

The Importance of Cusuco's buffer zone management shown by avian diversity

Abstract

Loss of tropical forest and habitat degradation continue to be a major issue in Mesoamerica despite the existence of protected areas. Avian bird counts have been acknowledged to be representative bioindicators for ecosystems and to give information for managerial purposes. The MacKinnon list method has been used to compare the species richness in core and buffer zone of the park, in order to give information of the quality of those habitats and anthropogenic influences. Currently human activities such as deforestation, Illegal hunting and logging as well as unsustainable farming methods increase not only in the buffer zone but also take place in the core of the park. Although the bird counts could not give a clear distinction between habitat quality through abundance of buffer and core zone, the community composition results supported the thesis, that the anthropogenic activities lead to habitat degradation and diminish the core zone more and more. Using these findings I suggest a renewal of the Management plan and a reassignment of responsibilities and tasks between NGOs and the government organisations. Since these problems arise from income practices of buffer zone residents this objective can be achieved by developing an income based on sustainable coffee farming which increases habitat quality and biodiversity.



Picture 1 - Keel-billed Toucan, picture taken by Manuel Loeffler, 2012, Buenos Aires, Honduras.

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Introduction

The Cusuco region in the north west of Honduras has been declared a national park and protected area in 1994 (HRPF, 1994). Back then the Management plan had been conceived but until today it has not been fully implemented. Cusuco's 23,400ha protected area comprises various habitats, mainly cloud forest, over an altitudinal range of 1700m, which is illustrated in the overview map in Figure 1, giving home to 223 different species of birds (Slater, Burdekin & Long, 2011). It is therefore one of many important regions within the Meso-American biodiversity Hotspot (Conservation International, 2012). According to Brooks *et al* there are only 20% of remaining primary habitat in this hotspot region (2002) especially due to continuing demographic growth utilizing inaccessible areas with new infrastructure (Lenkh, 2005). In order

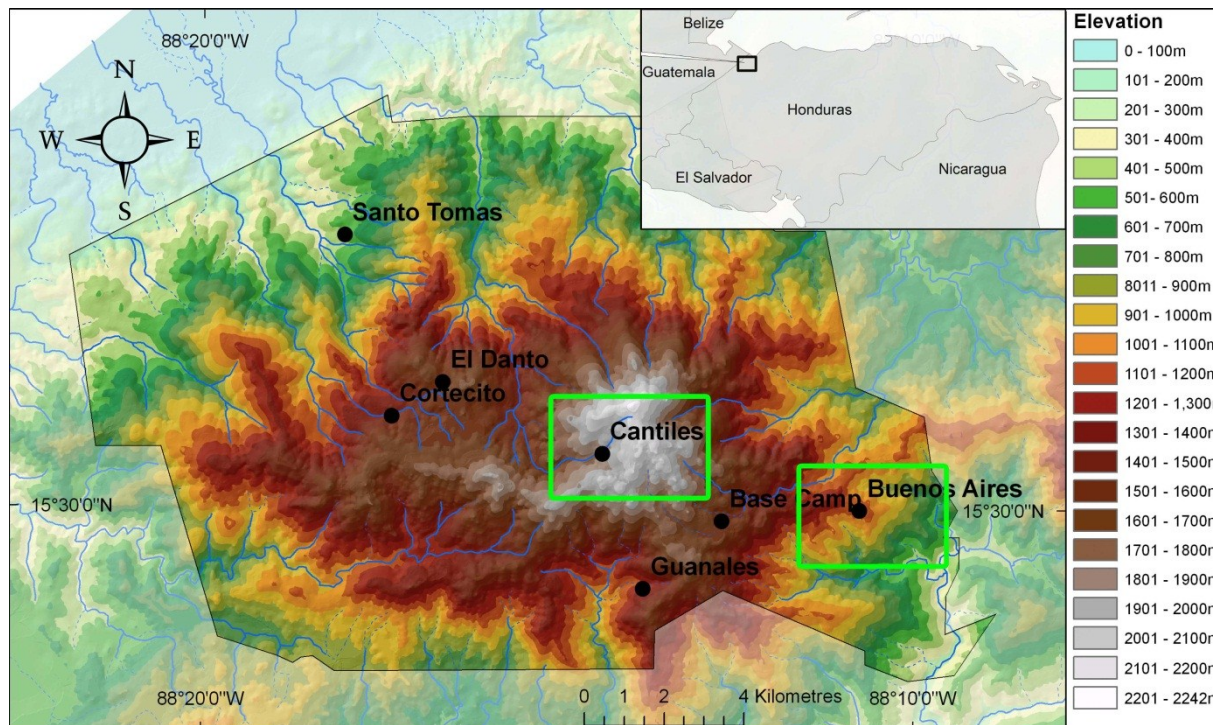


Figure 1 - Map of Cusuco National Park in Honduras. The two green square show the two study sites: Buenos Aires in the buffer zone and Cantiles in the core of the park. Source of edited graph: Cusuco Field report 2011 (Slater, Burdekin & Long, 2011)

to gather data representing this development bioindicators can be used, which are species that reflect the environmental quality of an area (Padoa-Schioppa *et al.*, 2005). Birds are useful bioindicators for several reasons. First of all their ecology is well understood. Secondly the links between habitat and specific communities that have been studied have shown to cover different trophic levels and ecological niches. Finally they can be easily detected which allows quick and cheap data collection (Padoa-Schioppa *et al.*, 2005). The latter applies especially for the inaccessible montane cloud forest of the Cusuco National Park (CNP). Although single species can give vital information, a higher abundance of various species can be considered a sign of healthier ecosystems (Bock & Jones, 2004). Previous studies have shown that the avifauna is richer in the buffer zone, whereas the abundance is higher in the core zone, where especially threatened species find refuge (Martin & Blackburn, 2009). Martin and Blackburn concluded further that the low level of active management of the park would still provide a certain degree of protection in the core of the park (2009). A decline in bird abundance in 2009 (Slater, Burdekin & Long, 2011) as well as a decline in Baird's Tapir population in 2011 however, suggest that increased human activity is impacting diversity and abundance (McCann *et al.*, 2012). This could also mean that the park's division of core and buffer zone has shifted and the core zone is decreased in size. In order to assess this possible shift bird counts using the MacKinnon list method have been undertaken in accordance with habitat analysis around the

buffer zone village of Buenos Aires as well as around the core zone camp of Operation Wallacea at the Cantiles river. These results can then be used to formulate recommendations for the mark management.

Methods

MacKinnon's lists have proved to be a good way of doing rapid bird assessment surveys in the tropics in order to make decisions in conservation management (Herzog, Kessler & Cahill, 2002). Birds are recorded per species in lists of 10 not as individuals. After ten different species have been recorded in one list a new one starts and previously recorded species can be recorded again. This makes up for observer experience, since less experienced observers just take longer to fill one list (Bibby, Jones & Marsden, 1998), but also makes sure that not only social species are recorded. For buffer and core zone 15 lists each have been generated in June 2012, gathered on five morning outings between 5am and 7am with three lists each. The individual points were chosen with an emphasis of six lists in the centre of each study area and with further point counts covering the recommended minimum of 1km² in order to get comparable results (Bibby, Jones & Marsden, 1998). These points were chosen by criteria of accessibility of paths. The exact locations can be seen on the site maps in Appendix A. Additionally species have been recorded during one day all over the site on a 16th list in order to take flocking species into account as well, which are usually underestimated using the MacKinnon method (Bibby, Jones & Marsden, 1998). The bird point counts constituted of field identification, field notes, photography and audio recording. This allowed post-identification to make up for the observer’s lack of experience in the field being unfamiliar with all of Cusuco's species. Therefore even if a bird was unidentifiable it was carried on and re-identified as such and still could be added to the bird abundance curve. The curves were generated by using EstimateS’s Diversity computation and the Cole Rarefaction values for the species accumulation curve (Coleman *et al*, 1982). Since bird populations are heterogeneously distributed and in order to make up for this error Colwell & Coddington suggested that Chao 2 is the most accurate estimator (1994), which was used to create a species richness graph. Furthermore habitat information was taken down during each point count in order to see the relation between community assemblies in different habitats around the park. These consisted of qualitative field notes and photographs for identification.

Results

A total of 127 different species were recorded in both zones during about 25 hours of surveying. In Buenos Aires a distance of 3.5km was covered in between the points over an altitudinal range of 775m-1075m. In total 74 species were recorded, 6 remained unidentified and 14 haven’t been recorded on the Operation Wallacea species list. This still leaves 54 certain identifications of different species. The buffer zone's most common species can be seen in table 1, showing a more even distribution than Cantile’s most common species for example.

Most common species in Buenos Aires

Common name of species	Latin name	Counted
Melodious Blackbird	<i>Dives dives</i>	11
Rusty Sparrow	<i>Aimophila rufescens</i>	8
House Wren	<i>Troglodytes aedon</i>	6
Grace's Warbler	<i>Dendroica graciae</i>	5
Green Jay	<i>Cyanocorax yncas</i>	5

Table 1- Most common species of the bird counts in Buenos Aires (BA)

The habitats predominant in the buffer zone village are built-up areas and grassland within the village as well as cultivated/disturbed land representing plantations and semi-natural

woodlands around. The coffee plantations are undergoing rapid change from shade-grown to sun-grown, using also more fertilizer, which could be confirmed by a socio-economic survey undertaken under the Phd Candidate Krisztina Szalai from Nottingham University. Predominant species within the village and on plantations are fruiting trees such as mango, banana and lime as well as shade trees, often reminders of the natural canopy structure of the forests. On the plantations itself are different local varieties of *coffea arabica*, listed with all the other habitat information in Table 2.

Habitat	Altitude	Count number	Species
J.3.6 and J5 built-up areas with scrubs A2	1000m	1,2,3,4,5,6, 11	Lime, citrus aurantiifolia (Christm.) C. sinensis L. green orange, Banana (Musca spp)
B Grassland	1000m	9, 10	Unidentified shrubs and herbs
J1 Cultivated/ disturbed land, Plantations	900-1000m	7,8	Coffea arabica (Lempira, Catura, Amarillo, Catui, San Ramon), Mango (Magnifera spp.), Banana (Musca spp), Platanos(Musaceae), Guamo (Inga spuria), Madragio, Cestrum diurnum L.,Busera simaraba
A Semi-natural Woodlands	775-900m	13,15	Unidentified broadleaves, ferns, scrubs
G2 Running water	775m	14	(broadleaf forest unidentified ferns and shrubs)

Table 2 - Habitat information for different habitats in the buffer zone area of Buenos Aires

In Cantiles the distance covered between the counts was about 3km on an altitudinal range of 1750m-2000m. Within this area a total of 78 different species was recorded of which 7 couldn't be identified and 28 were identified but were not on the latest Cusuco species list (Operation Wallacea, 2011). This would leave a total of 43 different identified species. 91% of the birds were identified using the audio recordings for call identification. The most common species are listed in table 3 below.

Most common species in Cantiles		
Common name of species	Latin name	Counted
Slate-colored Solitaire	<i>Myadestes unicolor</i>	15
Chestnut-capped Brush-finch	<i>Arremon brunneinucha</i>	14
Violet Sabrewing	<i>Campylopterus hemileucurus</i>	8
Highland Guan	<i>Penelopina nigra</i>	5
Brown Capped Vireo	<i>Vireo leucophrys</i>	3

Table 3 - Most common species of the bird counts in Cantiles (CA)

A high abundance of Slate-colored Solitaires with 15 counts and Chestnut-capped Brush-finches with 14 counts are striking. A total of 85% of the park are mixed with broadleaf trees dominating over pine (HRPF, 1994), which are considered primary forest, therefore natural woodlands Hurricane Mitch in 1998 caused landslides and *Pinus spp.* being pioneering species were the first ones to take up this niche, creating microhabitats. Table 4 gives more information on representative species.

Habitat	Altitude	Count number	species
A1.1.1 Woodlands, natural, Broadleaf predominant	1800-1900m	1,2,3,7,8,10,11,12,13	Quercus cortesii, Podocarpus oleifolius, Clusia massoniana, Hieronyma oblonga, Mollisedia spp., Miconia
A1.2.1 Woodlands, natural, Pine predominant	1850-1950m	4,5,6,14,15	Pinus spp., Liquidamber straciflua, Myrcia splendens, Talauma Mexicana, Toxidodendron striatum, Liquidambar styraciflua
G2 Running water	1750m	9	Pinus spp.

Table 4 - Habitat information for different habitats in core zone around Cantiles

The species accumulation curves of the bird counts are shown in figure 2. There is no significant difference between the species accumulation in Buenos Aires and Cantiles, although the survey in Cantiles recorded four more species. The species richness estimation shown in figure 3 shows that Cantiles has significant higher species richness according to the data collected. If however the data is adjusted, taking species off the record which have never been recorded in Cusuco before, then Buenos Aires shows a higher species richness, which is indicated by the dotted lines in figure 3.

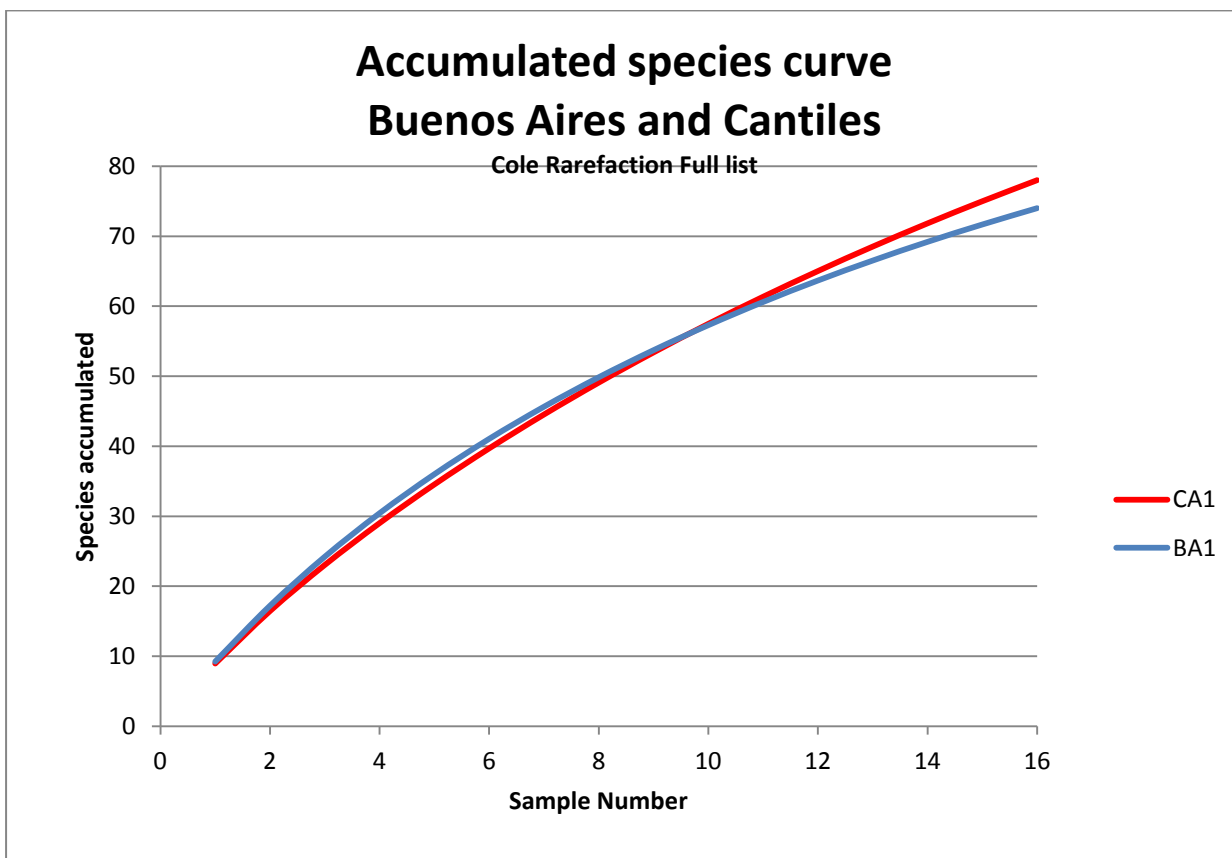


Figure 2 - Species accumulation curve of the bird counts in Buenos Aires (BA) and Cantiles (CA). Cole rarefaction was used as an estimator. The sample numbers are the total of all list graphed against the species accumulation over those randomised samples.

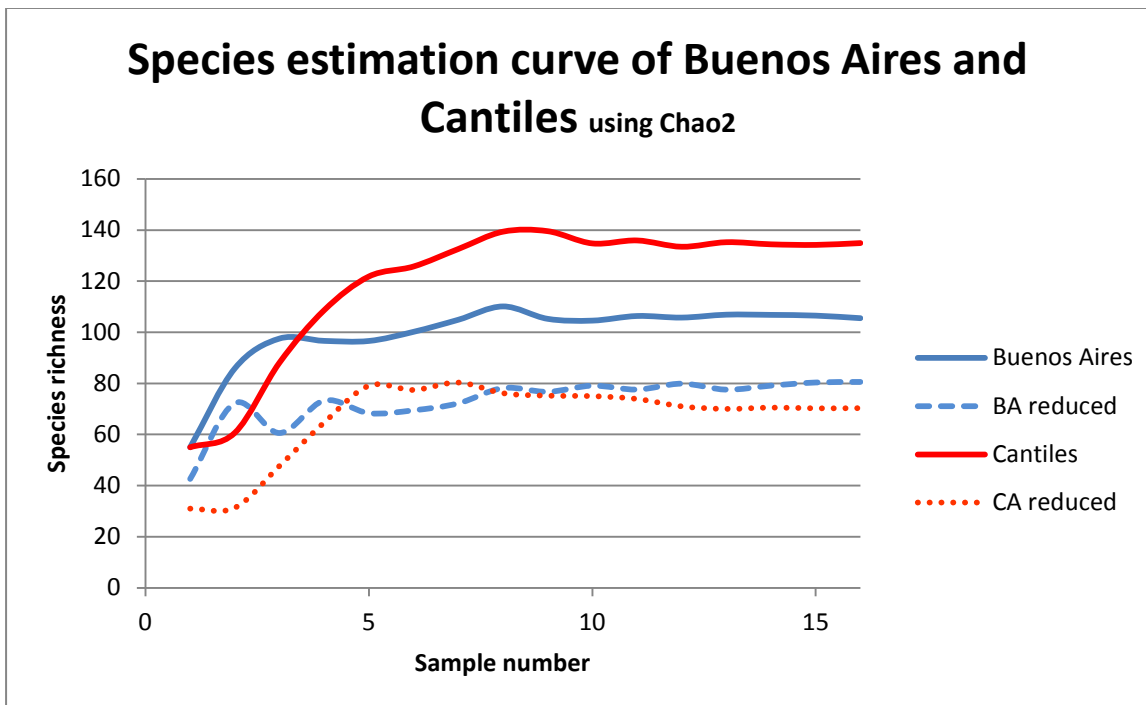


Figure 3 - Species estimation curve of Buenos Aires (BA) and Cantiles (CA) using Chao2. The dotted lines show the species estimation using the certain identified species in each area only.

Discussion

The comparison of the diversity and abundance curves of the two zones does not give certain evidence for the difference in quality of the habitats. And since 91% of the Cantiles species were identified by audio, the adjusted species richness data should be taken into account as well. More bird counts over a longer time would be needed. The species identified and the most common species however can help understand the two ecosystems and their changes better. In Buenos Aires the most abundant birds were generalist, which reflects the diversity of habitats. Melodious Blackbirds for example forage on nectar, seeds, fruits, insects and corn, which they find on lawns, agricultural land as well as open forests (Schulenberg, 2010). The House Wren does especially well in disturbed areas and is likewise Rusty Sparrow and Green Jay widely distributed in Central America (Schulenberg, 2010). In Buenos Aires these food sources were given by Lime, Banana, Mango trees as fruit sources and scrubs as well as Coffea arabica for insectivorous food sources. Buenos Aires, being about 800m lower than Cantiles would be higher on a altitudinal diversity gradient (Ruggiero & Lawton, 1997), so that low number of species here could also be a sign of habitat degradation. On the other hand in Cantiles one of the most common species amongst 14 other hummingbird species



Picture 2 - Picture of newly cleared area in the core zone of the park. Picture taken by Manuel Loeffler, 2012.

during the survey was the Violet Sabre-wing. Warwick found more hummingbirds in edge habitats than in dense forests in his surveys (2007), which would

mean in this context, that there are various edge habitats existing or arising. This could be confirmed by a discovery at the end of transect CA5 in Cantiles, see picture 2, where at GPS position: 16 P 366222 1716742 a clear-cut area could be found in the core of the protected area of the park (McCann, 2012) with high activity of hummingbirds.

Although Highland Guans as a vulnerable species were amongst the most common species in Cantiles, only one Resplendent Quetzal was recorded, whereas in Base Camp outside the two study areas and the surveys several encounters have been made. This speaks for the importance of the core zone as a refuge for rare species as well as a vast habitat. This is especially due to the canopy structure and diversity and abundance of tree species, like *Pinus* spp., *Liquidambar straciflua* and *Quercus cortesii*. And Brown-capped Vireos for example are said to be a third species of *Vireus gilvus* (Rodríguez-Flores, Soberanes-González & Arizmendi, 2010) whereas Slate-colored Solitaire and Chestnut-capped Brush-finch have a very high abundance with over 14 observations each. On the other hand it means that the zones and therefore their relative management techniques do not comply with the zones and the plan conceived in 1994 anymore. If there has been degradation in habitat quality in Buenos Aires, this could be due to increased use of fertilizers and less use of the traditional forest coffee farming methods. This includes keeping different layers of the forest intact by using shade trees, which provide a high variety of food to birds (Perfecto et al, 1996). These practices are in use because the price of coffee has decreased by 25%, comparing the prices at end of the harvest season in march 2011 and march 2012 (ICO, 2012) and the prices farmers get in remote areas are less dependent on quantity than on quality, since middle men bring the crops to the markets and not farmers themselves. Since it has become harder for the families to sustain themselves, illegal logging, hunting and farming in the core zone take place.

Establishing a co-operative in Buenos Aires has failed, so the question is how this development can be ensured. Operation Wallacea and a possible successful REDD+ application (Angelsen *et al*, 2009) could bring further investment in the area, increasing the awareness and livelihood of the buffer zone residents. If invested in a fund this money could be used for the costly transition to organic farming which would lead to a positive feedback loop of increased biodiversity leading to better coffee quality. Once transition to organic methods has taken places, the net gains for the farmers are higher (Perfecto et al, 1996). That omits externalities like the services provided by the park, which is mainly fresh water for the municipality of San Pedro Sula (HRPF, 1994). For this the results of the socio-economic survey in Buenos Aires by Krisztina Szalai should be incorporated. This process could be observed by a successor of the European Union's development program PROCORREDOR, with Germany being the largest importer of Honduran coffee (European Commission, 2010).

Since the transition from Honduras former environmental agency COHDEFOR to the new ICF, *Instituto Nacional de Conservación Forestal*, is slow, an immediate action plan has to be conceived before responsibilities can be redistributed in a new management plan.

Conclusion

Although the survey undertaken was too small to present clear results in the comparison of the avian diversity in Cusuco's buffer zone village of Buenos Aires and the camp Cantiles in the core, it still indicates the increasing anthropogenic pressure on the ecosystem. The results suggest that immediate action has to be taken against the further destruction of the core zone and habitat degradation. Furthermore I suggest more surveys in the buffer zone villages to establish bioindicators for those zones.

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APPENDIX A: Cusuco Buenos Aires and Cantiles overview map

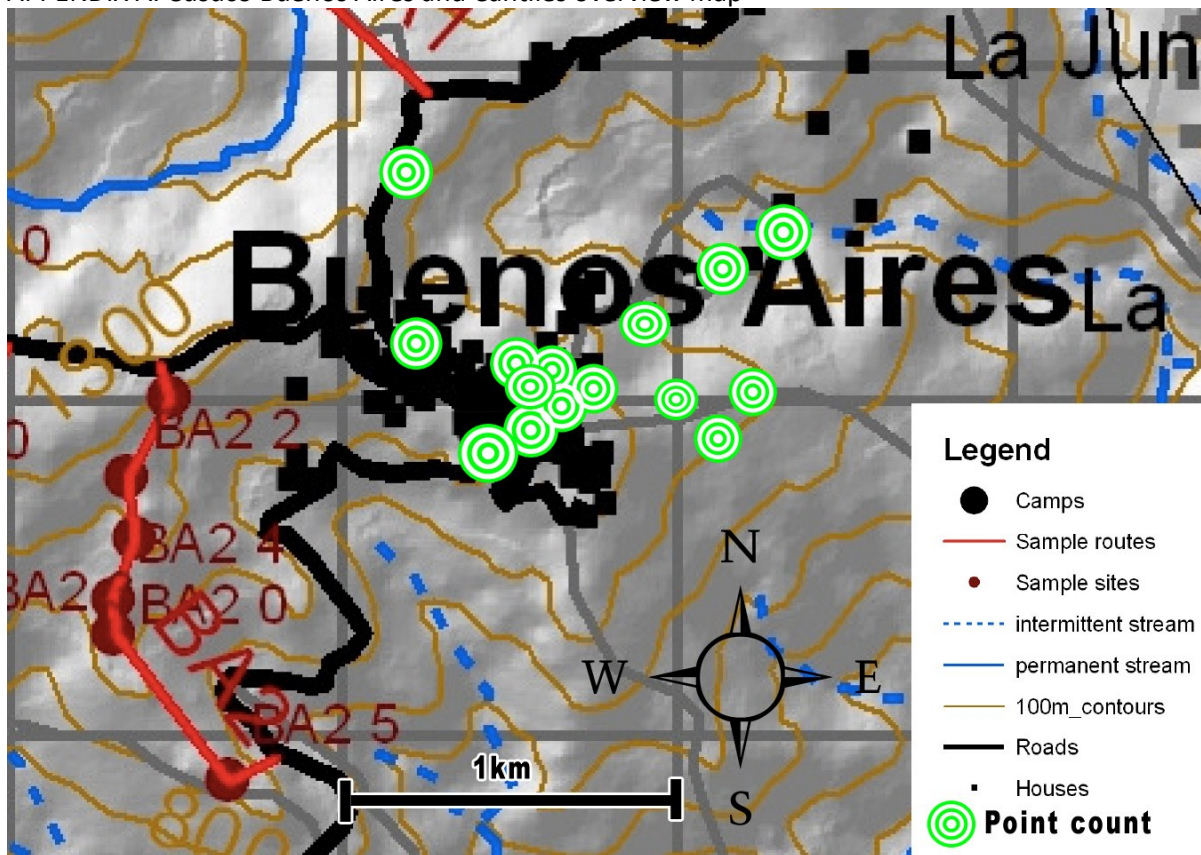


Figure 4 - Overview of the study area in Buenos Aires and where point counts with MacKinnon list have been undertaken. Source of edited map: Cusuco Field report 2011 (Slater, Burdekin & Long, 2011).

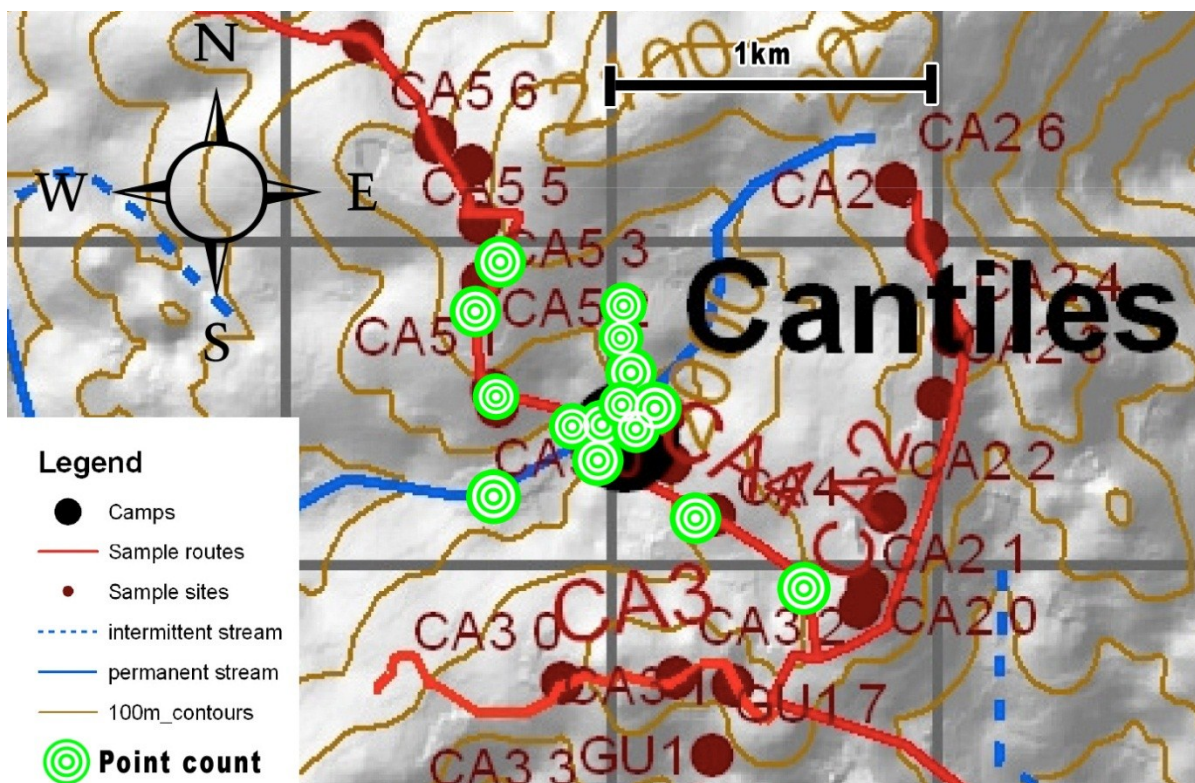


Figure 5 - Overview of the study area in Cantiles and where point counts with MacKinnon list have been undertaken. Source of edited map: Cusuco Field report 2011 (Slater, Burdekin & Long, 2011).

APPENDIX B: 1 - Bird counts field note lists of Buenos Aires

Bird Diversity and Abundance in Buenos Aires		Identified by		Manuel Loeffler	
Way of ID		ML		Manuel Loeffler	
FS	Field Sight				
FC	Field Call				
PP	Post-field with Photo				
PFN	Post-field with Field notebook description				
PC	Post field with recorded call	BA	1144m		
List Number 1	Date	Location	Vegetation	Weather	Time
1	21.06.2012	Buenos Aires, Residential Area, Miguel, looking mainly NE	Lime Tree, Banana, broadleaves, houses, street	Slightly clouded,	5:32am
	Audiofile	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by
	STE-076				
1	Melodious Blackbird			FS	ML
0:14	Clay-coloured Thrush			PC	I
0:35	Rusty Sparrow			FC, FS	ML
2:25	Green Jay			PC	ML
2:50	Ruddy Quail Dove			FC, PC	ML
3:07	Unknown 1		long winding down thirp, twice	PC	ML
4:15	Great-tailed Grackle			PC	ML
7	Green-throated Mountain Gem			FS, PFN	ML
4:20	Blue Black Grosbeak			PC	ML
5:12	Flame-coloured Tanager			PC	ML
List Number 2	Date	Location	Vegetation	Weather	Time
2	21.06.2012	Buenos Aires, Residential Area, Miguel, looking mainly NE	Lime Tree, Banana, broadleaves, houses, street	Slightly clouded,	5:50am
	Audiofile	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by
	STE-078				
1	Blue-black Grassquit			PC	ML
0:05	White-winged Dove			PC	ML
0:05	Green Jay			PC	ML
0:10	Melodious Blackbird			PC	ML
0:20	Unknown 1		wind thirp, twice	PC	ML
0:32	Rusty Sparrow			PC	ML
0:57	Olivaceous Woodpecker			PC	ML
7	Great-tailed Grackle			PFN, PC	ML
2:19	Golden-headed Tanager			PC	ML
3:13	Rufous-collared Robin			PC	ML
List Number 3	Date	Location	Vegetation	Weather	Time
3	21.06.2012	Buenos Aires, Residential Area, Miguel, looking mainly NE	Lime Tree, Banana, broadleaves, houses, street	Slightly clouded,	6:20
	Audiofile	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by
	STE-079				
0:01	House Wren			PC	ML
0:08	Olivaceous Woodcreeper			PC	ML
3	Green Jay			FS	ML
0:50	Rusty Sparrow			PC	ML
1:08	Clay-colored Thrush			PC	ML
6	Ruddy Foilage-Gleaner			PFN	ML
2:17	Pale-vented Pigeon			PC	ML
2:28	Rufous Coloured Robin			PC	ML
4:25	Melodious Blackbird			PC	ML
10	Vaux's Swift			FS	ML
List Number 4	Date	Location	Vegetation	Weather	Time
4	22.06.2012	Buenos Aires, Residential Area, Miguel, looking mainly NE	Lime Tree, Banana, broadleaves, houses, street	Rainy	5:40am
	Audiofile	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by
	STE-080				
0:01	House Wren			PC	ML
0:03	Rusty Sparrow			PC	ML
0:07	Grace's Warbler			PC	ML
0:44	Green Honeycreeper			PC	ML
1:01	Black-throated Jay			PC	ML
1:16	Olivaceous Woodcreeper			PC	ML
1:30	Great-tailed Grackle			FC	ML
2:27	Melodious Blackbird			FS, FC	ML
4:00	Rufous Coloured Robin			PC	ML
5:30	Violet Sabre-wing			PC	ML
List Number 5	Date	Location	Vegetation	Weather	Time
5	22.06.2012	Buenos Aires, Residential Area, Miguel, looking mainly NE	Lime Tree, Banana, broadleaves, houses, street	Rainy	5:50am
	Audiofile	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by
	STE-081				
0:01	Rusty Sparrow			PC	ML
2	House wren			PFN	ML
0:08	Green Jay			PC	ML
0:12	Melodious Blackbird			PC	ML
0:53	Unknown 2		gacker	PC	ML
2:50	Golden-fronted Woodpecker			PC	ML
3:16	Black-headed nightingale Thrush		Sad shriek triple down	PC	ML
5:26	White Winged Dove			PC	ML
6:02	White-throated Hummingbird			PFN, PC	ML
List Number 6	Date	Location	Vegetation	Weather	Time
6	22.06.2012	Buenos Aires, Residential Area, Miguel, looking mainly NE	Lime Tree, Banana, broadleaves, houses, street	Rainy	6:10am
	Audiofile	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by
	STE-081, STE-082				
6:25	Social Flycatcher			PP, PC	I, ML
7:51	Chestnutcapped brush finc		high triller	PC	ML
7:56	White-crowned parrot		squeaky shriek	PC	ML
0:03	Melodious Blackbird			FS	ML
0:11	Unknown 2		shrieky gacker	PC	ML
0:14	Rusty Sparrow			PC	ML
0:45	Unknown 3		Sad shriek triple down	PC	ML
2:00	Grace's warbler			PC	ML
2:20	Unknown 1		long winding down thirp, twice		

List Number 7					List Number 8					List Number 9				
Date	Location	Vegetation	Weather	Time	Date	Location	Vegetation	Weather	Time	Date	Location	Vegetation	Weather	Time
23.06.2012	Buenos Aires, lower, West-slope	Open range, mixed, coffee plantation, scrubs and shade trees, west slope	Previous night: heavy rainstorm, now clear sky	5:35am	23.06.2012	Buenos Aires, lower, South-east-slope	Open range, mixed, coffee plantation, scrubs and shade trees	Previous night: heavy rainstorm, now clear sky	5:50am	23.06.2012	Buenos Aires, lower, next to ecologue - open range to east#	Grasslands, ferns, single trees	Previous night: heavy rainstorm, now clear sky	6:05am
STE-083					STE-084					STE-085				
		Way of ID	Scientific Name or sound descrpt.	Identified by			Way of ID	Scientific Name or sound descrpt.	Identified by			Way of ID	Scientific Name or sound descrpt.	Identified by
0:06	Grey-breasted Woodwren	PC		ML	0:01	Highland Guan	PC		ML	0:01	White Winged dove	PC		ML
0:11	Acorn Woodpecker	PC		ML	0:04	Crested Caracara	PC		ML	0:05	Rufous capped warbler	PC		ML
0:30	Green Jay	PC		ML	0:05	Unknown 1	long winding down thirp	PC	ML	0:22	Lineated Woodpecker	PC		I
0:34	Nightingale Wren	PC		ML	0:10	Melodious Blackbird	PC		ML	0:55	Crested Caracara	PC		ML
0:53	White-throated Hummingbird	PC		ML	0:50	Black-headed saltator	PC		ML	1:12	Highland Guan	PC		ML
1:40	Buff-throated Saltator	PC		ML	1:16	Rusty Sparrow	PC		ML	6	Great-tailed Grackle	FS		ML
1:57	Chestnut Oropendula	FS, PC		ML	1:57	Clay-colored Thrush	PC		ML	2:10	Black-headed saltator	PC		ML
2:45	Barred Parakeet	PC		ML	8	Chestnut-headed Oropendula	PC		ML	2:40	Golden-fronted Woodpecker	PC		ML
3:20	Unknown 1	long winding down thirp, twice		ML	7:08	White-winged Dove	PC		ML	3:33	Grace's Warbler	PC		ML
4:17	White-fronted Parrot	PC		I	10	Common Yellowthroat	PC		ML	10	Great Kiskadee	PFN		ML
24.06.2012	Buenos Aires, Sportsfield	Open range, improved grassland, bushes	clouded, but no rain	5:30am	24.06.2012	Buenos Aires, road to San Pedro, Hamburger stall bend	Street, open range valley steep, coffee, shade trees, bananas	clouded, but no rain	5:40am	24.06.2012	Buenos Aires, road to San Pedro, outside of village, coffee plantations	Coffee, tall trees, shade trees, shrubs, forest on higher hill side	clouded, but no rain	5:50am
STE-086					STE-087, STE-088					STE-089				
		Way of ID	Scientific Name or sound descrpt.	Identified by			Way of ID	Scientific Name or sound descrpt.	Identified by			Way of ID	Scientific Name or sound descrpt.	Identified by
0:01	Black-headed Nightingale Thrush	PC		ML	1	Great Kiskadee	FS		ML	0:04	White-breasted Wood-wreath	PC		ML
0:02	Melodious Blackbird	PC		ML	2	Chestnut Oropendula	FS		ML	0:05	Grace's Warbler	PC		ML
0:08	Summer Tanager	PC		ML	3	White-winged Tanager	FS		ML	0:16	Rusty Sparrow	PC		ML
0:20	American Redstart	PC		ML	0:02	House Wren	PC		ML	0:21	Golden-fronted Woodpecker	PC		ML
0:39	Unknown 1	high call several		ML	0:05	Chestnut capped brush finch	flight, high soft trill	PC	ML	0:52	Grey-breasted wood wren	PC		ML
0:45	band-tailed barbthroat	long winding down thirp, twice		ML	0:22	Unknown 4	high squeaky bark se	PC	ML	1:09	Black Thrush	PC		ML
1:20	Unknown 4	high triller		ML	0:05	Melodious Blackbird	PC		ML	1:23	Band-tailed barbthroat	PC		ML
2:30	Plain Wren	high squeaky bark se		ML	0:30	Unknown 5	shrike ratsch wind	PC	ML	2:57	blue-throated golden tail	PC		ML
2:35	Unknown 6	several melo barks		ML	1:32	White-breasted Wood wren	PC		ML	4:40	sulphur bellied flycatcher	PC		ML
10	House Wren	PC		ML	10	Swallow-tailed kite	PC		ML	5:16	Plain wren	PC		ML
PFN					2									
25.06.2012	Buenos Aires, path down to CeFrada stream, forests, scrubs, path, bleo coffee plantations	Clear, dry		5:17am	25.06.2012	Buenos Aires, down at CeFrada stream	broadeaf forest, dense ground coverage with ferns and scrubs	clear, dry	5:45am	25.06.2012	Buenos Aires, path down to CeFrada stream, open range	tall scrubs, shade trees, coffee	clear, dry	6:17am
STE-090 & STE-091					STE-092 & STE-093				STE-094					
		Way of ID	Scientific Name or sound descrpt.	Identified by			Way of ID	Scientific Name or sound descrpt.	Identified by			Way of ID	Scientific Name or sound descrpt.	Identified by
0:01	Brown Jay	PC	kraechz, brighter	ML	0:01	Blue-crowned Mot Mot	hu hu owl sound	PC, PC	ML	0:05	Sulphur rumped flycatcher	single short chirp	PC	ML
0:07	Grey-crowned motmot	PC	hu-hu owl sound	ML	0:03	Grey-breasted Wood-wren	melody thirp	PC	ML	0:11	Short billed pidgeon	single short owl	PC	ML
0:54	Grey-breasted Wood-wren	PC	melody thirp	ML	0:08	Cinnamon Hummingbird	PC		ML	0:14	Cinnamon Hummingbird	high thirp	PC	ML
1:21	Ruddy Quail dove	long owl sound d deep		ML	4	Long-tailed Hermit	PC, PFN		ML	0:20	Unknown 1	long winding down thirp	PC	ML
2:37	Nightingale Wren	S - " high thirp"		ML	2:25	White-crowned parrot	high thirp	PC	ML	0:48	Chestnut collared swift	high windin	PC	ML
6	Yellow-winged Cacique	PC		ML	3:11	Olivaceous Woodcreeper	high pitch shriek thirp	PC	ML	1:08	Melodious Blackbird	PC		ML
0:02	Melodious Blackbird	PFN	pitchy, mel thirpo	ML	0:01	Wine-throated Hummingbird	winding ratter	PC, PP	ML	3:18	White-crowned parrot	shriek stuff	PC	ML
0:24	Violet Sabre Wing	PC	fast thirp with stops	ML	0:11	Grace's Warbler	zwitscher	PC	ML	8	Blue-black Grassquit	PC		ML
0:30	Olive-throated Parakeet	PC	shrieky squats	ML	0:44	Ruddy-quail dove	owl sound	PC	ML	3:40	White-breasted woodwren	pitchy	PC	ML
1:57	Plain Wren	PC	pitchy winding up se	ML	10	Chestnut capped warbler		PFN	ML	10	Black-crowned oriole		PC	ML

List Number	17				Total Time spent	min	s
Date	21.06.2012					1	5
Location	Buenos Aires, Residential Area, Miguel, looking mainly NE					2	3
Vegetation	Lime Tree, Banana, broadleafs, houses, street					3	4
Weather	Slightly clouded,					4	5
Time	Daylist					5	6
Audiofile	Visual					6	3
	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by		7	4
						8	7
1	Yellow-winged Tanager		PP	I		9	3
2	Sulphur-bellied Flycatcher		PP	ML		10	2
3	Clay-colored Thrush		PP	ML		11	1
4	Aztec Parakeet		PP	I		12	5
5	Turkey Vulture		FS	ML		13	4
6	Black Vulture		FS	ML		14	3
7	Swallow-tail kite		PP	ML		15	3
8	White-winged Tanager		PP	ML	Total		58
9	Brown Jay		PFN	ML	Total		64
10	Toucan		PFN	ML			43

APPENDIX B: 2 - Bird counts field note lists of Cantiles

Way of ID	Field Sight	Field Call	Post-field with Photo	Post-field with Field notebook description	Post-field with recorded call	24	Identified by	Way of ID	Field Sight	Field Call	Post-field with Photo	Post-field with Field notebook description	Post-field with recorded call																			
FS	Field Sight						Manuel Loeffler lan																									
FC	Field Call						Niall McCann																									
PP	Post-field with Photo																															
PFN	Post-field with Field notebook description																															
PC	Post-field with recorded call																															
List Number 1	Date	Location	Vegetation	Weather	Time	Audiofile	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by	List Number 2	Date	Location	Vegetation	Weather	Time	Audiofile	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by	List Number 3	Date	Location	Vegetation	Weather	Time	Audiofile	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by
0:00	28.06.2012	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	5:35am	STE-097	Highland Guan	<i>winding up call</i>	FC	ML	28.06.2012	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	5:48am	STE-098	Chestnut-capped Brushfinch		PC	ML	28.06.2012	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	6:02am	STE-098	Slate-colored Solitaire		PC	ML		
0:03	15.513328						Yellowish Flycatcher	<i>single note</i>	PC	I	0:01	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	5:48am	STE-098	Slate-colored Solitaire		PC	ML	0:05	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	6:02am	STE-098	Slate-colored Solitaire		PC	ML		
0:10							Chestnut-capped Brushfinch	<i>pei zwitscher</i>	PFN	ML	0:06	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	5:48am	STE-098	Slate-colored Solitaire		PC	ML	0:10	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	6:02am	STE-098	Slate-colored Solitaire		PC	ML		
0:13							Slate-colored Solitaire	<i>melody, pitch metallic</i>	PC	ML	0:37	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	5:48am	STE-098	Slate-colored Solitaire		PC	ML	0:32	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	6:02am	STE-098	White-throated Hummingbird	high frepsy thirps	PC	ML		
0:14							Ruddy-Foliage Gleaner	<i>squeaky wind</i>	PC	I	0:58	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	5:48am	STE-098	Unknown B		PC	ML	1:24	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	6:02am	STE-098	Unknown A	winding up melody	PC	ML		
0:42							Slate-throated Redstart		PC	I	1:16	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	5:48am	STE-098	Unknown A	winding wheeep	PC	ML	2:20	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	6:02am	STE-098	Plain wren	zipy thirps	PC	ML		
1:34							Unknown A	<i>winding up call</i>	PC	ML	2:01	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	5:48am	STE-098	Ruddy Foliage Cleaner		PC	ML	3:44	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	6:02am	STE-098	Chestnut-capped Brushfinch	chaotic melody	PC	ML		
2:10							Streak-headed Woodcreeper	<i>Winding Shrrrr</i>	PC	ML	1:52	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	5:48am	STE-098	Highland Guan		PC	I	4:14	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	6:02am	STE-098	Brown-capped Vireo	single thirp high	PC	ML		
9							Black-headed Nightingale-thrus	<i>winding squiiiiir</i>	PC	ML	3:05	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	5:48am	STE-098	Bush Tanager		PC	ML	4:54	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	6:02am	STE-098	Green Honeycreeper	single thirp high	PC	ML		
2:28							Spectacled Foliage Gleaner	<i>squeaky toy</i>	PC	I	4:40	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	5:48am	STE-098	violet Sabrewing		PC	ML	4:58	Cantiles, Camp, up on the hill	cloud forest, very tall broadleaves, canopy	rain during previous night, clouded	6:02am	STE-098	Tawny crowned Greenlet	single thirp/call	PC	ML		
List Number 4	Date	Location	Vegetation	Weather	Time	Audiofile	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by	List Number 5	Date	Location	Vegetation	Weather	Time	Audiofile	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by	List Number 6	Date	Location	Vegetation	Weather	Time	Audiofile	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by
0:00	29.06.2012	Cantile T5, 200m,	clouded sky, damp		5:43am	STE-100	Crested chested Warbler	winding ratsch	PC	ML	29.06.2012	Cantiles T5, 550m	Open Range to East, Pines	clouded sky, damp	6:00am	STE-101	Chestnut capped brush finch		PC	ML	0:04	Cantiles T5, 750m	Canopy forest	clouded sky, damp, windy	6:20am	STE-102	Chestnut capped brush finch	hollow high thirps	PC	ML		
0:03							Long-billed Gnatwren	winding triller down	PC	ML	0:01	Cantiles T5, 550m	Open Range to East, Pines	clouded sky, damp	6:00am	STE-101	Unknown A	winding up	PC	ML	0:10	Cantiles T5, 750m	Canopy forest	clouded sky, damp, windy	6:20am	STE-102	Slate-colored Solitaire	owl sound	PC	ML		
0:17							Nightingale Wren	winding whistl mel	PC	ML	0:05	Cantiles T5, 550m	Open Range to East, Pines	clouded sky, damp	6:00am	STE-101	Slate-colored Solitaire		PC	ML	0:19	Cantiles T5, 750m	Canopy forest	clouded sky, damp, windy	6:20am	STE-102	Grey chested dove	regular thirps	PC	ML		
0:20							Magnificent Hummingbird	whip whip whip	PC, PFN	ML	0:14	Cantiles T5, 550m	Open Range to East, Pines	clouded sky, damp	6:00am	STE-101	Brown-capped Vireo	4x thirp	PC	ML	0:22	Cantiles T5, 750m	Canopy forest	clouded sky, damp, windy	6:20am	STE-102	Violet Sabrewing	regular thirps	PC	ML		
0:38							Violet Sabrewing	chip-chap	PC	ML	0:25	Cantiles T5, 550m	Open Range to East, Pines	clouded sky, damp	6:00am	STE-101	grey chested dove	owl haul	PC	ML	0:36	Cantiles T5, 750m	Canopy forest	clouded sky, damp, windy	6:20am	STE-102	Common Bush Tanager	winding up	PC	ML		
0:50							Crowned Woodnymph	tchi tchi high	PC	ML	0:44	Cantiles T5, 550m	Open Range to East, Pines	clouded sky, damp	6:00am	STE-101	Garnet throated hummingbird	high laser thirps	PC	ML	1:02	Cantiles T5, 750m	Canopy forest	clouded sky, damp, windy	6:20am	STE-102	Unknown A	winding up	PC	ML		
1:28							Slate-colored Solitaire	meldoy triller	PC	ML	1:14	Cantiles T5, 550m	Open Range to East, Pines	clouded sky, damp	6:00am	STE-101	Resplendent Quetzal	Call	PC	ML	1:28	Cantiles T5, 750m	Canopy forest	clouded sky, damp, windy	6:20am	STE-102	Plain Wren	5x thirps melo	PC	ML		
2:30							Emerald Toucanet	single squeak	PC	ML	1:31	Cantiles T5, 550m	Open Range to East, Pines	clouded sky, damp	6:00am	STE-101	Golden-fronted Woodpecker	Call	PC	ML	2:04	Cantiles T5, 750m	Canopy forest	clouded sky, damp, windy	6:20am	STE-102	Blue-throated Sapphire	very high fast thirp	PC	ML		
2:40							Unknown A	winding thirp high lo	PC	ML	2:19	Cantiles T5, 550m	Open Range to East, Pines	clouded sky, damp	6:00am	STE-101	Plain Wren	melody triller	PC	ML	3:06	Cantiles T5, 750m	Canopy forest	clouded sky, damp, windy	6:20am	STE-102	Unknown C	"hick-up" thirp	PC	ML		
3:32							Chestnut capped brush finch		PC	ML	2:33	Cantiles T5, 550m	Open Range to East, Pines	clouded sky, damp	6:00am	STE-101	Ochre bellied flycatcher	squeaky barks	PC	ML	3:45	Cantiles T5, 750m	Canopy forest	clouded sky, damp, windy	6:20am	STE-102	Highland Guan	gacker	PC	ML		

List Number 7	Date 30.06.2012	Location Cantiles, Transect 4, 550m broadleaf forest, with open range	Vegetation slightly clear	Weather 5:25am	Audiofile STE-103	Species Common Name 0:00 Flame-colored Tanager 0:03 Highland Guan 0:08 Slate-colored Solitaire 0:15 Chestnut-capped brush finch 0:20 Brown capped Vireo 1:40 Rufous-capped warbler 2:49 ochre bellied flycatcher 3:20 Violet Sabrewing 4:30 Green Shrike Vireo	Way of ID PC PC PC PC PC PC PC PC PC	Identified ML ML ML ML ML ML ML ML	1900m	List Number 8	Date 30.06.2012	Location Cantiles, Transect 4, 860m closed canopy forest, broadleaf around path	Vegetation slightly clear	Weather 5:50am	Audiofile STE-104	Species Common Name 0:05 Slate colored solitaire 0:10 Chestnut-capped brush finch 0:17 Blue backed grassquit 0:19 Flame-colored Tanager 0:45 Chestnut capped warbler 1:40 Nightingale Wren 1:55 Collared Trogon 2:00 Common Tanager 2:26 Unknown D 3:44 Unknown E	Way of ID PC PC PC PC PC PC PC PC PC	Identified ML ML ML ML ML ML ML ML	1950m	List Number 9	Date 30.06.2012	Location Cantiles, off T4, Cantiles River, about 250m River, pines, steep valley, lots of raffie	Vegetation slightly clear	Weather 6:30am	Audiofile STE-105	Species Common Name 0:10 Chestnut-capped brush finch 0:17 Rufous winged tanager 0:25 Chestnut-capped warbler 0:30 Blue-crowned Mot Mot 1:39 ruddy capped Nightingale Thrush 2:34 Ruddy Quail dove 3:17 Cinnamon Hummingbird 4:10 Unknown F 4:28 Unknown G	Way of ID PC PC PC PC PC PC PC PC	Identified ML ML ML ML ML ML ML ML	1800m
List Number 10	Date 02.07.2012	Location Cantiles, beginning of T4, 110m dense forest, around path, broadleaf mainly	Vegetation dense forest, around path, broadleaf mainly clouded and windy	Weather 5:45am	Audiofile STE-106	Species Common Name 0:01 Violet Sabrewing 0:05 Chestnut-capped brush finch 0:15 Lesser Swallow-tailed Swift 0:20 Slate-colored Solitaire 0:36 Orange-fronted Parakeet 1:16 Streak backed oriole 1:18 Tropical Gnatcatcher 2:15 Grae's Warbler 2:28 Black Banded woodcreeper 4:05 Dusky capped Flycatcher	Way of ID PC PC PC PC PC PC PC PC PC	Identified ML ML ML ML ML ML ML ML	1825m	List Number 11	Date 02.07.2012	Location Cantiles, camp trench, burning toilet paper close to river, broadleaf trees, scrubs, bamboo, ferns	Vegetation clouded and windy	Weather 6:15am	Audiofile STE-107	Species Common Name 0:05 Slate-colored Solitaire 0:10 Chestnut capped warbler 0:13 Chestnut capped brush finch 0:25 Banded Woodcreeper 0:30 Ochre-bellied Flycatcher 1:14 Emerald Chinned hummingbird 2:28 Yellowish Flycatcher 2:42 Yellow-olive Flycatcher 4:47 Unknown G 5:19 Buff-rumped warbler	Way of ID PC PC PC PC PC PC PC PC	Identified ML ML ML ML ML ML ML ML	1810m	List Number 12	Date 02.07.2012	Location Cantiles, camp site Fire broadleaf trees, scrubs, bamboo, ferns, tents	Vegetation clouded and windy	Weather 6:35am	Audiofile STE-108	Species Common Name 0:01 Blue-crowned Chlorophoni 0:02 Chestnut-capped brush-fin 0:05 Slate-colored Solitaire 0:17 Emerald Chinned hummingbird 0:49 Unknown A 0:50 Unknown G 2:00 Buff-rumped warbler 2:45 Rufous-winged Tanager 4:03 Golden-fronted Woodpecker 5:38 Black-eared wood quail	Way of ID PC PC PC PC PC PC PC PC	Identified ML ML ML ML ML ML ML ML	1828m
List Number 13	Date 03.07.2012	Location Cantiles, beginning Transect 1 broadleaf forest, dense and steep under canopy	Vegetation damp	Weather 5:50am	Audiofile STE-111	Species Common Name 0:00 Highland Guan 0:02 Ruddy Foliage Gleaner 0:03 Violet Sabre Wind 0:05 Slate-colored solitaire 0:40 Unknown B 1:10 brown-backed solitaire 1:46 Blue-gray tanager 2:02 Black Banded woodcreeper 2:40 Buff-rumped warbler 3:10 White-faced quail dove	Way of ID PC PC PC PC PC PC PC PC PC	Identified ML ML ML ML ML ML ML ML	1835m	List Number 14	Date 03.07.2012	Location Cantiles, T1, ca. 250m predominant pine, scrubs, pine litter on ground 5cm	Vegetation damp	Weather 6:06am	Audiofile STE-112	Species Common Name 0:06 Slate-colored solitaire 0:16 Brown-crested Flycatcher 0:18 Chestnut capped brush finch 0:31 Unknown Y 5 Green-throated Mountain Gem 0:37 Banded Woodcreeper 0:41 Unknown A 1:32 Azure-crowned Hummingbird 3:35 Buff-rumped warbler 5:34 White-faced quail dove	Way of ID PC PC PC PC PC PC PC PC	Identified ML ML ML ML ML ML ML ML	1880m	List Number 15	Date 03.07.2012	Location Cantiles, T1, ca. 450m, south side valley glade dense pine, ferns, small glade, broadleaves, scrubs	Vegetation damp	Weather 6:23am	Audiofile STE-113 & STE-114	Species Common Name 0:01 Violet Sabre-Wing 0:04 Slate-colored solitaire 0:06 Yellow-throated brush finch 0:10 Chestnut-capped brush finch 0:18 Azure crowned Humminbird 0:28 Unknown A 0:30 Chestnut-colored woodpecker 1:10 Band tailed barb throat 4:05 Black-headed Nightingale 5:04 Grey breasted wood wren	Way of ID PC PC PC PC PC PC PC PC	Identified ML ML ML ML ML ML ML ML	1920m

List Number	16					Total Time spent	min	s
Date						1	2	26
Location						2	4	40
Vegetation						3	4	58
Weather						4	3	32
Time	day					5	2	33
Audiofile	Visual					6	3	45
	Species Common Name	Scientific Name or sound descript.	Way of ID	Identified by		7	4	30
						8	3	44
1	Green throated Mountain Gem		FS	ML		9	4	28
2	Green-Violet-ear		FS	ML		10	4	5
3	Painted Redstart		PP	ML		11	5	19
4	Eye-ringed Flatbill		PP	ML		12	5	38
5	Greenish Elaenig		PP	ML		13	3	10
6	Ruddy Woodcreeper		PP	ML		14	5	34
7	Collared Trogon		FS	NM		15	5	4
8	American Robin		PP	ML				
9	Chestnut-capped Warbler		PP	ML		Total	56	446
10	Slaty Antwren		FS	ML, NM		Total	63	26

APPENDIX C: 1 – Buenos Aires species list, formatted for Estimates

Species	No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Acorn Woodpecker	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Redstart	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aztec Parakeet	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Band-tailed barbtthroat	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Barred Parakeet	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Black-cowled oriole	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Black-headed Nightingale thrush	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Black Thrush	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Black-throated Jay	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black Vulture	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black-headed saltator	2	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Blue Black Grosbeak	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blue-throated Golden Tail	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blue-black Grassquit	2	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Blue-crowned Mot Mot	2	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Brown Jay	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Buff-throated Saltator	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chestnut-capped Warbler	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chestnut-collared Swift	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chestnut-headed Oropendula	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chestnut-capped Brush-finch	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cinnamon Hummingbird	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clay-colored Thrush	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Common Yellowthroat	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crested Caracara	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flame-coloured Tanager	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Golden-fronted woodpecker	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Golden-hooded Tanager	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grace's Warbler	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Kiskadee	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great-tailed Grackle	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green Honeycreeper	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green Jay	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green-throated Mountain Gem	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray-breasted wood wren	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Highland Guan	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
House Wren	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lineated Woodpecker	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long-tailed Hermit	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melodious Blackbird	11	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Nightingale-Wren	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Melanerpes formicivorus</i>																	
<i>Setophaga ruticilla</i>																	
<i>Aratinga aztec</i>																	
<i>Threnetes ruckeri</i>																	
<i>Bolborhynchus lineola</i>																	
<i>Icterus prothemelas</i>																	
<i>Catharus mexicanus</i>																	
<i>Turdus infuscatus</i>																	
<i>Cyanolyca pumilo</i>																	
<i>Coragyps atratus</i>																	
<i>Salpator atriceps</i>																	
<i>Cyanocampa cyanooides</i>																	
<i>Hylocharis eliciae</i>																	
<i>Volatinia jacarina</i>																	
<i>Momotus momota</i>																	
<i>Cyanocorax morio</i>																	
<i>Salpator maximus</i>																	
<i>Basileuterus delatitri</i>																	
<i>Streptoprocne rutilla</i>																	
<i>Psarocolius wagleri</i>																	
<i>Arremon brunneinucha</i>																	
<i>Amazilia rutila</i>																	
<i>Turdus grayi</i>																	
<i>Geothlypis trichas</i>																	
<i>Caracara cheriway</i>																	
<i>Piranga bidentata</i>																	
<i>Melanerpes aurifrons</i>																	
<i>Tangara larvata</i>																	
<i>Dendroica graciae</i>																	
<i>Pitangus sulphuratus</i>																	
<i>Quiscalus mexicanus</i>																	
<i>Chlorophanes spiza</i>																	
<i>Cyanocorax yncas</i>																	
<i>Lampornis viridipallens</i>																	
<i>Henicorhina leucophrys</i>																	
<i>Penelopina nigra</i>																	
<i>Troglodytes aedon</i>																	
<i>Dryocopus lineatus</i>																	
<i>Phaethornis superciliosus</i>																	
<i>Dives dives</i>																	
<i>Microcerulus philomela</i>																	

Species	No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
American Robin	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Azule crowned Humminbird	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Band-tailed barbthroat	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Barred Woodcreeper	2	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
Black Banded woodcreeper	2	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Black-eared wood quail	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Black-headed Nightingale thrush	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Blue Black grassquit	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Blue-crowned Chlorophonia	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Blue-crowned Mot Mot	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Blue-gray tanager	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Blue-throated Sapphire	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Brown Capped Vireo	3	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0
Brown-backed Solitaire	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Brown-crested Flycatcher	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buff-rumped Warbler	4	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
Common Bush Tanager	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chestnut capped brush finch	14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Chestnut-colored woodpecker	4	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1
Cinnamon Hummingbird	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Collared Trogon	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Common Bush Tanager	2	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
Crescent-chested Warbler	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
Crowned Woodnymph	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Dusky capped Flycatcher	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Emerald Chinned hummingbird	2	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Emerald Toucanet	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Eye-ringed Flatbill	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Flame-colored Tanager	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Garnet-throated Hummingbird	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Golden-fronted Woodpecker	2	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
Grace's Warbler	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Green Honeycreeper	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Green Shrike Vireo	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Green throated Mountain Gem	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Greenish Elaenia	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Green-Violet-ear	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gray-breasted Wood-Wren	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gray-chested Dove	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Highland Guan	5	1	1	0	0	0	1	1	0	0	0	0	0	1	0	0	0
<i>Turdus migratorius</i>																	
<i>Amazilia cyanocephala</i>																	
<i>Threnetes ruckeri</i>																	
<i>Dendrocolaptes certhia</i>																	
<i>Dendrocolaptes picumnus</i>																	
<i>Odontophorus melanotis</i>																	
<i>Catharus mexicanus</i>																	
<i>Volatinia jacarina</i>																	
<i>Chlorophonia occipitalis</i>																	
<i>Momotus momota</i>																	
<i>Thraupis episcopus</i>																	
<i>Hylacharis eliciae</i>																	
<i>Vireo leucophrys</i>																	
<i>Miyadestes occidentalis</i>																	
<i>Myiarchus tyrannulus</i>																	
<i>Phaethlypis fulvicauda</i>																	
<i>Chlorospingus flavospectus</i>																	
<i>Arremon brunneiucha</i>																	
<i>Basilæuterus delatitri</i>																	
<i>Celeus castaneus</i>																	
<i>Amazilia rutila</i>																	
<i>Trogon collaris</i>																	
<i>Chlorospingus ophthalmicus</i>																	
<i>Oreothlypis superciliosa</i>																	
<i>Thalurania spp.</i>																	
<i>Myiarchus tuberculifer</i>																	
<i>Abeilla abeillei</i>																	
<i>Aulacorhynchus prasinus</i>																	
<i>Rhynchocyclus brevirostris</i>																	
<i>Piranga bidentata</i>																	
<i>Lamprolaima rhami</i>																	
<i>Melanerpes aurifrons</i>																	
<i>Dendroica graciae</i>																	
<i>Chlorophanes spiza</i>																	
<i>Vireolanus pulchellus</i>																	
<i>Lampornis viridipallens</i>																	
<i>Myiopagis viridicata</i>																	
<i>Colibri thalassinus</i>																	
<i>Henicorhina leucophrys</i>																	
<i>Leptotila cassini</i>																	
<i>Penelopina nigra</i>																	

