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ARTICLE

A preliminary survey and rapid ecological assessment of the avifauna of Amana National Forest (Itaituba and Jacareacanga, Pará, Brazil)

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ABSTRACT: Amana National Forest (FLONA Amana) is located on the left bank of the middle Tapajós River, in the interfluve of the Tapajós and Madeira Rivers, state of Pará, Brazil. I performed a "Rapid Ecological Assessment" (REA) on the bird communities of the park to identify important areas for avian conservation and areas where activities could impact bird communities. Field surveys were carried out at the end of the rainy season and at the beginning of the dry season. Nine points distributed among five sites were sampled within Amana or very close to its borders. Three approaches were used to survey the avifauna of each point: (a) a quantitative approach using mist nets, (b) a qualitative approach using field observations with binoculars, and (c) interviews with local residents. With a sampling effort of 3,320 net hours, interviews with local residents, and approximately 60 additional hours of visual observations, 247 species of birds were recorded belonging to 51 families. Eight taxa are considered endemic to the interfluve of the Tapajós/Madeira Rivers. Two species are on IUCN's Red List of endangered birds (*Penelope pileata* and *Guaruba guarouba*), and the known distribution of two species (*Topaza pella* and *Discosura longicaudus*) is extended by our surveys. Two activities within Amana were detected to have possible negative impacts on avifauna, specifically hunting and gold and cassiterite mining.

KEYWORDS: birds, Amana National Forest, Amazon, conservation.

INTRODUCTION

Although the Brazilian Amazon has been subject to scientific study for many decades, due to its large expanse, it is still considered under studied by ornithologists (Oren & Albuquerque 1991). For example, the region between the lower and middle Tapajós River in Pará State has been visited and studied for over 100 years by Brazilian and foreign ornithologists (Snethlage 1908; Oren & Parker 1997; Pacheco & Olmos 2005; Santos *et al*. 2011; Lees *et al*. 2013a). It is estimated that more than 2,000 specimens have been collected from the lower and middle Tapajós River, the area that contains Amazonia National Park (Parque Nacional da Amazônia) and Amana National Forest (Floresta Nacional do Amana). The study of birds in this region over the past 100 years has resulted in the description of 16 new species and records for over 400 bird species in the area between the city of Itaituba and the southern boundary of Amazonia National Park (Oren & Parker 1997). Even recently, new bird species have been described to the interfluve of the Madeira and Tapajós Rivers, the most recent ones being the Bald Parrot (*Pyrilia aurantiocephala*); Roosevelt Stipple-throated Antwren (*Epinecrophylla dentei*); Alta Floresta Antpitta (*Hylopezus whittakeri*); Chico's Tyrannulet (*Zimmerius chicomendesi*); and Sucunduri Yellow-margined Flycatcher (*Tolmomyias sucunduri)* (Gaban-Lima *et al*. 2002; Whitney *et al.* 2013a; Carneiro *et al.* 2012; Whitney *et al.* 2013b; Whitney *et al.* 2013c).

Amana National Forest was created by the Brazilian Government by an unnumbered decree on 13 February 2006, and has an area of 540,417.17 ha (DOU 2009). Amana was created to promote sustainable multiple-use management of forest resources; maintain and protect water resources and biodiversity; and support development of methods for the sustainable use of natural resources (DOU 2009).

The goal of this study was to conduct a preliminary survey of the local avifauna to identify potential anthropogenic impacts on and important areas for conservation of bird communities within Amana. I performed a "Rapid Ecological Assessment" (REA; Sayre *et al*. 2003) of Amana. The REA is an integrated methodology used to direct the efforts of conservation planning sites and contributes to the inventories of biodiversity (Sayre *et al*. 2003). Together with information

from other taxa, this survey will enable the creation of a management plan for Amana National Forest.

METHODS

Location of Sites and Sampling Period

Field surveys were performed at the end of the rainy season, from 24 April to 6 May 2008 and at the beginning of the dry season from 21 July to 8 August 2008. Nine points distributed among five sites were sampled within Amana (Table 1, Figure 1). Four sampled sites were visited during both sampling periods, and one (Site 5 - Igarapé Preto) during only the second sampling period (Table 1). Two additional locations along the Transamazonian Highway were also partially sampled during the sampling period (Sites 6 and 7; Table 1, Figure 1). General information is shown in Table 1, including habitat present at every studied point.

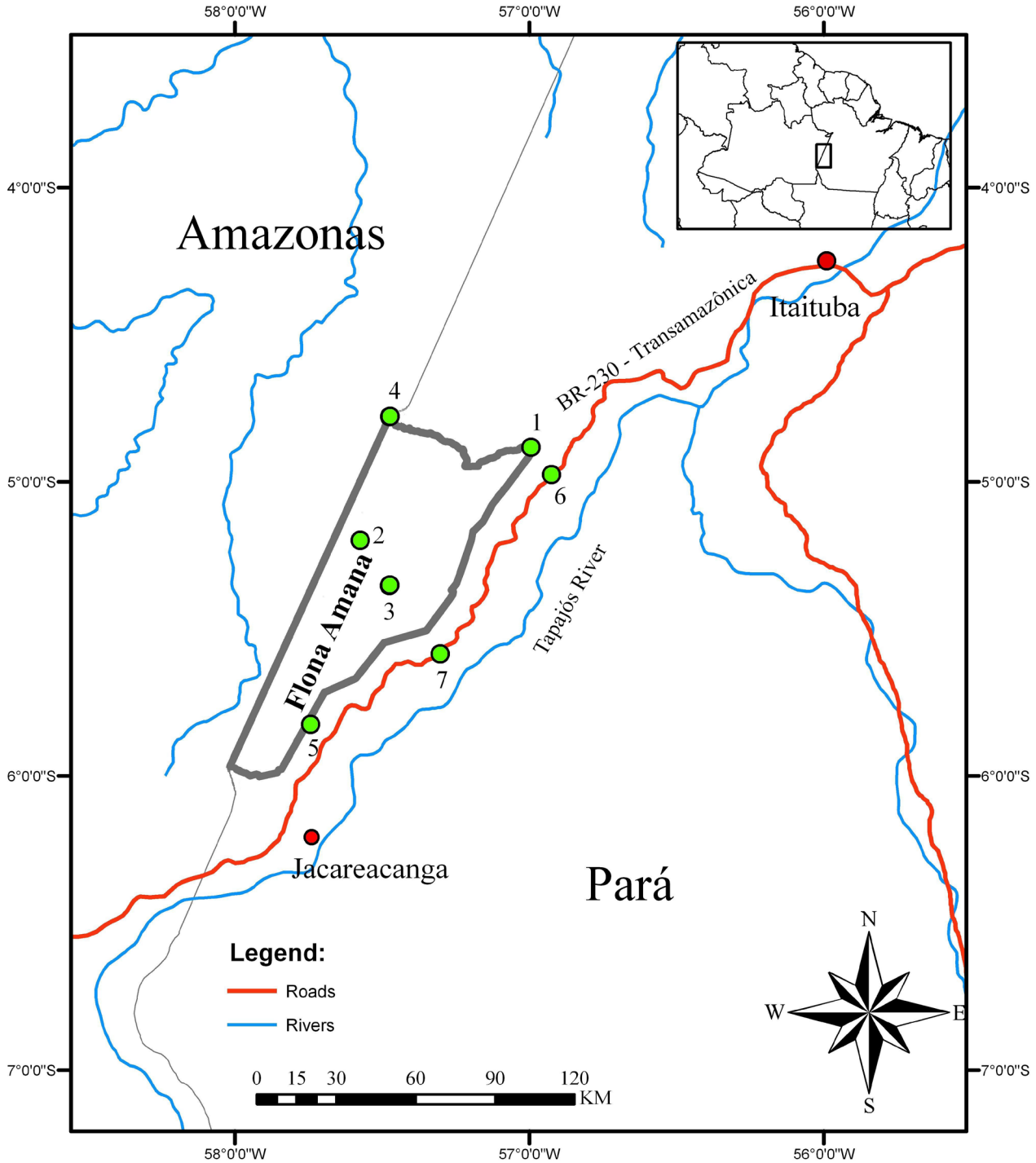

FIGURE 1. Location of the Amana National Forest and sampling sites. 1 - Igarapé Montanha (Montanha stream); 2 - JML Gold Mining; 3 – Maranhense Landing Strip; 4 - São Pedro Landing Strip; 5 – Igarapé Preto (Preto stream); 6 - Amana surrounding area (Km 180); 7 - Amana surrounding area (Km 275, Rabelo).

TABLE 1. Sites and points of observation and collection of birds during the two campaigns of Rapid Ecological Assessment in Amana National Forest, Pará, Brazil.

Site	Point	Coordinates		Sampling Days	Habitat
		W	S		
1 - Montanha Stream	01	56°58'10.1"W	04°52'58,7"S	25-27 April 2008	Plateau of *terra-firme* forest
	02	56°58'07.0"W	04°52'55.9"S	22-24 July 2008	Lowland alluvial forest
2 - JML Gold Mining	03	57°32'14.9"W	05°06'35.7"S	29-30 April 2008	*Terra-firme* forest with palm trees
	04	57°32'07.8"W	05°06'28.3"S	30 July to 01 August 2008	Secondary forest with bamboo
3 - Maranhense	05	57°28'32.0"W	05°21'10.7S	01-03 May 2008	*Terra-firme* forest with palm trees
	06	57°28'27.0"W	05°21'04.7S	02-04 August 2008	Submontane forest with palm trees
4 - São Pedro	07	57°28'24.7"W	04°46'41.1"S	05-06 May 2008	Vegetation on white sand soil (*campina*)
	08	57°28'28.4"W	04°46'43.4"S	26-29 April 2008	Edge of floodplain forest, sandy beaches, and *campina*
5 - Southern Portion of FLONA (Igarapé Preto)	09	57°42'29,1"W	05°54'31,9"S	06-08 August 2008	Edge of *terra-firme* forest
6 - FLONA Surrounding		56°55'29.0"	04°58'32.7	24 April 2008 and 21 July 2008	Km 180 - anthropogenically influenced area (open area)
7 - FLONA Surrounding		57°18'10.8"	05°35'07.1"	05 August 2008	Km 275 – Rabelo - anthropogenically influenced area (open area)

Species Survey

Three approaches were used to survey the avifauna of each point: (a) quantitative, with mist nets, (b) qualitative, through field observations with binoculars, and (c) interviews with local residents. Scientific nomenclature is in accordance with the Comitê Brasileiro de Registros Ornitológicos (CBRO 2014).

(a) **Mist-net surveys**: Eighteen mist nets were used, 12 x 2 m in length with 36-mm mesh (Rosaminas®). The nets were placed in pre-existing transects at each point where they remained on average for two days. The opening of nets took place soon after sunrise, from 0530 to approximately 1600 h in order to maximize catches. Individuals were identified, photographed, and released. To monitor recaptures during each campaign,

individuals released were marked by cutting the tip of two rectrices. Some individuals were collected and prepared as specimens to document occurrence at the study area. Voucher specimens were taken with the permission of Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis-IBAMA (Brazilian Institute of Environment and Renewable Natural Resources). All collected specimens are currently deposited for further studies at the Museu Paraense Emílio Goeldi, Belém, Pará.

(b) **Observations:** Observations were performed daily with binoculars (Eagle Optics, 8 x 42) from 0600-0900 h. Trails inside the forest, roads, and open areas around the main localities were censused. Occasionally, I made boat trips along rivers and streams near the sites to maximize the observation of riverside species. Since I did not use recording devices, I was unable to identify all vocalizations heard during censuses. I report our observations of the portion of the avain community I was able to positively identify.

(c) **Interviews**: Some local residents, mostly miners, were interviewed about which bird species are best known in the region. In order to minimize the confusion generated by common bird names (which vary from one region to another), books containing photos of Amazonian birds with their species names were shown. This methodology allowed us to check *in loco* whether the species mentioned in the interviews were expected to occur in this region of study.

Data Analysis

Aiming to understand the degree of similarity among bird communities at different sites surveyed in this study, similarity analysis was performed. A Jaccard index was calculated based on the presence and absence of species at each site (Magurran 1988). Cluster analysis was performed using the MVSP 3.1 software package (Kovach 2003).

RESULTS

Two hundred forty-seven species of birds belonging to 51 families were recorded (Appendix). The capture effort consisted of 3,320 hours/net and approximately 60 additional hours of visual observation. The most representative families were Thraupidae, Thamnophilidae, Tyrannidae and Psittacidae, with 21, 20, 18, and 14 species, respectively (Appendix). More than 300 individuals were captured by mist net and 130 specimens were collected for further study.

Similarity Analysis among Sampling Sites

All sites located within the FLONA had an average similarity above 0.3 (30%), making them more similar to each other when compared to sites located outside the National Forest (Table 2, Figure 2). The dendrogram (Figure 2) resulting from hierarchical cluster analysis showed the formation of two distinct groups: the first group was formed by sites 6 and 7, and the second one by the other sites.

Endemic Species

We recorded eight interfluve endemics taxa (Cracraft 1985) in Amana, including Red-throated Piping-Guan (*Aburria cujubi nattereri*), Bar-breasted Piculet (*Picumnus aurifrons borbae*), Hoffmanns's Woodcreeper

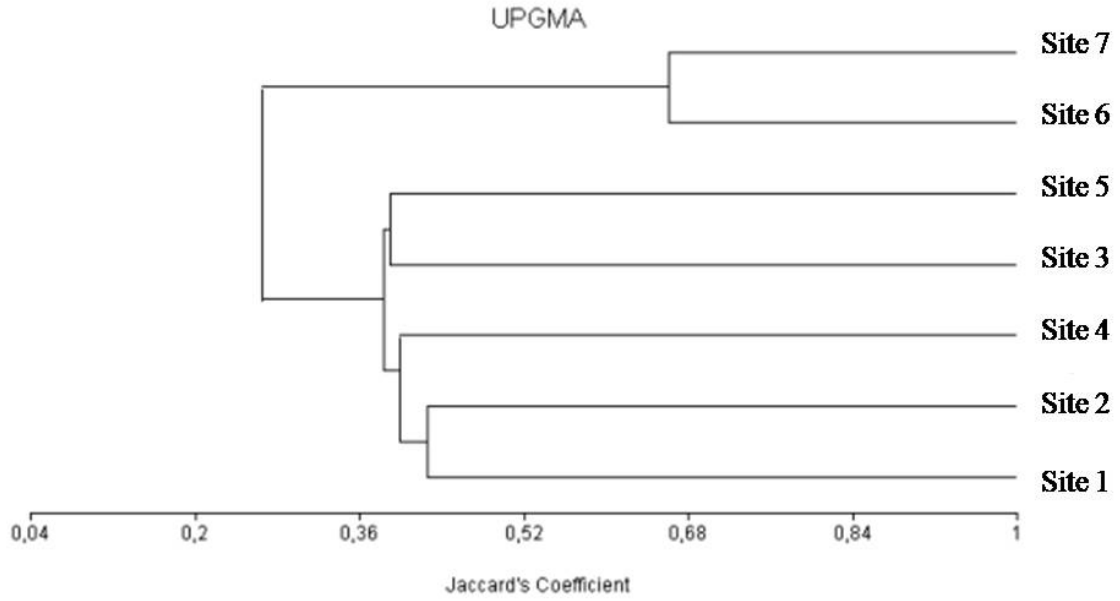

FIGURE 2. Hierarchical clustering analysis for avian survey sites in Amana National Forest using Jaccard similarity distances.

TABLE 2. Similarity matrix of Jaccard coefficients among sites surveyed in Amana National Forest.

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
Site 1	1						
Site 2	0.427	1					
Site 3	0.373	0.427	1				
Site 4	0.391	0.408	0.356	1			
Site 5	0.357	0.415	0.39	0.374	1		
Site 6	0.184	0.279	0.252	0.262	0.351	1	
Site 7	0.193	0.254	0.237	0.25	0.388	0.66	1

(*Dendrocolaptes hoffmannsi*), Ferruginous-backed Antbird (*Myrmoderus ferrugineus elatus*), Long-winged Antwren (*Myrmotherula longipennis ochrogyna*), White-eyed Antwren (*Epinecrophylla leucophthalma phaeonota*), Harlequin Antbird (*Rhegmatorhina berlepschi*), and Pale-faced Antbird (*Phlegopsis borbae*).

Threatened Species

Among the species observed within the FLONA, at least two deserve special attention because they are on red lists of threatened birds.

White-crested Guan (*Penelope pileata*): Although this species is not included by IBAMA on the list of threatened birds in Brazil, White-crested Guan is on the IUCN's Red List in the Vulnerable category (Birdlife International 2014a). Due to the prospects of future deforestation in the Amazon region, where this species occurs, and its sensitivity to hunting and fragmentation, the conservation status of this species has received considerable attention. This species, as well as other cracids, is used as a source of protein by traditional residents (Brooks *et al*. 2006). During the survey, a single individual of *P. pileata* (Appendix) was observed and photographed on 31 July 2008 (Guilherme 2008).

Golden Parakeet (*Guaruba guarouba*): This psittacid has been recently reclassified as Vulnerable by Birdlife International (2014b). The threat to this species lies mainly in its habitat loss and offspring capture by illegal bird traders (Oren & Novaes 1986; Laranjeiras & Cohn-Haft 2009). In Amana, I observed several flocks of 18 to 22 individuals, flying daily over the camps of sites 3, 4, 5, 6, and 7. Fortunately, residents raising individuals of this species as pets were not detected in Amana or its surroundings. Therefore, in a preliminary assessment, it seems that populations of this species are in good condition within Amana.

Species of Regional Relevance

During this Rapid Ecological Assessment of Amana National Forest, three important records were made: Bald Parrot (*Pyrilia aurantiocephala*), Crimson Topaz (*Topaza pella*), and Racket-tailed Coquette (*Discosura longicaudus*). Crimson Topaz and Racket-tailed records represent an extension of their known geographic ranges; Bald Parrot was only recently described and is poorly known.

Bald Parrot (*Pyrilia aurantiocephala*): These parrots with a bare and orange head were for many years considered to be the young of the Vulturine Parrot (*Pyrilia vulturina*; Sick 1997). Now recognized as its own species (Gaban-Lima *et al*. 2002), it is endemic to the Brazilian Amazon, with its entire geographical distribution restricted to a narrow band of the southeastern Amazon within interfluves of the Madeira, Tapajós, and Xingu Rivers (InfoNatura 2007; del Hoyo *et al*. 2013). Because it was only described a few years ago, virtually nothing is known about its biology. It is highly recommended that a study be made on its populations including preferential habitat, feeding, and reproductive biology. Gaban-Lima *et al*. (2002) suggest that the preferential habitat of this species is "*campinarana*." Based on our observations in Amana National Forest, the species seems to occur in the canopy of the floodplain forests, where an individual was collected at site 2 (Figure 4; Appendix). This habitat has been one of the most impacted by mining in Amana National Forest. As this species occurs only in a very restricted area that has been suffering intense anthropogenic pressure, the Bald Parrot was recently included on the IUCN's Red List in the Near Threatened category (Birdlife International 2014c).

Crimson Topaz (*Topaza pella*): This magnificent hummingbird is well known from the northeastern Amazon (from Guyana to the region around Belém, Brazil; Schuchmann 1999). Until recently, only two

records of Crimson Topaz had been made in the southern basin of the middle and lower Amazon River, between the cities of Parintins in Amazonas and Santarém in Pará (Hu *et al*. 2000). Davis & Olmstead (2010) reported a compilation of scattered records of this species made in the southern basin of the Amazon River, including the states of Pará, Amazonas, Mato Grosso, and Rondônia. The few records of this species from the southern bank of the Amazon River indicate that it appears to be rare at least in this region. The female specimen of Crimson Topaz collected during this study in Site 3 (Appendix) extends this species' distribution a few kilometers west of the "Trairão" locality, the previous southernmost record of this species from state of Pará (Pacheco & Olmos 2005).

Racket-tailed Coquette (*Discosura longicaudus*): In Amazonia, the occurrence of this species is restricted to a portion of the northeastern basin and the mouth of the Amazon River (Venezuela, Guyana, states of Amazonas, Amapá, and Pará, in Brazil; Schuchmann 1999; Daffonseca 2010). There are also a few records of this species in the Brazilian Atlantic Forest (Schuchmann 1999, InfoNatura 2007, Albano 2012). During the first field campaign at Site 3, one individual of this species was photographed at the forest edge (Figure 5). We observed the species and collected one individual in the same place three months later (Appendix). These records considerably extend the geographical distribution of this species, so that it reaches the southern Brazilian Amazon. Surely, this species must be quite rare in the region, which would explain the fact that no record of it has been made until now.

Black-bellied Thorntail (*Discosura langsdorffi*): This little hummingbird was known only from the western Amazon (Colombia, Ecuador, Peru, Bolivia, and Brazil) and the Brazilian Atlantic Forest (Schuchmann 1999). The first records of this species in the southern portion of the eastern Amazon were made in Alta Floresta, Mato Grosso (Zimmer *et al.* 1997). More recently the Black-bellied Thorntail was recorded in the Carajás region (Pacheco *et al*. 2007) and Parauapebas, southeastern Pará (Endrigo 2011). It seems to be a rare species whose populations in the Atlantic Forest (states of Bahia, Espírito Santo, and Rio de Janeiro) are endangered, mainly due to deforestation (IBAMA 2003; Olmos 2005). There is no information on the conservation status of this species in the eastern portion of the Amazon, a region that has suffered enormous anthropogenic pressures (Capobianco *et al*. 2001). There is urgent need to carry out a study on the distribution and abundance of this taxon within Amana National Forest. During the two field campaigns, this species was only seen and photographed (Figure 3) at forest edge in Site 3 (Maranhese; Appendix, Figure 3). Further study of this species should work to identify its preferred habitats in the region, so that they can be protected within Amana.

FIGURE 3. Black-bellied Thorntail (*Discosura langsdorffi*). Species recorded in secondary forest edge within Amana National Forest. Besides being a species of interest for conservation, this record extends its known geographical distribution in the Brazilian Amazon.

FIGURE 4. Bald Parrot (*Pyrilia aurantiocephala*). Species present in Amana National Forest; still little known regarding its geographical distribution and ecological requirements. This record adds important information for this species.

FIGURE 5. Racket-tailed Coquette (*Discosura longicaudus*). The record of this species in Amana National Forest extends its distribution in the Brazilian Amazon.

Species Associated with Specific Habitats

Besides *terra-firme* and floodplain forests, in Amana National Forest there is a vegetation type known as *campina*, which is found on white sand soil. *Campina* vegetation has a low height, with a high density of small and thin trees, and scarcity of emergent trees. *Campina* shelters a number of species that are closely associated with this habitat (Oren 1981; Borges 2004; Guilherme & Borges 2011). Even after obtaining information by local residents regarding the presence of several spots of *campina* and *campinarana* in Amana National Forest, it was only possible to inventory a small portion of this habitat at site 4.

Below are comments on some recorded species associated with this vegetation type:

Red-shouldered Tanager (*Tachyphonus phoenicius*): This species is associated with *campina* and *campinarana* throughout the Amazon (Oren 1981; Borges 2004). One individual was collected in April 2008 (Appendix) during the first field campaign.

Flame-crowned Manakin (*Heterocercus linteatus*): This is an uncommon species associated with sandy soil vegetation, mostly near black water rivers and streams (Polleto & Aleixo 2005). It was observed on the banks of Igarapé Porquinho at Site 3 and Igarapé Preto at Site 5. One individual was collected in a *campina* spot at Site 4 (Appendix).

White-bearded Manakin (*Manacus manacus*): Although this species is found in many types of environments within the Amazon, including *terra-firme* forest and secondary vegetation, referred to as *capoeira*, (Sick 1997), its abundance seems to increase significantly in *campina* (pers. obs.). Throughout the field campaign, 12 individuals of White-bearded Manakin were captured. All observed and captured individuals were along the stretch of *campina* at Site 4.

Environmental Impacts

Two types of impacts on the environment of Amana were identified: one that affects the ecosystem as a whole (mining), and another that directly affects the populations of game birds (hunting).

Mining - Environmental changes caused by mining, either gold or cassiterite, were detected at all sites (Figure 6) except for Site 1.

FIGURE 6. Washing soil to extract gold within Amana National Forest. Note the crater formed in the woods due to soil leaching.

Evidence of Hunting - Bird hunting activity, especially for food, was detected at all surveyed points within Amana, except Site 1, which had no homes nearby. The bird families most affected appear to be Cracidae (Curassows and Guans) and Anatidae (Table 3; Figure 7).

TABLE 3. Evidence of hunting at surveyed sites.

Location	Hunted Species	Evidence
Site 2 (JML Gold Mining)	Crestless Curassow (*Pauxi tuberosa*)	feathers
	Scarlet Macaw (*Ara macao*)	feathers
Site 3 (Maranhense)	Crestless Curassow (*Pauxi tuberosa*)	feathers
	Red-throated Piping-Guan (*Aburria cujubi*)	carcass
Site 4 (São Pedro)	Ornate Hawk-Eagle (*Spizaetus ornatus*)	carcass
	Black-bellied Whistling-Duck (*Dendrocygna autumnalis*)	carcass (Figure 7)
Site 5 (Igarapé Preto)	Gray Tinamou (*Tinamus tao*)	Witnessed eggs collected for consumption

FIGURE 7. Black-bellied Whistling-duck (*Dendrocygna autumnalis*) hunted by a local resident.

DISCUSSION

The number of species reported during this study is about 45% less than the number of expected species for the total area of Amana National Forest. Oren & Parker (1997) recorded 448 bird species in Amazonia National Park. As Amazonia National Park is limited to the south by Amana National Forest, it is plausible that many species found in this park are also present within Amana. Because the sampling effort of this Rapid Ecological Assessment was much smaller than the effort used in Amazonia National Park (Oren & Parker 1997), many species will be added to this preliminary list (Appendix) as more surveys are accomplished in Amana.

Similarity Analysis among Sampling Sites

The two distinct groups shown in the dendrogram (Figure 2) were expected. The separation of Sites 6 (Km 180) and 7 (Km 275; Figure 2) were expected since these sites were located in an open area and quite anthropogenically influenced. At these sites, most bird species are associated with open environments and/or forest edges, differentiating these communities from ones located in sites within Amana. The second group formed by sites 1, 2, 3, 4, and 5 have in common the fact that they are located in a predominantly forest-based habitat of Amana. Three subdivisions within this group can be noted. The first subdivision includes Sites 5 (southern portion of Amana) and 3 (Maranhense), in which the relative proximity and likeness among explored habitats explain similarities among their avian communities. The second subdivision groups Sites 1 (Montanha stream) and 2 (JML Gold Mining), which are highly similar to each other (Table 2). This resemblance can be explained due to the presence of *terra-firme* forest with plateaus and well-marked shallows. The third subdivision is formed only by Site 4 (São Pedro), located at an intermediate position between the first and second groups of sites (Figure 2). The most plausible explanation for this separation seems to be the presence of two types of environments within

the site, which were not sampled at other points. The first habitat type refers to the floodplain forest and sandy beaches along the Amana River passing through this site. The presence of this medium-sized river with a range of micro-aquatic habitats allowed observation of some species that were not detected at other sites (Appendix). However, the largest contributor to the separation of this site from the others was the presence of the white-sand "*campina*" forest (*sensu*, Anderson 1981; Guilherme & Borges 2011). I dedicated special attention to the *campina* spot in Site 4, and recorded some species typical of *campina* that were not found at other sampled sites (Appendix).

Endemic Species

According to Cracraft (1985), 21 taxa are considered endemic to the interfluve of the Tapajós and Madeira Rivers. Eight (38.0%) of these taxa were recorded in Amana. White-crested Guan (*Penelope pileata*), Crimson-bellied Parakeet (*Pyrrhura perlata*) and Snow-capped Manakin (*Lepidothrix nattereri*) are cited in the list by Cracraft (1985) as endemic in this interfluve and were recorded in this work (Appendix). However, later studies showed that White-crested Guan occur in almost the entire southern bank of the middle and lower Amazon River (InfoNatura 2007, Brooks *et al*. 2006) and Crimson-bellied Parakeet and Snow-capped Manakin have been recorded out of the interfluve of the Tapajos/ Madeira Rivers in Rondônia and Mato Grosso States (Cordasso 2014; Lees *et al*. 2013b; Zanon 2013).

Species Associated with Specific Habitats

The detection of species closely associated with *campina* and species with higher abundance in this habitat is a clear indication of its importance for the maintenance of local biodiversity. It is necessary to find strategies for preserving this ecosystem against anthropogenic alteration. It is important that biological studies be undertaken at these *campinas*, which likely hold other rare or geographically restricted species whose survival depends solely on maintaining this habitat intact. Despite not being as rich in species as other Amazonian environments (Oren 1981; Borges 2004), they contribute significantly to the increase of α (local) and β (regional) diversity because some species are restricted only to this habitat (Oren 1981; Stotz *et. al*. 1996; Guilherme & Borges 2011). In the case of Amana National Forest, it was only possible to sample a small portion of *campina* located at Site 4. It is essential that the other areas of *campina* within Amana be identified, studied, and preserved. It is important not only to preserve the *campinas* intact, but also to maintain the matrix of trees around them. This maintenance may contribute significantly to the health of the environment.

Environmental impacts

Mining -- When gold mining is performed manually, the impacts are minimal. Mechanized operation, on other hand, causes huge changes in the environment. The problem lies in the fact that miners dissolve the forest floor with water jets as they search for small fragments of gold mixed with underground argillaceous rock (Figure 6). As a result of this procedure, damage is caused to fauna and flora on various levels: the first and most harmful is forest destruction (in general, the floodplain forest) in the operation area (Figure 6); the second is the transport of large amounts of sediment into rivers and streams, forming craters without vegetation at places of operation (Figure 6); third is the use of chemicals (*e.g.,* mercury and diesel), the waste of which often remains in the area and is not disposed of properly. Mining, besides destroying the main habitats of shorebird species, can also cause the death of the birds, due to harmful, but commonly used, chemicals being released into the environment through seepage or accidents.

Hunting – Hunting, even for subsistence, may reduce the abundance of game species in the Amazon forest (Thiollay 2005). Avian species hunted as game are often naturally rare in tropical forests (Pizo 2001), exacerbating hunting's effects on their populations. If hunting is associated with deforestation or any other type human-caused habitat modification, populations of these species can be drastically reduced and become extinct at certain sites within a few years. Hunting in the FLONA is not yet considered as serious a problem as mining. However, it is necessary to conduct an awareness campaign with local residents. A good awareness campaign could prevent populations of the most persecuted species from being reduced to unsustainable levels. In combination, habitat management tactics like selective logging are essential to ensure persistence of game species' populations. An investigation into the combined effects of this type of forest management as well as hunting pressures on populations of game birds is recommended to understand how best to maintain game species' populations in the long term.

Final Considerations

Although I remained only four days (on average) at each point, and census methods did not sample the entire avian community, our results are useful. More than half (54.9%) of the expected species for the study area were detected, considering all 448 species recorded in Amazonia National Park and its vicinity (Oren & Parker, 1997). These data were sufficient for performing a Rapid Ecological Assessment (Sayre *et al*. 2003). The survey conducted was preliminary — just enough to compile the REA and identify important areas for biodiversity

conservation in Amana National Forest. Detection of bird species in the Amazon demands an enormous effort of fieldwork. However, this effort is not normally used in rapid studies aimed at implementing Management Plans (Vasconcelos 2006).

Despite problems related to mining and hunting, the general state of Amana National Forest conservation is still satisfactory. The complications seem to be concentrated along major rivers and streams in Amana, which somehow has protected the *terra-firme* (upland) forests in interfluves. The *terra-firme* forests that are distant from areas where mining is more intense are well preserved and meet all the conditions to maintain viable populations of large birds, such as the Razor-billed Curassow (*Pauxi tuberosa*), as well as large birds of prey. In fact, several curassow flocks within Amana were observed, indicating no significant hunting activity in areas where there is no mining. Additionally, local residents have confirmed the presence of Harpy Eagle at almost all sampling points. The presence of the above listed species, coupled with the occurrence of other cracids such as the Red-throated Piping-Guan (*Aburria cujubi*) and guans (*Penelope sp*.), trumpeters (*Psophia viridis*), large Psittacidae (parrots), and Ramphastidae (toucans), indicate good environmental health of much of Amana.

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APPENDIX:

List of bird species recorded in Amana National Forest and its surroundings, with information on habitat. Sites: 1 - Right bank of Montanha Stream; 2 - JMS Gold Mining, right bank of Porquinho Stream; 3 - Maranhense; 4 - São Pedro, on the right bank of Amana River; 5 – Igarapé Preto, Southern FLONA point; 6 - FLONA surrounding area, km 180, at the banks of Transamazon Highway; and 7 - FLONA surrounding area, km 275, Rabelo Location. **Record Type**: I – interview, O - observation, P - photo published on WikiAves (www.wikiaves.org), S - specimen collected and deposited in the Museu Paraense Emílio Goeldi, V - recognized vocalization. **Habitats:** A - anthropogenic area; AE - aerial environment, ETF - edge of *terra-firme* rainforest; EFR - edge of floodplain rainforest, ESR - edge of second-growth forest, FR - floodplain rainforest, O - open area, R – banks of rivers and lakes, P - ponds of water along roads and highways, Pa – pasture, S - sandy soil vegetation, TF – *terra-firme* rainforest.

Family and Species	English Name	Habitat	Records Type	Sites
TINAMIDAE				
Tinamus tao	Gray Tinamou	TF	V, Recorded evidence (egg)	1, 2, 3, 4, 5
Tinamus major	Great Tinamou	TF	I[1]	2, 3, 4
Crypturellus cinereus	Cinereous Tinamou	TF	O, V	1, 2, 3, 4, 5
Crypturellus soui	Little Tinamou	TF	O, V	1, 2, 3, 4, 5
Crypturellus variegatus	Variegated Tinamou	TF	S (MPEG 65102)	1
ANATIDAE				
Dendrocygna autumnalis	Black-bellied Whistling-Duck	R	O	1, 4
Cairina moschata	Muscovy Duck	R	O	1, 5
CRACIDAE				
Pauxi tuberosa	Razor-billed Curassow	TF	O, I[1], Recorded evidence (feathers)	1, 2, 3, 4
Penelope pileata	White-crested Guan	TF	O, P(WA436254)	
Aburria cujubi	Red-throated Piping-Guan	TF	O, S (MPEG 65593)	1, 3
PHALACROCORACIDAE				
Phalacrocorax brasilianus	Neotropic Cormorant	R	O	4
ANHINGIDAE				
Anhinga anhinga	Anhinga	R	O	1, 4
ARDEIDAE		**R**		
Tigrisoma lineatum	Rufescent Tiger-Heron	R	O	1, 4
Cochlearius cochlearius	Boat-billed Heron	R	I[1]	4
Butorides striata	Striated Heron	R	O	1, 3, 4, 5
Pilherodius pileatus	Capped Heron	R	O	1, 5
Bubulcus ibis	Cattle Egret	O, Pa	O, S (MPEG 65103)	3, 4
Ardea alba	Great Egret	R	O	2, 4
Egretta thula	Snowy Egret	R	O	2, 4
Ardea cocoi	Cocoi Heron	R	O	1, 4
CATHARTIDAE				
Cathartes aura	Turkey Vulture	ETF, O	O	2, 3, 4, 6

Family and Species	English Name	Habitat	Records Type	Sites
Cathartes burrovianus	Lesser Yellow-headed Vulture	ETF, O	O	1, 2, 3, 4, 6, 5, 7
Coragyps atratus	Black Vulture	O	O	1, 2, 3, 4, 6, 5, 7
Sarcoramphus papa	King Vulture	TF, O	O	1, 3
ACCIPITRIDAE				
Elanoides forficatus	Swallow-tailed Kite	TF, O	O	1, 2, 3, 4, 6, 7
Ictinia plumbea	Plumbeous Kite	EFR	O	1, 2, 3, 4, 6, 5, 7
Geranospiza caerulescens	Crane Hawk	TF	O	4
Urubitinga urubitinga	Great Black-Hawk	EFR	O	4
Rupornis magnirostris	Roadside Hawk	ETF,FR, O	O	1, 2, 3, 4, 6, 5, 7
Buteo nitidus	Gray Hawk	EFR, O	O	4
Buteo brachyurus	Short-tailed Hawk	O	O	6
Harpia harpyja	Harpy Eagle	TF	O	4
Spizaetus tyrannus	Black Hawk-Eagle	EFR	O	2
Spizaetus ornatus	Ornate Hawk-Eagle	TF	I[1]	4
PSOPHIIDAE				
Psophia viridis	Green-winged Trumpeter	TF	O	1, 3, 4
RALLIDAE				
Aramides cajaneus	Gray-necked Wood-Rail	TF	O	1, 2, 3, 4, 5
EURYPYGIDAE				
Eurypyga helias	Sunbittern	R	I[1]	1, 2, 4, 5
CHARADRIIDAE				
Vanellus cayanus	Pied Lapwing	R	O, S (MPEG 65595)	4
Vanellus chilensis	Southern Lapwing	O	O	4, 6, 5
Charadrius collaris	Collared Plover	P	O	6
JACANIDAE				
Jacana jacana	Wattled Jacana	R	O	4, 5
STERNIDAE				
Sternula superciliaris	Yellow-billed Tern	R	O	4
COLUMBIDAE				
Columbina passerina	Common Ground-Dove	O	O	1, 2, 3, 4, 6, 5, 7
Columba livia	Rock Pigeon	A	O	6
Patagioenas speciosa	Scaled Pigeon	ETF	O	3, 4, 5
Patagioenas cayennensis	Pale-vented Pigeon	TF	O	2, 3, 4, 5
Leptotila verreauxi	White-tipped Dove	TF	S (MPEG 65596)	4, 5
Leptotila rufaxilla	Gray-fronted Dove	TF	O	2, 3
Geotrygon montana	Ruddy Quail-Dove	TF	S (MPEG 65597)	1, 4, 5
OPISTHOCOMIDAE				
Opisthocomus hoazin	Hoatzin	R	O	1, 2, 4

Family and Species	English Name	Habitat	Records Type	Sites
CUCULIDAE				
Piaya cayana	Squirrel Cuckoo	TF	O	1, 2, 3, 4, 5
Crotophaga major	Greater Ani	R	O	1, 2, 4
Crotophaga ani	Smooth-billed Ani	ESR, O	O	2, 3, 4, 6, 5, 7
Neomorphus squamiger	Scaled Ground-Cuckoo	TF	O	1
STRIGIDAE				
Megascops choliba	Tropical Screech-Owl	ETF	V, O	1, 3
Athene cunicularia	Burrowing Owl	O	O	7
NYCTIBIIDAE				
Nyctibius griseus	Common Potoo	TF	V, O	1, 5
CAPRIMULGIDAE				
Chordeiles nacunda	Nacunda Nighthawk	O	O	6
Hydropsalis albicollis	Pauraque	ETF	V, O	1,2,3,4,6,5,7
Hydropsalis nigrescens	Blackish Nightjar	S	S (MPEG 65600)	4
Hydropsalis torquata	Scissor-tailed Nightjar	R	S (MPEG 65106)	2
APODIDAE				
Chaetura brachyura	Short-tailed Swift	AE	O	2, 3
Tachornis squamata	Fork-tailed Palm-Swift	AE	O	2, 3, 4, 5
Cypseloides senex	Great Dusky Swift	AE	O	4
TROCHILIDAE				
Threnetes leucurus	Pale-tailed Barbthroat	TF	S (MPEG 65604)	3
Phaethornis ruber	Reddish Hermit	TF	O, V	2, 5
Phaethornis philippii	Needle-billed Hermit	S, TF, ETF	S (MPEG 65104, 65605, 65606, 65607, 65110)	1, 2, 4, 5
Phaethornis superciliosus	Long-tailed Hermit	TF	S (65609, 65610)	1, 2, 3, 4, 5
Phaethornis malaris	Great-billed Hermit	TF	S (MPEG 65111)	3
Campylopterus largipennis	Gray-breasted Sabrewing	ESR	S (MPEG 65112)	3
Florisuga mellivora	White-necked Jacobin	ESR	O	3, 5
Anthracothorax nigricollis	Black-throated Mango	ETF	O	4
Topaza pella	Crimson Topaz	TF	S (MPEG 65603)	3
Discosura langsdorffi	Black-bellied Thorntail	ESR	O, P(WA784190)	3
Discosura longicaudus	Racket-tailed Coquette	ESR	S (MPEG 65602), P(WA784194)	3
Thalurania furcata	Fork-tailed Woodnymph	TF	S (MPEG 65611, 65612)	1, 2, 3, 5
Hylocharis sapphirina	Rufous-throated Sapphire	ESR	S (MPEG 65601) P(WA453732)	3
Heliothryx auritus	Black-eared Fairy	ETF	S (MPEG 65608)	5
TROGONIDAE				
Trogon viridis	White-tailed Trogon	EFR	O	2
Trogon curucui	Blue-crowned Trogon	EFR	O	1, 2

Family and Species	English Name	Habitat	Records Type	Sites
Trogon violaceus	Violaceous Trogon	TF	O	1, 4
Trogon collaris	Collared Trogon	TF	O	3
Trogon rufus	Black-throated Trogon	TF	O	2
Trogon melanurus	Black-tailed Trogon	TF	O	1
ALCEDINIDAE				
Megaceryle torquata	Ringed Kingfisher	R	O	1, 2, 4
Chloroceryle amazona	Amazon Kingfisher	R	O	1, 2, 4
Chloroceryle aenea	American Pygmy Kingfisher	R	O	1, 2, 4
Chloroceryle americana	Green Kingfisher	R	O	1, 2, 4
Chloroceryle inda	Green-and-rufous Kingfisher	TF	O	1
MOMOTIDAE				
Electron platyrhynchum	Broad-billed Motmot	EFR	O	1
Baryphthengus martii	Rufous Motmot	TF	S (MPEG 65594)	1, 3, 5
Momotus momota	Amazonian Motmot	TF	O	1
GALBULIDAE				
Galbula dea	Paradise Jacamar	FR	O	1, 2
BUCCONIDAE				
Bucco tamatia	Spotted Puffbird	TF	O, P (WA785084)	1
Malacoptila rufa	Rufous-necked Puffbird	TF	S (MPEG 65613)	1, 2, 5
Monasa nigrifrons	Black-fronted Nunbird	TF, FR	O	1, 2, 3, 4
Monasa morphoeus	White-fronted Nunbird	ETF	O	1, 3
Chelidoptera tenebrosa	Swallow-winged Puffbird	EFR	O	1, 2, 4, 6, 5, 7
RAMPHASTIDAE				
Ramphastos tucanus	White-throated Toucan	TF	O	1, 2, 3, 4, 6, 5, 7
Ramphastos vitellinus	Channel-billed Toucan	TF	O	1, 2, 3, 4, 6, 5, 7
Pteroglossus inscriptus	Lettered Aracari	EFR	O	4
Pteroglossus aracari	Black-necked Aracari	TF	O	1, 2, 3, 4, 5
PICIDAE				
Picumnus aurifrons	Bar-breasted Piculet	TF	S (MPEG 65113)	3
Melanerpes cruentatus	Yellow-tufted Woodpecker	ETF	O	1, 2, 3, 4
Piculus flavigula	Yellow-throated Woodpecker	TF	O	1
Celeus grammicus	Scaly-breasted Woodpecker	EFR	O	1
Dryocopus lineatus	Lineated Woodpecker	EFR	O	1, 2, 3, 4, 6, 5, 7
Campephilus rubricollis	Red-necked Woodpecker	ETF	O	2
FALCONIDAE				
Daptrius ater	Black Caracara	ETF, FR	O	2, 4, 6
Ibycter americanus	Red-throated Caracara	EFR	O	1, 4
Milvago chimachima	Yellow-headed Caracara	ETF, O	O	1

Family and Species	English Name	Habitat	Records Type	Sites
Herpetotheres cachinnans	Laughing Falcon	ETF, O	O	1, 3, 4, 5
Falco rufigularis	Bat Falcon	EFR	O	1, 4, 5
PSITTACIDAE				
Ara ararauna	Blue-and-yellow Macaw	TF	I[1]	1, 2, 3, 4, 6, 5, 7
Ara macao	Scarlet Macaw	TF	O	1, 2, 3, 4, 6, 5, 7
Ara chloropterus	Red-and-green Macaw	TF	I[1]	4
Orthopsittaca manilatus	Red-bellied Macaw	TF	O	1, 2, 3, 4, 6, 5, 7
Guaruba guarouba	Golden Parakeet	TF, FR	O	2, 3, 4, 6, 5, 7
Psittacara leucophthalmus	White-eyed Parakeet	TF, FR	O	6, 5
Pyrrhura perlata	Crimson-bellied Parakeet	EFR	O	1, 4
Brotogeris versicolurus	Canary-winged Parakeet	EFR	O	1, 4
Brotogeris chrysoptera	Golden-winged Parakeet	ETF	O	1, 4, 5
Pyrilia aurantiocephala	Bald Parrot	EFR	S (MPEG 65599)	2
Amazona ochrocephala	Yellow-crowned Parrot	EFR	O	4
Amazona kawalli	Kawall's Parrot	EFR	O	4
Amazona amazonica	Orange-winged Parrot	ESR	O	1, 4, 6, 5, 7
Deroptyus accipitrinus	Red-fan Parrot	EFR	I[1]	4
THAMNOPHILIDAE				
Epinecrophylla leucophthalma	White-eyed Antwren	FR	S (MPEG 65127, 65128)	1
Myrmotherula multostriata	Amazonian Streaked-Antwren	TF	O, S (MPEG 65135)	2, 3
Myrmotherula axillaris	White-flanked Antwren	TF	S (MPEG 65625)	3
Myrmotherula longipennis	Long-winged Antwren	TF	S (MPEG 65622)	3
Isleria hauxwelli	Plain-throated Antwren	FR	O	1
Thamnomanes saturninus	Saturnine Antshrike	TF	O, S (MPEG 65125, 65126)	1, 2, 3, 4, 5
Thamnomanes caesius	Cinereous Antshrike	TF	O, S (MPEG 65124)	1, 2, 3, 4, 5
Thamnophilus doliatus	Barred Antshrike	ESR	O	2, 5
Thamnophilus schistaceus	Plain-winged Antshrike	TF	S (MPEG 65123)	2
Thamnophilus aethiops	White-shouldered Antshrike	TF	O	3
Thamnophilus stictocephalus	Natterer's Slaty-Antshrike	TF	O	1
Thamnophilus amazonicus	Amazonian Antshrike	TF	S (MPEG 65626)	1
Myrmoderus ferrugineus	Ferruginous-backed Antbird	TF	O, S (MPEG 65130)	1, 2, 5
Hylophylax naevius	Spot-backed Antbird	FR	O	1
Myrmoborus myotherinus	Black-faced Antbird	TF	O, S (MPEG 65129)	1, 2
Hypocnemis striata	Spix's Warbling-Antbird	TF	O, S (MPEG 65628)	1, 3, 5
Willisornis poecilinotus	Scale-backed Antbird	TF	S (MPEG 65132)	1, 2, 3, 5
Phlegopsis nigromaculata	Black-spotted Bare-eye	TF	O, S (MPEG 65133)	1, 2, 3, 5
Phlegopsis borbae	Pale-faced Antbird	TF	S (MPEG 65631, 65632)	3
Rhegmatorhina berlepschi	Harlequin Antbird	TF	S (MPEG 65131, 65134)	1, 2, 3, 5

Family and Species	English Name	Habitat	Records Type	Sites
FORMICARIIDAE				
Formicarius analis	Black-faced Antthrush	TF	O	1, 2, 3, 5
DENDROCOLAPTIDAE				
Dendrocincla fuliginosa	Plain-brown Woodcreeper	TF	S (MPEG 65115, 65116, 65615)	1, 4
Dendrocincla merula	White-chinned Woodcreeper	TF	S (MPEG 65614)	3
Deconychura longicauda	Long-tailed Woodcreeper	TF	S (MPEG 65616)	1
Certhiasomus stictolaemus	Spot-throated Woodcreeper	TF	S (MPEG 65617)	1, 3
Glyphorynchus spirurus	Wedge-billed Woodcreeper	TF	S (MPEG 65121)	1, 2, 3, 4, 5
Dendrocolaptes hoffmannsi	Hoffmanns's Woodcreeper	TF	S (MPEG 65117)	1, 3
Xiphorhynchus ocellatus	Ocellated Woodcreeper	FR	S (MPEG 65119)	1
Xiphorhynchus elegans	Elegant Woodcreeper	TF	S (MPEG 65120)	1, 2
Xiphorhynchus guttatus	Buff-throated Woodcreeper	FR	S (MPEG 65118)	1, 2, 3, 4, 5
XENOPIDAE				
Xenops tenuirostris	Slender-billed Xenops	FR	O	1
Xenops minutus	Plain Xenops	FR	O	1
FURNARIIDAE				
Philydor pyrrhodes	Cinnamon-rumped Foliage-gleaner	FR	S (MPEG 65122)	1, 2
Philydor erythropterum	Chestnut-winged Foliage-gleaner	FR	O	1
Automolus paraensis	Para Foliage-gleaner	FR	S (MPEG 65620)	1, 2, 3
Automolus ochrolaemus	Buff-throated Foliage-gleaner	FR	O	2
Synallaxis gujanensis	Plain-crowned Spinetail	EFR	S (MPEG 65621)	4
PIPRIDAE				
Pipra fasciicauda	Band-tailed Manakin	FR	S (MPEG 65152)	2, 3
Ceratopipra rubrocapilla	Red-headed Manakin	FR	O, S (MPEG 65645, 65153)	1, 2, 3, 4
Lepidothrix nattereri	Snow-capped Manakin	FR	S (MPEG 65149, 65150, 65151)	1, 3, 4
Manacus manacus	White-bearded Manakin	S,	S (MPEG 65148)	4
Heterocercus linteatus	Flame-crowned Manakin	FR, S	O, S (MPEG 65158), P(WA784186)	2, 4, 6
Chiroxiphia pareola	Blue-backed Manakin	FR	S (MPEG 65644)	1
ONYCHORHYNCHIDAE				
Onychorhynchus coronatus	Royal Flycatcher	FR	O	2, 5
Myiobius barbatus	Whiskered Flycatcher	FR	S (MPEG 65634)	3, 4
TITYRIDAE				
Laniocera hypopyrra	Cinereous Mourner	FR	S (MPEG 65154)	4
Tityra inquisitor	Black-crowned Tityra	S	S (MPEG 65642)	4
Tityra cayana	Black-tailed Tityra	TF, S	O, S (MPEG 65641)	1, 2, 3, 4, 6, 5. 7
Tityra semifasciata	Masked Tityra	EFR	O	4

Family and Species	English Name	Habitat	Records Type	Sites
COTINGIDAE				
Lipaugus vociferans	Screaming Piha	TF,FR	O, V	1, 2, 3, 4, 5
Xipholena lamellipennis	White-tailed Cotinga	FR	O	3
Gymnoderus foetidus	Bare-necked Fruitcrow	FR	O	2
TYRANNIDAE				
Mionectes oleagineus	Ochre-bellied Flycatcher	FR	O, S (MPEG 65146)	1, 2, 3, 4
Mionectes macconnelli	McConnell's Flycatcher	S	S (MPEG 65638, 65639)	4
Hemitriccus minor	Snethlage's Tody-Tyrant	FR	S (MPEG 65145)	1
Myiopagis gaimardii	Forest Elaenia	ESR	S (MPEG 65635)	3, 5
Elaenia parvirostris	Small-billed Elaenia	EFR	S (MPEG 65139)	4
Elaenia spectabilis	Large Elaenia	ESR	S (MPEG 65142)	3
Tolmomyias flaviventris	Yellow-breasted Flycatcher	ESR	S (MPEG 65636, 65637, 65140, 65141)	3, 4
Tolmomyias poliocephalus	Gray-crowned Flycatcher	ESR	S (MPEG 65633)	3
Lathrotriccus euleri	Euler's Flycatcher	ESR	O	6
Legatus leucophaius	Piratic Flycatcher	ESR	O, S (MPEG 65144)	1, 2, 3, 4, 6
Myiozetetes cayanensis	Rusty-margined Flycatcher	ETF	O	1, 2, 3, 4, 6, 5, 7
Pitangus sulphuratus	Great Kiskadee	ETF	O	1, 2, 3, 4, 6, 5, 7
Myiodynastes maculatus	Streaked Flycatcher	ETF	O	2, 6
Megarynchus pitangua	Boat-billed Flycatcher	EFR	O	1, 2, 3, 4, 6, 5, 7
Empidonomus varius	Variegated Flycatcher	EFR	O, P(WA454249)	3, 6
Tyrannus melancholicus	Tropical Kingbird	EFR	O	1, 2, 3, 4, 6, 5, 7
Myiarchus ferox	Short-crested Flycatcher	EFR	O, S (MPEG 65640)	1, 2, 3, 4, 6, 5, 7
Attila spadiceus	Bright-rumped Attila	FR	O, S (MPEG 65137)	2, 3
VIREONIDAE				
Cyclarhis gujanensis	Rufous-browed Peppershrike	EFR	O, V	1, 2, 3, 4, 6
Vireo olivaceus	Red-eyed Vireo	ESR	S (MPEG 65647)	6
Hylophilus semicinereus	Gray-chested Greenlet	ESR	S (MPEG 65648)	6
Hylophilus ochraceiceps	Tawny-crowned Greenlet	FR	S (MPEG 65160)	1
HIRUNDINIDAE				
Tachycineta albiventer	White-winged Swallow	R	O	1, 2, 4
Progne tapera	Brown-chested Martin	O	O	4, 6
Progne chalybea	Gray-breasted Martin	O, A	O	4, 6, 5, 7
Atticora fasciata	White-banded Swallow	R	O, S (MPEG 65162)	1, 2, 4, 5
TROGLODYTIDAE				
Microcerculus marginatus	Scaly-breasted Wren	TF	S (MPEG 65155)	1
Troglodytes musculus	Southern House Wren	A, O	O	2, 6
Campylorhynchus turdinus	Thrush-like Wren	EFR	O	1, 2, 3, 4, 5
Pheugopedius genibarbis	Moustached Wren	ESR	O, S (MPEG 65156)	2, 5

Family and Species	English Name	Habitat	Records Type	Sites
Cantorchilus leucotis	Buff-breasted Wren	S	S (MPEG 65157)	4
TURDIDAE				
Turdus fumigatus	Cocoa Thrush	EFR	S (MPEG 65654)	1, 4
Turdus lawrencii	Lawrence's Thrush	FR	O, V	1
Turdus albicollis	White-necked Thrush	TF	S (MPEG 65655)	3, 5
PASSERELLIDAE				
Ammodramus aurifrons	Yellow-browed Sparrow	O	O	2, 3, 4, 6, 5, 7
Arremon taciturnus	Pectoral Sparrow	S	S (MPEG 65168, 65656)	3, 4
PARULIDAE				
Myiothlypis rivularis	Neotropical River Warbler	FR	S (MPEG 65161)	1
ICTERIDAE				
Psarocolius viridis	Green Oropendola	EFR, FR	O	3, 4
Icterus cayanensis	Epaulet Oriole	EFR, FR	O	5
Cacicus cela	Yellow-rumped Cacique	EFR	O	1, 2, 3, 4, 6, 5, 7
Molothrus oryzivorus	Bobolink	R	O	4
Molothrus bonariensis	Shiny Cowbird	EFR	S (MPEG 65662)	2, 4
Sturnella militaris	Red-breasted Blackbird	O	S (MPEG 65169)	4, 5, 7
THRAUPIDAE				
Saltator grossus	Slate-colored Grosbeak	ESR	O	2
Saltator maximus	Buff-throated Saltator	EFR	O	2, 3, 4
Habia rubica	Red-crowned Ant-Tanager	TF	S (MPEG 65657)	1
Lanio cristatus	Flame-crested Tanager	TF	S (MPEG 65653)	1
Lanio surinamus	Fulvous-crested Tanager	EFR	O	3
Tachyphonus rufus	White-lined Tanager	EFR	O, S (MPEG 65164, 65165, 65166)	2, 4, 6, 5, 7
Tachyphonus phoenicius	Red-shouldered Tanager	S	S (MPEG 65159)	4
Ramphocelus carbo	Silver-beaked Tanager	EFR	O, S (MPEG 65658)	1, 2, 3, 4, 6, 5, 7
Tangara episcopus	Blue-gray Tanager	EFR	O	1, 2, 3, 4, 6, 5, 7
Tangara palmarum	Palm Tanager	EFR	O	1, 2, 3, 4, 6, 5, 7
Tangara chilensis	Paradise Tanager	TF	O	3
Tangara schrankii	Green-and-gold Tanager	FR	O, P(WA784182)	2
Dacnis lineata	Black-faced Dacnis	TF, ESR	S (MPEG 65178, 65179)	3
Dacnis cayana	Blue Dacnis	TF, ESR	S (MPEG 65177)	3
Cyanerpes nitidus	Short-billed Honeycreeper	TF, ESR	S (MPEG 65170, 65171, 65172, 65173, 65174)	3
Cyanerpes caeruleus	Purple Honeycreeper	TF, ESR	S (MPEG 65175, 65176)	3
Volatinia jacarina	Blue-black Grassquit	ESR	O	4, 6, 5, 7
Sporophila americana	Wing-barred Seedeater	O	S (MPEG 65167, 65663), P(WA453727)	4

Family and Species	English Name	Habitat	Records Type	Sites
Sporophila nigricollis	Yellow-bellied Seedeater	ESR	O, S (MPEG 65664, 65666)	3, 6
Sporophila castaneiventris	Chestnut-bellied Seedeater	O	O	4, 6, 5, 7
Sporophila angolensis	Chestnut-bellied Seed-Finch	O	O, S (MPEG 65665)	2, 3 , 4
Paroaria gularis	Red-capped Cardinal	R	O	1, 2, 4, 5
CARDINALIDAE				
Caryothraustes canadensis	Yellow-green Grosbeak	S	S (MPEG 65660)	4
Cyanoloxia rothschildii	Rothschild's Blue Grosbeak	TF	O	1, 3, 4
FRINGILIDAE				
Euphonia xanthogaster	Orange-bellied Euphonia	TF	S (MPEG 65667)	3

[1] - Refers to interviews with local residents (at each sampling point) on the occurrence of some bird species in the Amana National Forest.