* 2003, Maceda 2007, Tittarelli & Villarreal 2009, Pereyra Lobos *et al.* 2011). As in other countries, armadillos seem to have an important role in the eagle's diet during the breeding season (Maceda *et al.* 2003, Pereyra Lobos *et al.* 2011). Armadillos and other terrestrial animals are usually affected by fire, an annual human activity in Moxos plains (Langstroth Plotkin 1996). These fires could be affecting the availability of prey for Crowned Eagles.

New localities reported in this work suggest that Moxos plains are a favorable environment for the species and its presence could be better known. The plains of Moxos is an important site for the species. We observed at least seven individuals, including family groups, juveniles and a nestling, confirming the reproduction of Crowned Eagles in Moxos plains. Botflies and fire may act as potential threats for this northwestern-most population of the endangered Crowned Eagle.

ACKNOWLEDGMENTS

Most of these observations were possible thanks to the Blue-throated Macaw Conservation Project (World Parrot Trust). We thank Wilfredo Villavicencio, Roberto Fernandez (Don Bobby), Hernán Parada and Fernando Ávila for allowing us to work on their properties. Sergio Seipke provides valuable suggestions to improve the manuscript.

REFERENCES

Araujo, N.; Ibisch, P. & Cuellar, S. 2001. *Diagnóstico de Biodiversidad e insumos técnicos para el Plan de Manejo del área Protegida Municipal Santiago, Tucavaca*. Santa Cruz de la Sierra: Fundación Amigos de la Naturaleza, Informe Técnico.

Balderrama, J. A.; Olivo, C.; Flores, B. & Crespo, M. 2009. *Harpyhaliaetus coronatus*, p. 337-338. In: Ministerio de Medio Ambiente y Agua (eds). Libro rojo de la fauna silvestre de vertebrados de Bolivia. La Paz: Ministerio de Medio Ambiente y Agua.

Barcellos, A. & Accordi, I. A. 2006. New records of the Crowned Eagle, *Harpyhaliaetus coronatus*, in the State of Rio Grande do Sul, southern Brazil. *Revista Brasileira Ornitologia*, 14: 345-349.

Bellocq, M. I.; Bonaventura, S. M.; Marcelino, F. N. & Sabatini, M. 1998. Habitat use of Crowned Eagles (*Harpyhaliaetus coronatus*) in the southern limits of the species' range. *Journal of Raptor Research*, 32: 312-314.

Bellocq, M. I.; Ramírez-Llorens, P. & Filloy, J. 2002. Recent records of Crowned Eagles (*Harpyhaliaetus coronatus*) from Argentina. 1981-2000. *Journal of Raptor Research*, 36: 206-212.

Birdlife International. 2012. Species factsheet: *Harpyhaliaetus coronatus*. http://www.birdlife.org (access on 24 January 2012).

Brace, R. C.; Hornbuckle, J. & Pearce-Higgins, J. W. 1997. The avifauna of the Beni Biological Station, Bolivia. *Bird Conservation International* , 7: 117-159.

Collar, N. J.; Gonzaga, L. P.; Krabbe, N.; Madroño Nieto, A.; Naranjo, L. G.; Parker III, T. A. & Wege, D. C. 1992. *Threatened birds of the Americas: the ICBP/IUCN Red Data Book*. Cambridge: International Council for Bird Preservation.

Denevan, W. 1980. *La geografía cultural de los aborígenes de los Llanos de Mojos*. La Paz: Sibiria Ed. Juventud.

Ferguson-Lees, J. & Christie, D. A. 2001. *Raptors of the World.* New York: Houghton and Mifflin Company.

Hennessey, A. B.; Herzog, S. K. & Sagot, F. 2003. *Lista anotada de las aves de Bolivia.* Santa Cruz de la Sierra: Asociación Armonía/ BirdLife International.

IUCN. 2012. IUCN Red List of Threatened Species. Version 2012.1. www.iucnredlist.org. (access on 27 August 2012)

Kingsbury, J. & McNeill, D. 2010. *Bolivia 2010, A joint Glasgow University and Bolivian conservation expedition to the Beni savannah of Bolivia*. Glasgow: Glasgow University.

Kratter, A. W.; Scotts Illett, J. T.; Terry Chesser, R.; O'Neill, J. P.; Parker, T. A. & Castillo, A. 1993. Avifauna of a Chaco locality in Bolivia. *Wilson Bulletin*, 105: 114-141.

Langstroth Plotkin, R. 1996. *Forest islands in an amazonian savanna of northeastern Bolivia*. Ph.D. dissertation. Madison: University of Wisconsin-Madison.

Maceda, J. J. 2007. Biología y conservación del Águila coronada (*Harpyhaliaetus coronatus*) en Argentina. *Hornero*, 22: 159-171.

Maceda, J. J.; Sarasola, J. H. & María Pessino, M. E. 2003. Prey consumed by the Crowned Eagle (*Harpyhaliaetus coronatus*) in the southern limits of its range in Argentina. *Ornitologia Neotropical*, 14: 419-422.

Maillard, O.; Quillén Vidoz, J. & Herrera, M. 2008. Registros significativos de aves para el departamento del Beni, Bolivia: parte 2. *Kempffiana*, 4: 8-12.

Monteiro Granzinolli, M. A.; Garcia Pereira, R. J. & Motta-Junior, J. C. 2006. The Crowned Solitary-Eagle *Harpyhaliaetus coronatus* (Accipitridae) in the cerrado of Estação Ecológica de Itirapina, southeast Brazil. *Revista Brasileira Ornitologia*, 14: 429-432.

Pereyra Lobos, R.; Santander, F. J.; Alvarado Orellana, S.; Ramírez, P. A.; Muñoz, L. & Fernández Bellón, D. 2011. Diet of the Crowned Eagle (*Harpyhaliaetus coronatus*) during the breeding season in the Monte Desert, Mendoza, Argentina. *Journal of Raptor Research*, 45: 180-183.

Quiroga, O. A. & Malo, A. F. 2006. Composición de la avifauna del área protegida Pantanal de Otuquis (Santa Cruz, Bolivia). *Revista Boliviana de Ecología y Conservación Ambiental*, 19: 59-73.

Rocha, O. 1990. Lista preliminar de aves de la Reserva de la Biosfera "Estación Biológica Beni". *Ecología en Bolivia*, 15: 57-68.

Sarasola, J. H. & Maceda, J. J. 2006. Past and current evidence of persecution of the Endangered crowned eagle *Harpyhaliaetus coronatus* in Argentina. *Oryx*, 40: 347-350.

Thiollay, J. M. 1994. Family Accipitridae, p. 52-205. In*:* J. del Hoyo, J. Elliot. & J. Sargatal (eds.). Handbook of the birds of the world, New World vultures to guineafowl, v. 2. Barcelona: Lynx Edicions.

Tittarelli, R. F. & Villarreal, D. 2009. Alimentación piscívora de un pichón de águila coronada (*Harpyhaliaetus coronatus*) en los bañados del Atuel, La Pampa, Argentina. *Nuestras Aves*, 54: 41-42.

Vidoz, J. Q.; Jahn, A. E. & Mamani, A. M. 2010a. The avifauna of Estación Biológica Caparú, Bolivia. *Cotinga*, 32: 51-68.

Vidoz, J. Q.; Aponte, M. A.; Velásquez, M. A. & Alarcón, R. 2010b. Contribución al conocimiento de la avifauna del Parque Nacional Kaa-Iya del Gran Chaco, departamento de Santa Cruz, Bolivia. *Revista Brasileira Ornitologia*, 18: 34-44.

Revista Brasileira de Ornitologia, 20(4), 451-452
Dezembro de 2012 / December 2012

NOTA/SHORT-COMMUNICATION

Predation of Long–tailed Silky Flycatcher *(Ptilogonys caudatus)* by Ornate Hawk–Eagle *(Spizaetus ornatus)* in a cloud forest of Costa Rica

Víctor Acosta-Chaves[1,2,3,4], Federico Granados-Rodríguez[2] and David Araya-Huertas[2,3]

[1] Sistema de Estudios de Posgrado en Biología, Universidad de Costa Rica, San Pedro, Costa Rica.
[2] Escuela de Ciencias Biológicas, Universidad Nacional, Heredia, Costa Rica
[3] Fundación Rapaces de Costa Rica. PO Box 1626-3000 Heredia, Costa Rica.
[4] Corresponding author: vacosta@rapacesdecostarica.com

Received on16 February 2012. Accepted on 24 August 2012.

ABSTRACT: Predation of Long–tailed Silky Flycatcher (*Ptilogonys caudatus*) by Ornate Hawk–Eagle (*Spizaetus ornatus*) in a cloud forest of Costa Rica. This paper is the first record of a predation event made by an Hawk–Eagle (*S.ornatus*, Accipitridae) on a Long–tailed Silky Flycatcher (*P. caudatus,* Ptilogonatidae) in a cloud forest of Costa Rica, and this is the first prey item reported for this raptor in a middle elevation forest. Also this is the first predation event reported for the Ptilogonatidae family.

KEY-WORDS: Accipitridae; middle elevation forest; Ptilogonatidae; Río Macho.

The Ornate Hawk-Eagle ranges from southern Mexico through Central America to South America (Marquez *et al.* 2005). In Costa Rica, it is found almost exclusively in moist forests from sea level to 1500 meters, but can reach up 3000 m.a.s.l. (Stiles & Skutch 1989). The Ornate Hawk-Eagle is dependent on mature forest for nesting which takes place in the forest canopy, but can use clearings or open areas for foraging (Lyon & Kuhnigk 1985, Stiles & Skutch 1989, Marquez *et al.* 2005).

The diet of this hawk eagle has been studied mainly in the Petén of Guatemala (Lyon & Kuhnigk 1985, Madrid *et al.* 1991), Manaus in Brazil (Klein *et al.* 1988), Belize (Clinton *et al.* 1991) and Amazonian Peru (Robinson 1994), but few isolated predation events have been previously reported for other areas (Haymann 1990, Boinski *et al.* 2003, De Luna *et al.* 2010). Its dietary items include birds, small mammals and reptiles such as snakes and lizards (*e.g.* Iguanidae *Iguana iguana,* Teiidae; Klein *et al.* 1988, Clinton *et al*. 1991, Rangel & Enriquez 1993, Robinson 1994). Avian prey items included members of the following families: Tinamidae (*e.g. Tinamus* sp., *Crypturellus* sp.), Rallidae (*e.g. Aramides cajanea*, *Porphyrio martinica*), Ramphastidae (*e.g. Ramphastos* sp. *Pteroglossus* sp.), Psittacidae (*e.g. Ara* spp., *Brotogeris* sp., *Aratinga* sp.), Cracidae (*e.g. Penelope* sp., *Ortalis* sp.), Psophiidae (*e.g. Psophia leucoptera*), Columbidae (*e.g. Leptotila* sp.), Cotingidae (*e.g. Rupicola rupicola*), Icteridae (e.g. *Psarocolius* sp, *Cacicus* sp) as well as unidentified small birds (Lyon & Kuhnigk 1985, Klein *et al.* 1988, Clinton *et al*. 1991, Madrid *et al.* 1991, Robinson 1994). The mammalian prey items observed included Echimyidae (e.g. *Proecomys* sp.), Sciuridae (*e.g. Sciurus* spp.), Didelphidae (*e.g. Didelphis marsupialis*, *Methachiurus nudicaudatus*), Dasyproctidae (eg. *Dasyprocta* sp.*, Myoprocta* sp.), Erethizontidae (*e.g. Coendu* sp.), Procyonidae (*e.g. Potus flavus, Procyon lotor*), Canidae (*e.g. Speothos venaticus*), Cebidae (*e.g. Alouatta* sp., *Saimiri* spp., *Saguinus* spp., *Cebus* sp., *Callicebus* sp.) and even Phyllostomidae bats (Lyon & Kuhningk 1985, Klein *et al.* 1988, Stiles & Skutch 1989, Haymann 1990, Madrid *et al.* 1991, Rangel & Enriquez 1993, Robinson 1994, Boinski *et al.* 2003, De Luna *et al.* 2010). In Costa Rica the prey items of the Ornate Hawk-Eagle have been poorly documented, except for some notes of guans, unspecified small mammals, lizards and snakes (Stiles & Skutch 1989) and a squirrel monkey (*Saimiri oerstedi*) in Corcovado National Park (Boinski *et al.* 2003).

This raptor is known to occur in Río Macho, Cartago Province, near the hydroelectric dam of the "Instituto Costarricense de Electricidad" and the "Estación de Biología Tropical y Acuicultura Río Macho" of the "Universidad Nacional de Costa Rica". This site belongs to the Premontane Rain Forest and Lower Montane Rain Forest life zones, with an average annual rainfall

of 3200-3500 mm, temperature ranging between 14-26ºC (Calderón 1994) and altitude varying from 1500 to 1900 m.a.s.l. The landscape consists of mature forest and secondary regenerating forest, forest plantations of *Cupressus lusitanica* and *Alnus acumminata*, coffee fields, grasslands and infrastructure for hydropower generation with a few farmhouses.

When visiting this site on 5 December 2010 along a dirt road surrounded by secondary forest and grasslands, where the oscillation tank of the hydroelectric dam is located (9°46'6.52"N; 83°51'8.02"W), we observed a flock of Emerald Toucanets (*Aulacorhynchus prasinus*) with a pair of Long-tailed Silky Flycatcher (*P. caudatus*) foraging in a bush (Lauraceae) at the border of the roadside at about 7h 30 min. While we watched those birds, an Ornate Hawk-eagle emerged from the surrounding trees, then glided towards the bush and captured a Long-tailed Silky Flycatcher while it was eating a fruit. At that moment, the Emerald Toucanets and the other Long-tailed Silky Flycatcher that survived the attack escaped to the secondary forest for protection, as even bigger toucans are also potential preys according to literature (Rangel & Enriquez 1993). The hawk-eagle flew very quickly to the dense vegetation on the other side of the road as we lost sight of the raptor.

The Long-tailed Silky Flycatcher is endemic to the highlands of Costa Rica and western Panama and inhabits middle and highland forest (it occurs at around 1600 m.a.s.l. to timberline). This bird can use partially open areas for feeding (Skutch 1965, Stiles & Skutch 1989). To our knowledge, this is first predation report involving an adult Long-tailed Silky Flycatcher and the family Ptilogonatidae as a whole, since only nest predation reports are avaliable for this species. (Skutch 1965). This observation highlights the importance of predation reports obtained in the field, as many of the passerine birds consumed by the Ornate Hawk-Eagle were not identified to species level in studies based on pellet or bones analysis (Klein *et al.* 1988, Rangel & Enriquez 1993). Furthermore, these records contribute to a better understanding of the habits of this predator in cloud forests, as current knowledge is limited to the humid lowlands.

ACKNOWLEDGMENTS

We thank the "Estación de Biología Tropical y Acuicultura Río Macho" for lending us facilities for bird watching. To Oscar Ramirez, Pablo Camacho, Paulo Araya, Juan Vargas and Roberto Vargas for data on sightings of the species, and for joining us in multiple occasions to watch these birds of prey. Also thanks to Ryan Phillips, Carmen Hidalgo, Otto Monge, Pablo Camacho, Oscar Ramirez, Haiany Miranda and Ignacio Escalante for suggestions improved the manuscript.

REFERENCES

Boinski, S.; Kauffman, L.; Westoll, A.; Stickler, C. M.; Cropp, S & Ehmke, E. 2003. Are vigilance, risk from avian predators and group size consequences of habitat structure? A comparison of three species of squirrel monkey (*Saimiri oerstedii*, *S. boliviensis*, and *S.sciureus*). *Behaviour*, 140 (11, 12): 1421-1467.

Calderón, R. 1994. *Rubiáceas y arbustivas de la Estación Biológica Tropical Río Macho, Orosi, Cartago*. Undergraduate Thesis. Heredia: Universidad Nacional de Costa Rica.

Clinton, J.; Gartside, M & Kainer, M. 1991. Ornate Hawk–Eagle feeding on Green Iguana. *Journal of Raptor Research*, 25 (1): 19-20.

De Luna, A. G.; Sanmiguel, R.; Di Fiori, A & Duque E. F. 2010. Predation and Predation Attempts on Red Titi Monkeys *(Callicebus discolor)* and Equatorial Sakis *(Pithecia aequatorialis)* in Amazonian Ecuador. *Folia Primatol,* 81: 86-95. DOI: 10.1159/000314948.

Haymann, E. W. 1990. Reaction of wild tamarins, *Saguinus mystax* and *Saguinus fuscicollis* to avian predators. *International Journal of Primatology*, 11(4): 327-337.

Klein, B. C.; Harper, L. H.; Bierregaard, R. O. & Powell, G.V. 1988. The nesting and feeding behavior of the Ornate Hawk-Eagle near Manaus, Brazil. *The Condor*, 90: 239-241.

Lyon, B. & Kuhnigk A. 1985. Observations on nesting Ornate Hawk-eagles in Guatemala. *Wilson Bulletin*, 97: 141-147.

Madrid, J. A.; Madrid, H. D.; Funes, S. H.; López, J.; Botzoc, R & Ramos, A. 1991. Biología de la reproducción y comportamiento del Águila Elegante (*Spizaetus ornatus*), en el Parque Nacional de Tikal, p. 157-187. In: Whitacre, D. F.; Burnham, W. A. & Jenny, J. P. (eds.). IV Reporte de avance, Proyecto Maya: Uso de aves rapaces y de otros integrantes de la fauna como indicadores del medio ambiente, para el diseño de áreas protegidas y para fortalecer la capacidad del personal del lugar en orden a la conservación en América Latina. Boise: The Peregrine Fund.

Marquez, C.; Bechard, M.; Gast, F & Vanegas, V. 2005. *Aves rapaces diurnas de Colombia*. Bogotá: Instituto de Investigación de Recursos Biológicos "Alexander von Humboldt".

Rangel, J. & Enriquez, P.. 1993. Nest record and dietary items for the Black Hawk-eagle (*Spizaetus tyrannus*) from the Yucatán Peninsula. *Journal of Raptor Research*, 27 (2): 121-122.

Robinson, S. 1994. Habitat selection and foraging ecology of raptors in Amazonian Peru. *Biotropica*, 26 (4): 443-458.

Skutch, A. 1965. Life history of the Long-tailed Silky Flycatcher with notes on related species. *The Auk*, 82: 375-426.

Stiles, G. & Skutch, A. 1989. *A Guide to the Birds of Costa Rica*. Ithaca: Cornell University Press.

Revista Brasileira de Ornitologia, 20(4), 453-454
Dezembro de 2012 / December 2012

NOTA/SHORT-COMMUNICATION

First record of the Chaco Earthcreeper *Tarphonomus certhioides* (Furnariidae), in Brazil.

Márcio Repenning[1], Eduardo Chiarani[1], Mauricio da Silveira Pereira[1] and Carla Suertegaray Fontana[1,2]

[1] Laboratório de Ornitologia, Museu de Ciências e Tecnologia e Programa de Pós Graduação em Biociências-Zoologia, Pontifícia Universidade Católica do Rio Grande do Sul - PUCRS, Porto Alegre, RS.
[2] Corresponding author. Email: carla@pucrs.br

Received on 3 August 2012. Accepted on 20 August 2012.

ABSTRACT: During an expedition to the Espinilho State Park, located at Barra do Quaraí, Rio Grande do Sul, Brazil (30° 12 ‘ 11 “S 29° 57 ‘ 40” W), from 18 to 24 July 2012, we recorded an individual *Tarphonomus certhioides*, which was captured, banded (CEMAVE G 106017), recorded, and photographed. It was found in an area of dense dry and thorny vegetation, with predominance of *Vachellia caven* (Fabaceae). We suggest “joão-chaquenho” as the vernacular name in Portuguese for this species.

KEY-WORDS: *Espinilho*, range extension, distribution, Brazilian Official Bird List, *Upucerthia*

The Chaco Earthcreeper *Tarphonomus certhioides* (d’Orbigny & Lafresnaye, 1938) is found in southeastern Bolivia (southern Dpto. Santa Cruz), western Paraguay and northern and central Argentina (Provs. Mendoza, La Pampa, Santa Fé, Corrientes, and Entre Rios) (Fjeldså & Krabbe 1990, Ridgely & Tudor 1994). It is generally regarded as a resident and fairly common species in its range (Short 1975, Remsen 2003). Although not included within the austral migrants by Chesser (1994), it might be an austral migrant in Formosa (Di Giacomo 2005).

On 21 July 2012, we found an individual of this species in Rio Grande do Sul State, Brazil, near the borders with Argentina and Uruguay, at Parque Estadual do Espinilho, Barra do Quaraí municipality (30°12’11”S; 57°29’40”W). It was photographed, tape recorded, and captured with mist nets and banded (metal band Centro Nacional de Pesquisa e Conservação de Aves Silvestres – CEMAVE - G 106017 with a red color band on opposed tarsus [left]). We also collected a blood sample of this individual, which was deposited in the bird collection of Museu de Ciências e Tecnologia, Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS - MCP 3395). We found the bird in a habitat characterized by a high density of *espinilho* like trees, dominated by *Vachellia caven* (Fabaceae) mixed with scrubby thickets and thorny, short trees (Figure 1). The habitat was similar to that described for this species in the literature: thickets in arid scrub (Remsen 2003, Chesser & Brumfield 2007). The individual recorded was identified by plumage as an adult of the nominate subspecies (Figure 2), which occurs in nearby Corrientes, and Entre Ríos, Argentina (Remsen 2003). The measurements (mm) of the individual were: tarsus (21.1), culmen (23.75), exposed culmen (23.1), culmen from nostril (16.5), wing chord (68.0), tail (total length; 72.0), and body mass (24.7 g).

FIGURE 1. Habitat where the Chaco Earthcreeper *Tarphonomus certhioides* was recorded in Brazil on 21 July 2012. Photo: E. C.

FIGURE 2. Adult Chaco Earthcreeper *Tarphonomus certhioides* captured by a mist net. Photo: M. S. at Parque Estadual do Espinilho, Barra do Quaraí, Rio Grande do Sul, Brazil, on 21 July 2012.

This is the first documented record of *Tarphonomus certhioides* for Brazil, supporting its inclusion in the primary list of the Brazilian Checklist Committee (CBRO 2011). Our preliminary data suggest that the species should be considered an occasional visitor in Brazil, but subsequent fieldwork may alter this view. We suggest for the species the Portuguese name "joão-chaquenho" in allusion to its English and Spanish names added of the vernacular name "joão" used commonly for the representatives of ovenbirds in Brazil. We suggest that the range of *Tarphonomus certhioides* might extend to Uruguay in the *Espinilho* formation along the Uruguay River banks.

ACKNOWLEDGMENTS

We thank Gabriel Larre, Caio Wahl and Miriam Santos Borba for the valuable help in the field. We thank A. Aleixo (Editor) and J. V Remsen for valuable suggestions in the manuscript. We thank Condomínio Agropecuário Ceolin for logistical support during field work and Secretaria Estadual do Meio ambiente (SEMA) for the permission to develop the MSc. project: " Assembléia de aves territorialistas da formação Espinilho: densidade e seleção de habitat" at Parque Estadual do Espinilho. We thank *Centro Nacional de Pesquisa e Conservação de Aves Silvestres* (CEMAVE) for licenses and metal bands and *Instituto Chico Mendes para a Conservação da Biodiversidade* for Licenses.

REFERENCES

CBRO – Comitê Brasileiro de Registros Ornitológicos. 2011. Listas das aves do Brasil. 10ª ed., http://www.cbro.org.br/CBRO/pdf/AvesBrasil2011.pdf (access on 30 July 2012).

Chesser, R. T. 1994. Migration in South America: an overview of the austral system. *Bird Conservation International*, 4: 91-107.

Chesser, R. T. & Brumfield, R. T. 2007. *Tarphonomus,* a new genus of ovenbird (Aves: Passeriformes: Furnariidae) from South America. *Proceedings of the Biological Society of Washington*, 120: 337-339.

Di Giacomo, A. G. 2005. Aves de la Reserva El Bagual, p. 201-465. In: Di Giacomo, A. G. & Krapovickas, S. F. (eds.). Historia natural y paisaje de la Reserva El Bagual, Provincia de Formosa, Argentina. Inventario de la fauna de vertebrados y de la flora vascular de um área protegida del Chaco Húmedo. Buenos Aires: Aves Argentinas/Asociación Ornitológica del Plata (Temas de Naturaleza y Conservacion 4).

Fjeldså, J. & Krabbe, N. 1990. *Birds of the high Andes*. Copenhagen: Zoological Museum, University of Copenhagen and Svendborg, Apollo Books.

Remsen Jr., J. V. 2003. Family Furnariidae (Ovenbirds), p. 162-357. In: Del Hoyo, J., Elliott, A. & Christie, D. A. (eds.). Handbook of the Birds of the World, Broadbills to Tapaculos, v. 8. Barcelona: Lynx Edicions.

Ridgely, R. S. & Tudor, G. 1994. *The birds of South America: The Suboscines Passerines*, v. 2. Austin: University of Texas Press.

Short, L. L. 1975. A zoogeographic analysis of South American Chaco avifauna. *Bulletin of the American Museum of Natural History,* 154: 163-352.

Revista Brasileira de Ornitologia, 20(4), 455-457
Dezembro de 2012 / December 2012

NOTA/SHORT-COMMUNICATION

A first documented Brazilian record of Least Seedsnipe *Thinocorus rumicivorus* Eschscholtz, 1829 (Thinocoridae)

Felipe Castro[1], João Castro[1], Aluisio Ramos Ferreira[2], Marco Aurélio Crozariol[3,6] and Alexander Charles Lees[4,5]

[1] Rua Tainha, 345, Bairro Sítio Ressaca, Ubatuba, SP. CEP: 11680-000. Brazil.
[2] Rua Joaquim do Prado, 413, Cruzeiro, SP. CEP: 12701-370. Brazil.
[3] Clube de Observadores de Aves do Vale do Paraíba Paulista – COAVAP; Programa de Pós-Graduação em Zoologia. Museu Nacional/UFRJ, Departamento de Vertebrados, Setor de Ornitologia, Quinta da Boa Vista, São Cristóvão, Rio de Janeiro, RJ. CEP: 20940-040. Brazil.
[4] Coordenação de Zoologia, Museu Paraense Emílio Goeldi, CP 399, Belém, Pará, Brazil.
[5] Department of Zoology, University of Cambridge, Cambridge CB2 3EJ, UK.
[6] Corresponding author: marcocrozariol@gmail.com

Received on 25 July 2012. Accepted on 23 August 2012.

ABSTRACT: Herein we present the first documented record of the Least Seedsnipe *Thinocorus rumicivorus* (Eschscholtz, 1829) for Brazil. On the 21 April 2012 a juvenile *T. rumicivorus* was photographed and sound-recorded by birdwatchers on the beach at Ubatumirim in the municipality of Ubatuba, on the northern São Paulo state coast. This is the first documented record of any seedsnipe (Thinocoridae) for Brazil. Its behaviour and the circumstances and potential drivers of its vagration are discussed.

KEY-WORDS: birdwatching; *Eragrostis*; *Thinocorus*; vagrancy.

At mid-morning on 21 April 2012, F. C., J. C. and A. R. F. were birdwatching on the beach at Ubatumirim (23°19'53.53"S; 44°54'34.89"W) in the municipality of Ubatuba, in northern São Paulo state, Brazil, when they encountered an unusual bird with which they were not familiar and could not identify. They documented the occurrence with a series of digital images and sound-recordings. On returning home, F. C. posted these on a social networking site and solicited help with the identification from A. C. L.; who along with Juan Mazar Barnett immediately identified the bird as a juvenile Least Seedsnipe *Thinocorus rumicivorus*. The bird remained at the same site for five days, remaining until the 26 April. The individual (Figure 1a) was very tame and did not interact with any other bird species on site, occasionally drinking from nearby small pools (Figure 1b), and spending its entire stay along a straight path which gave access to the beach for local people (Figures 1c and 1d). It foraged on the seeds of the non-native Elastic Grass *Eragrostis tenuifolia* (Poaceae, Chloridoideae) in addition to other unidentified food items picked up from the ground. The bird was extremely tame and when approached closely it would prefer to run away and hide between grass tussocks rather than flying (a behaviour that reflects its Portuguese name 'agachadeira-mirim'; Figure 1a). The bird only flew on rare occasions when totally encircled by the watching observers or when approached rapidly by locals on foot or on bicycles. On flushing, the species would typically call (see archived record: Pereira 2012). In the middle of the day the bird would shelter in the shade of the tussocks with beak and wings open, apparently suffering from the effects of heat stress. This species has not previously been documented drinking in the wild, as it is normally thought to obtain all its dietary moisture through eating succulent plants (Fjeldså 1996).

Thinocoridae is an exclusively South American family, composed of four species in two genera (*Attagis gayi, A. malouinus, Thinocorus orbignyianus* and *T. rumicivorus*), which are principally distributed in Andean and cold temperate environments in the Andes and Patagonia (Fjeldså 1996). *Thinocorus rumicivorus* is the smallest species in the family and is composed of four subspecies: *T. r. pallidus* found in the lowlands of southwestern Ecuador and northwestern Peru; *T. r. cuneicauda* of the Peruvian desert; *T. r. bolivianus* of the Altiplano region extending from the extreme south of Peru through northern Chile and western Bolivia to northwestern Argentina; and finally *T. r. rumicivorus* of the Patagonian steppe south to northern Tierra del Fuego, migrating to central Chile

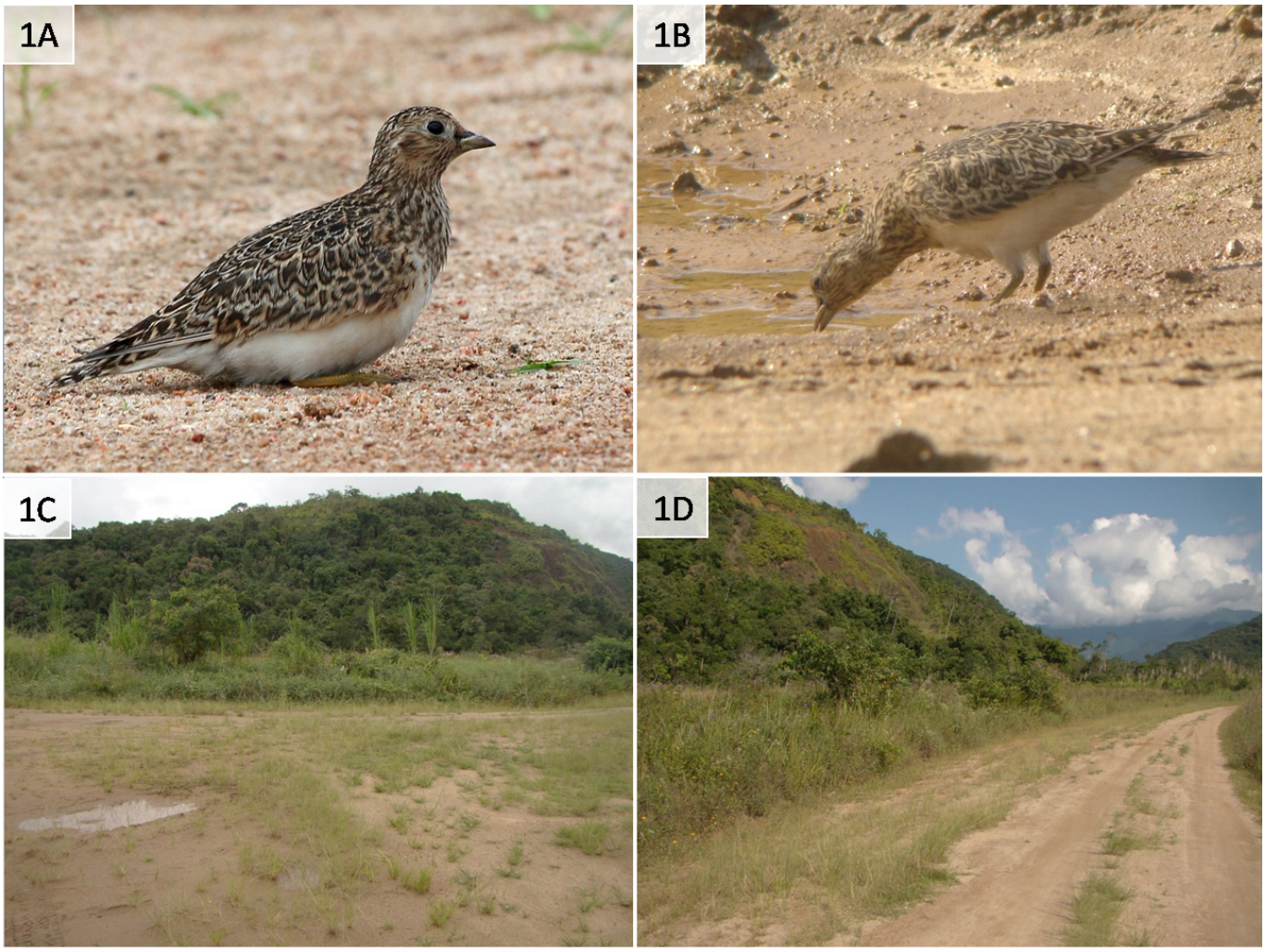

FIGURE 1. a): juvenile Least Seedsnipe *Thinocorus rumicivorus* (photo by J. C.); 1b: *Thinocorus rumicivorus* drinking rainwater from a puddle (photo by M. A. C.); 1c and 1d: images depicting the habitat frequented by the individual (photos by M. A. C.).

and the plains of northeastern Argentina and Uruguay. The species typically occupies sandy semi-desert habitats with a sparse cover of creeping plants and shrubs, with many succulents. It may also use lightly cultivated areas, feeding on roads and shrubby pastures close to flooded plains, especially in areas dominated by *Parastrephia* sp. (Fjeldså 1996, Laredo 1996, Aramburú *et al.* 2007). Its diet consists primarily of seeds and foliage (Fjeldså 1996, Aramburú *et al.* 2007, Korzun *et al.* 2009).

In Brazil the species has been reported on one previous occasion; from the state of Rio Grande do Sul, in the municipality of Tavares at the Parque Nacional da Lagoa do Peixe, on 26 April 1990 by Antas (1990), as follows:

"Thinocorus rumicivorus – *Uma ave em plumagem juvenil encontrada nos campos úmidos entre a formação de dunas e a lagoa a 26 de abril de 1990. Diagnosticada pelo seu característico deslocamento no solo e forma de corpo e bico inconfundíveis. A ausência do negro no centro do pescoço denunciou a idade da ave. Essa ave, componente de uma família especial de Charadriiformes, tem distribuição predominantemente andina, ocorrendo também na Patagônia argentina tanto em reprodução, como invernando. No inverno austral alcança rotineiramente as costas uruguaias. Esse é, entretanto, o primeiro registro da espécie e da família no país.".*

As this record did not include any supporting vouchers (images, recordings or a specimen) it could not be accepted onto the primary list of Brazilian birds by the Comitê Brasileiro de Registros Ornitológicos (CBRO) along with 30 other species for which documentation is not available (CBRO 2011). Reasons for this CBRO decision were outlined in the journal "Nattereria" (CBRO 2000). As such, this record of a multi-observed, photographed and sound-recorded individual should be sufficient proof to allow this species to be promoted to the primary list by the CBRO.

Despite being one of the commonest bird species of southern Patagonia, *Thinocorus rumicivorus* has been the subject of few field studies and its natural history is poorly known (Fjeldså 1996, Laredo 1996, Aramburú *et al.* 2007, Korzun *et al.* 2009). We consider it most

likely that this individual pertains to the subspecies *T. r. rumicivorus*, since individuals of this taxon are migratory, travelling north to Uruguay to escape the austral winter (Fjeldså 1996). Rates of long-range vagrancy are typically far higher in longer-distance migrants than shorter-distance migrants or resident species (McLaren *et al*. 2006). The overlapping of the two Brazilian records within a few days of each other at the onset of the austral autumn is probably more than coincidental, and both events may have been related to the presence of exceptional cold weather which may have stimulated the individual to migrate farther north than normal. The weather at the time of the discovery was calm, overcast, 20.0 °C, 88% relative humidity and 1017 hPa, but there had been a particularly strong cold front over southern South America in the preceding week. Vagrancy in the species has previously been reported with an adult male photographed on the South Shetland Islands, Antarctica on 1 December 1996 (Favero & Silva 1998). It is also possible, that this individual, a juvenile on its first migration, may have committed a navigation error or failed to 'turn off' the endogenous urge ('zugunruhe') to continue migrating (cf. Lees & Gilroy 2009).

The diet of the family is poorly known, although the beak morphology is suitable for removing both seeds and parts of the plant itself (Korzun *et al*. 2009) and this species consumes more seeds than other members of the family, which apparently prefer shoots (Fjeldså 1996). *Thinocorus rumicivorus* has not previously been reported as consuming seeds of *Eragrostris* (cf. Aramburú *et al*. 2007) although Aramburú *et al.* (2007) found that members of the family Poaceae may make up around 40% of the species' diet. *Eragrostis tenuifolia* is native to south-east Asia and the Afrotropics but has been widely introduced elsewhere in the world (Jung *et al.* 2008). In Brazil it has been reported from the states of Goiás, Minas Gerais, São Paulo, and Rio Grande do Sul (Boechat & Longhi-Wagner 2000). Within its regular range, *T. rumicivorus* has been viewed as a potential crop pest, but has been shown to be beneficial to farmers as the species actually consumes more weed species and may in fact be providing an ecosystem service (Aramburú *et al.* 2007). For example, in Buenos Aires the species principally consumed the species *Polygonum aviculare*, a pest of wheat (*Triticum* sp.), from within crops of "couza" (*Brassipus napus*) (Aramburú *et al.* 2007).

This Brazilian 'first' also illustrates the growing trend for notable ornithological records to be made by amateur ornithologists, a situation fostered by the growth of the Wikiaves website (www.wikiaves.com.br) which has acted as a focal point in nurturing the community of domestic amateur ornithologists. This vagrant was also visited ('twitched') by many observers on subsequent days, a regular occurrence for a vagrant sighting in Europe or North America, but perhaps the first instance of its kind in Brazil, see Booth *et al*. (2011) for a review of the potential conservation benefits of this activity.

ACKNOWLEDGEMENTS

We thank Paulo de Tarso Z. Antas for comments on the record from Rio Grande do Sul, Daniel Firme for help finding pertinent literature, and Dr Hilda Wagner for help with identification of the grass species.

REFERENCES

Antas, P. T. Z. 1990. Novos registros para a avifauna do Rio Grande do Sul, p. 67. In: Encontro Nacional de Anilhadores de Aves, 6. Pelotas: Universidade Católica de Pelotas.

Aramburú, R.; Formoso, A.; Arambarri, A. M. & Montalti D. 2007. Morfometría, peso corporal y dieta invernal de la Agachona Chica *Thinocorus rumicivorus* em La provincia de Buenos Aires. *Hornero,* 22: 39-42.

Boechat, S. C. & Longhi-Wagner, H. M. 2000. Padrões de distribuição geográfica dos táxons brasileiros de *Eragrostis* (Poaceae, Chloridoideae). *Revista Brasileira de Botânica*, 23: 177-194.

Booth, J. E.; Gaston, K. J.; Evans, K. L. & Armsworth, P. R. 2011. The value of species rarity in biodiversity recreation: A birdwatching example. *Biological Conservation,* 144: 2728-2732.

CBRO – Comitê Brasileiro de Registros Ornitológicos. 2000. Resoluções do CBRO. Resolução n° 13: Excluir *Thinocorus rumicivorus* Eschscholtz, 1829 da lista principal de aves brasileira, transferindo-o para a lista secundária. *Nattereria,* 1: 46.

CBRO – Comitê Brasileiro de Registros Ornitológicos. 2011. Listas das aves do Brasil. 10ª ed., http://www.cbro.org.br/CBRO/pdf/AvesBrasil2011.pdf (access on 19 February 2012).

Favero, M. & Silva, M. P. 1998. First Record of the Least Seedsnipe *Thinocorus rumicivorus* in the Antartic. *Ornitologia Neotropical,* 10: 107-109.

Fjeldså, J. 1996. Family Thinocoridae (seedsnipes), p. 538-545. In: Del Hoyo, J.; Elliott, A. & Sargatal J. (eds.). Handbook of the Birds of the World, Hoatzin to Auks, v. 3. Barcelona: Lynx Edicions.

Jung, M. J.; Veldkamp, J. F. & Kuoh, C. S. 2008. Notes on *Eragrostis* Wolf (Poaceae) for the Flora of Taiwan. *Taiwania*, 53: 96-102.

Korzun L. P.; Érard, C.; Gasc, J. P. & Dzerzhinsky, F. J. 2009. Adaptation of seedsnipes (Aves, Charadriiformes, Thinocoridae) to browsing: a study of their feeding apparatus. *Zoosystema,* 31: 347-368.

Laredo, C. D. 1996. Observations on migratory and resident shorebirds in lakes in the highlands of North-western Argentina. *International Wader Studies,* 8: 103-111.

Lees, A. C. & Gilroy, J. J. 2009. Vagrancy Mechanisms in Passerines and Near-Passerines, p. 1-23. In: Slack, R. (ed.). Rare Birds Where and When: An analysis of status and distribution in Britain and Ireland, v. 1: sandgrouse to New World orioles. York: Rare Bird Books.

McLaren, I. A.; Lees, A. C.; Field, C. & Collins, K. J. 2006. Origins and Characteristics of Nearctic Landbirds in Britain and Ireland in Autumn: a Statistical Analysis. *Ibis*, 148: 707-726.

Pereira, F. A. 2012. [WA622741, *Thinocorus rumicivorus* (Eschscholtz, 1829)]. www.wikiaves.com/622741 (access on 03 May 2012).

Instructions to Authors

The ***Revista Brasileira de Ornitologia*** will accept original contributions related to any aspect of the biology of birds, with emphasis on the documentation, analysis, and interpretation of field and laboratory studies, presentation of new methodologies, theories or reviews of ideas or previously known information. The ***Revista Brasileira de Ornitologia*** is interested in publishing ornithological studies on behavior, behavioral ecology, biogeography, breeding biology, community ecology, conservation biology, distribution, evolution and genetics, landscape ecology, methods and statistics, migration, nomenclature, paleontology, parasites and disease, phylogeography, physiology, population biology, systematics, and taxonomy. Noteworthy range extensions and novel geopolitical (country/state/province) records are also welcome, but not mere lists of the avifauna of a specific locality. Monographs may be considered for publication upon consultation with the editor.

Manuscripts submitted to The ***Revista Brasileira de Ornitologia*** must not have been published previously or be under consideration for publication, in whole or in part, in another journal or book. **Manuscripts may be written only in English** and must be typed in Microsoft Word, using Times New Roman 12, double spaced and left justified. Scientific names must be shown in *italic,* and authors are encouraged to follow the latest systematic sequence of the Brazilian (www.cbro.org.br/CBRO/index.htm) or South American (www.museum.lsu.edu/~Remsen/SACCBaseline.html) bird lists, when pertinent and at their discretion. When using one of each of those sources, please be explicit about which one is being used, following it consistently throughout the manuscript. Common names should follow those recommended by the South American Checklist Committee (www.museum.lsu.edu/~Remsen/SACCBaseline.html).

Authors for whom English is not their native language are strongly recommended to have their manuscript professionally edited before submission to improve the English. Three of these independent suppliers of editing services in Brazil can be found through Ana Teresa Bueno - tessabueno@gmail.com, maryandriani@yahoo.com or the web site www.idstudio.art.br. All services are paid for and arranged by the author, and use of one of these services does not guarantee acceptance or preference for publication.

SUBMISSION

Originals must be submitted by email only (editoriarbo@gmail.com) and as a single Microsoft Word file (figures and table must me imbedded into the manuscript). Upon manuscript acceptance, high quality image files (extensions JPG, TIF, PSD, CDR, AI, EPS, WMF or XLS; minimum resolution of 300 DPI) of the original figures will be requested. The *title* must be concise and clearly define the topic of the manuscript. Generic expressions such as "contribution to the knowledge…" or "notes about…" must be avoided. The name of each author must be written fully, followed by the full mailing address, and author for communication in the case of multiple authors.

The parts of the manuscript must be organized as follows:

– **Title** (of the manuscript, in lowercase – not capitals - with names and addresses of all the authors)
– **Abstract/Key-Words** (with title and up to 300 words; five key-words related to the main topics of the manuscript and *not already mentioned in the title* must be provided in alphabetical order and separated by semicolons)
– **Introduction** (starting on a new page)
– **Methods** (this and subsequent parts continue without page breaks)
– **Results** (only the results, succinctly)
– **Discussion**
– **Acknowledgments**
– **References**
– **Tables**
– **Figure Legends**
– **Figures**

For short notes, the same *Abstract* and *Key-Words* structure outlined above must be included. The *text* must provide a brief introduction, description of methods and of the study area, presentation and discussion of the results, acknowledgments and references. Conclusions may be provided after the discussion or within it.

Each Table should be on a separate page, numbered in Arabic numerals, with its own legend. The legend should be part of the table, and occupy the space made by inserting an extra line at the beginning of the table, in which the cells are merged. Figure legends, occupying one or more pages following the tables, should be numbered successively, also in Arabic numerals. Figures will follow, one to each page, and clearly numbered in agreement with the legends.

As necessary, subsections may be identified and labeled as such. All pages should be numbered in the upper, right hand corner.

The following *abbreviations* should be used: h (hour), min (minute), s (second), km (kilometer), m (meter), cm (centimeter), mm (millimeter), ha (hectare), kg (kilogram), g (gram), mg (miligram), all of them in lowercase (not capitals) and with no "periods" (".") Use the following *statistical notations:* P, n, t, r, F, G, U, χ^2, df (degrees of freedom), ns (non significant), CV (coefficient of variation), SD (standard deviation), SE (standard error). With the exception of temperature and percentage symbols (*e.g.,* 15°C, 45%), leave a space between the number and the unit or symbol (*e.g.,* n = 12, P < 0.05, 25 min). Latin words or expressions should be written in italics (*e.g., et al., in vitro, in vivo, sensu*). Numbers one to nine should be written out unless a measurement (*e.g.,* four birds, 6 mm, 2 min); from 10 onwards use numbers.

Author *citations* in the text must follow the pattern: (Pinto 1964) or Pinto (1964); two publications of the same author must be cited as (Sick 1985, 1993) or (Ribeiro 1920a, b); several authors must be presented in chronological order: (Pinto 1938, Aguirre 1976b); for two-author publications

both authors must be cited: (Ihering & Ihering 1907), but for more than two authors, only the first one should be cited: (Schubart *et al.* 1965); authors' names cited together are linked by "&". Unpublished information by third parties must be credited to the source by citing the initials and the last name of the informer followed by the appropriate abbreviation of the form of communication: (H. Sick *pers. comm.*) or V. Loskot (*in litt.*); unpublished observations by the authors can be indicated by the abbreviation: (*pers. obs.*); when only one of the authors deserves credit for the unpublished observation or another aspect cited or pointed out in the text, this must be indicated by the name initials: "… in 1989 A. S. returned to the area…". *Unpublished manuscripts* (*e.g.,* technical reports, undergraduate monographs) and *meeting abstracts* should be cited only exceptionally in cases they are absolutely essential and no alternative sources exist. The *reference* list must include all and only the cited publications (titles written in full, not abbreviated), in alphabetical order by the authors' last name:

Articles

Fargione, J.; Hill, J.; Tilman, D.; Polasky, S. & Hawthornez, P. 2008. Land clearing and the biofuel carbon debt. *Science,* 319: 1235-1238.

Santos, M. P. D. & Vasconcelos, M. F. 2007. Range extension for Kaempfer's Woodpecker *Celeus obrieni* in Brazil, with the first male specimen. *Bulletin of the British Ornithologists' Club,* 127: 249-252.

Worthington, A. H. 1989. Adaptations for avian frugivory: assimilation efficiency and gut transit time of *Manacus vitellinus* and *Pipra mentalis. Oecologia,* 80: 381-389.

Books and Monographs

Sick, H. 1985. *Ornitologia brasileira, uma introdução,* v. 1. Brasília: Editora Universidade de Brasília.

Book Chapters

Remsen, J. V. & Robinson, S. K. 1990. A classification scheme for foraging behavior of birds in terrestrial habitats, p. 144-160. In: Morrison, M. L.; Ralph, C. J.; Verner, J. & Jehl Jr., J. R. (eds.). Avian foraging: theory, methodology, and applications. Lawrence: Cooper Ornithological Society (Studies in Avian Biology 13).

Theses and Dissertations

Novaes, F. C. 1970. *Estudo ecológico das aves em uma área de vegetação secundária no Baixo Amazonas, Estado do Pará.* Ph.D. dissertation. Rio Claro: Faculdade de Filosofia, Ciências e Letras de Rio Claro.

Web-Based References

Dornas, T. 2009a. [XC95575, *Celeus obrieni*]. www.xeno-canto.org/95575 (access on 25 February 2012).

Dornas, T. 2009b. [XC95576, *Celeus obrieni*]. www.xeno-canto.org/95576 (access on 25 February 2012).

IUCN. 1987. A posição da IUCN sobre a migração de organismos vivos: introduções, reintroduções e reforços. http://iucn.org/themes/ssc/pubs/policy/index.htm (access on 25 August 2005).

Pinheiro, R. T. 2009. [WA589090, *Celeus obrieni* Short, 1973]. www.wikiaves.com/589090 (access on 05 March 2012).

Footnotes will not be accepted.

Illustrations and *tables.* The illustrations (photographs, drawings, graphics and maps), which will be called figures, must be numbered with Arabic numerals in the order in which they are cited and will be inserted into the text. Upon manuscript acceptance, high quality image files (extensions JPG, TIF, PSD, CDR, AI, EPS, WMF or XLS; minimum resolution of 300 DPI) of the original figures will be requested. Tables and figures will receive independent numbering and must appear at the end of the text, as well as all legends to the figures that must be presented on separate sheets. In the text, mentioning figures and tables must follow the pattern: "(Figure 2)" or "… in figure 2." Table headings must provide a complete title, and be self-explanatory, without needing to refer to the text. All figure legends must be grouped in numerical order on a separate sheet from the figures.

All material must be sent to the editor of the *Revista Brasileira de Ornitologia:*

Alexandre Aleixo, Ph.D.
Coordenação de Zoologia / MCTI / Museu Paraense Emílio Goeldi
Caixa Postal 399 / CEP 66040-170 / Belém / PA / Brazil
Phone: (55-91) 3075-6102 / 3075-6282
E-mail: editoriarbo@gmail.com

A letter of submission or email message must accompany the manuscript and mention the manuscript title, authors' names, address and e-mail address of the author with whom the editor will maintain contact concerning the manuscript. Notification of receipt of the originals will be sent to the corresponding author. Once the manuscript is finally accepted and a final version consolidated, PDF proofs will be sent by email to this author for revision. The correction of the final version sent for publication is entirely the authors' responsibility. The first author of each published paper will receive via e-mail, free of charge, a PDF file of the published paper. In the case of doubts as to the rules of format, please contact the editor prior to submission.

Revista Brasileira de Ornitologia

Volume 20 – Número 4 – Dezembro 2012 / Issue 20 – Number 4 – December 2012

SUMÁRIO / CONTENTS

ARTIGOS / PAPERS

NOTAS / SHORT-COMMUNICATIONS

ISSN 0103-5657