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The contribution of an urban park to the conservation of birds in Federal District, Brazil

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Introduction

Being bioindicators of environmental quality, birds are important to investigate as part of many management and conservation plans. Their occurrence in the environment is related to the presence of resources for each species in a given ecosystem. Changes detected in the basic composition of bird communities can allow for an assessment of the impacts of environmental change, whether natural or resulting from human actions (Antas 2003). Vegetation structure is one of the most important features influencing the composition of the avifauna of a particular site. Therefore, changes in vegetation can make the natural environment unsuitable for birds that require more specific habitat conditions to survive (Argel-de-Oliveira 1996). The consequences of urbanization for birds have been studied extensively, and many factors that intertwine in complex ways contribute to the reduction in the establishment of birds in urban areas (Marzluff *et al*. 2001). Many birds seek not only shelter in urban parks, but also food and nesting sites. The parks and public green areas, which make up the urban vegetation, are of great importance for birds. However, these environments are not sufficient to provide refuges (Argel-de-Oliveira 1996) because they are formed by local islands of vegetation. One result of fragmentation is the reduction of species richness; small fragments tend to harbor fewer species (Marini 2001).

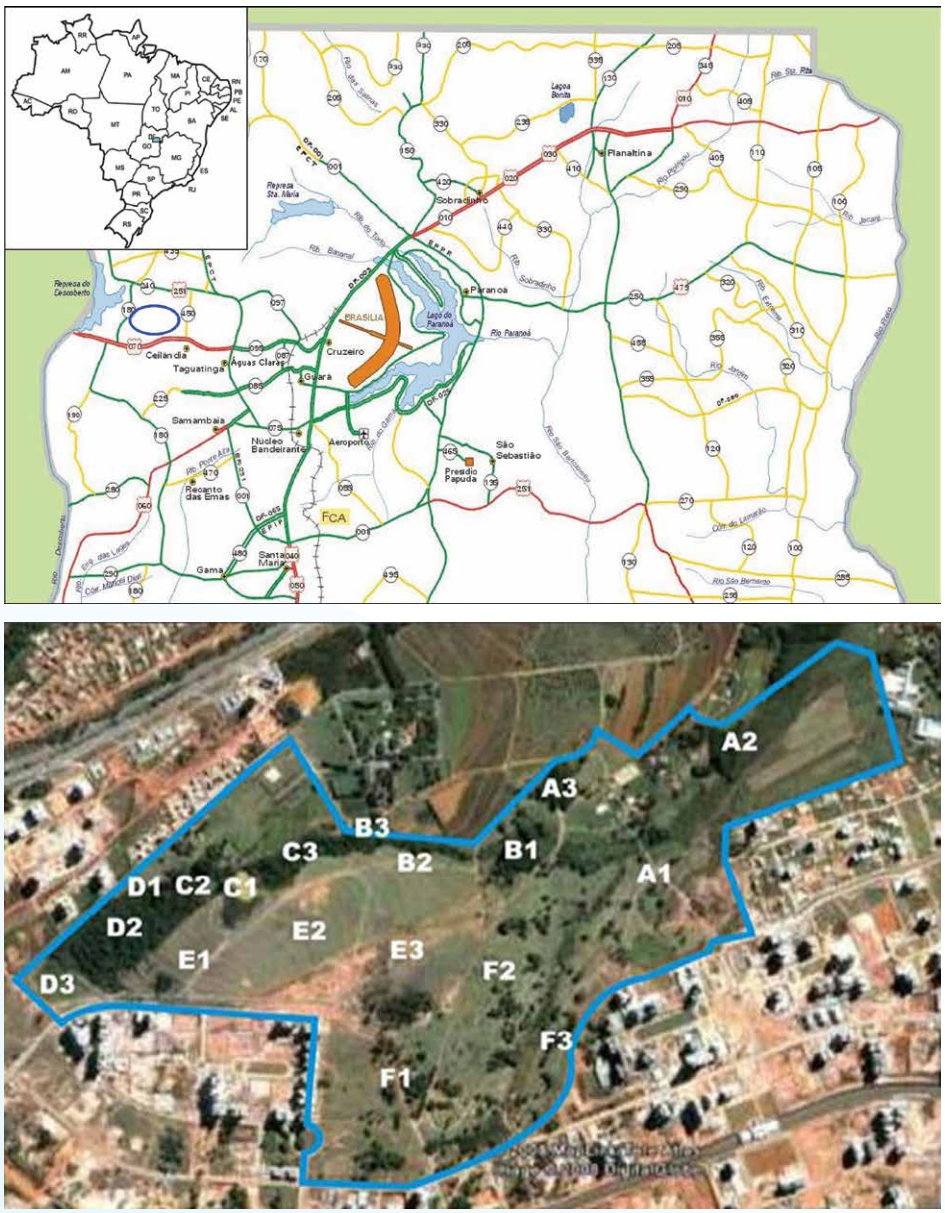

Figure 1. Parque Ecológico Águas Claras in Distrito Federal/Brazil and bird survey points in the park.

The reduction of forest cover in very small fragments has negative consequences for bird communities, weakening them considerably (D'Angelo-Neto *et al*. 1998). There are selective extinctions of species in fragments (Gimenes & Anjos 2003), which tend to reduce the number of specialist species while maintaining mostly generalist species (D'Angelo-Neto *et al*. 1998).

The Brazilian Cerrado, one of the world's biodiversity hotspots (Myers *et al*. 2000), has only 20% of its original area preserved and approximately 67% has already been deforested or modified by human action (Silva *et al*. 2002). Located in the central part of Brazil and South America, Cerrado is connected with the major biomes of the continent. The composition of the Cerrado vegetation is relatively diverse, and many of its types are endemic to South America and Brazil (Walter 2006). Despite this, only 2.2% of the Cerrado areas are legally protected in the form of protected areas, which corresponds to a very small portion of a biome of great importance for

biodiversity (Oliveira 2008). The formation of Cerrado vegetation appears in patches, with grasslands and forest vegetation types (Eiten 1993). Birds are thus distributed according to this spatial heterogeneity, being grouped basically in five habitat categories: aquatic, strictly campestral, essentially campestral, strictly forestland, and essentially forestland (Bagno & Marinho-Filho 2001).

The Cerrado's avifauna is very rich, comprised of at least 841 species, almost half of all of Brazil's bird species (Bagno & Marinho-Filho 2001), and 36 species are endemic. Forty-eight species are considered to be threatened or near threatened by extinction, and 14 of these species are endemic (Marini & Garcia 2005).

Located entirely in the Cerrado area, Distrito Federal has 42% of its territory occupied by protected areas, in which there are 73 urban parks. These areas are meant to keep examples and remnants of natural ecosystems in urban areas, and they encourage research activities, environmental education, recreation, and leisure nature immersion (Oliveira 2008). During the construction of the city of Brasilia, natural environments were replaced by anthropogenic environments and rural areas. The development of the city and the expansion of agriculture have affected birds differentially, favoring some tolerant species and being more detrimental to others (Cavalcanti 1998).

The occurrence of birds in Brasilia can be species typical of the Cerrado remnants that still occur within the urban area, native species that colonize or use anthropic environments, or introduced species specialized in urban areas (Cavalcanti 2009). There are about 450 species of birds in the Distrito Federal region, which represents more than half of species recorded in Cerrado. There are reports of at least 22 biome endemic species (Bagno & Marinho-Filho 2001). Environmental degradation due to economic growth and the urban sprawl of Distrito Federal has changed and affected the balance of bird communities. Today the most abundant species are those capable of colonizing urban environments, and the more rare species are those that normally occur in a typical Cerrado (Cavalcanti 2009). While large conservation units are somewhat stable, buffer zones are not being respected, and their perimeters are being occupied, causing the elimination of connections and ecological corridors and compromising the buffer effect on edges (Cavalcanti & Silva 2011).

The purpose of this study was to identify the composition of the bird community in Parque Ecológico Águas Claras, an urban park in Distrito Federal, to highlight important points for the conservation of bird species in the park, and thus to inform conservation efforts and the management plan for the park.

Material and methods

Study Area

The Parque Ecológico Águas Claras is a 95 ha area located in Distrito Federal (15º 50'-15º 49' S and 48º 01'-48º 01' W). The main vegetation types found in the Park are gallery forests, disturbed areas of palm swamps and Cerrado *sensu stricto*. The park has some exotic plant species, such as *Mangifera indica*, *Persea americana*, *Spathodea campanulata* and *Bauhinia variegata* which were planted by smallholders who lived in the region previously (Munhoz & Amaral 2007). A small stream traverses the park and forms two ponds (Oliveira 2008). Figure 1 illustrates the park areas surveyed for birds, which were established in six locations (A-F) with different vegetation types. Each location was divided into three strategic points, according to certain vegetation types. Areas A, E and F show predominantly grass vegetation, but points A2, A3 and F3 within those areas are more shaded with large trees and large bushes, and the last two points are cut by a stream. Areas B, C and D are formed by forests and have streams as well, with points C3 and D2 located within the riparian forest. The climate corresponds to the typical climate of the central region of the Cerrado, with the rainy season between October and May and the dry season from June to September (Cavalcanti & Silva 2011).

Sampling and data analysis

The sampling of birds in the Parque Ecológico Águas Claras area was conducted with audio recordings and through direct observations using binoculars. Species that were not identified in the field were photographed and/or recorded to be identified later. Identifications were aided by a field guide (Sigrist 2009). Four visits were performed monthly, two in the morning in the period from 06:00 a.m. to 09:00 a.m., and two in the afternoon from 03:00 p.m. to 6:00 p.m., normal sunrise time. The observations were from September 2009 to March 2010, totaling 28 visits and 84 hours in the field.

During the first month of observation, birds were sought by active searching, aiming initially to cover the total area of the park. Beginning in the second month, the method was changed to using sampling points, which were established points throughout the park, as mentioned above. All points were sampled in all visiting hours. Observations lasted seven minutes per point (adapted from Cooper 2002), an adequate time to sample all points distributed throughout the park area without sampling outside the period of greatest activity of the birds. We recorded the species sighted and heard, the type and height of the vertical occupation, the number of individuals, feeding information, and reproductive indicators, when applicable.

The occupation of the vertical space was estimated according to the height where the bird was located (adapted from Matarazzo-Neuberger 1995): aquatic (Aq) on the water; epigeal (E) on the ground; herbaceous (H) by 0.5 m high; shrubby (Ar) at 0.5 to 2 m; arboreal (a) at more than 2 m; and aerial (Ae) at the space above the vegetation.

Because we did not use mist-nets and individuals were not tagged, the same individuals may have been recorded more than once. The analysis of eating behaviors included the species' diet, according to the classification of Sick (1997), the type of food eaten by the individual, and place of capture of food. The reproductive indicators were courtship rituals, copulations, nesting, and the presence of young birds.

The frequency of occurrence (FO) of recorded species was calculated from the relationship between the number of visits in which the species occurred, and the total months of study (adapted from Argel-de-Oliveira 1995): species with FO above 0.6 were classified as residents (R), between 0.6 and 0.15 as probable residents (P), and below 0.15 as occasional (O). The resident species recorded in all the months of the study were classified as common (C) (Franchin & Marçal Júnior 2002).

To evaluate the similarity between the sampled areas in relation to the composition of the avifauna a dissimilarity matrix was calculated using the Morisita Horn index (Magurran 2004). Sites with greater similarity were grouped using the R program, by the average method using data on abundance.

In order to evaluate the sampling effort throughout the months, a species accumulation curve was used. The curve´s shape helps to evaluate how effectively the sampling effort recorded of all of the species in a given study site. If the curve stabilizes or flattens as it approaches an asymptote, it means that the total species richness was likely detected (Santos 2003).

The nomenclature of species follows the Brazilian Committee of Ornithological Records (Piacentini *et al*. 2015).

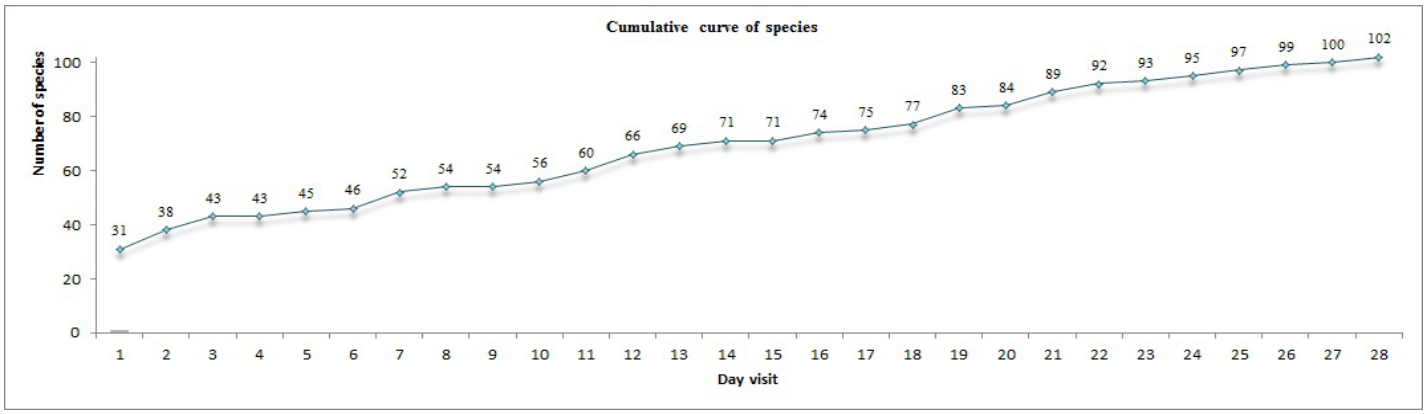

Figure 2. Species accumulation curve of bird species found in the Parque Ecológico Águas Claras, between September 2009 and March 2010.

Results

We recorded 102 species of birds distributed in 16 orders, 39 families and 87 genera (Appendix). The richest Orders in species were Passeriformes and Psittaciformes, with 61 and six species, respectively. Among Passeriformes, the predominant were the families Thraupidae with 14 species and Tyrannidae with 11 species. Within the non-passerine birds, the highlights were the families Psittacidae with six species. The cumulative curve showed a slight tendency to stabilize at the end of the sampling (Figure 2).

We found six endemic Cerrado species (Leite 2006): *Alipiopsitta xanthops*, which is a near threatened species (IUCN 2010), *Antilophia galeata*, *Myiothlypis leucophrys*, *Herpsilochmus longirostris*, *Clibanornis rectirostris* and *Syndactyla dimidiata*, with the last five species being of forest habitats (Silva 1997, Lopes 2007). We also recorded a migratory species, *Tyrannus savana*, which occurs in Central Plateau between August and February (Marini *et al.* 2009).

The most used vertical occupation (V.O.) was Arboreal, with 70 species of birds, representing 68.62% of the total, and the least used V.O.s were Aquatic and Herbaceous, both with five species, equivalent to 4.9%.

Feeding behavior was observed very often, occurring in all 28 field visits. In relation to feeding guilds, the insectivorous (42.85%) and omnivorous (26.98%) guilds were the most representative whereas frugivorous (4.76%) and nectivorous (3.17%) guilds were the least representative. Sixty three species were recorded feeding in the park. The food ingested (Table 1) was insects for approximately 46% of the species (23.8% in trees and 22.22% on the ground), and fruits such as babassu (*Orbignya oleifera*), embauba (*Cecropia pachystachia*), guava (*Psidium guajava*), inga (*Inga edulis*) and oil-wood, *Alchornea triplinervia*, among others, which fueled approximately 17% of these 63 species.

Twenty one species showed reproductive behaviors or indicators of reproduction (Appendix). There was evidence of *Molothrus bonariensis* as nest parasites of *Empidonomus varius*, *Mimus saturninus* and *Zonotrichia capensis*, which were seen caring for baby *Molothrus* brood parasites.

Twenty eight species were classified as residents, 38 species as probable residents, and 36 as occasional species. Twenty five species were common, because they were recorded in all the months of study (Appendix).

According to Morisita Horn index, there was clustering of predominantly campestral or field (D3-F2-A1-E3 and F1-F3) and forest areas (B3-D2, A2-B1, C1-D1, E1-A3-C2). There was also the grouping of a point formed by forest track, B2, with one campestral point, E2. Point C3 was the most different of all, being isolated from other clusters (Figure 3).

Discussion

Parque Ecológico Águas Claras is home to a significant number of bird species (102 species), considering the fact that it is in an urban environment. In a bird survey at Parque do Sabiá, an urban park at Minas Gerais, Franchin & Marçal Junior (2004) recorded 149 species of birds, dominated especially by the family Tyrannidae (26 species). Valadão *et al.* (2006) also conducted a bird survey at Minas Gerais, at Parque Municipal Santa Luzia, in an urban area, and recorded 130 species, with the Tyrannidae family (23 species) again being the most well represented family among the Passeriformes. In both surveys, the number of recorded species is close to the number of species identified in this study; moreover the family Tyrannidae was the most dominant family in all of these studies.

The bird community composition found here is typical of Cerrado, including the endemics and the predominance of Tyrannid species (Silva 1995). The number of species recorded for the Park corresponds to 12.12% of 841 bird Cerrado species (Bagno & Marinho-Filho 2001), and this number is likely an underestimate since the study was conducted only during the rainy season. The species accumulation curve did not stabilize toward the asymptote by the end of sampling. Therefore, the number of species and total community composition may not have been fully documented by this study, underscoring the importance of additional surveys and long-term studies to know the full avian biodiversity of the park.

The presence of endemic species, including a near threatened species, indicates the importance of protecting urban areas, where endemic species are more susceptible to the risk of extinction (Ganem 2011). Although many important species occur in Cerrado, only 2.2% of the biome is contained within legally protected areas, representing a very small portion of a biome with great importance for Brazilian biodiversity (Oliveira 2008), especially given that it contains endangered and endemic species of several groups.

In terms of vertical occupation, the preference of most birds for high sites shows the importance of arboreal coverage in the park. The epigeal (ground) stratum was also preferred, similar to other studies conducted in urban areas (Matarazzo-Neuberger 1995).

The predominance of insectivorous and omnivorous guilds is because these guilds are represented usually by generalist species that are favored in urban environments in relation to other guilds (Villanueva & Silva 1996). The low representation of frugivorous and nectarivorous guilds may result from lack of food resources for these habits in the urban environment (Willis 1979). This reinforces the need for more appropriate management of the park in order to offer better conditions and opportunities to support other types of diets (Franchin and Marçal Junior 2002).

The number of species found in reproductive activity is consistent with the reproductive period of most birds that breed during the rainy season, when there is a greater abundance of food, facilitating the raising of offspring (Sick 1997). In addition, the park served as a habitat for *Tyrannus savana*, which uses the migration strategy to reproduce. It stays from February to July in the Amazon and then migrates to South and Central Brazil, where it reproduces between September and February, to take advantage of the period of greatest abundance of insects in these regions (Sanaiotti and Cintra, 2001; Marini *et al*., 2009). The occurrence of this species in the park is an important record because, according to legislation (Conama 2002), areas where reproduction or refuge for migratory birds occurs should be considered as Permanent Protected Areas.

The occurrence of brood parasitism by species *Molothrus bonariensis* is explained because the species depends entirely on other birds to care for their eggs and chicks. The species *Empidonomus varius*, *Mimus saturninus* and *Zonotrichia capensis*, which were seen caring for brood parasite nestlings, are among the species known to be affected by this brood parasite in Brazil (Sick, 1997). The host species have their reproductive cycles damaged, because with the elimination of their real offspring they fail to pass on their own genes, and the maintenance of the populations of these species is compromised. Birds in urban areas may be more vulnerable to these brood parasites.

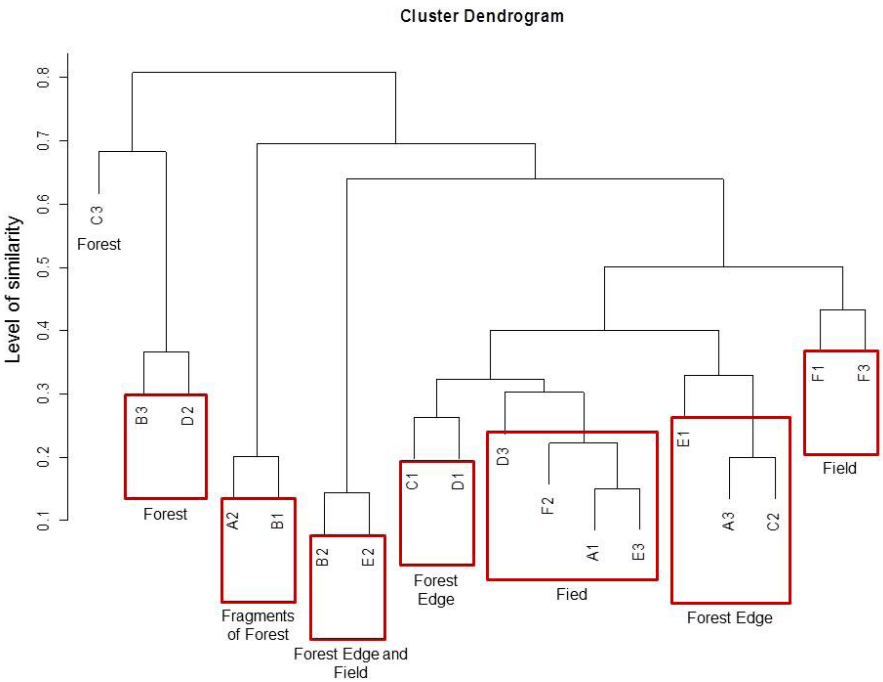

Figure 3. Clustering points of bird surveys (Dissimilarity matrix showing similarity of avifauna at different points) using the Morisita Horn index according to average abundance of species.

The high number of resident species and potential residents shows that the park plays an important role in maintaining the birds in the region, mainly by providing food and resources for reproduction, allowing the species to establish themselves on the site (Franchin e Marçal Júnior 2002). However, because it is an urban environment and a fragmented landscape, these resources may tend to attract generalist species. The area of the park can also act as a point of passage, facilitating the movement of birds in the landscape (Braga 2009). In addition, it functions as a corridor for gene flow among populations separated by fragmentation (Kageyama & Gandara 2001). The Federal District has long suffered from deforestation in exchange for urbanization, and both reduced area and isolation of fragments directly affect the dynamics of populations in these environments, leading to reduced local diversity (Ferreira *et al*. 2005) and genetic diversity (Nascimento *et al*. 1999), which in turn can cause an increase in inbreeding (Ferreira 2007).

The current management of the park is not suitable for the birds' maintenance: there are ditches built in areas with palm swamp that alter soil moisture, affecting both vegetation types of the park as well as bird species that depend on wetlands or moist habitats. The grass maintenance harms the feeding by granivorous birds, which migrate in search of food to other locations where the vegetation is still preserved, as in the case of points E2 and B2. These points are formed respectively by field and forest edges and their grouping is due to the fact that the grasses in these areas are mowed and managed less frequently, leading to abundant food for birds that feed on the seeds of grasses and habitat for the birds seeking insects hidden in vegetation.

The grouping of the survey points by the Morisita Horn index formed groups of riparian environments, open field environments and environments composed of fragments or forest edge. These groupings show that each vegetation type has its importance in maintaining the overall bird diversity. The isolation of point C3 in terms of similarity among sites in the abundance of species is probably due to the presence of sewage in the stream that cuts through point C3, which degrades the environmental quality of this site. In contrast, at point B3 (as well as D2 with which it was grouped), the vegetation in the area is represented by a small fragment of forest preserved better than at point C3, which explains its higher species richness. Except for the isolation of point C3 and the grouping of the points B2 and E2 (Forest edge and field), the grouping of the other points met expectations based on similarity of vegetation.

A serious problem that affects conservation in the area is the lack of a buffer zone, since there is no minimum distance between the park and buildings, which makes the environment of the park more susceptible to human influence.

Final considerations

The avifauna of Parque Ecológico Águas Claras is relatively rich and represents an important area to Cerrado preservation. Knowing the biodiversity of an area and studying the birds as bioindicators are important for the development of management plans and for the conservation of native species. It's important to find solutions to the identified problems in the park, for example: manage habitat to increase nectarivores and frugivores, attend to the dregradation of the area in wich point C3 is located, manage for buffers to enhance conservation of more typical Cerrado species; enabling not only the establishment of generalist edge species, but also specialists species. It is not enough just to maintain the habitat, we have to provide conditions suitable for the survival of birds on site (Cavalcanti 2009). Thus, this study can serve to inform future planning and management for Águas Claras.

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Table 1. Distribution of avian species that indicated feeding behavior in the Parque Ecológico Águas Claras region, according to the feeding preference and place where the food was captured.

FOOD/ CAPTURE	NUMBER OF SPECIES	PERCENTAGE
Insects/ Tree	15	23,80%
Insects/ Soil	14	22,22%
Fruit/ Tree	11	17,50%
Insects/ Sky	6	9,50%
Seeds/ Grass	6	9,50%
Grains/ Soil	4	6,30%
Fish/ Water	3	4,80%
Bird/ Nest	2	3,20%
Arthropods/ Water	1	1,60%
Nectar/ Flower	1	1,60%
Total	**63**	**100%**

Appendix – List of birds species recorded in Parque Ecológico Águas Claras, from September 2009 to March 2010, according to recorded areas, vertical occupation (V.O.) and frequency of occurrence (F.O.). The nomenclature of species follows the Comitê Brasileiro de Registros Ornitológicos (Piacentini *et al.* 2015). The recorded areas were classified from A to F (1, 2, 3). The vertical occupation (V.O.) was represented by: Air (Ae), Aquatic (Aq), arboreal (A), shrubby (Ar), Epigeal (E) and Herbaceous (H). The frequency of occurrence (F.O.) was classified as: Occasional (O), Likely Resident (P), Resident (R) and Usual (C). Species in the reproductive period were represented by [R].

TAXON	RECORD AREA	V.O.	F.O.	
ANSERIFORMES				
Anatidae				
Amazonetta brasiliensis	C1, E1	Aq	0,71	R, C
PELECANIFORMES				
Ardeidae				
Butorides striata	C2	Aq	0,1	O
Syrigma sibilatrix	A3, B2, E2, E3, F2	E	0,28	P
Threskiornithidae				
Mesembrinibis cayennensis		A e Ae	0,25	P
Theristicus caudatus	A1, D1, E1, E2, E3, F2	E	0,25	P
CATHARTIFORMES				
Cathartidae				
Coragyps atratus	A1	Ae	0,03	O
ACCIPITRIFORMES				
Accipitridae				
Rupornis magnirostris	A1, D1, D2	A e Ae	0,28	P
GRUIFORMES				
Rallidae				
Aramides cajaneus	C1, C2, C3, D2	E	0,28	P
Mustelirallus albicollis	B2, C1	E	0,53	P
CHARADRIIFORMES				
Charadriidae				
Vanellus chilensis [R]	A1, A3, B2, C1, D1, D3, E2, E3, F1, F2, F3	Ae e E	1	R, C
Jacanidae				
Jacana jacana	C1	E	0,03	O
COLUMBIFORMES				
Columbidae				
Columbina talpacoti	A1, A3, B1, B2, B3, C1, C2, C3, D1, D2, D3, E1, E2, E3, F1, F2, F3	A e E	1	R, C
Columbina squammata [R]	A1, A2, A3, B1, B2, B3, C1, C2, C3, D1, D2, D3, E1, E2, E3, F1, F2, F3	A e E	0,96	R, C
Columbina picui	D1, E1	A	0,07	O
Patagioenas picazuro [R]	A1, A2, A3, B1, B2, B3, C1, C2, C3, D1, D2, E1, E2, E3, F1, F2, F3	A e Ae	1	R, C
CUCULIFORMES				
Cuculidae				
Piaya cayana	A1, A2, B3, D1, D2, F2	A	0,5	P
Crotophaga major	C2	A e Ar	0,07	O
Crotophaga ani [R]	A1, A2, A3, B1, B2, B3, C1, C2, D1, D3, E1, E2, E3, F1, F2, F3	A e E	0,96	R, C
Guira guira [R]	A1, A3, B2, C1, D1, E2, E3, F2	A e E	0,85	R, C
STRIGIFORMES				
Strigidae				
Athene cunicularia	A1, E2, E3, F2	E	0,78	R, C
APODIFORMES				
Trochilidae				
Eupetomena macroura	C1, D1, D3, F2	A e Ae	0,64	R, C
Aphantochroa cirrochloris	D2	C	0,03	O
Amazilia versicolor	D2	A	0,07	O
CORACIIFORMES				
Alcedinidae				
Megaceryle torquata	C1, C2	Aq	0,07	O
Chloroceryle amazona	C1, C2	Aq	0,35	P
Chloroceryle americana	C1, C2	Aq	0,03	O

GALBULIFORMES				
Galbulidae				
Galbula ruficauda	A2, B2, B3, C1, C2, D1, D2, F1	A e Ar	60	R
PICIFORMES				
Ramphastidae				
Ramphastos toco	A1, B1, D2, E2, E3	A e Ae	0,21	P
Picidae				
Picumnus albosquamatus [R]	B3, D1, D2, F1	A	0,17	P
Veniliornis passerinus	C1, C3	A	0,07	O
Colaptes melanochloros	A2, B1, B2, C1, C2, D1, D2, E2	A	0,6	R
Colaptes campestris	A1, E3, F2, F3	A e E	0,42	P
FALCONIFORMES				
Falconidae				
Caracara plancus	A1, A3, B1, B2, C1, D1, D3, E1, E2, E3, F2	Ae	0,82	R, C
Falco sparverius	E3, F1	A	0,1	O
Falco femoralis	A1	A	0,03	O
PSITTACIFORMES				
Psittacidae				
Ara ararauna	A1	Ae	0,03	O
Forpus xanthopterygius [R]	C1, C2, C3, D1, E2, F2, F3	A	0,39	P
Brotogeris chiriri	A1, A3, B2, C1, D1, D3, E2, E3, F1, F2, F3	A e Ae	0,67	R, C
Alipiopsitta xanthops	A1, B2	Ae	0,1	O
Amazona amazonica	C2	Ae	0,03	P
Amazona aestiva	C3	A	0,1	O
PASSERIFORMES				
Thamnophilidae				
Herpsilochmus longirostris	A2, B1, D2	A	0,28	P
Thamnophilus caerulescens	B3, C3, D2	A	0,28	P
Conopophagidae				
Conopophaga lineata	C2, D2	A	0,1	O
Dendrocolaptidae				
Sittasomus griseicapillus	D1	A	0,03	O
Dendrocolaptes platyrostris	F3	A	0,03	O
Furnariidae				
Furnarius rufus [R]	A1, A3, B1, B2, C1, C2, D1, D3, E2, E3, F1, F2, F3	A e E	1	R, C
Clibanornis rectirostris	A2, C1, D2	A e Ar	0,21	P
Syndactyla dimidiata	D2	Ar	0,21	P
Phacellodomus ruber	A1, B2	A	0,07	O
Pipridae				
Antilophia galeata	D2	A	0,07	O
Tityridae				
Pachyramphus polychopterus	C2, D1, D2, F3	A	0,21	P
Rhynchocyclidae				
Leptopogon amaurocephalus	D2	A	0,03	O
Tolmomyias sulphurescens	C1, D2	A e Ar	0,1	O
Todirostrum cinereum	C1, C2, D1, D2, D3, F1, F2	A	0,39	P
Tyrannidae				
Camptostoma obsoletum	B3, C3	A	0,03	O
Elaenia flavogaster	A1, B3, C1, C2, C3, D1, D3, E2, F1, F2	A	0,5	P
Myiarchus ferox	C2	Ar	0,14	O
Pitangus sulphuratus [R]	A1, A3, B1, B2, B3, C1, C2, D1, D2, D3, E1, E2, E3, F1, F2, F3	A	1	R, C
Machetornis rixosa	B2, D1, E2, E3, F2, F3	E	0,25	P
Megarynchus pitangua [R]	A1, A2, B2, C1, C2, D1, D2, E1	A	0,64	R, C
Tyrannus albogularis	F1	Ar	0,03	O

Tyrannus melancholicus	A1, A2, A3, B1, B2, C1, C2, D1, D3, E1, E2, E3, F1, F2, F3	A	0,92	R, C
Tyrannus savana	B2, C1, D1, E2, F2	A e Ae	0,57	P
Empidonomus varius [R]	A1, A3, B2, C1, C2, F2	A	0,32	P
Xolmis cinereus	A3, E2, E3	A	0,25	P
Vireonidae				
Cyclarhis gujanensis [R]	A1, B3, C1, D1, D2, E1, F1, F3	A	0,6	R C
Hirundinidae				
Pygochelidon cyanoleuca	A1, A3, B2, C1, C2, D1, D3, E1, E2, E3, F1, F2, F3	Ae	1	R, C
Stelgidopteryx ruficollis	A1	A	0,03	O
Troglodytidae				
Troglodytes musculus	A1, A2, B1, B2, C2, D1, E1, E3, F2, F3	Ar	0,53	P
Cantorchilus leucotis	A1, A2, B1, B2, B3, C1, C2, C3, D1, D2, E1, F1, F3	A	0,78	R, C
Polioptilidae				
Polioptila dumicola [R]	A1, A3, B1, B2, C1, C2, D1, D3, E2, E3, F1, F2, F3	A	0,67	R
Turdidae				
Turdus leucomelas [R]	A1, A2, A3, B1, B2, B3, C1, C2, C3, D1, D2, D3, E1, F1, F2, F3	A	0,78	R, C
Turdus rufiventris	A1, A2, B1, B2, B3, C1, C3, D1, D2, D3, E1, F1, F2, F3	A e E	0,89	R, C
Turdus amaurochalinus	A1, B1, B3, C1, D2, D3, E1,	A e E	0,46	P
Mimidae				
Mimus saturninus [R]	A1, A2, A3, B1, B2, C1, D1, E2, E3, F1, F2, F3	A e E	0,89	R, C
Motacillidae				
Anthus lutescens [R]	E1, E2, E3, F2	E	0,14	O
Passerellidae				
Zonotrichia capensis [R]	D3, E2	A	0,1	O
Ammodramus humeralis [R]	B2, D1, D3, E1, E2, E3	Ar e E	0,46	P
Arremon flavirostris	C2, D2	E	0,21	P
Parulidae				
Geothlypis aequinoctialis	C2, C3, D1, D2	Ar	0,17	P
Basileuterus culicivorus hypoleucus	D2	A	0,28	P
Myiothlypis leucophrys	D2	A e E	0,28	P
Icteridae				
Molothrus bonariensis [R]	A1, B2, C1, C2, D1, D3, E2, E3, F2	A e E	0,6	R
Sturnella superciliaris	E2	A	0,07	O
Thraupidae				
Tangara sayaca	B2, C1, D1, F1, F2	A e Ar	0,42	P
Tangara palmarum	C1, D1	A	0,07	O
Tangara cayana	D1, D3, F1, F2	A	0,28	P
Sicalis flaveola [R]	A3, B2, E2, E3	E e H	0,21	P
Volatinia jacarina	A1, A3, B2, C1, C2, D1, D3, E1, E2, F1, F2, F3	Ar e H	0,96	R, C
Coryphospingus sp.	C2	A	0,03	O
Tachyphonus rufus	A1, C1	A	0,14	O
Tersina viridis	A1, B2, C2, D1	A	0,25	P
Dacnis cayana	B2, D1	A	0,1	O
Coereba flaveola	A1, B2, C1, C2, D1, D2, D3, E1, F1, F2, F3	A	0,64	R, C
Sporophila nigricollis	A1, A3, B2, C1, C2, D1, D3, E1, E2,	H	0,71	R, C
Sporophila caerulescens	B2, E2	H	0,1	O
Emberizoides herbicola	D1	Ar	0,03	O
Saltator maximus	C1, D1	A	0,1	O
Fringillidae				
Euphonia chlorotica	A1, B1, B3, C1, C2, C3, D1, D2, F1, F2, F3	A	0,53	P
Euphonia violacea [R]	C2, D1, F1	A e Ar	0,14	O
Estrildidae				
Estrilda astrild	B2, D1, E2	H	0,42	P, C