

An avifaunal inventory and conservation prospects for the Gurupi Biological Reserve, Maranhão, Brazil

Diego Mendes Lima^{1,4}, Carlos Martínez² and Daniel Santana Lorenzo Raíces³

¹ Centro Nacional de Pesquisa e Conservação de Aves Silvestres/ICMBio, BR 230, km 10, Renascer, CEP 58108-012, Cabedelo, PB, Brazil.

² Departamento de Biologia, Universidade Federal do Maranhão, UFMA, Av. dos Portugueses s/n, Bacanga, CEP 65080-040, São Luis, MA, Brazil.

³ Instituto Chico Mendes de Conservação da Biodiversidade, Reserva Biológica do Gurupi BR 222 Km 12, CEP 65.930-000, Açailândia, MA, Brazil.

⁴ Corresponding author: diego.lima@icmbio.gov.br

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ABSTRACT: We carried out an avifaunal inventory of the Gurupi Biological Reserve, Maranhão, municipalities of Bom Jardim and Centro Novo do Maranhão, between December 2009 and December 2013. The main objective was to estimate species richness and identify endemic species. A further objective was to identify vulnerable and endangered species to provide information for the development of conservation strategies. Data were collected using mist-netting and MacKinnon lists, as well as nonsystematic observations. A total of 424 species were recorded from 64 families; 18 of which considered endemic taxa. Seven are threatened nationally: *Psophia obscura*, *Guaruba guarouba*, *Pyrrhura lepida lepida*, *Pteroglossus bitorquatus bitorquatus*, *Phlegopsis nigromaculata paraensis*, *Dendrocincla merula badia*, and *Dendrocolaptes medius*. In addition to these, another eight are threatened internationally (IUCN 2014): *Tinamus tao*, *Penelope pileata*, *Lophornis gouldii*, *Pyrrhura amazonum*, *Touit huetii*, *Pionites leucogaster*, *Pyrrhura vulturina* and *Lepidothrix iris*. Survey results underscore the extreme importance of the Gurupi Biological Reserve as a strategic site for the conservation and maintenance of endemic and endangered species of the Belém Center of Endemism in Brazilian Amazonia.

KEY-WORDS: Amazon, birds, Belém Center of Endemism, endangered species, inventory.

INTRODUCTION

During the 1980s, a number of scientific expeditions were conducted in the remaining tracts of Amazonian forest in the Brazilian state of Maranhão, many of which involved the ornithological division of the Goeldi Museum, in Belém (IBAMA 1999).

These studies resulted in the production of a number of reports, which were presented in 1984 by the Brazilian Institute for Forestry Development (*Instituto Brasileiro de Desenvolvimento Florestal* - IBDF), as the federal forestry institute was then known, concerning the Golden Parakeet, *Guaruba guarouba* (IBAMA 1999). These documents recommended the creation of a national park or biological reserve in western Maranhão. This proposal was based on biogeographical analyses of endemism and total species richness (Oren 1988), which focused primarily on the threatened species that occur in the region.

These initiatives led to the creation of the Gurupi Biological Reserve (REBIO Gurupi), through the Federal Decree N° 95614 of January 12, 1988, which had the primary objective of ensuring the conservation of the

fauna and flora of one of the last significant remnants of the typical dense alluvial and plateau rainforests of the state of Maranhão (IBAMA 1999).

The REBIO Gurupi is an extremely important area for bird conservation in the Amazon, since it is located in the most threatened endemism center in Brazil, the Belém Center of Endemism (hereafter Belém CE) (Silva *et al.* 2005, De Luca *et al.* 2009). The greatest threats to this center are disorderly occupation, illegal logging and deforestation due to the expansion of agricultural activities (Skole & Tucker 1993, Gascon *et al.* 2001, Valois 2003). The expansion of agriculture and deforestation in the Brazilian Amazon has reached its highest rates in 1970s, with western and southern Maranhão ranking among the most heavily deforested areas. Only a few scattered forest fragments, located primarily within reserves, remained (Aleixo 2009).

These areas are important for studies on historical biogeography, as well as providing data for the testing of hypotheses on the processes that resulted in the formation of the region's biota (Cracraft 1985, 1994, Morrone 1994, Morrone & Crisci 1995). They also contain a number of unique and irreplaceable species (Silva *et al.* 2005).

There have been no comprehensive surveys of the avifauna of the interior of the REBIO Gurupi. The few available studies have been conducted in the areas surrounding the reserve, such as Oren & Roma (2011) and Oren (1992), who described a new subspecies, *Celeus torquatus pieteroyensi* (Pieter Oyen's Ringed Woodpecker), from the region of the Gurupi River in Maranhão, and also the forested districts of Marajo Island. To further illustrate the lack of primary data on the bird fauna of REBIO Gurupi, the appendix VII of the reserve's management plan provides a list of species actually found in a nearby forest reserve belonging to the Vale do Rio Doce mining company, in the municipality of Buriticupu (IBAMA 1999).

Here, we compile a list of bird species for the REBIO of Gurupi, identifying endemic, endangered and vulnerable species to support conservation and protection strategies in the area.

MATERIAL AND METHODS

Study area

The REBIO Gurupi is an integral protection conservation unit, created by decree number 95,614 of January 12th, 1988, which delimits a total area of 341,650 hectares. Subsequently, however, measurements of the area using a Global Positioning System corrected the area to 271,000 ha, partially located within the municipalities of Bom Jardim, Centro Novo do Maranhão, and São João do Carú, all in the state of Maranhão. The reserve is bordered by three indigenous reservations, Alto Turiaçu to the north, and Carú and Awa to the west, and is located within the Belém CE.

The reserve's management plan establishes three zones, that is, areas that present specific characteristics, which require distinct strategies of intervention and protection. During the present study, data were collected at 12 points within two of these zones - the undisturbed zone and the recovery zone (Figure 1). The points were located to best sample the different successional stages and aquatic environments found within each zone (Figure 2). All sampling points were georeferenced using a Garmin Etrex Vista, Datum SAD 69 handheld GPS (Table 1).

Undisturbed zone

The REBIO Gurupi management plan defines this area as the central and best preserved portion of the reserve (IBAMA 1999). The vegetation is dense rainforest with a continuous canopy of approximately 35 m in height, with emergent trees reaching 50 m. The most frequent canopy tree species include *Manilkara huberi* (Ducke) Standl, *Shefflera morototoni* (Aubl.) March., *Hymenaea*

courbaril Linnaeus, *Cenostigma tocaninum* Ducke, and *Goupia glabra* Aubl., in addition to genera such as *Hymenobolium* Benth., *Eschweilera* Mart. ex DC., *Cordia* L., *Inga* Mill., *Jacaranda* Juss., *Simarouba* Aubl., *Spondias* L., and *Vismia* Vand. Below the canopy, the lower strata are formed by a diversity of trees, shrubs, lianas, and herbaceous plants, which formed a well stratified, shady and humid understory, with a thick layer of leaf litter. This zone is dominated by plant species of the families Rubiaceae, Maranthaceae, and Arecaceae. The structure and composition of this forest are characteristic of an advanced stage of maturity (Freitas *et al.* 2005, Prata 2007, Guariguata & Ostertag 2001). However, some areas have suffered the effects of illegal logging, which has resulted in clearings produced by the felling and dragging of trees.

Recovery zone

The REBIO Gurupi management plan defines this area as the portion of the reserve affected by anthropogenic impacts, which will be reclassified as and when it will be completely restored. This zone is characterized by the presence of a number of tracts of degraded primary forest as well as many areas previously deforested for the establishment of pastures and "slash and burn" agriculture, presenting different successional stages. Some of the sampling points were located in areas characterized by widely-spaced emergents of the genera *Eschweilera* Mart. ex DC., *Byrsonima* H.B.K., *Ocotea* Aubl., and *Inga* Mill., with an understory dominated by shrubs of the family Piperaceae which are typical of an advanced stage of regeneration (Prata 2007). Other areas of this zone are characterized by the presence of the Jamaican nettle tree (*Trema micrantha* (L.) Blume.), a number of different *Cecropia* species, as well as *Tapirira guianensis* Aubl., which are considered to be indicators of early-growth forests (Guariguata & Ostertag 2001). Other records were collected at distinct features of the landscape in the study areas, such as pastures, and small marshes and permanent lakes.

Systematic field work was conducted by D. M. L. and D. S. L. R., beginning in August, 2010, and ending in December, 2012. Nonsystematic observations were carried out by C. M. between December, 2009, and December, 2013. Surveys of the reserve's avifauna also involved the use of complementary qualitative and quantitative methods for the collection of data in the different habitats sampled. Survey data were collected using mist-nets and MacKinnon lists (Anjos *et al.* 2010, Ribon 2010).

The MacKinnon lists method employed (MacKinnon 1991) consisted of the identification of 10 species, which represent a sampling unit, based on the modifications suggested by Herzog *et al.* (2002). This

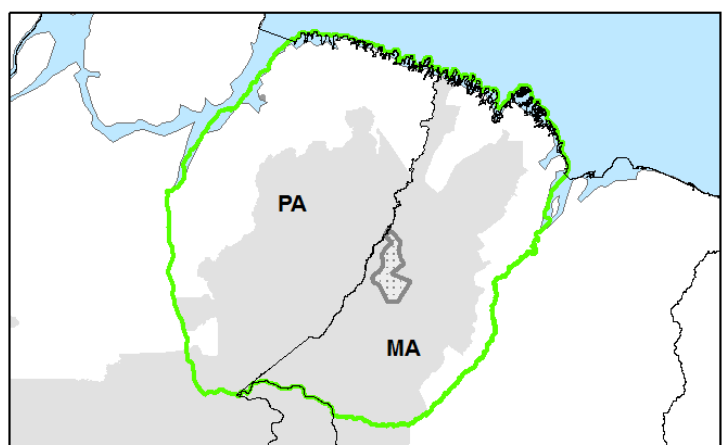
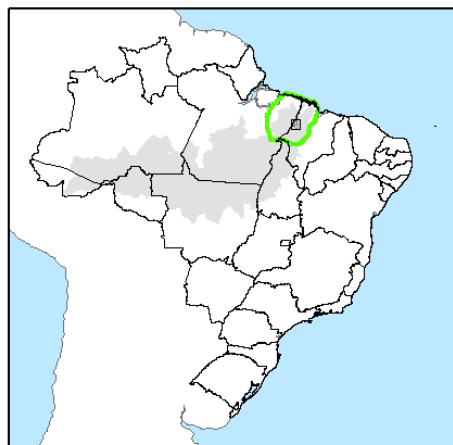
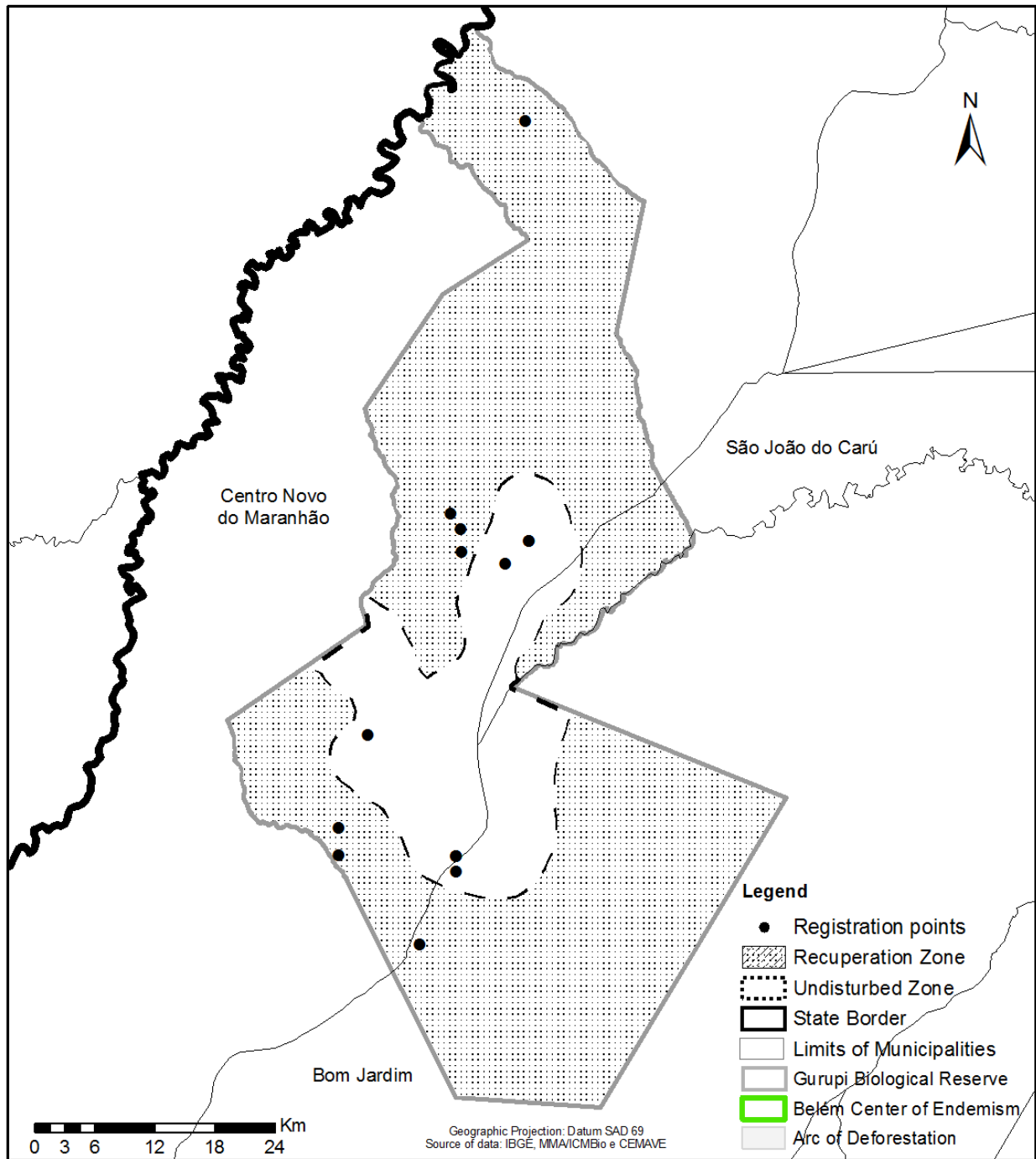


FIGURE 1. Localities surveyed during this study at REBIO Gurupi between December 2009 and December 2012. The figure also shows the location of the reservation with respect to the state of Maranhão, adjacent municipalities, the Belém Center of Endemism, and the arc of deforestation in Brazil.



FIGURE 2. Habitats surveyed in both undisturbed and recovery areas at REBIO Gurupi: (a) primary forest; (b) forest regeneration in advanced stage; (c) small marshes; (d) forest regeneration in early stage; (e) disturbed areas / pastures; (f) temporary lake. Photographs were taken by D. M. L.

procedure was used to survey all different habitat types found within the reserve, and resulted in the collection of a total of 199 lists, in order to obtain a rarefaction curve and quantify the number of species. These records were collected during 30 nonconsecutive days, generally between 06:00 h and 10:00 h in the morning, and 15:00-18:30 h in the afternoon, with a total of 225 hours of

sampling time. Complementary data were collected in a nonsystematic manner by C. M. between December, 2009, and December, 2013, during periodic visits to the reserve as part of the eastern Amazonian division of the national Program for Biodiversity Research (PPBio). However, nonsystematic data obtained by C. M. were not used to estimate a rarefaction curve.

Estimates of species richness obtained with the Mackinnon lists were carried out with Bootstrap Mean estimators and CHAO 2 using the statistical program EstimateSWin 8.2 (Colwell 2006).

Additional data were collected using mist nets, with 10 nets (9 m x 2.5 m, with a 25 mm mesh) set up on nonconsecutive days in each sampling area, with five days spent in the recovery Zone, and four days in the undisturbed zone. The nets were open between 05:30 h and 18:00 h, with a total sampling effort of 625 net-hours in the recovery Zone, and 500 net-hours in the undisturbed zone. Following identification and processing, the birds captured were marked with standard CEMAVE/ICMBio metallic bands before released back into the wild.

Species were identified based on the specialized literature (Erize *et al.* 2006, Ridgely & Tudor 1989, 1994, 2009, Sick 1997, Sigrist 2009, van Perlo 2009). Photographic records obtained in the field of considerable biogeographic importance were compared with material available online (www.wikiaves.com.br), and later archived this same database. In the case of threatened species for which no documentation was available, a detailed description was recorded, based on field observations. Species of relevant biogeographical interest, for which we obtained only isolated observations, were listed separately (Appendix 1), following the recommendations in Lees *et al.* (2014).

RESULTS

Altogether 424 species were recorded at the REBIO Gurupi (Table 2). Among the species and subspecies recorded, seven were considered endangered according to the National List of Brazilian Fauna Threatened with

Extinction (MMA 2003), as follows: *Psophia obscura* (Endangered - EN; also regarded as threatened globally, see IUCN 2014), *Guaruba guarouba* (Vulnerable - VU; also threatened globally according to the IUCN 2014), *Pyrrhura lepida lepida* (Endangered - EN, also threatened globally according to the IUCN 2014), *Pteroglossus bitorquatus bitorquatus* (Vulnerable - VU), *Phlegopsis nigromaculata paraensis* (Endangered - EN), *Dendrocincla merula badia* (Endangered - EN), and *Dendrocolaptes medius* (Endangered - EN). In addition to these, eight species are threatened globally (IUCN 2014): *Tinamus tao* (Vulnerable - VU), *Penelope pileata* (Vulnerable - VU), *Lophornis gouldii* (Vulnerable - VU), *Pyrrhura amazonum* (Endangered - EN), *Touit huetii* (Vulnerable - VU), *Pionites leucogaster* (Vulnerable - VU), *Pyrilia vulturina* (Vulnerable - VU), and *Lepidothrix iris* (Vulnerable - VU).

We recorded 18 taxa endemic to the Belém CE: *Ortalis superciliaris*, *P. obscura*, *P. lepida lepida*, *P. bitorquatus bitorquatus*, *Celeus torquatus pieteroyensi*, *Thamnophilus aethiops incertus*, *Pyriglena leuconota leuconota*, *Phlegopsis nigromaculata paraensis*, *Dendrocincla merula badia*, *Synallaxis rutilans omissa*, *Todirostrum chrysocrotaphum illigeri*, *Piprites chloris grisescens*, *Manacus manacus purissimus*, *Terentriacus erythrurus hellmayri*, *Ramphocaenus melanurus austerus*, *Lanio cristatus pallidigula*, *Tangara velia signata* and *Granatellus pelzelni paraensis*.

The data from mist-net captures are included here only for the calculation of species richness. The cumulative species curve based on the 10 species MacKinnon lists accumulated throughout REBIO Gurupi (n = 199) reached a total of 320 species. The CHAO 2 and Bootstrap estimators calculated a total species richness of 380 and 364, respectively. Therefore, the estimated values are higher than the species richness recorded empirically (Figure 3).

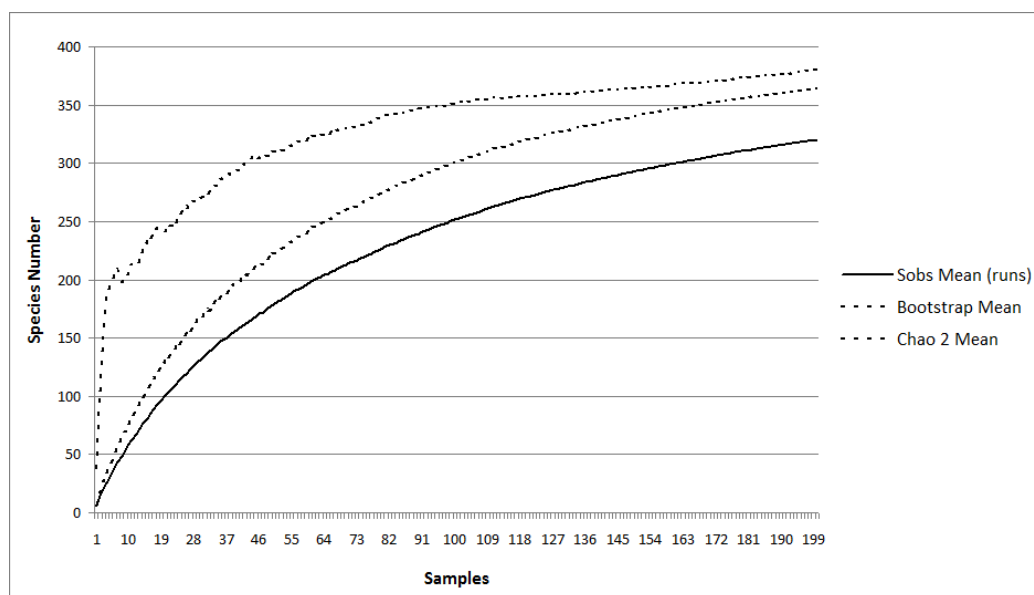


FIGURE 3. Species accumulation curve based on 199 Mackinnon lists obtained between August 2010 and December 2012 at REBIO Gurupi. Values of observed species richness (Sobs) along with those estimated by Bootstrap and CHAO 2 are shown.

TABLE 1. Coordinates (SAD 69 Lat/Lon hddd°mm'ss.") of sampling points in undisturbed (Zd) and recovery zones (Zr) of REBIO Gurupi.

Points	Lat	Long	Area
1	W 46 42 38.0	S 03 38 33.7	Zd
2	W 46 41 21.5	S 03 37 21.2	Zd
3	W 46 50 03.1	S 03 47 50.0	Zd
4	W 46 45 16.7	S 03 54 21.2	Zd
5	W 46 45 18.0	S 03 55 10.0	Zd
6	W 46 47 15.5	S 03 59 07.4	Zr
7	W 46 51 38.1	S 03 52 48.7	Zr
8	W 46 51 36.3	S 03 54 17.3	Zr
9	W 46 44 57.9	S 03 37 57.1	Zr
10	W 46 45 02.5	S 03 36 41.2	Zr
11	W 46 45 35.2	S 03 35 52.2	Zr
12	W 46 41 34.2	S 03 14 42.5	Zr

DISCUSSION

According to Oren & Roma (2011) 503 species of birds were recorded in the Amazonian sector of Maranhão State. According to our data, REBIO Gurupi holds at least 84% of these species. Compared with the total number of species recorded for the state of Maranhão (640 spp., Oren 1991), REBIO Gurupi harbors about 66% of the bird species recorded in the state. The number of species inventoried by us in the reserve, taking into account the proportions of the sampled area, habitat heterogeneity, and sampling effort, is also significant in comparison to the total number of species recorded for the Belém CE. Roma (1996) lists 529 species for the Belém CE in the eastern part of the state of Pará, while Novaes & Lima (2009) recorded 490 species for the Belém metropolitan area, and Lees *et al.* (2012) listed 440 species for several sites at Paragominas. Only Portes *et al.* (2011) recorded a slightly greater number of species (441 species) than us at nine forest fragments of the Belém CE in the state of Pará, covering the municipalities of Paragominas, Tailândia and Tomé-Açu.

In our study, the cumulative species curve did not stabilize by the end of the sampling (Figure 3), indicating that additional species would probably have been recorded if more MacKinnon lists had been collected. The asymptote may rarely be reached in areas of high diversity (Ribon 2010), and it seems likely that further surveys at REBIO Gurupi will render a more complete picture of the diversity of the reserve's avifauna.

In the present study, the most diverse bird family was Tyrannidae, which is the third richest avian taxon in Brazil

(CBRO 2014). Tyrannids are highly versatile ecologically, and are able to live in a wide range of habitats, including primary and secondary forests, as well as more open spaces (Sick 1997, Sigrist 2009). In the present study, species typical of open areas, such as *Pitangus sulphuratus*, *Tyrannus melancholicus*, *Machetornis rixosa*, and *Fluvicola nengeta*, were common in the recovery Zone. Early and mid-growth secondary forests also favor the occurrence of more generalist species, tolerant of habitat disturbance, such as *Forpus xanthopterygius*, *Thamnophilus doliatus*, *Thamnophilus palliatus*, *Taraba major*, *Legatus leucophaeus*, *Cyanocorax cyanopogon*, *Pheugopedius genibarbis*, and *Ramphocelus carbo*.

The geographical proximity to other, more open biomes, such as the cerrado and dry forests, may account for species from other biomes occurring into the study area following the new open areas created by deforestation (Develey 2009, Sick 1997). Species in this category are, for example, *Bubo virginianus*, *Ara severus*, *Brotogeris chiriri*, *Columbina minuta* and *Polioptila plumbea*.

Army ant swarms, which displace insects such as crickets and cockroaches during their forays, are common in the Amazon basin (Sick 1997). These columns attract birds that habitually exploit the insect prey disturbed by the ants' foraging behavior, including species of the families Thamnophilidae, Dendrocolaptidae, and Furnariidae. This phenomenon was observed frequently during the period of the present study, with the following species commonly attending the army ant swarms: *Pyriglena leuconota*, *Willisornis vidua*, *Phlegopsis nigromaculata paraensis*, *Dendrocincla merula badia*, *Deconychura longicauda* and *Dendrocincla fuliginosa*. The largest numbers of thamnophilid, dendrocolaptid and furnarid species were observed in mixed species flocks in the undergrowth, which normally included *Thamnomanes caesius*, *Xenops minutus*, *Glyphorhynchus spirurus*, *Deconychura longicauda*, *Dendrocincla fuliginosa*, *Dendroplex picus*, *Xiphorhynchus guttatus*, *Myrmotherula axillaris*, *Isleria hauxwelli*, *Myrmotherula menetriesii*, *Dysithamnus mentalis*, *Automolus rufipileatus* and *Herpsilochmus rufmarginatus*.

The relatively large number of accipitrid species recorded during the present study, in addition to a number of frugivores that are sensitive to habitat fragmentation, such as *Selenidera gouldii*, *Cotinga cotinga*, *Cotinga cayana*, *Xipholena lamellipennis*, *Iodopleura isabellae*, *Haematoderus militaris*, and *Aburria kujubi* indicate the presence of good quality habitat, and suggest a relatively well-balanced food web at REBIO Gurupi (Willis 1979, Ricklefs 2001, Noss & Csuti 1997, Lees & Peres 2006). In particular, records of *Harpia harpyja*, *Spizaetus tyrannus*, and *Leucopternis albicollis* indicate good primary forest cover, given that the presence of these raptor species may be dependent on large areas of pristine habitat (Oren & Roma 2011).

The family Psittacidae was one of the five most diverse recorded in the present study, as might be expected, considering that the Amazon region has the highest diversity of parrots (Sick 1997). Two of the taxa recorded - *Guaruba guarouba* and *Pyrrhura lepida lepida* - are listed in Brazil (MMA 2003) as threatened with extinction.

Noteworthy conservation and biogeographic records

Harpy Eagle (*Harpia harpyja*). An individual was observed perched on a maçaranduba tree (*Manilkara huberi*) in the recovery Zone in September, 2011, at around 08:00 h. This relatively robust specimen was presumed to be a female. In the same area in March, 2012, a second individual was sighted flying over an area of late-growth secondary forest. A third photographic record was obtained from a local resident of the sustainable forest management project adjacent to the biological reserve. Prior to the present study, in January, 2000, C. M. observed the species in a peripheral area of the reserve, which has now been deforested. There is evidence of genetic structuring of the *Harpia* populations in the Amazon biome, which are still relatively large, although there is lower variability in the Arc of Deforestation (ICMBio 2008). Given this, the populations located in highly impacted areas may be at increased risk of local extinction, given that this species is sensitive to anthropogenic disturbance, and is among the first to disappear when deforestation accelerates (Trinca *et al.* 2008, ICMBio 2008). The species is included in Appendix I of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) and is also listed as near-threatened by the IUCN (2014).

Black-and-white Hawk-Eagle (*Spizaetus melanoleucus*). D. M. L. recorded an individual flying over the margin of the primary forest in the northern extreme of the reserve, at 03°14'42.56"S, 46°41'34.22"W (Lima 2010). In December, 2013, C. M. recorded another individual in the south of the reserve. These appear to be the first published records of the species in the Amazon sector of Maranhão, given that it is not cited in Oren & Roma (2011), although C. M. observed the species previously at a different locality (unpublished data). According to Sick (1997) the species occurs from Mexico to Argentina, and in Brazil its presence is characterized by scattered occurrences.

Orange-breasted Falcon (*Falco deiroleucus*). C. M. observed one individual on 4th March 2010 a few km south of the ICMBio station, not strictly inside the Reserve, but in the buffer zone. As far as we know, this is the first report for this species in Maranhão. The observation took place at around 07:00 hs, during a walk in the area, and the bird was perched, eating an individual of *Eupsittula aurea* (Psittacidae). The falcon showed a less compact appearance than the similar and far more common *Falco rufigularis*.

It seemed to be longer-tailed than the latter species, and showed a rufous color in the upper breast. Further and most importantly, the falcon was around twice the size of the parakeet it had captured, eliminating any possible misidentification.

Dark-winged Trumpeter (*Psophia obscura*). This species was recorded on 20 occasions during the present study. Two records were obtained in December, 2009, three in June, 2010, three in August, 2010 (Lima & Raíces 2012), two in December, 2010, two in September, 2011, and six in December, 2013, all in the recovery Zone (Figure 4, C. M. photographed), with a further two records obtained in the undisturbed zone in November, 2011 (D.M. L. and D. S. L. R.). The species was observed at several locations in primary forest, but sometimes also in disturbed areas affected by illegal deforestation. While most of the sightings were recorded in the recovery zone, the vast majority of these observations coincided with the areas of pristine forest within this zone. While the species may occur throughout the Belém CE (Oren & Roma 2011), it is dependent on well-preserved habitats, and may thus be vulnerable to disturbance, which may often lead to local extinction. The species is considered to be endangered, both in Brazil (MMA 2003) and within its geographic range in general (IUCN 2014), as well as in the state of Pará (COEMA 2007). The species is rare and difficult to observe in most other forest remnants located within the Belém CE (A. Aleixo *pers. comm.*).

Golden Parakeet (*Guaruba guarouba*). This species was recorded in both recovery and undisturbed zones. On October, 2010, D. M. L. and D. S. L. R. observed an active *G. guarouba* nest containing two nestlings in an angelim tree (*Hymenolobium* sp.) of approximately 40 m in height in an area of secondary forest at the edge of an access road close to the sustainable forest management project (Lima 2012a). Laranjeiras (2011) also observed Golden Parakeet nests in open areas adjacent to the continuous forest, which were exposed to potential disturbance such as nest robbery for the illegal wild bird trade. During observations of this nest, a group of three individuals were observed feeding the nestlings. Similar cooperative infant care involving family members has been observed in this species by Silveira & Belmonte (2005). During the present study, a total of approximately 145 individuals were observed during 19 encounters with the species, although it seems likely that many of these parakeets were recorded more than once, given that it was not possible to identify the animals individually. The maximum number of individuals observed during a single encounter was 34.

Pearly Parakeet (*Pyrrhura lepida lepida*) – C. M. observed four individuals flying over an area of the recovery zone in December 2009 and two other individuals were seen, also in flight, on September, 2011. Four individuals were sighted resting in the subdossel of a forest in an

advanced state of regeneration, connected by continuous primary forest in December 2011 (registration by D. M. L.). In December 2012 a flock of about 8-10 individuals was sighted consuming the inflorescence of *Parkia decussata* Ducke (Fabaceae) (Lima 2012b). This species was sighted at least four times in December, 2013, in flocks of up to six individuals (registration by C. M.). Once again, it is not possible to confirm whether these encounters involved the same or different groups. Silveira (2008a) indicated that recent records of the subspecies are scarce and poorly

documented, but that it probably occurred in the REBIO Gurupi. Thus, this is the first documented record of this species for the REBIO Gurupi (Table 2). The nominate subspecies distribution is in upland forest of northern and eastern Pará, between the Tocantins and Gurupi Rivers and western Maranhão, being endemic to the Belém CE (Oren & Roma 2011, Silveira 2008a). It is categorized as endangered (MMA 2003). The main threats are habitat loss and, in recent years, capture to the illegal trade of wild birds (Silveira 2008b).



FIGURE 4. Flock of Dark-winged trumpeters (*Psophia obscura*). Photograph taken on December, 2013 by C. M.

TABLE 2. List of the 424 bird species recorded in the Gurupi Biological Reserve (MA, Brazil), from December 2010 to December 2012 and (*) complementary data collected in a nonsystematic manner by C. M. between December, 2009, and December, 2013. Zoning: Zd = undisturbed zone; Zr = recovery zone. Habitat: P = primary forest; S = forest regeneration in advanced stage; Cp = forest regeneration in early stage; B = small marshes; L = lakes; aa = disturbed areas / pasture. Type of record: A = Auditory, V = Visual, Ca = capture in mist nets; F = Photographed. Photo reference numbers are searchable in the online databases of www.wikiaves.com.br (WA). Taxon/species names followed by the acronym (Tn) indicate those regarded as threatened according to the National List of Brazilian Fauna Species Threatened with Extinction (MMA 2003). Taxon/species names followed by the acronym (Ti) indicate those regarded as threatened globally according to IUCN (2014). EN = Endemic species / subspecies to the Belém Center of Endemism according to Oren & Roma (2011). Taxonomy and nomenclature follows CBRO (2014).

Taxon	Zoning		Habitats	Type of record	Photo Ref. WA:
	Zd	Zr			
Tinamidae Gray, 1840					
<i>Tinamus major</i> (Gmelin, 1789)*		x	P	A	
<i>Tinamus tao</i> Temminck, 1815 ^{Ti}	x	x	P, S	A	

Taxon	Zoning		Habitats	Type of record	Photo Ref. WA:
	Zd	Zr			
<i>Crypturellus cinereus</i> (Gmelin, 1789)		x	Cp	A	
<i>Crypturellus soui</i> (Hermann, 1783)	x		S	A	
<i>Crypturellus strigulosus</i> (Temminck, 1815)		x	Cp	A	
<i>Crypturellus variegatus</i> (Gmelin, 1789)	x	x	P, Cp	A	
<i>Crypturellus parvirostris</i> (Wagler, 1827)	x	x	P, S	V, A	
Anhimidae Stejneger, 1885					
<i>Anhima cornuta</i> (Linnaeus, 1766)	x	x	Cp, B	F, V	1037719
Anatidae Leach, 1820					
<i>Dendrocygna viduata</i> (Linnaeus, 1766)	x		B, L	F	
<i>Dendrocygna autumnalis</i> (Linnaeus, 1758)	x		B, L	V	
<i>Cairina moschata</i> (Linnaeus, 1758)	x		B, L	F	
<i>Amazonetta brasiliensis</i> (Gmelin, 1789)	x		B, L	F	1064152
Cracidae Rafinesque, 1815					
<i>Ortalis superciliaris</i> (Gray, 1867) ^{EN}	x	x	P, Cp, S, B	V	
<i>Penelope superciliaris</i> Temminck, 1815	x	x	Cp, S	V	
<i>Penelope pileata</i> Wagler, 1830 ^{TI}	x		P, S	F, V	1036681
<i>Aburria kujubi</i> (Pelzeln, 1858)	x	x	P, Cp	V	
<i>Pauxi tuberosa</i> (Spix, 1825)		x	P, Cp	F	1029277
Odontophoridae Gould, 1844					
<i>Odontophorus gujanensis</i> (Gmelin, 1789)*		x	P	A	
Podicipedidae Bonaparte, 1831					
<i>Tachybaptus dominicus</i> (Linnaeus, 1766)*		x	B	V	
<i>Podilymbus podiceps</i> (Linnaeus, 1758)	x		B, L	V	
Ciconiidae Sundevall, 1836					
<i>Mycteria americana</i> Linnaeus, 1758	x		B	F	1065020
Anhingidae Reichenbach, 1849					
<i>Anhinga anhinga</i> (Linnaeus, 1766)	x		B, L	F	1041429
Ardeidae Leach, 1820					
<i>Tigrisoma lineatum</i> (Boddaert, 1783)	x		B, L	V	
<i>Cochlearius cochlearius</i> (Linnaeus, 1766)	x		B	V	
<i>Nycticorax nycticorax</i> (Linnaeus, 1758)	x		B	V	
<i>Butorides striata</i> (Linnaeus, 1758)	x		B, L	V	
<i>Bubulcus ibis</i> (Linnaeus, 1758)	x	x	B	V	
<i>Ardea cocoi</i> Linnaeus, 1766	x		L	V	
<i>Ardea alba</i> Linnaeus, 1758	x		B, L	V	
<i>Pilherodius pileatus</i> (Boddaert, 1783)	x		B	V	
<i>Egretta thula</i> (Molina, 1782)	x		B, L	V	
Threskiornithidae Poche, 1904					
<i>Mesembrinibis cayennensis</i> (Gmelin, 1789)*	x		B	V	
<i>Theristicus caudatus</i> (Boddaert, 1783)	x		B	V	
Cathartidae Lafresnaye, 1839					
<i>Cathartes aura</i> (Linnaeus, 1758)	x	x	P, S, Cp, B, C	V	
<i>Cathartes burrovianus</i> Cassin, 1845	x	x	P, Cp, B, C	V	

Taxon	Zoning		Habitats	Type of record	Photo Ref. WA:
	Zd	Zr			
<i>Cathartes melambrotus</i> Wetmore, 1964		x	Cp	F	1064209
<i>Coragyps atratus</i> (Bechstein, 1793)	x	x	P, Cp, aa	V	
<i>Sarcoramphus papa</i> (Linnaeus, 1758)	x	x	P, Cp	V	
Accipitridae Vigors, 1824					
<i>Leptodon cayanensis</i> (Latham, 1790)	x	x	P, S	F	1065446
<i>Chondrohierax uncinatus</i> (Temminck, 1822)		x	S	V	
<i>Elanoides forficatus</i> (Linnaeus, 1758)	x	x	P, Cp, B	F	1036637
<i>Gampsonyx swainsonii</i> Vigors, 1825		x	Cp	V	
<i>Elanus leucurus</i> (Vieillot, 1818)	x	x	aa	V	
<i>Harpagus bidentatus</i> (Latham, 1790)		x	Cp	V, F	1180188
<i>Harpagus diodon</i> (Temminck, 1823)	x		S	V	
<i>Ictinia plumbea</i> (Gmelin, 1788)		x	Cp	V	
<i>Accipiter superciliosus</i> (Linnaeus, 1766)*		x	P	V	
<i>Accipiter bicolor</i> (Vieillot, 1817)*		x	P	V	
<i>Busarellus nigricollis</i> (Latham, 1790)	x	x	P, Cp	V	
<i>Rostrhamus sociabilis</i> (Vieillot, 1817)*		x	B	V	
<i>Geranoospiza caerulescens</i> (Vieillot, 1817)		x	S	V	
<i>Heterospizias meridionalis</i> (Latham, 1790)	x	x	P	V	
<i>Urubitinga urubitinga</i> (Gmelin, 1788)	x		B	F	1180181
<i>Rupornis magnirostris</i> (Gmelin, 1788)	x	x	Cp, S	V	
<i>Geranoaetus albicaudatus</i> (Vieillot, 1816)	x	x	aa	V	
<i>Pseudastur albicollis</i> (Latham, 1790)	x	x	P, S	F	1030148
<i>Leucopternis kuhli</i> Bonaparte, 1850*		x	P	V	
<i>Buteo nitidus</i> (Latham, 1790)		x	Cp	V, F	1238809
<i>Buteo brachyurus</i> Vieillot, 1816	x		Cp, S	V, F	1194316
<i>Buteo albonotatus</i> Kaup, 1847	x		P	V, F	1238793
<i>Harpia harpyja</i> (Linnaeus, 1758)		x	P	V	
<i>Spizaetus tyrannus</i> (Wied, 1820)	x	x	P	V	
<i>Spizaetus melanoleucus</i> (Vieillot, 1816)	x	x	P	F	1065501
Aramidae Bonaparte, 1852					
<i>Aramus guarauna</i> (Linnaeus, 1766)		x	B	V	
Psophiidae Bonaparte, 1831					
<i>Psophia obscura</i> Pelzeln ^{Tn; Tr; EN}	x	x	P, Cp	V, A, F	C. M. R.
Rallidae Rafinesque, 1815					
<i>Aramides cajaneus</i> (Statius Muller, 1776)	x		B	A	
<i>Laterallus viridis</i> (Statius Muller, 1776)	x		B	A	
<i>Laterallus melanophaius</i> (Vieillot, 1819)	x		B, L	V	
<i>Porzana flaviventer</i> (Boddaert, 1783)	x		B	V	
<i>Gallinula galeata</i> (Lichtenstein, 1818)	x		B, L	V	
<i>Porphyrio martinicus</i> (Linnaeus, 1766)	x		B, L	V	
Charadriidae Leach, 1820					
<i>Vanellus chilensis</i> (Molina, 1782)	x	x	B, aa	V	
Scolopacidae Rafinesque, 1815					

Taxon	Zoning		Habitats	Type of record	Photo Ref. WA:
	Zd	Zr			
<i>Actitis macularius</i> (Linnaeus, 1766)	x	x	B, L	V	
<i>Tringa solitaria</i> Wilson, 1813		x	B, L	F	1038987
Jacanidae Chenu & Des Murs, 1854					
<i>Jacana jacana</i> (Linnaeus, 1766)	x	x	B, L	V	
Columbidae Leach, 1820					
<i>Columbina passerina</i> (Linnaeus, 1758)	x		Cp, aa, S	V	
<i>Columbina minuta</i> (Linnaeus, 1766)*		x	Cp	V	
<i>Columbina talpacoti</i> (Temminck, 1811)	x	x	Cp, aa, B	V	
<i>Columbina squammata</i> (Lesson, 1831)	x		Cp, aa	V,A	
<i>Columbina picui</i> (Temminck, 1813)*		x	Cp	V	
<i>Claravis pretiosa</i> (Ferrari-Perez, 1886)	x	x	Cp, S	V, A, Ca	
<i>Patagioenas speciosa</i> (Gmelin, 1789)		x	P, Cp	V	
<i>Patagioenas cayennensis</i> (Bonnaterre, 1792)*		x	P, S, Cp	V	
<i>Patagioenas plumbea</i> (Vieillot, 1818)		x	P, Cp	V	
<i>Patagioenas subvinacea</i> (Lawrence, 1868)*		x	P	V	
<i>Zenaida auriculata</i> (Des Murs, 1847)		x	Cp	V	
<i>Leptotila verreauxi</i> Bonaparte, 1855	x	x	Cp	A	
<i>Leptotila rufaxilla</i> (Richard & Bernard, 1792)	x	x	Cp	V, A, Ca	
<i>Geotrygon montana</i> (Linnaeus, 1758)	x	x	Cp, S	A, Ca	
Cuculidae Leach, 1820					
<i>Coccyzus minuta</i> (Vieillot, 1817)	x	x	P	V,F	
<i>Piaya cayana</i> (Linnaeus, 1766)	x	x	P, Cp	V	
<i>Coccyzus melacoryphus</i> Vieillot, 1817	x		S	V	
<i>Coccyzus americanus</i> (Linnaeus, 1758)*		x	S	V	
<i>Coccyzus euleri</i> Cabanis, 1873	x		P, S	A	
<i>Crotophaga major</i> Gmelin, 1788	x	x	Cp, B, aa	V	
<i>Crotophaga ani</i> Gmelin, 1788		x	B, aa	V	
<i>Guirra guira</i> (Gmelin, 1788)	x	x	Cp, B, aa	V	
<i>Tapera naevia</i> (Linnaeus, 1766)	x		aa	V	
<i>Dromococcyx phasianellus</i> (Spix, 1824)*		x	Cp	V	
Tytonidae Mathews, 1912					
<i>Tyto furcata</i> (Temminck, 1827)*		x	Cp, aa	V	
Strigidae Leach, 1820					
<i>Megascops choliba</i> (Vieillot, 1817)		x	Cp	A	
<i>Megascops usta</i> (Sclater, 1858)		x	Cp	Ca	
<i>Lophotrix cristata</i> (Daudin, 1800)	x		P	A	
<i>Pulsatrix perspicillata</i> (Latham, 1790)		x	P, Cp	A	
<i>Bubo virginianus</i> (Gmelin, 1788)*		x	S	V, A	
<i>Strix virgata</i> (Cassin, 1849)*		x	P, S	V, A	
<i>Strix hubula</i> Daudin, 1800	x	x	P, Cp	A	
<i>Glaucidium hardyi</i> Vielliard, 1990*		x	P	A	
<i>Glaucidium brasilianum</i> (Gmelin, 1788)		x	Cp	A, Ca	
<i>Athene cunicularia</i> (Molina, 1782)	x		aa	V	

Taxon	Zoning		Habitats	Type of record	Photo Ref. WA:
	Zd	Zr			
Nyctibiidae Chenu & Des Murs, 1851					
<i>Nyctibius grandis</i> (Gmelin, 1789)		x	P, Cp	A	
<i>Nyctibius griseus</i> (Gmelin, 1789)	x	x	Cp	V, A	
<i>Nyctibius leucopterus</i> (Wied, 1821)*		x	P	V	
Caprimulgidae Vigors, 1825					
<i>Nyctiphrynus ocellatus</i> (Tschudi, 1844)*		x	P, S	V	
<i>Antrostomus rufus</i> (Boddaert, 1783)*		x	P, S	V, A	
<i>Antrostomus sericocaudatus</i> Cassin, 1849*		x	P	V	
<i>Hydropsalis leucopyga</i> (Spix, 1825)*		x	P, S	V	
<i>Hydropsalis nigrescens</i> (Cabanis, 1848)	x	x	P, Cp	V	
<i>Hydropsalis albicollis</i> (Gmelin, 1789)	x	x	P, Cp	V, A, Ca	
<i>Hydropsalis parvula</i> (Gould, 1837)*		x	P, S	V, A	
<i>Chordeiles acutipennis</i> (Hermann, 1783)	x		Cp	V	
Apodidae Olphe-Galliard, 1887					
<i>Chaetura spinicaudus</i> (Temminck, 1839)	x	x	Cp, aa	V	
<i>Chaetura chapmani</i> Hellmayr, 1907*		x	S	V	
<i>Chaetura brachyura</i> (Jardine, 1846)	x	x	Cp, aa, S	V	
<i>Tachornis squamata</i> (Cassin, 1853)	x	x	Cp	V	
<i>Panyptila cayennensis</i> (Gmelin, 1789)	x	x	Cp	V	
Trochilidae Vigors, 1825					
<i>Glaucis hirsutus</i> (Gmelin, 1788)		x	Cp	V, Ca	
<i>Phaethornis ruber</i> (Linnaeus, 1758)	x	x	P, Cp, S	V, Ca	
<i>Phaethornis superciliosus</i> (Linnaeus, 1766)	x	x	P, Cp, S	V, Ca	
<i>Campylopterus largipennis obscurus</i> Gould, 1848 ^{EN*}		x	P, S	V, Ca	
<i>Eupetomena macroura</i> (Gmelin, 1788)		x	Cp	V	
<i>Florisuga mellivora</i> (Linnaeus, 1758)*		x	P	V	
<i>Anthracothorax nigricollis</i> (Vieillot, 1817)		x	Cp	V	
<i>Topaza pella</i> (Linnaeus, 1758)	x	x	P, Cp, S	V	
<i>Chrysolampis mosquitus</i> (Linnaeus, 1758)	x	x	P, Cp, S	V, Ca	
<i>Lophornis gouldii</i> (Lesson, 1832) ^{Ti*}	x	x	S	V	
<i>Chlorostilbon notatus</i> (Reich, 1793)*		x	P, S	V, Ca	
<i>Thalurania furcata</i> (Gmelin, 1788)	x	x	P, Cp	V, Ca	
<i>Amazilia versicolor</i> (Vieillot, 1818)*		x	S	V	
<i>Amazilia fimbriata</i> (Gmelin, 1788)	x	x	Cp, S	V	
<i>Heliothryx auritus</i> (Gmelin, 1788)	x	x	P, Cp	V	
<i>Heliomaster longirostris</i> (Audebert & Vieillot, 1801)*		x	S	V	
<i>Calliphlox amethystina</i> (Boddaert, 1783)*		x	S	V	
Trogonidae Lesson, 1828					
<i>Trogon melanurus</i> Swainson, 1838	x	x	P	V	
<i>Trogon viridis</i> Linnaeus, 1766		x	Cp	V, A	
<i>Trogon ramonianus</i> Deville & DesMurs, 1849	x	x	P, S	V, A	
<i>Trogon curucui</i> Linnaeus, 1766	x		P	V, A	
<i>Trogon rufus</i> Gmelin, 1788	x		P	Ca	

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	Zd	Zr			
Alcedinidae Rafinesque, 1815					
<i>Megaceryle torquata</i> (Linnaeus, 1766)	x	x	B	V	
<i>Chloroceryle amazona</i> (Latham, 1790)	x	x	B	V	
<i>Chloroceryle americana</i> (Gmelin, 1788)	x		L	V	
<i>Chloroceryle inda</i> (Linnaeus, 1766)	x		L	V	
Momotidae Gray, 1840					
<i>Momotus momota</i> (Linnaeus, 1766)		x	P, S	V, A	
Galbulidae Vigors, 1825					
<i>Brachygalba lugubris</i> (Swainson, 1838)	x		B	F	1041472
<i>Galbula cyanicollis</i> Cassin, 1851	x	x	P, Cp	V, Ca	
<i>Galbula ruficauda</i> Cuvier, 1816	x	x	P, Cp, S	V, F	
<i>Galbula dea</i> (Linnaeus, 1758)	x		B	V	
<i>Jacamerops aureus</i> (Statius Muller, 1776)*		x	P	V	
Bucconidae Horsfield, 1821					
<i>Notharchus hyperrhynchus</i> (Sclater, 1856)	x	x	P	F	1073816
<i>Notharchus tectus</i> (Boddaert, 1783)	x	x	P, Cp, S	V, F	1081976
<i>Bucco tamatia</i> Gmelin, 1788	x		S	V	
<i>Bucco capensis</i> Linnaeus, 1766	x	x	P, Cp	A	
<i>Nystalus torridus</i> Bond & Meyer de Schauensee, 1940	x	x	P, Cp, S	A, F	1073824
<i>Nystalus maculatus</i> (Gmelin, 1788)	x	x	Cp	A	
<i>Monasa nigrifrons</i> (Spix, 1824)	x	x	P, Cp	V, A	
<i>Monasa morphoeus</i> (Hahn & Küster, 1823)	x	x	P, Cp, S	V, EA	1030081
<i>Chelidoptera tenebrosa</i> (Pallas, 1782)	x	x	Aa	F	1029232
Ramphastidae Vigors, 1825					
<i>Ramphastos tucanus</i> Linnaeus, 1758	x	x	P, Cp, S	V, A, F	1180193
<i>Ramphastos vitellinus</i> Lichtenstein, 1823	x	x	P, Cp, S	V, A, F	1036649
<i>Selenidera gouldii</i> (Natterer, 1837)	x		P	A, F	1238732
<i>Pteroglossus inscriptus</i> Swainson, 1822	x	x	P, Cp	V, A, F	1031536
<i>Pteroglossus bitorquatus bitorquatus</i> Vigors, 1826 ^{Tn; Ti; EN}	x	x	P, Cp, S	V, F	1029361
<i>Pteroglossus aracari</i> (Linnaeus, 1758)	x	x	S, Cp	V	
Picidae Leach, 1820					
<i>Picumnus exilis</i> (Lichtenstein, 1823)*	z		P, Cp	V	
<i>Melanerpes candidus</i> (Otto, 1796)		x	Cp	V	
<i>Melanerpes cruentatus</i> (Boddaert, 1783)		x	Cp	V, F	1032436
<i>Veniliornis affinis</i> (Swainson, 1821)*		x	P, S	V	
<i>Piculus flavigula</i> (Boddaert, 1783)*		x	P, S	V	
<i>Piculus paraensis</i> (Sneathlge, 1907) ^{EN*}		x	P	V	
<i>Colaptes melanochloros</i> (Gmelin, 1788)		x	Cp	V	
<i>Celeus elegans</i> (Statius Muller, 1776)	x	x	S	V, A	
<i>Celeus ochraceus</i> (Spix, 1824)*		x	P	V	
<i>Celeus flavus</i> (Statius Muller, 1776)*		x	P	V	
<i>Celeus torquatus pieteroyensi</i> Oren, 1992 ^{EN}	x	x	P	V, A	
<i>Dryocopus lineatus</i> (Linnaeus, 1766)	x	x	P, Cp, S	V, F	1041940

Taxon	Zoning		Habitats	Type of record	Photo Ref. WA:
	Zd	Zr			
<i>Campephilus rubricollis</i> (Boddaert, 1783)	x	x	P, Cp, S	V, F	1083897
<i>Campephilus melanoleucos</i> (Gmelin, 1788)	x	x	P	V	
Falconidae Leach, 1820					
<i>Ibycter americanus</i> (Boddaert, 1783)	x	x	P, Cp, S	F	1180215
<i>Caracara plancus</i> (Miller, 1777)	x	x	B, aa	F	
<i>Milvago chimachima</i> (Vieillot, 1816)		x	aa	V	
<i>Herpetotheres cachinnans</i> (Linnaeus, 1758)	x	x	Cp	F	1031555
<i>Micrastur ruficollis</i> (Vieillot, 1817)*		x	P	V	
<i>Micrastur mintoni</i> Whittaker, 2002	x	x	P	V	
<i>Micrastur semitorquatus</i> (Vieillot, 1817)	x		P	V	
<i>Falco sparverius</i> Linnaeus, 1758		x	Cp, aa	V	
<i>Falco rufigularis</i> Daudin, 1800	x	x	Cp	F	1083881
<i>Falco deiroleucus</i> Temminck, 1825*	x		Cp	V	
Psittacidae Rafinesque, 1815					
<i>Ara macao</i> (Linnaeus, 1758)	x	x	P, Cp, S	F	1036661
<i>Ara chloropterus</i> Gray, 1859	x		P, S	F	1030079
<i>Ara severus</i> (Linnaeus, 1758)*		x	P, S, Cp	V	
<i>Orthopsittaca manilatus</i> (Boddaert, 1783)		x	P, Cp	V	
<i>Diopsittaca nobilis</i> (Linnaeus, 1758)		x	S, Cp	V	
<i>Guaruba guarouba</i> (Gmelin, 1788) ^{Tn; Ti}	x	x	P, Cp, S	F	1029265
<i>Psittacara leucophthalmus</i> (Statius Muller, 1776)	x	x	Cp, S	F	1185791
<i>Aratinga jandaya</i> (Gmelin, 1788)	x	x	P, Cp, S	V, F	
<i>Eupsittula aurea</i> (Gmelin, 1788)*		x	S, Cp	V	
<i>Pyrrhura lepida lepida</i> (Wagler, 1832) ^{Tn; Ti; EN}	x	x	P, S	F	1027814
<i>Pyrrhura amazonum</i> Hellmayr, 1906 ^{Ti *}		x	P, S	V	
<i>Forpus xanthopterygius</i> (Spix, 1824)	x	x	Cp	V	
<i>Brotogeris chiriri</i> (Vieillot, 1818)*	x	x	Cp, S	V	
<i>Brotogeris chrysoptera</i> (Linnaeus, 1766)	x	x	P	V	
<i>Touit huetii</i> (Temminck, 1830) ^{Ti *}		x	P	V	
<i>Pionites leucogaster</i> (Kuhl, 1820) ^{Ti}	x	x	P, Cp, S	V	
<i>Pyrilia vulturina</i> (Kuhl, 1820) ^{Ti}	x		P	F	1238382
<i>Pionus menstruus</i> (Linnaeus, 1766)	x	x	P, Cp, S	F	1038941
<i>Pionus fuscus</i> (Statius Muller, 1776)	x	x	P, Cp	F	1029310
<i>Amazona farinosa</i> (Boddaert, 1783)	x	x	Cp, S	V	
<i>Amazona amazonica</i> (Linnaeus, 1766)	x	x	P	V	
<i>Amazona ochrocephala</i> (Gmelin, 1788)*		x	P	V, F	1083958
<i>Deroptus accipitrinus</i> (Linnaeus, 1758)	x	x	P, S	F	1180250
Thamnophilidae Swainson, 1824					
<i>Pygiptila stellaris</i> (Spix, 1825)	x	x	P, Cp	A	
<i>Myrmotherula multostriata</i> Sclater, 1858	x	x	P	V, A	
<i>Myrmotherula longipennis</i> Pelzeln, 1868*		x	P	V	
<i>Myrmotherula axillaris</i> (Vieillot, 1817)	x	x	P, Cp	A, Ca	
<i>Myrmotherula menetriesii</i> (d'Orbigny, 1837)	x	x	P, Cp	V, Ca	

Taxon	Zoning		Habitats	Type of record	Photo Ref. WA:
	Zd	Zr			
<i>Formicivora grisea</i> (Boddaert, 1783)	x	x	P, Cp	A, Ca	
<i>Iseria hauxwelli</i> (Sclater, 1857)	x		P, S	A, Ca	
<i>Thamnomanes caesi</i> (Temminck, 1820)	x	x	P, Cp	A, Ca	
<i>Dysithamnus mentalis</i> (Temminck, 1823)	x	x	P, Cp	A, P, Ca	
<i>Herpsilochmus rufimarginatus</i> (Temminck, 1822)	x	x	P, Cp, S	A	
<i>Sakesphorus luctuosus</i> (Lichtenstein, 1823)	x		P	A	
<i>Thamnophilus doliatus</i> (Linnaeus, 1764)*		x	Cp	V	
<i>Thamnophilus palliatus</i> (Lichtenstein, 1823)	x		Cp, S, B	F	1041503
<i>Thamnophilus pelzelni</i> Hellmayr, 1924	x		P	A	
<i>Thamnophilus aethiops incertus</i> Pelzeln, 1869 ^{EN}	x	x	P, Cp	A, Ca	
<i>Thamnophilus amazonicus</i> Sclater, 1858	x	x	P, Cp, S	A, Ca	
<i>Taraba major</i> (Vieillot, 1816)	x		Cp, S	V, A, F	1036704
<i>Hypocnemoides maculicauda</i> (Pelzeln, 1868)	x		S	A	
<i>Pyriglena leuconota leuconota</i> (Spix, 1824) ^{EN}	x	x	P, Cp	V, A, Ca	
<i>Cercomacra cinerascens</i> (Sclater, 1857)*	x	x	P, Cp	A	
<i>Cercomacra laeta</i> Todd, 1920*		x	P, S, Cp	V, A, Ca	
<i>Willisornis vidua</i> (Hellmayr, 1905)	x	x	P, Cp	A, Ca	
<i>Phlegopsis nigromaculata paraensis</i> Hellmayr, 1904 ^{Tn; EN}	x	x	P, Cp	V	
Conopophagidae Sclater & Salvin, 1873					
<i>Conopophaga roberti</i> Hellmayr, 1905 ^{EN}		x	Cp	V, A, Ca	
Grallariidae Sclater & Salvin, 1873					
<i>Hylopezus paraensis</i> Sneath, 1910	x	x	P, Cp	A	
Formicariidae Gray, 1840					
<i>Formicarius colma</i> Boddaert, 1783		x	Cp	A, Ca	
<i>Formicarius analis</i> (d'Orbigny & Lafresnaye, 1837)*		x	P, S	V, A	
Scleruridae Swainson, 1827					
<i>Sclerurus macconnelli</i> Chubb, 1919	x		P	A	
<i>Sclerurus rufularis</i> Pelzeln, 1868		x	P	V, A	
<i>Sclerurus caudacutus</i> (Vieillot, 1816)	x	x	P, Cp, S	V, A	
Dendrocolaptidae Gray, 1840					
<i>Dendrocincla fuliginosa</i> (Vieillot, 1818)	x	x	P, Cp	A, Ca	
<i>Dendrocincla merula badia</i> (Zimmer, 1934) ^{Tn; EN}	x		P	A, Ca	
<i>Deconychura longicauda</i> (Pelzeln, 1868) *		x	P	Ca	
<i>Certhiasomus stictolaemus</i> (Pelzeln, 1868)		x	Cp	A	
<i>Glyphorhynchus spirurus</i> (Vieillot, 1819)	x	x	P, Cp	V, Ca	
<i>Xiphorhynchus spixii</i> (Lesson, 1830)	x	x	S	A	
<i>Xiphorhynchus obsoletus</i> (Lichtenstein, 1820)		x	S	A, Ca	
<i>Xiphorhynchus guttatus</i> (Lichtenstein, 1820)	x	x	P, S	A, F	1038873
<i>Dendroplex picus</i> (Gmelin, 1788)	x	x	P, Cp, S	A, Ca	
<i>Lepidocolaptes layardi</i> (Sclater, 1873)*		x	P, S	V, A	
<i>Dendrocolaptes medius</i> Todd, 1920 ^{Tn; EN}	x	x	P, Cp, S	V, A	
Xenopidae Bonaparte, 1854					
<i>Xenops minutus</i> (Sparman, 1788)	x	x	P, Cp	Ca	

Taxon	Zoning		Habitats	Type of record	Photo Ref. WA:
	Zd	Zr			
Furnariidae Gray, 1840					
<i>Berlepschia rikeri</i> (Ridgway, 1886)	x	x	P, Cp	A	
<i>Automolus paraensis</i> Hartert, 1902*		x	P	V, A	
<i>Automolus rufipileatus</i> (Pelzeln, 1859)*	x		P, S	V, A, Ca	
<i>Anabacerthia ruficaudata</i> (d'Orbigny & Lafresnaye, 1838) *		x	P	V	
<i>Philydor erythrocerum</i> (Pelzeln, 1859)*		x	P	V, Ca	
<i>Philydor pyrhrhodes</i> (Cabanis, 1848)	x		P	A	
<i>Certhiaxis cinnamomeus</i> (Gmelin, 1788)	x		B	A	
<i>Synallaxis albescens</i> Temminck, 1823	x		Cp, B	A	
<i>Synallaxis rutilans omissa</i> (Hartert, 1901) ^{EN}	x	x	P, Cp	A	
<i>Synallaxis gujanensis</i> (Gmelin, 1789)*		x	S	V	
Pipridae Rafinesque, 1815					
<i>Tyranneutes stolzmanni</i> (Hellmayr, 1906)*		x	P	V, A	
<i>Ceratopipra rubrocapilla</i> Temminck, 1821*		x	P	V, A	
<i>Lepidothrix iris</i> (Schinz, 1851) ^{TI}		x	P	A	
<i>Manacus manacus purissimus</i> Todd, 1928 ^{EN}	x	x	Cp	V, Ca	
<i>Chiroxiphia pareola</i> (Linnaeus, 1766)	x	x	Cp, S	V, Ca	
<i>Dixiphia pipra</i> (Linnaeus, 1758)		x	P	V, A	
Onychorhynchidae Tello, Moyle, Marchese & Cracraft, 2009					
<i>Onychorhynchus coronatus</i> (Stadius Muller, 1776)	x	x	P, Cp	V, Ca	
<i>Terenotriccus erythrurus hellmayri</i> (E. Sneath, 1907) ^{EN}	x	x	P, Cp, S	V, Ca	
<i>Myiobius atricaudus</i> Lawrence, 1863	x	x	Cp, S	V, Ca	
Tityridae Gray, 1840					
<i>Schiffornis turdina</i> (Wied, 1831)*		x	P	A, Ca	
<i>Iodopleura isabellae</i> Parzudaki, 1847*		x	P	V	
<i>Tityra inquisitor</i> (Lichtenstein, 1823)	x	x	P, S	V	
<i>Tityra cayana</i> (Linnaeus, 1766)	x	x	P, S	F	1194380
<i>Tityra semifasciata</i> (Spix, 1825)	x	x	P, Cp	V	
<i>Pachyramphus castaneus</i> (Jardine & Selby, 1827)*		x	S	V	
<i>Pachyramphus polychopterus</i> (Vieillot, 1818)	x	x	P, Cp	A	
<i>Pachyramphus marginatus</i> (Lichtenstein, 1823)	x		P, S	V	
<i>Pachyramphus minor</i> (Lesson, 1830)		x	S	V, A	
<i>Pachyramphus validus</i> (Lichtenstein, 1823)	x	x	P	V, A	
Cotingidae Bonaparte, 1849					
<i>Lipaugus vociferans</i> (Wied, 1820)	x	x	P, Cp, S	A	
<i>Gymnoderus foetidus</i> (Linnaeus, 1758)*		x	P	V	
<i>Xipholena lamellipennis</i> (Lafresnaye, 1839)	x	x	P	F	1180204
<i>Cotinga cotinga</i> (Linnaeus, 1766)	x	x	P, S	F	1422358
<i>Cotinga cayana</i> (Linnaeus, 1766)*		x	P	V	
<i>Haematoderus militaris</i> (Shaw, 1792)	x		P	F	1080430
<i>Querula purpurata</i> (Stadius Muller, 1776)		x	Cp	F	1081252
Pipritidae Ohlson, Irestedt, Ericson & Fjeldså, 2013					
<i>Piprites chloris griseescens</i> (Novaes, 1964) ^{EN}	x	x	P, Cp, S	V, A	

Taxon	Zoning		Habitats	Type of record	Photo Ref. WA:
	Zd	Zr			
Platyrinchidae Bonaparte, 1854					
<i>Platyrinchus saturatus</i> Salvin & Godman, 1882*		x	P	V	
<i>Platyrinchus platyrhynchos</i> (Gmelin, 1788)*		x	P	V	
Rhynchocyclidae Berlepsch, 1907					
<i>Taeniotriccus andrei</i> (Berlepsch & Hartert, 1902)*		x	P	A	
<i>Mionectes oleagineus</i> (Lichtenstein, 1823)	x	x	P, Cp	A, Ca	
<i>Mionectes macconnelli</i> (Chubb, 1919)	x	x	P	Ca	
<i>Tolmomyias sulphureus</i> Zimmer, 1939	x	x	P	V	
<i>Tolmomyias flaviventris</i> (Wied, 1831)	x	x	P, S	V	
<i>Todirostrum maculatum</i> (Desmarest, 1806)		x	P	V	
<i>Todirostrum cinereum</i> (Linnaeus, 1766)	x	x	P, Cp	V	
<i>Todirostrum chrysocrotaphum illigeri</i> (Cabanis & Heine, 1859) ^{EN} *	x	x	P, Cp	V, A	
<i>Poeciloriccus fumifrons</i> (Hartlaub, 1853)*		x	P	V	
<i>Poeciloriccus sylvia</i> (Desmarest, 1806)*		x	P	V	
<i>Myiornis ecaudatus</i> (d'Orbigny & Lafresnaye, 1837)*		x	P	V	
<i>Hemitriccus striaticollis</i> (Lafresnaye, 1853)	x		S	V	
<i>Lophotriccus galeatus</i> (Boddaert, 1783)	x	x	P, Cp	V, Ca	
Tyrannidae Vigors, 1825					
<i>Zimmerius acer</i> (Salvin & Godman, 1883)*		x	P, S, Cp	V, A,	
<i>Ornithion inerme</i> Hartlaub, 1853*		x	P	V	
<i>Camptostoma obsoletum</i> (Temminck, 1824)	x	x	Cp, S, B	A	
<i>Elaenia flavogaster</i> (Thunberg, 1822)		x	Cp	A	
<i>Elaenia cristata</i> Pelzeln, 1868*		x	Cp	A	
<i>Myiopagis gaimardii</i> (d'Orbigny, 1839)*		x	P, S	V,A	
<i>Myiopagis viridicata</i> (Vieillot, 1817)		x	Cp	A	
<i>Tyrannulus elatus</i> (Latham, 1790)*		x	S	V, A	
<i>Phaeomyias murina</i> (Spix, 1825)	x	x	P, S	A	
<i>Attila spadiceus</i> (Gmelin, 1789)	x	x	P	V, A	
<i>Legatus leucophaeus</i> (Vieillot, 1818)	x	x	P, Cp, aa, B, S	A, F, V	1038926
<i>Ramphotrigon ruficauda</i> (Spix, 1825)*		x	P	V	
<i>Myiarchus tuberculifer</i> (d'Orbigny & Lafresnaye, 1837)*		x	P, S, Cp	V	
<i>Myiarchus swainsoni</i> Cabanis & Heine, 1859	x		S	A	
<i>Myiarchus ferox</i> (Gmelin, 1789)	x	x	P, Cp, S	A	
<i>Myiarchus tyrannulus</i> (Statius Muller, 1776)*		x	S	V, A	
<i>Casiornis fuscus</i> Sclater & Salvin, 1873	x		P	V	
<i>Pitangus sulphuratus</i> (Linnaeus, 1766)	x	x	Cp, aa, S	V, A	
<i>Machetornis rixosa</i> (Vieillot, 1819)*		x	aa	V	
<i>Myiodynastes maculatus</i> (Statius Muller, 1776)	x	x	Cp, aa	F	1030139
<i>Tyrannopsis sulphurea</i> (Spix, 1825)*		x	S,B	V, A	
<i>Megarynchus pitangua</i> (Linnaeus, 1766)	x	x	Cp, aa	A	
<i>Myiozetetes cayanensis</i> (Linnaeus, 1766)	x	x	Cp, B, aa	V, A	
<i>Myiozetetes similis</i> (Spix, 1825)	x	x	Cp	V, A	
<i>Tyrannus melancholicus</i> Vieillot, 1819	x	x	Cp, aa, B,S	V, A	

Taxon	Zoning		Habitats	Type of record	Photo Ref. WA:
	Zd	Zr			
<i>Tyrannus savana</i> Vieillot, 1808*		x	S, Cp	V	
<i>Empidonomus varius</i> (Vieillot, 1818)		x	Cp	V	
<i>Colonia colonus</i> (Vieillot, 1818)*		x	P	V	
<i>Myiophobus fasciatus</i> (Statius Muller, 1776)*		x	S	V	
<i>Fluvicola nengeta</i> (Linnaeus, 1766)	x	x	Cp, B, aa	V	
<i>Arundinicola leucocephala</i> (Linnaeus, 1764)	x		B	V	
<i>Lathrotriccus euleri</i> (Cabanis, 1868)*		x	P, S	V	
<i>Cnemotriccus fuscatus</i> (Wied, 1831)*		x	S	V	
<i>Contopus nigrescens</i> (Sclater & Salvin, 1880)	x	x	P, S	F	1151531
Vireonidae Swainson, 1837					
<i>Cyclarhis gujanensis</i> (Gmelin, 1789)	x	x	Cp, aa, S	V, A	
<i>Vireo chivi</i> (Vieillot, 1817)	x	x	P, S	A	
<i>Hylophilus semicinereus</i> Sclater & Salvin, 1867	x	x	P, Cp, S	V, A	
<i>Hylophilus pectoralis</i> Sclater, 1866		x	Cp	A	
Corvidae Leach, 1820					
<i>Cyanocorax cyanopogon</i> (Wied, 1821)*		x	S, Cp	V	
Hirundinidae Rafinesque, 1815					
<i>Stelgidopteryx ruficollis</i> (Vieillot, 1817)	x	x	B, aa	V	
<i>Progne tapera</i> (Vieillot, 1817)	x	x	Cp, aa, B	V	
<i>Progne chalybea</i> (Gmelin, 1789)	x	x	aa	V	
<i>Tachycineta albiventer</i> (Boddaert, 1783)	x	x	B	V	
Troglodytidae Swainson, 1831					
<i>Microcerculus marginatus</i> (Sclater, 1855)*		x	S	Ca	
<i>Troglodytes musculus</i> Naumann, 1823	x		aa	V	
<i>Campylorhynchus turdinus</i> (Wied, 1831)		x	Cp	V	
<i>Pheugopedius genibarbis</i> (Swainson, 1838)	x	x	P, Cp, S	A, Ca	
<i>Cantorchilus leucotis</i> (Lafresnaye, 1845)		x	P	A	
Donacobiidae Aleixo & Pacheco, 2006					
<i>Donacobius atricapilla</i> (Linnaeus, 1766)	x		B	V	
Poliptilidae Baird, 1858					
<i>Ramphocaenus melanurus austerus</i> Zimmer, 1937 ^{EN*}		x	P, S, Cp	V	
<i>Poliptila plumbea</i> (Gmelin, 1788)	x	x	Cp	V	
<i>Poliptila paraensis</i> Todd, 1937*		x	S	V	
Turdidae Rafinesque, 1815					
<i>Turdus nudigenis</i> Lafresnaye, 1848*		x	P, S	V	
<i>Turdus fumigatus</i> Lichtenstein, 1823*		x	P, S	V	
<i>Turdus leucomelas</i> Vieillot, 1818		x	S	V, A	
<i>Turdus amaurochalinus</i> Cabanis, 1850	x	x	P, Cp	A	
<i>Turdus albicollis</i> Vieillot, 1818	x	x	P	A	
Passerellidae Cabanis & Heine, 1850					
<i>Ammodramus humeralis</i> (Bosc, 1792)	x	x	aa	V	
<i>Arremon taciturnus</i> (Hermann, 1783)	x	x	Cp, S	A, Ca	
Parulidae Wetmore & Zimmer 1947					

Taxon	Zoning		Habitats	Type of record	Photo Ref. WA:
	Zd	Zr			
<i>Myiothlypis mesoleuca</i> (Sclater, 1866)	x	x	P, Cp	A	
Icteridae Vigors, 1825					
<i>Psarocolius viridis</i> (Statius Muller, 1776)		x	S	V, F	1031543
<i>Psarocolius decumanus</i> (Pallas, 1769)		x	S, Cp	V	
<i>Psarocolius bifasciatus</i> (Spix, 1824)	x	x	P, S	V, A	
<i>Procacicus solitarius</i> (Vieillot, 1816)*		x	P, S	V	
<i>Cacicus haemorrhous</i> (Linnaeus, 1766)	x	x	P, Cp, S	V	
<i>Cacicus cela</i> (Linnaeus, 1758)	x	x	P, Cp	V, F	1037714
<i>Icterus cayanensis</i> (Linnaeus, 1766)	x	x	P, Cp	V	
<i>Icterus jamacaii</i> (Gmelin, 1788)		x	Cp	V	
<i>Molothrus oryzivorus</i> (Gmelin, 1788)		x	Cp, S	V	
<i>Molothrus bonariensis</i> (Gmelin, 1789)		x	B,aa	V	
<i>Sturnella militaris</i> (Linnaeus, 1758)	x	x	Cp, aa	V,F	1030127
Mitrospingidae Barker, Burns, Klicka, Lanyon & Lovette, 2013					
<i>Lamprospiza melanoleuca</i> (Vieillot, 1817)	x	x	P, S	F	1081284
Thraupidae Cabanis, 1847					
<i>Coereba flaveola</i> (Linnaeus, 1758)	x	x	Cp, S	V	
<i>Saltator grossus</i> (Linnaeus, 1766)*		x	P, S	V, A	
<i>Saltator coerulescens</i> Vieillot, 1817*		x	S, Cp	V	
<i>Saltator maximus</i> (Statius Muller, 1776)	x	x	Cp, S	V,A	
<i>Parkerthraustes humeralis</i> (Lawrence, 1867)*		x	P	V	
<i>Nemosia pileata</i> (Boddaert, 1783)	x		S	V	
<i>Tachyphonus rufus</i> (Boddaert, 1783)	x	x	P, Cp, S, B	V	
<i>Ramphocelus carbo</i> (Pallas, 1764)	x	x	P, Cp, S	V	
<i>Lanio luctuosus</i> (d'Orbigny & Lafresnaye, 1837)		x	Cp	V	
<i>Lanio cristatus pallidigula</i> Zimmer, 1945 ^{EN}		x	Ca	V	
<i>Tangara mexicana</i> (Linnaeus, 1766)	x		P	V	
<i>Tangara velia signata</i> (Hellmayr, 1905)* ^{EN}		x	P	V	
<i>Tangara punctata</i> (Linnaeus, 1766)	x		S	V	
<i>Tangara episcopus</i> (Linnaeus, 1766)	x	x	P, Cp, B, S	V	
<i>Tangara palmarum</i> (Wied, 1823)	x	x	P, Cp, S	V,F	1041465
<i>Tangara cayana</i> (Linnaeus, 1766)	x		Cp	V	
<i>Cissopis leverianus</i> (Gmelin, 1788)		x	Cp	V	
<i>Dacnis lineata</i> (Gmelin, 1789)*		x	P	V	
<i>Dacnis cayana</i> (Linnaeus, 1766)	x	x	P, Cp, S	V	
<i>Cyanerpes caeruleus</i> (Linnaeus, 1758)*		x	P, S		
<i>Cyanerpes cyaneus</i> (Linnaeus, 1766)	x	x	P, Cp,S	V	
<i>Chlorophanes spiza</i> (Linnaeus, 1758)		x	P, S, Cp	V	
<i>Hemithraupis guira</i> (Linnaeus, 1766)	x	x	P, Cp, S	V	
<i>Conirostrum speciosum</i> (Temminck, 1824)		x	P, S	V	
<i>Emberizoides herbicola</i> (Vieillot, 1817)	x	x	aa	V	
<i>Volatinia jacarina</i> (Linnaeus, 1766)	x	x	aa, B, Cp	V	
<i>Sicalis columbiana</i> Cabanis, 1851*		x	Cp, aa	V	

Taxon	Zoning		Habitats	Type of record	Photo Ref. WA:
	Zd	Zr			
<i>Sporophila lineola</i> (Linnaeus, 1758)	x	x	aa	V	
<i>Sporophila nigricollis</i> (Vieillot, 1823)	x	x	aa, B	V	
<i>Sporophila bouvreuil</i> (Statius Muller, 1776)	x		aa	V	
<i>Sporophila minuta</i> (Linnaeus, 1758)	x		B	F	1027698
<i>Sporophila angolensis</i> (Linnaeus, 1766)	x	x	Cp, aa, B	V	
Cardinalidae Ridgway, 1901					
<i>Granatellus pelzelni paraensis</i> Rothschild, 1906 ^{EN}	x	x	P, Cp, S	A, Ca	
<i>Caryothraustes canadensis</i> (Linnaeus, 1766)	x	x	P, Cp, S	F	1043126
<i>Cyanoloxia rothschildii</i> (Lafresnaye, 1847)*		x	S, Cp	V	
Fringillidae Leach, 1820				V	
<i>Euphonia chlorotica</i> (Linnaeus, 1766)	x	x	P, Cp, S	V	
<i>Euphonia violacea</i> (Linnaeus, 1758)	x	x	P, Cp	A	
<i>Euphonia cayennensis</i> (Gmelin, 1789)*		x	P	V	

Vulturine Parrot (*Pytilia vulturina*). An individual was photographed in November 2011 by D. M. L. (Lima 2011a). The species was recorded in an area of continuous primary forest. *Pytilia vulturina* is endemic to eastern Amazon (lower Amazon), with other recent records in the Belém CE by Portes *et al.* (2011) and Oren & Roma (2011). Due to habitat loss the species was assessed globally by the IUCN (2014) as vulnerable of extinction.

White-winged Potoo (*Nyctibius leucopterus*). C.M. held a single sighting, from December 10th, 2010. The bird was found around 1 km NW from the ICMBio station, in the southern border of the Reserve. As far as we know, this is the first report for this species in Maranhão. The observation took place at around 20:00 hs, during a nocturnal spot lighting, and the bird was perched in the usual attitude for the species of *Nyctibius*, in a primary *terra firme* forest. The bird remained perched, and could be observed for several minutes, under the spot-light, and using binoculars. The diagnostic large white patch on wing coverts could be observed under optimal conditions.

Red-necked Aracari (*Pteroglossus bitorquatus bitorquatus*). The species was recorded at base camp of the Gurupi REBIO consuming papaya (registration by D. M. L.). This is a disturbed area with forest regeneration in advanced stage. It was also recorded in the recovery zone with predominant secondary vegetation and plenty of *Cecropia* spp. (Lima 2012c), as well as in the undisturbed zone where it was sighted consuming the fruits of a Sapotaceae of the genus *Pouteria* sp. The species is common in the reserve area and its surroundings. The species is distributed in lowland forests from the right bank of the Tocantins River through northern Maranhão, and according to Silveira (2008b) it would likely occur in the Gurupi REBIO. This is the first documented record

of the species inside the reserve. However, it is relatively common in the whole area and in preserved forest remnants in neighboring localities.

White-chinned Woodcreeper (*Dendrocincla merula badia*). The first record of this species at REBIO Gurupi was documented by Lima & Raíces (2012). During the survey the species was recorded only in the undisturbed zone of the protected area, where the vegetation is characterized as dense rainforest, with a continuous canopy (D. M. L.). The species was sighted foraging alongside army ants in the understorey. This subspecies is endemic to the Belém CE, occurring east of the Tocantins river into Amazonian Maranhão (Aleixo 2008a). The species is considered endangered at both national (MMA 2003) and state (Pará) levels (COEMA 2007).

Todd's Woodcreeper (*Dendrocolaptes medius*). This species was recorded both in primary forest and *capoeira* (secondary forest) inside the reserve (registration by D. M. L.). According to Aleixo (2008b) the species can often be found in upland forests, floodplains and forest in an advanced stage of succession. According to the list of species of Brazilian fauna threatened with extinction (MMA 2003), the species is endangered under the same category of threat as in the state of Pará (COEMA 2007).

Black-spotted Bare-eye (*Phlegopsis nigromaculata paraensis*). The species was recorded foraging solitarily in primary forest and forest in advanced stage of succession inside the reserve (D. M. L.). Aleixo (2008c) reports that this species may forage alone, in pairs, or family groups. Apparently, the species is more tolerant to fragmentation and degradation of forest structure than other species associated with army ants (Aleixo 2008c). This explains the presence of the species in forest at advanced stages of regeneration, which suffered from selective logging.

Blackish Pewee (*Contopus nigrescens*). D.M.L. and C. M. observed this species on five occasions during the present study in an area of primary forest in the recovery zone, and in the undisturbed zone. On all occasions, a solitary individual was observed perched in the middle stratum of the forest, engaging in flying forays during which it captured insects on the wing, a typical behavior of this genus. D. M. L. photographed the species in December 2011 (Lima 2011b) where the diagnostic overall uniform dark sooty-gray plumage, dark head, neck and upper parts, blackish-brown wings, blackish tail (sooty gray below) and slightly paler throat could be easily noticed. Sick (1997) reports that the species is rare, with a patchy distribution in the eastern Andes, and in the Acary Mountains of Guyana, for example. In Brazil, the species is known from specimens collected at Itupiranga, Pará (specimens housed at *Museu de Zoologia da Universidade de São Paulo* – MZUSP number 64232), and from observations in the Serra dos Carajás, and one sighting in the area of the Pindaré River, Maranhão, in November, 1977 (Ridgely & Tudor 1994). The species was recently recorded in the Carajás National Forest by Aleixo *et al.* (2012), but was not registered by Oren & Roma (2011), Portes *et al.* (2011) or Lees *et al.* (2012) for the Belém CE. C. M. has also recorded the species several times from a site near Açailândia.

Crimson Fruitcrow (*Haematoderus militaris*). D.M.L. recorded this species on August, 2012. A male perched on a tree was photographed from a distance (Lima 2012d) in an area of primary forest surrounded by secondary growth. This species is considered to be rare, and is probably sensitive to habitat fragmentation and disturbance (Lees *et al.* 2012).

Actions for conservation

The REBIO Gurupi is the only integral protection conservation unit located within the Belém CE, which encompasses the most impacted region of the Brazilian Amazon basin, located between eastern Pará and western Maranhão. This reserve is even more significant in the local context of the Amazon sector of Maranhão, where forest cover has been reduced to less than 25% of the original area (Martins 2011). This whole region, including the REBIO Gurupi, is suffering from the ongoing expansion of the Arc of Deforestation, which is converting forest into pasture at an alarming rate, reducing the once continuous forest to a series of fragments.

One of the major bottlenecks hindering the conservation unit from fully realizing its goal of preserving the flora and fauna within its limits is non-sustainable illegal occupation. For decades REBIO Gurupi has been occupied by irregular settlements approved by government agencies and by squatters

(Lima & Raíces 2012); this occupation has resulted in the raising of livestock and has stimulated illegal logging. According to the latest land survey of the reserve, there are roughly 6,306 people living within REBIO Gurupi (ESTRUTURAL 2007).

Actions that can minimize the loss of habitat and hunting of the local avifauna have been performed, for example: demarcation of the unit, judicial direction to begin proceedings for land compensation, creation of an advisory board, and drafting terms of commitment for settlers. Furthermore, an institutional presence has been established in the form of two operational field bases with full-time policing, as well as instruction in administrative processes for the removal of cattle from inside the reserve. At the time of the study, approximately 3,500 heads of cattle were removed from inside the reserve (E.A. Lisboa *pers. comm.*).

Given that much of the Gurupi reserve has been impacted by illegal logging, in addition to the areas cleared for pastures and other land use, there is an urgent need for the development of a reforestation project, which will guarantee the connectivity of habitats, especially for those species that require large tracts of continuous forest for their survival. These species include the members of the Cracidae, in particular *Crax fasciolata pinima*, which was reported by local residents to still occur in the region, and may in fact be held in captivity in some households.

The presence in the reserve of seven endangered species, and two others (*Harpia harpyja* and *Pyrilia vulturina*) that are likely to be included in the Brazilian list of threatened species in the near future, reinforce the need for the establishment of a continuous research program for the REBIO Gurupi, with the aim of providing effective conservation measures that can be implemented by the unit's administrators and partner institutions. In particular, the confirmation of the occurrence of *Crax fasciolata pinima* in the reserve and adjoining indigenous reservations, is a major research priority.

Surrounding the unit grows the demand for permits to implement plans for selective logging and vegetation removal. Therefore, it is important that the National Action Plan for the Conservation of Endangered Species of the Amazon is enforced since it contains the regulatory instructions and resolutions governing the environmental licensing procedures. As such, environmental agencies are legally required to heed protocols that establish conditions and procedures for protection, for example, of trees that present nests of *Harpia harpyja* and *Guaruba guarouba*; as well as to promote the recovery of degraded areas.

New formats for the planning and execution of inspection activities have been carried out, providing an intelligence service aimed at disrupting illegal logging. Another aspect strengthening enforcement actions is the publication of the term of reciprocity between the

Public Security Bureau of Maranhão and the Chico Mendes Institute for Biodiversity Conservation, since the agreement fosters the training of law enforcement agents and police support staff in the field to identify any species that are targeted for trafficking or hunting, as well as the development of allocation protocols for *Crax fasciolata pinima*, *Pteroglossus bitorquatus bitorquatus*, *Psophia obscura*, *Guaruba guarouba*, *Pyrrhura lepida lepida* and *Harpyja harpyja*.

Public policy actions, along with the participation of civil entities, in the commitment to protect and conserve the Amazonian forest fragments existing in the REBIO Gurupi and indigenous lands with their surrounding areas have strengthened the implementation and consolidation of the conservation unit. The high number of endemic and endangered species identified in the reserve reinforces its importance for conservation. It is essential to continue all efforts by the federal government to implement these actions specific to the unit, established as effective and efficient tools for the full compliance of the conservation unit's original mission.

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APPENDIX

Species of relevant biogeographical interest, for which we obtained only isolated and undocumented records. We recommend that they are added to the REBIO Gurupi checklist whenever material evidence such as digital or specimen vouchers are obtained.

Species
<i>Tinamus guttatus</i>
<i>Porzana flaviventer</i>
<i>Phaethornis maranhaoensis</i>
<i>Chlorostilbon mellisugus</i>
<i>Myrmornis torquata</i>
<i>Synallaxis frontalis</i>
<i>Myiobius barbatus</i>
<i>Elaenia chiriquensis</i>