The Effect of Deforestation on the Toucan Barbet (*Semnornis ramphastinus*) in Ecuador's Andean Cloud Forest

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Abstract:

Deforestation has influenced bird species in numerous ways, including declining population size, shifting migration patterns, and changing habitat locations. I researched how has the density of the Toucan Barbet (*Semnornis ramphastinus*) changed due to deforestation in the Ecuadorian Andes cloud forest. All research and case studies used were taken from parts of the Choco cloud forest in the Andean mountain range of Ecuador. I collected data on the Santa Lucia Reserve in Ecuador for the Earthwatch program over a period of ten days. Toucan Barbets appeared to have better adapted to the deforestation than most birds, having an increasing density in the silvapasture areas than the primary and secondary forest. Their population seems to be stable in comparison to most bird species which are on the decline. I concluded that several characteristics of the frugivorous Toucan Barbets make them more tolerant of open forest created through deforestation.

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Problem Question:

How has the density of the Toucan Barbet (*Semnornis ramphastinus*) changed due to deforestation in the Ecuadorian Andes cloud forest?

Introduction:

The Ecuadorian Andes are home to a variety of endemic species, including the Toucan Barbet. In recent years, parts of their fragile habitat have been cut down for multiple reasons, including farming, livestock grazing ground, and mining. These forests, which make Ecuador the 8th most biodiverse country in the world, have the highest deforestation rates in the world (Peck). Oil exploration, logging, and road construction have had detrimental effects on the ecosystem and made the country notorious for having the worst environmental policy in the world (Peck). In an attempt to preserve the cloud forest, the Ecuadorian government and locals have attempted to reforest some areas of the forest. In this investigation, I explored how different types of forests affected the bird density of the Toucan Barbet.

The Toucan Barbet is an important species to examine because its population is thought to be declining moderately rapidly predominately because of habitat destruction, causing less suitable feeding grounds for the Toucan Barbets (Benstead). It is assumed that deforestation has also caused loss in nesting ground for Toucan Barbets as it has done for most avifaunal populations, though no significant research to support this has been completed (Sodhi et al.). Toucan Barbets are considered a Near Threatened species, a term assigned to species that may be considered as threatened with extinction in the near future. Uncontrolled logging and clear cutting for pasture land has degraded over 40% of the bird's natural habitat in Andes forests (Benstead). There was a worldwide population of 73,000 "abundant" Toucan Barbets in the 1980's, but this number is

considered to have drastically decreased and the bird is now described as “very uncommon” (Benstead). Data quality covering the extent of population loss is considered poor, so specific numbers are not known (Benstead). Further investigating how these types of forest could aid in recovering the Toucan Barbet population is vital to recovering the devastating effects that humans have had on the species as well as producing information on how other declining species may be further aided.

Manipulated Variable:

The Ecuadorian Andes are crowned with 6,310 meter peaks which separate the lowlands of the western coast area from the eastern Amazon basin (Short). While Ecuador only covers 1.6% of South America, the moist cloud forests makes up 39.2% of the land area, about 10,853,000 hectares (Short). Toucan Barbets are found only in the Andes of Colombia and Ecuador, a short range of about 14,000 kilometers (Short). The birds have limited ranges in montane cloud rainforest, and are found in the expansive Chocó forest covering this area (Short).

Figure 1: Toucan Barbet Range (Coswell)

Figure 2: Map of Andes Cloud Forest (Smith)

The manipulated variable in this experiment was the type of forest that I took each data point in. There are three different forest types that compose the Ecuadorian Andes mountain range in which the Toucan Barbet is known to inhabit. The three types of forest I used in this investigation were silvapasture, primary forest, and secondary forest, each described in more detail below. I placed each of these forest types in a seral stage, which range from stage 1 through stage 5 based on the restoration of the ecosystem. Recently cut forests will be at seral stage 1, and as they grow back and revert to their natural wildlife they begin to approach seral stage 5. Once a habitat has reached its primary forest, it is no longer at a seral stage but considered a climax community. The reforestation attempts in the Ecuadorian Andes are an example of secondary succession, ecological succession that occurs in a habitat that has been destroyed though some forms of life such as grass or lichen remain. These manipulated variables are important to measure, as the density of the Toucan Barbet depends on the habitat (Benstead).

Manipulated Variable: Value 1

Silvapasture, making around 3% of Ecuador's land, is land that has been cut down for animal grazing but has been partially reforested ("Santa Lucia Reserve"). An area will be clear cut down and the vegetation will be destroyed in the area, being in seral stage 1 of ecological succession. In place of the plant life, long grasses and foresting woods are typically introduced into the area. The area will be used for livestock land so that mules or cows can graze within the silvapasture. There is a sparse distribution of trees among the land to protect the soil's nutritional quality and preserve an ecosystem for cloud forest organisms, as well as in some cases providing a timber to harvest and sell. This type of foresting is specifically designed so that the natural forest is integrated as part of the agroforesty area that is mutually beneficial for humans and the biome. Though this

system does provide more habitat than a clear cut grazing field typically would, this is not an ideal habitat for birds. The trees planted in the Silvapasture, typically oaks, such as the Red Oak or the Black Oak, or fruit trees, do not provide the ideal area for nesting due to denser wood and les supportive branches. Sources of food that the Ecuadorian birds are used to are typically not provided by the fruit trees. The openness of the area compared the original cloud forest and the disturbance from human and animal activities also make this a more vulnerable spot for birds to stay.

Figure 3: Example of Silvapasture in the Ecuadorian cloud forest (personal photo)

Manipulated Variable: Value 2

Primary forest, now making less that 15% of Ecuador's land, is forest that has not been affected by human activity. The old growth forest can be defined as a climax community, an ecosystem that has attained great age with little disturbance. This incorporates a diversity of trees in height, canopy coverage, canopy layers, and decaying classes that provide a large variety of habitats. In turn, the biodiversity of both the

animals and plants within an area of primary forest is much greater than in any other type of forest. Its unique ecological features of thick underbrush and dense canopy layers host a wide variety of organisms. This type of forest is typically ideal for birds, who through evolution over generations have adapted to living within the old growth. Areas for nesting and foraging are more frequent throughout the forest rich in plant vegetation, and different birds develop their own niches on how to defend themselves and their young.

Figure 4: Example of Primary Forest in the Ecuadorian Cloud Forest (personal photo)

Manipulated Variable: Value 3

Secondary forest, making up about 2% of Ecuador's land, is forest that has been logged and clear cut down but then left for restoration for 15-20 years. Though this is a relatively short amount of time, because of the rapid growth of the cloud forest the secondary forest areas are usually at seral stage 4 or 5 and indistinguishable from the primary forest. The moist atmosphere of the cloud forest and steady rainfall of up to 25 cm a month make land that is left alone ideal for ecological succession of organisms. A

heavy underbrush and layered, thick canopies similarly distinguish this type of habitat. In some instances, perennial trees may not yet have undergone enough growth to become one of the dominant trees in the habitat. These habitats are usually similarly considered ideal for bird populations. Some birds that inhabit niches that require perennial old growth trees may be found less common in these areas, as the shelter and food these trees provide will be absent. After just under two decades the effect of human traffic disturbance on bird populations disappears, and birds who had migrated from the population may return. Though not as ideal as primary forest, secondary forest is also a very suitable habitat for bird populations.

Figure 5: Example of Secondary Forest in the Ecuadorian Cloud Forest (personal photo)

Responding Variable:

The responding variable of this investigation is the density of the Toucan Barbets in each region. To determine this, the population heard and seen, the procedure of which is described in methodology, of the Toucan Barbets was recorded at multiple locations. The number of Toucan Barbets seen on average per location could then be compared among the different types of forest I investigated. The number of birds inhabiting or residing in the various areas could then be approximated using this data, revealing how the Toucan Barbet population avoids or thrives in different types of habitats.

The Toucan Barbet Introduction:

Figure 6: Toucan Barbet (Ownby 2012)

Semnornis ramphastinus, commonly known as Toucan Barbets, are colorful birds, often brightly patterned. Barbets are typically found in smaller groups of up to 6 birds

often consisting of adults and their young. Toucan Barbets breed between February and October, usually nesting in trees and incubating 2-3 eggs for up to 15 days (Foreshaw).

Figure 7: Toucan Barbet Foraging (Ownby 2011)

Toucan Barbets are frugivorous birds often found in small flocks in fruiting trees (Short). Fruits can be eaten whole, broken apart while held in barbet feet and eaten, or used for their juice (Forshaw). One study in 1993 showed that all of the stomach contents of Toucan Barbets checked in Ecuador only contained fruit (Short). In temporal zones, many birds switch to a diet of insects; however in cloud rain forests such as those in Ecuador and Colombia, this switch is not needed due to a constant supply of fruit that allow the Toucan Barbet to feed year round (Krischer).

Introduction to the Habits of Frugivorous Bird

A recent study, *Effects of Disturbance or Loss of Tropical Rainforest on Birds*, has shown that frugivore bird populations will be the first group to decline rapidly after deforestation due to limited food availability (Sodhi et al.). The extinction threat due to deforestation is not evenly distributed among all avian groups and has the largest impact on birds requiring fruit-based diets (Sodhi et al.). The loss of frugivores could drastically impact other bird populations. Tropical trees have evolved to produce large fruits for animal seed dispersal, and the loss of frugivores could mean large consequences to reforestation (Sodhi et al.). There are several trees that have failed to reestablish after deforestation in which the fruit-eating birds responsible for their seed dispersion have declined or disappeared (Sodhi et al.). "The declining availability of fruit in disturbed tropical forests that results from disrupted avian-mediated seed dispersal may prevent colonization of frugivores in certain habitats," furthering the declines of the avian group (Sodhi et al). Frugivores such as the Toucan Barbets are considered very fragmentation sensitive (Sodhi et al.). Because the birds depend on distributed trees that fruit at different times, lower diversity in fragmented forest will likely not support them (Sodhi et al.).

Hypothesis:

The density of the Toucan Barbet will decrease depending on how recently the habitat is disturbed. Primary forest will have the greatest density, secondary forest will have the second greatest density and silvapasture will have the lowest density of Toucan Barbets. This is because Toucan Barbets are foragers and require old growth forest to provide their resource of food. Toucan Barbets will also find places for nesting more easily in areas that have thick, tall, perennial trees that offer a great protection. Without the disturbance

from human logging and traffic, Toucan Barbets choose the most undisrupted habitat for the safest area to reside in.

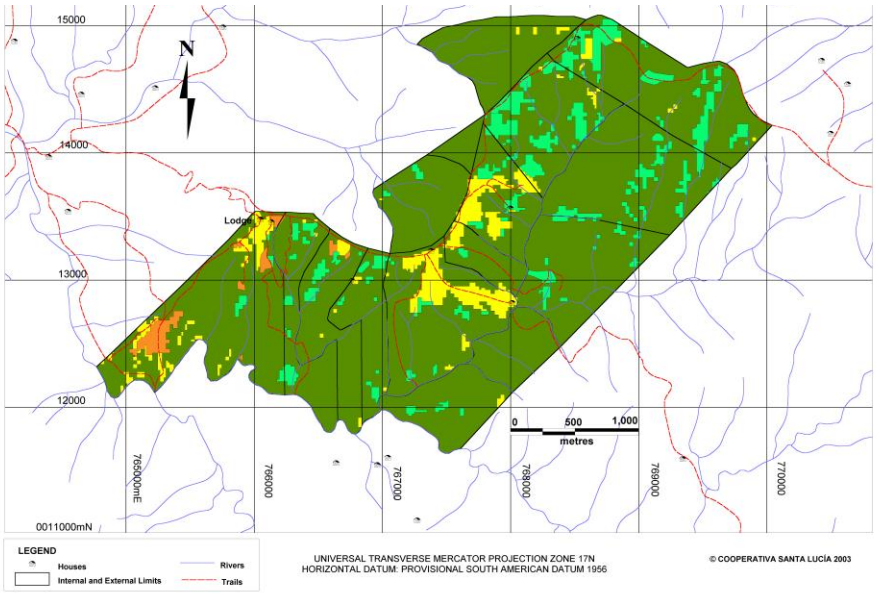
Methodology:

Location: This study was carried out on the Santa Lucia Reserve located north of Quito, Ecuador as part of an Earthwatch volunteer program. Ecuador has over 1600 bird species identified, making it rank 4th in the world for greatest bird diversity ("Santa Lucia Reserve"). There is greater bird diversity per square kilometer in Ecuador than anywhere else ("Santa Lucia Reserve"). The reserve is located in the Andes mountain range and hosts the 1800 acres of the Choco-Andean cloud forest ("Santa Lucia Reserve"). The reserve ranges between 1250 to 2550 meters above sea level, and hosts 394 bird species ("Santa Lucia Reserve"). A remarkable 42% of these species are considered endemic, meaning exclusively confined to one place, at the reserve ("Santa Lucia Reserve").

An 80% majority of the cloud forest remains primary forests, but some areas during those years were cleared for pasture, crop land, or timber to construct homes ("Santa Lucia Reserve"). All the silvapasture land in the reserve is about 15 years old ("Santa Lucia Reserve").

Figure 8: The Santa Lucia Reserve Lodge (personal photo)

Figure 9: Map of Primary Forest (dark green), Secondary Forest (light green), and Silvapasture (yellow) in the Santa Lucia Reserve (Ownby 2011)



Method: Research was conducted on the reserve over a 7 day period from June 20 – June 27, 2012. Based off of previous studies' suggestions, I decided that each day data would be best collected through recording the amount of birds heard and seen at various locations over a 10 minute time span (Welford).

Each day, I hiked out to conduct the field work. I was accompanied by Noe, a local Ecuadorian avifaunal expert who was able to identify all bird calls and birds seen. Noe spoke limited English, but knew all of the common bird names in English. We were also accompanied by at least one person who had taken Spanish language classes as well to assure that data was being collected reliably.

Each morning I left at 6:00am to be in the field during the typical time that birds were most vocal and active, around sunrise. Data was collected over a 2-3 hour period before returning to the lodge.

Noe is the leader of the Earthwatch investigation and therefore chose the assortment of places we stopped to collect data that he thought would give a best diversity of locations, no location being visited more than once. As Noe has led previous avifaunal studies before, I decided that the sampling of locations he visited would provide an accurate sample of the forest that could later be comparable to the previous studies. I decided that no location should be visited more than once in case any particular location had an abnormal population density. Predetermined locations had been marked on trees at various spots within the Santa Lucia reserves. Locations were labeled as FP, FS, or S and followed by a number with tape. FP is primary forest, FS is secondary forest, and S is silvapasture. There are 117 points for bird collection in the Santa Lucia Reserve.

Figure 10: Example Marking for Data Collection Point (personal photo)

At each point in the Santa Lucia reserve I recorded the location, date, weather, wind, and start and end time. I recorded each of these factors as previous studies had proved that varying weather could have large impacts on birds seen and heard (Welford). We stayed at each location for ten minutes, one group member holding a timer to make sure that we spent a consistent time at each point. I chose ten minutes for our data collection time based on a similar study that used the same allotment of time (Welford). Because birds are typically sensitive to human movement and noise, groups attempted to stay relatively quiet so as not to disturb life. I recorded birds both seen and heard to get the most accurate idea of nearby avifaunal life. After helping Noe spot birds, he would dictate to me the species information which I would then record on my data sheet. For birds heard, the common name and distance were also recorded. For birds seen, the

common name, distance in length, distance in height, and activity were recorded. I chose these variables to record as they provide the best insight into Toucan Barbet behaviors (Welford). Activities could be P (perched), FL (flying), F (feeding), S (singing/calling), or R (roosting). Further observations by Noe were also recorded, such as the avian gender.

Figure 11: Raw data collection worksheet (personal photo)

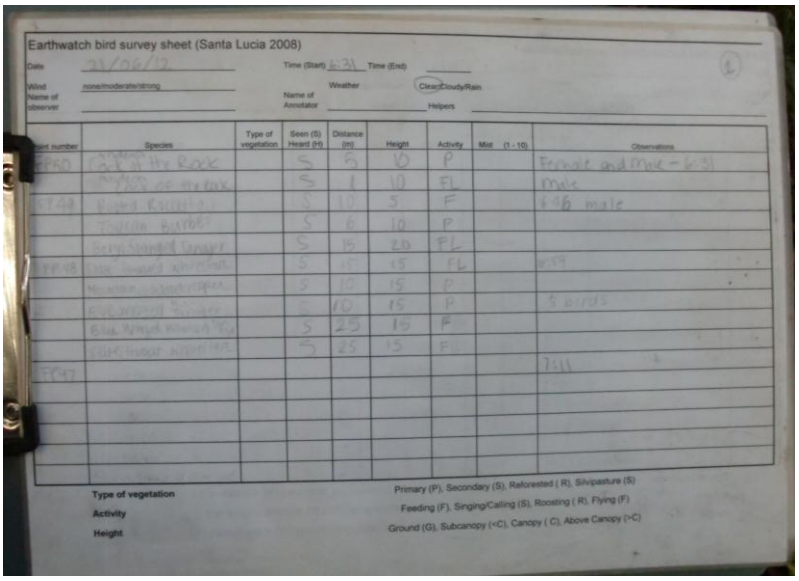


Figure 12: Collecting bird survey data (personal photo)

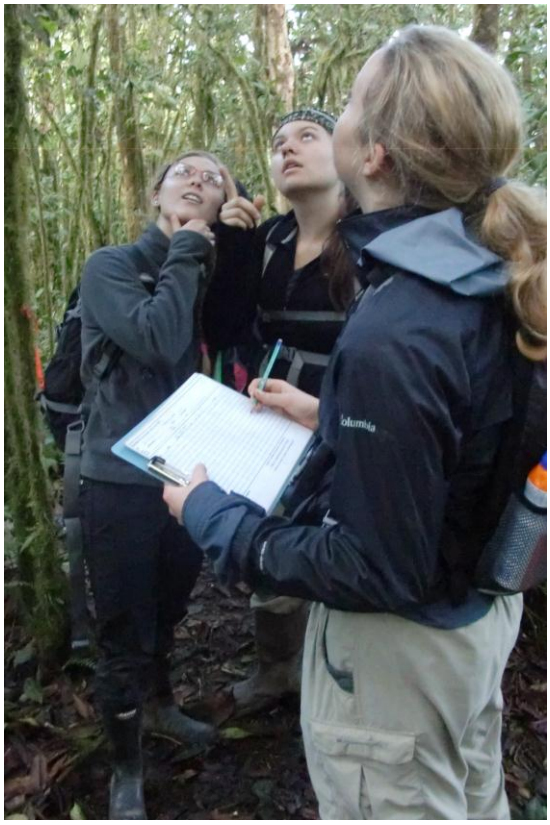


Figure 13: Hiking to various locations (personal photo)

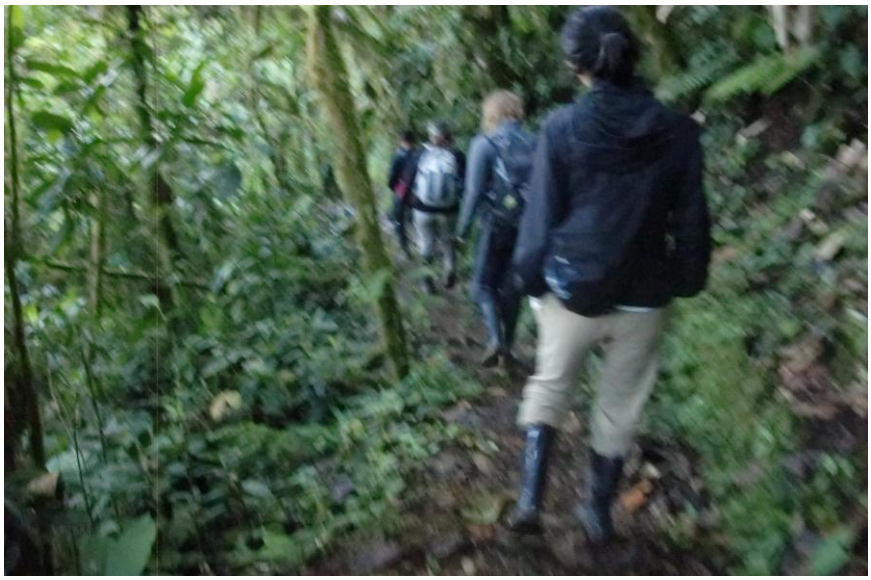


Figure 14: Guide Noe looking for birds (personal photo)

After returning from the bird survey collection data, I would input the data collected into an excel spreadsheet. I collected the cumulative data from our 7 day trip as well as numbers from previous years to analyze for this investigation. Conditions of data collection are presented below.

Table 1: Conditions of Toucan Barbet Data Collection (See Appendix A for raw data)

Date	Conditions				
	Clear Sun	Cloudy Rain	No Wind	Wind	Collection Points Reached
20-Jul	Yes	No	Yes	No	12
21-Jul	Yes	No	Yes	No	13
22-Jul	Yes	No	Yes	No	12
23-Jul	Yes	No	Yes	No	15
24-Jul	Yes	No	Yes	No	10
25-Jul	No	Yes	Yes	No	4
26-Jul	Yes	No	Yes	No	14
27-Jul	Yes	No	Yes	No	14

It is important to note that many factors, such as season and climate, can affect bird populations seen and heard. In addition birds that were marked H for heard often 25-120

meters away in distance could have been inhabiting forest nearby to the designated area. Birds may also roost in one zone and feed in another, as migration between zones is easy. For the purposes of this investigation, I decided to use the sample I collected as a good approximation for the general Toucan Barbet population trends, though it should be noted that the uncertainty of this data is high. The error rate of bird identification in this experiment is unknown, so no uncertainties or error bars are included. The reliability of the measurements is considered very high, as Noe is experienced in bird identification and the group of people collecting data was usually able to check identifications. Uncertainty in this experiment comes from the outside variables listed above.

Data and Analysis:

To see all Toucan Barbet data refer to Appendix A. To see all bird collection data see Appendix B. To see all calculations see Appendix C (referenced with superscript corresponding numbers).

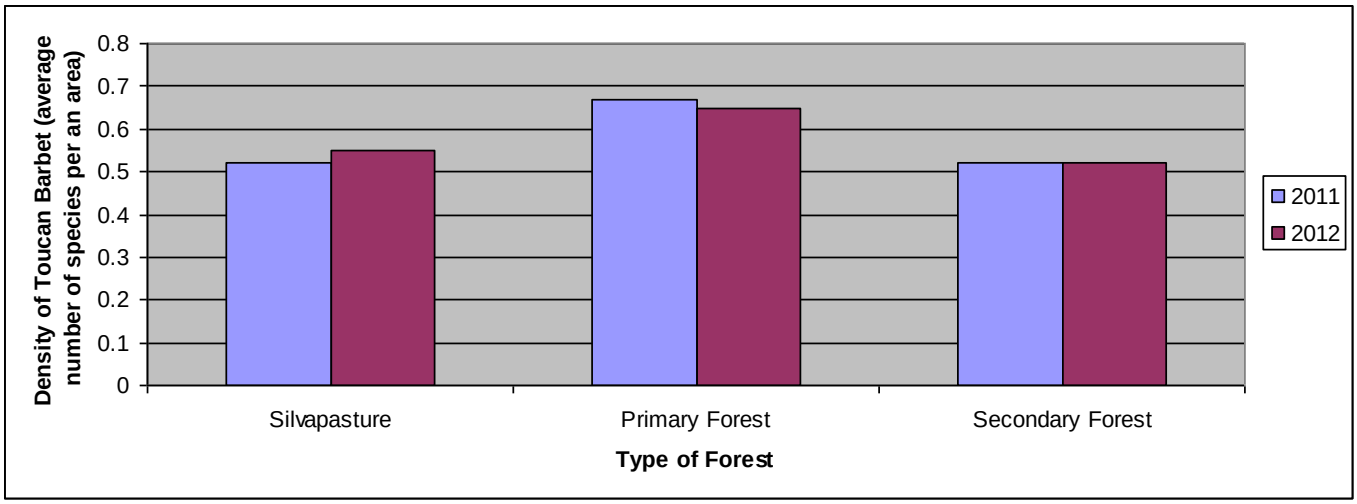
Table 2: Comparing 2012 Data and 2011 Data for the Toucan Barbet

	2011 - Average Data	2012 - My data
Total bird count	752	698
Total Toucan Barbet count	44	41
Percent of birds record that were Toucan Barbets	5.88%[1]	5.87%
Total number of species recorded	121	105
S Toucan Barbet count	11	10
S places visited	19	18
S density (average Toucan Barbet population per an area)	0.52[2]	0.55
FS Toucan Barbet count	17	16
FS places visited	33	31
FS density (average Toucan Barbet population per an area)	0.52	0.52
FP Toucan Barbet count	16	15
FP places visited	24	23
FP density (average Toucan Barbet population per an area)	0.67	0.65

The overall bird populations in Santa Lucia are on the decline. During our 7 days of data collection, I recorded 698 birds. Last year, on average in 7 days of bird data collection, 752 birds were recorded (Peck). This is a decrease of about 7.18% of avifaunal population. This supports Santa Lucia's claim that bird population in the reserve is still on the decline (Peck). Out of the 698 bird collected, 41 of these were toucan barbets making up 5.87% of our data. When compared to last year, 44 out of 752 bird collection points were toucan barbets, about 5.88% of data (Peck). This suggests that the Toucan Barbet population have declined overall along with the other bird populations. In comparison to the average 121 species recorded last year in 7 days, my data only found 105 species (Peck). Although the total bird population observations showed signs of loss of avian population, the full scope of the loss of diversity may not be understood as better adapting species could be increasing in response to deforestation compared to other birds who survive in much fewer numbers. Therefore the uncertainty in the statistical significance of these numbers is fairly high.

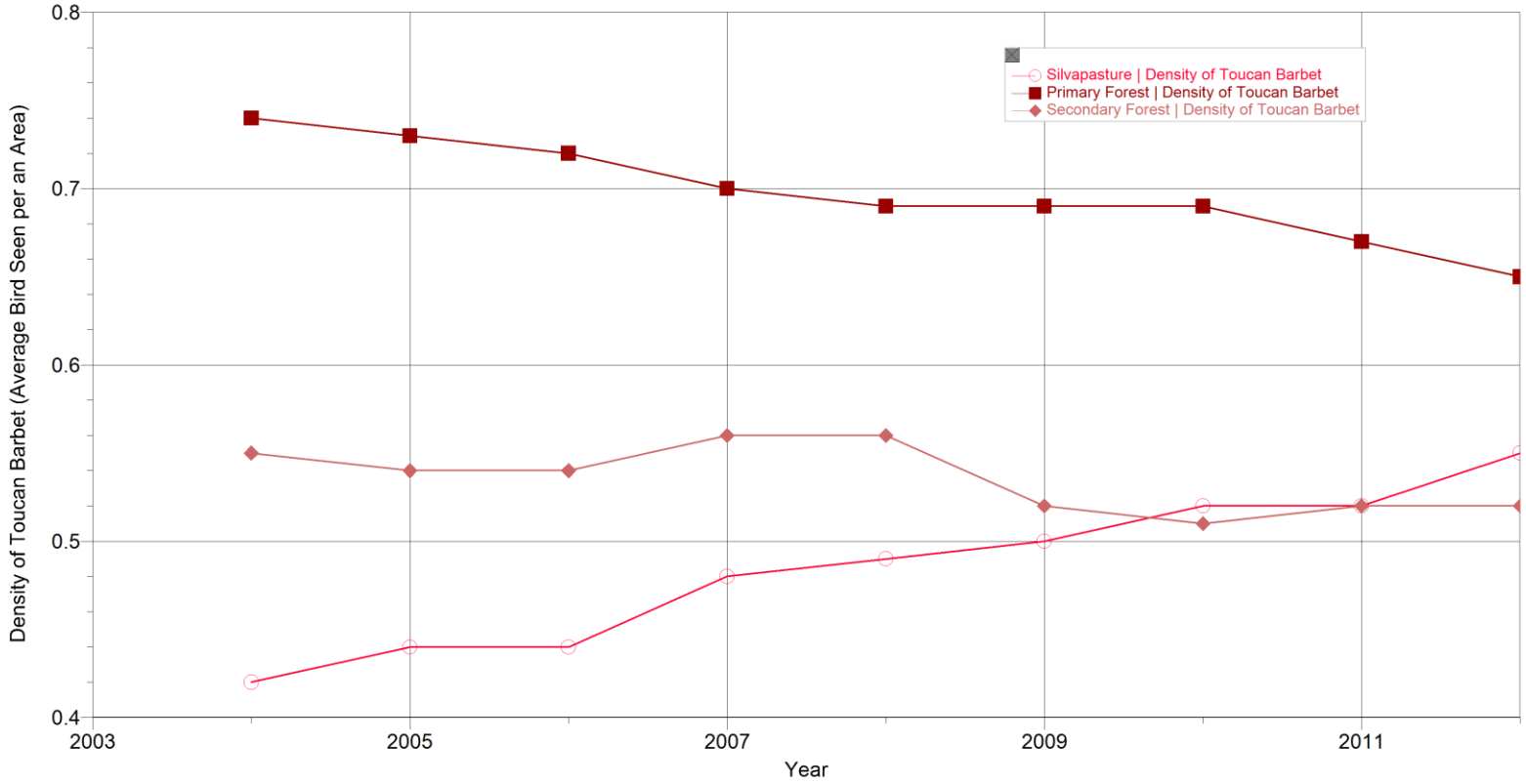
I calculated and graphed the density of the average number of Toucan Barbet's seen at each area for my data in 2012, seen in purple, and the data collected in 2011, seen in blue below.

Figure 15: Comparing 2011 and 2012 Toucan Barbet Data in Various Areas ("Santa Lucia Reserve")



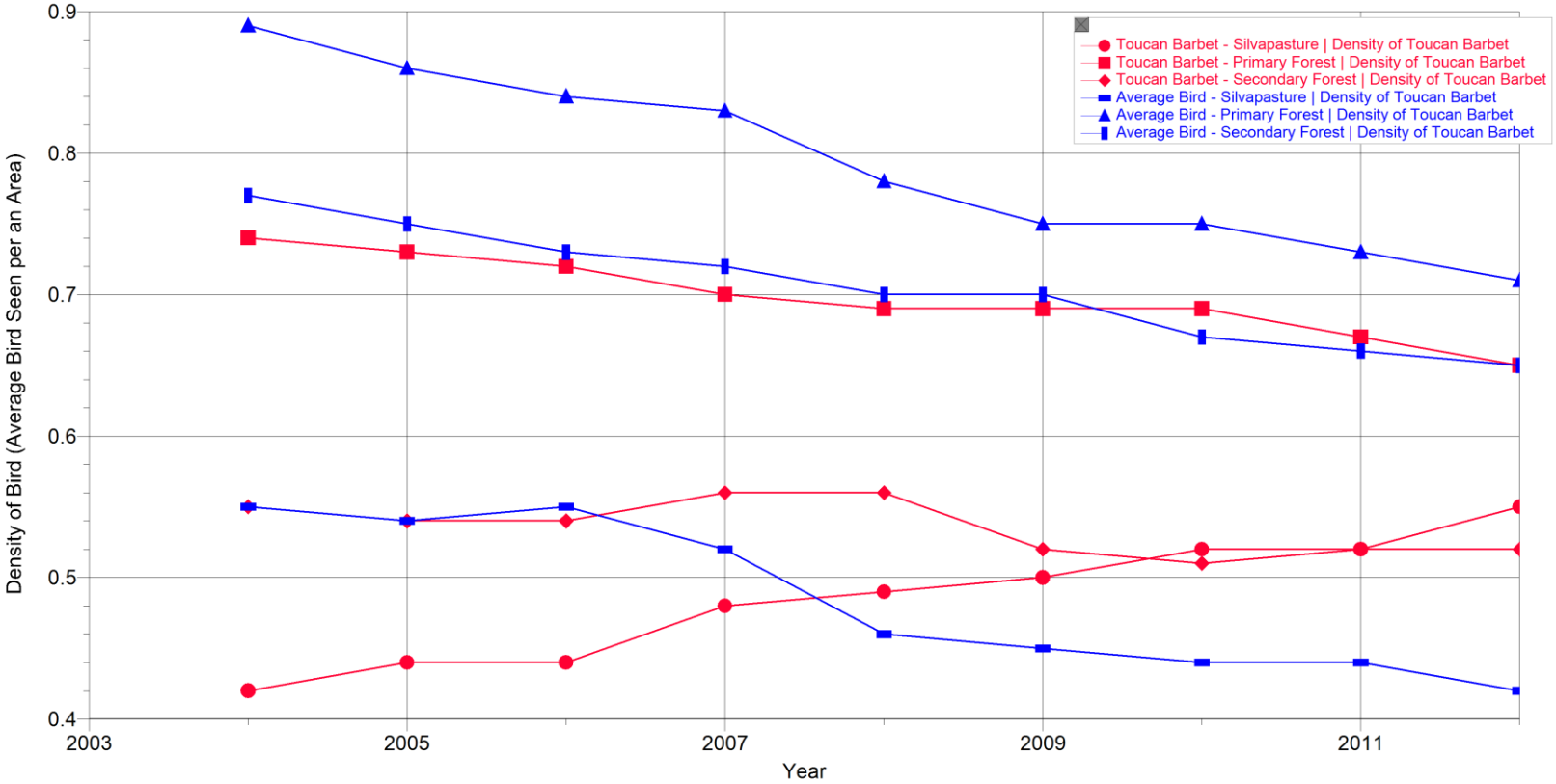
Looking at this graph, I could see that the average density of the Toucan Barbet increased in the silvapasture, but remained the same or declined in the other two types of forest. I went through the historical data to graph the overall trend of bird density over the last 8 years to see if this was a consistent pattern with previous years.

Figure 16: 2004-2012 Change in Toucan Barbet Density of Various Areas ("Santa Lucia Reserve")



Looking at Figure 16, I saw that though the bird population in the primary and secondary forest was declining at a steady rate over the years, the silvapasture was the only area that actually increased in Toucan Barbet bird density. Wanting to know if this was consistent with the trend for average bird density, I graphed the average bird density for the last 8 years in comparison to Figure 17 above. The red represents the Toucan Barbet data and the blue represents the average bird data.

Figure 17: 2004-2012 Change in Toucan Barbet Density and Average Bird Density of Various Areas ("Santa Lucia Reserve")



This graph indicates that most bird density numbers have consistently decreased in all three areas over the past 8 years in contrast to the Toucan Barbet density increases in the silvapasture.

Finally, I looked at what proportion of birds seen were doing each of the types of activity in the forest, P (perched), FL (flying), F (feeding), S (singing/calling), or R (roosting).

Table 3: Toucan Barbet Activity in Various Types of Forest

	Percentage of Toucan Barbets performing activity			
Type of Forest	Feeding (F)	Flying (FL)	Perched (P)	Roosting (R)
Primary Forest	13.33% [3]	6.66%	0%	0%
Secondary Forest	12.50%	0%	12.50%	0%
Silvapasture	20.00%	0%	0%	10%

A majority of the birds found in Silvapasture were feeding and the only Toucan Barbets found Roosting were in silvapasture.

In conclusion, I found that though most bird populations were decreasing, the proportion of Toucan Barbets remained stable. The population density of the Toucan Barbets decreased or remained the same in all the areas except for the silvapasture in which it actually increased, following the trend of data from previous years but unlike the average bird density. Silvapasture had the highest rate of Toucan Barbet roosting and feeding.

Discussion:

The overall trend of bird populations was not surprising. The Santa Lucia reserve follows trends of declines in species richness and diversity in the Andean cloud forest. The Choco cloud forest has already seen alarming impacts of deforestation on birds (Bubb). The Toucan Barbet contradiction to this trend suggests that it is better at adjusting to changes in cloud forest.

I compared my results to the findings of two similar studies to further my analysis on Toucan Barbets reactions to deforestation.

In a study done by Welford and Defalco also done in the Ecuadorian Andes East of Quito, avian frugivores were found to use abandoned pasture for feeding or singing more than any other bird. Using silvapasture, primary forest, and secondary forest sites, they conducted 41 surveys to determine which bird guilds (such as frugivore, insectivore, etc) best accommodated forest disruption (Welford and Defalco). Of the 89 species recorded at the separate site, only 18 of these species were found in silvapasture land (Welford and Defalco). Of these 18 species, 10 were frugivores including the Toucan Barbet (Welford and Defalco). They concluded that frugivores have utilized the

advantage of the open forest in silvapasture better than other guilds of birds (Welford and Defalco). All three sites were considered equally utilized by the frugivores, "no difference in numbers [of frugivorous birds] being found between the three disturbance categories of forest," (Welford and Defalco). Frugivores, such as the toucan barbets, appeared more tolerant of edge and open habitats than previously suspected (Welford and Defalco).

Another study done individually by M. R. Welford surveyed the ability of different type of bird guilds (such a frugivores or granivores) to return to previously cultured land. He conducted his work in a separate reserve very close to the Santa Lucia reserve, north of Quito, Ecuador (Welford). Pastures were labeled with the number of years since established (for example silvapasture created 6 years ago would be labeled Pasture 6) (Welford). Each pasture was at a relatively similar elevation (within 200 meters) and within the same cloud forest reserve (Welford). He recorded the number of species found on average in each guild at the different pastures (Welford).

Table 4: Number of Species found from different guilds in various pastures (Welford)

Guilds	Pasture 0	Pasture 2	Pasture 4	Pasture 6
Insectivores	3	5	9	11
Nectivores	1	2	5	4
Frugivores	0	4	11	14
Omnivores	2	3	6	7
Granivores	0	0	1	0
Raporial	0	0	1	0

In his finding, frugivores showed the most rapid return rate to silvapasture land as years elapsed since the land was cultured (Welford). In his study less than 30% of the total number of species observed in primary forest were recorded in the silvapasture, suggesting that silvapasture is not an optimal habitat for avifaunal life in general

(Welford). Welford concluded that frugivores might be better situated to adapt to silvapasture land than other guilds. In addition, he found that "Toucan Barbets, although restricted range and near-threatened, were recorded at all pasture sites except for one," (Welford). His study showed Toucan Barbets frequently visited forest borders and open land (Welford).

Both of these studies correlated with my observations.

Several reasons are possible to why toucan barbets may be better suited to adapting to open forest. Two reasons commonly suggested are the greater resource availability and the lower energy expenditure needed during foraging. When Santa Lucia first began reforesting clear cut land to turn it into silvapasture, they concentrated on planting "trees that that thrive in full sunlight such as Lechero (*Euphorbia laurifolia*) and Sangre de Drago, (*Dracaena cinnabari)*" ("Santa Lucia Reserve"). Almost all of the tree species planted were fruit bearing trees ("Santa Lucia Reserve"). This could cause greater inclination for frugivores, such as Toucan Barbets, to utilize silvapasture as opposed to other bird guilds.

Toucan barbets could also be looking to take advantage of the lower psychological stress and predation risk of being in open forest (de Silvlia et al.). Silvapasture has "habitat structure (for perches) that could be used for frugivorous bird species that attracts the bird for surveillance opportunities," (de Silvlia et al.). The predator of the Toucan Barbet, the Plate-billed Mountain Toucan is also found frequently in the Santa Lucia reserve. There is low reproductive success of Toucan Barbets owing to "competition for nest-sites with, and predation of young by Plate-billed Mountain-toucan," (Benstead). Improved mating success and greater reproductive output may be other possible benefits in living in silvapasture where clear territorial ground may be

established (de Silvlia et al.). Toucan Barbets are territorial birds living in small group and may establish their land in silvapasture, some studies finding that 40% of territorial land established by Toucan Barbets was established in silvapasture due to high resource availability and reduced competition (Restrepo). These suggested reasons would also account for the higher rate of Toucan Barbets found feeding and roosting in the silvapasture.

It is interesting that the average bird density and Toucan Barbet density declined in the untouched forest (Primary and Secondary). This could be due to a smaller amount of available food, migration disruption, or noise and smoke pollution caused by foresting in the silvapasture. On a global scale, this could also be related to climate change and air pollution around the world. The increase in Toucan Barbet density in the silvapasture appears more significant when compared with the other birds and areas' decline.

In accordance to these various benefits, Toucan Barbet population may not undergo the same negative impact as other bird species in the future due to deforestation in light of their tolerance to open forest.

Conclusions:

The Toucan Barbet species appears to have responded well to deforestation in Ecuadorian Andes cloud forest compared to other birds. Where bird diversity has been lost and avian populations have declined, the Toucan Barbets seem to have taken advantage of the different types of forest now found. This suggests that the bird population density response to deforestation in Ecuadorian cloud forests will be species dependent, with feeding style playing a large factor in reaction. Although Toucan Barbets and frugivores in general show increasing density of bird species in silvapasture land, it is important to note that diversity is not necessarily returning to the deforested land. Further research is needed on why Toucan Barbets have responded well to pasture habitats to better understand how more avian diversity can be brought back to deforested segments of the Choco forest.

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Appendix A: Raw Data of Toucan Barbet Bird Population Observations

date (enter DD-MM-YY)	observer	wind	weather	point	S or H	distance (m)	height (m)	activity	start time
22/06/2012	Noe	none	clear	S-08	H	50			6:25
22/06/2012	Noe	none	clear	S-09	S	10	15	F	6:37
25/06/2012	Noe	none	cloudy, rain	S-03	S	10	15	F	6:31
26/06/2012	Noe	none	clear	S-06	H	80			7:39
27/06/2012	Noe	none	clear	S-12	H	80			6:34
27/06/2012	Noe	none	clear	S-12	H	80			6:34
27/06/2012	Noe	none	clear	S-12	S	20	30	R	6:34
27/06/2012	Noe	none	clear	S-12	H	80			6:34
27/06/2012	Noe	none	clear	S-14	H	70			7:32
27/06/2012	Noe	none	clear	S-14	H	70			7:32
27/06/2012	Noe	none	clear	S-14	H	70			7:32
20/06/2012	Noe	none	clear	Fs-03	S	30	15	P	6:54
20/06/2012	Noe	none	clear	Fs-03	S	30	15	P	6:54
20/06/2012	Noe	none	clear	Fs-02	H	50			6:41
20/06/2012	Noe	none	clear	Fs-03	H	25			6:54
20/06/2012	Noe	none	clear	Fs-03	H	25			6:54
20/06/2012	Noe	none	clear	Fs-03	H	60			6:54
20/06/2012	Noe	none	clear	Fs-03	H	60			6:54
22/06/2012	Noe	none	clear	Fs-12	H	80			6:49
22/06/2012	Noe	none	clear	Fs-12	H	50			6:49
22/06/2012	Noe	none	clear	Fs-12	H	50			6:49
22/06/2012	Noe	none	clear	Fs-13	H	70			7:20
26/06/2012	Noe	none	clear	Fs-06	S	4	15	F	6:08
26/06/2012	Noe	none	clear	Fs-06	S	4	15	F	6:08
26/06/2012	Noe	none	clear	Fs-10	H	150			7:13
26/06/2012	Noe	none	clear	Fs-10	H	150			7:13
27/06/2012	Noe	none	clear	Fs-15	H	80			6:47
20/06/2012	Noe	none	clear	FP-03	H	60			7:40
21/06/2012	Noe	none	clear	FP-49	S	6	10	FL	6:46
21/06/2012	Noe	none	clear	FP-46	H	100			7:24
21/06/2012	Noe	none	clear	FP-45	H	100			7:36
21/06/2012	Noe	none	clear	FP-44	H	120			7:49
21/06/2012	Noe	none	clear	FP-44	H	120			7:49
22/06/2012	Noe	none	clear	FP-18	H	70			7:48
22/06/2012	Noe	none	clear	FP-18	S	10	15	F	7:48
22/06/2012	Noe	none	clear	FP-18	S	10	15	F	7:48
24/06/2012	Noe	none	clear	FP-26	H	100			7:18
24/06/2012	Noe	none	clear	FP-25	H	40			7:32
24/06/2012	Noe	none	clear	FP-23	H	20			8:00
24/06/2012	Noe	none	clear	FP-23	H	20			8:00

24/06/2012	Noe	none	clear	FP-22	H	100			8:13
27/06/2012	Noe	none	clear	FP-19	H	80			6:06
27/06/2012	Noe	none	clear	FP-19	H	80			6:06
27/06/2012	Noe	none	clear	FP-19	H	80			6:06

Appendix B: Complete Bird Survey Data Taken

date (enter DD-MM-YY)	observer	wind	weather	point	observation (species)	S or H	distance (m)	height (m)	activity	start time
20/06/2012	Noe	none	clear	S-01	Powerful Woodpecker	S	25	10	P	6:10
20/06/2012	Noe	none	clear	S-01	Powerful Woodpecker	S	25	10	P	6:10
20/06/2012	Noe	none	clear	S-01	Powerful Woodpecker	S	25	10	P	6:10
20/06/2012	Noe	none	clear	S-01	Golden-headed quetzal	S	30	15	P	6:10
20/06/2012	Noe	none	clear	S-01	Crimson-mantled Woodpecker	S	10	15	P	6:10
20/06/2012	Noe	none	clear	S-01	Crimson-mantled Woodpecker	S	10	15	P	6:10
20/06/2012	Noe	none	clear	F-01	Beryl-spangled tanager	S	10	15	F	6:27
20/06/2012	Noe	none	clear	F-01	Beryl-spangled tanager	S	10	15	F	6:27
20/06/2012	Noe	none	clear	F-01	Beryl-spangled tanager	S	10	15	F	6:27
20/06/2012	Noe	none	clear	F-01	Beryl-spangled tanager	S	10	15	F	6:27
20/06/2012	Noe	none	clear	F-01	Beryl-spangled tanager	S	10	15	F	6:27
20/06/2012	Noe	none	clear	FS-02	Wedge-billed Hummingbird	S	10	6	FL	6:41
20/06/2012	Noe	none	clear	FS-02	Flavescent Flycatcher	S	15	15	P	6:41
20/06/2012	Noe	none	clear	FS-03	Toucan Barbet	S	30	15	P	6:54
20/06/2012	Noe	none	clear	FS-03	Toucan Barbet	S	30	15	P	6:54
20/06/2012	Noe	none	clear	FP-01	Golden-headed Quetzal	S	15	20	P	7:08
20/06/201	Noe	none	clear	FP-	Beryl-	S	20	20	F	7:08

2				01	spangled Tanager					
20/06/2012	Noe	none	clear	FP-01	Beryl-spangled Tanager	S	20	20	F	7:08
20/06/2012	Noe	none	clear	FP-02	Golden-winged Manakin	S	5	10	F	7:25
20/06/2012	Noe	none	clear	FP-03	Toucan Barbet	S	2	10	P	7:40
20/06/2012	Noe	none	clear	FP-03	Red-headed Barbet	S	10	10	F	7:40
20/06/2012	Noe	none	clear	FP-03	Red-headed Barbet	S	10	10	F	7:40
20/06/2012	Noe	none	clear	FP-03	Orange-bellied Euphonia	S	5	10	P	7:40
20/06/2012	Noe	none	clear	S-02	Orange-bellied Euphonia	S	5	6	P	7:53
20/06/2012	Noe	none	clear	S-02	Red-billed Parrot	S	50	20	FL	7:53
20/06/2012	Noe	none	clear	S-02	Red-billed Parrot	S	50	20	FL	7:53
20/06/2012	Noe	none	clear	S-02	Beryl-spangled tanager	S	6	12	FL	7:53
20/06/2012	Noe	none	clear	FS-04	Violet-tailed Sylph	S	1	3	P	8:20
20/06/2012	Noe	none	clear	S-01	Golden-headed Quetzal	H	50			6:10
20/06/2012	Noe	none	clear	S-01	Rufous-breasted Antthrush	H	40			6:10
20/06/2012	Noe	none	clear	S-01	Gray-breasted Wood-Wren	H	30			6:10
20/06/2012	Noe	none	clear	S-01	Azara's Spinetail	H	25			6:10
20/06/2012	Noe	none	clear	S-01	Crimson-mantled Woodpecker	H	35			6:10
20/06/2012	Noe	none	clear	S-01	Smoke-collored Pewee	H	30			6:10
20/06/201	Noe	none	clear	S-01	Tricoloured	H	50			6:10

2					Brush-finch					
20/06/2012	Noe	none	clear	S-01	Masked Trogon	H	55			6:10
20/06/2012	Noe	none	clear	FS-01	Scale-crested Pygmy-Tyrant	H	20			6:27
20/06/2012	Noe	none	clear	FS-01	Russet-crowned Warbler	H	20			6:27
20/06/2012	Noe	none	clear	FS-01	Lineated Foliage-gleaner	H	30			6:27
20/06/2012	Noe	none	clear	FS-01	Rufous-breasted Antthrush	H	50			6:27
20/06/2012	Noe	none	clear	FS-01	Golden-headed Quetzal	H	40			6:27
20/06/2012	Noe	none	clear	FS-01	Gray-breasted wood-wren	H	25			6:27
20/06/2012	Noe	none	clear	FS-01	Andean Solitaire	H	20			6:27
20/06/2012	Noe	none	clear	FS-01	Mountain Woodcreeper	H	30			6:27
20/06/2012	Noe	none	clear	FS-02	Slate-throated Whitestart	H	50			6:41
20/06/2012	Noe	none	clear	FS-02	Brown-capped Vireo	H	50			6:41
20/06/2012	Noe	none	clear	FS-02	Golden-olive Woodpecker	H	50			6:41
20/06/2012	Noe	none	clear	FS-02	Orange-bellied Euphonia	H	50			6:41
20/06/2012	Noe	none	clear	FS-02	Golden Tanager	H	15			6:41
20/06/2012	Noe	none	clear	FS-02	Toucan Barbet	H	50			6:41
20/06/2012	Noe	none	clear	FS-02	Rufous-breasted Antthrush	H	50			6:41
20/06/2012	Noe	none	clear	FS-03	Roadside Hawk	H	20			6:54
20/06/2012	Noe	none	clear	FS-03	Andean Solitaire	H	55			6:54
20/06/2012	Noe	none	clear	FS-03	Mountain Woodcreeper	H	20			6:54
20/06/201	Noe	none	clear	FS-	Rufous-	H	40			6:54

2				03	breasted Antthrush					
20/06/2012	Noe	none	clear	FS-03	Rufous-breasted Antthrush	H	40			6:54
20/06/2012	Noe	none	clear	FS-03	Slate-throated Whitestart	H	25			6:54
20/06/2012	Noe	none	clear	FS-03	Toucan Barbet	H	25			6:54
20/06/2012	Noe	none	clear	FS-03	Toucan Barbet	H	25			6:54
20/06/2012	Noe	none	clear	FS-03	Gray-breasted Wood-Wren	H	30			6:54
20/06/2012	Noe	none	clear	FS-03	Toucan Barbet	H	60			6:54
20/06/2012	Noe	none	clear	FS-03	Toucan Barbet	H	60			6:54
20/06/2012	Noe	none	clear	FP-01	Mountain Wren	H	50			7:08
20/06/2012	Noe	none	clear	FP-01	Andean Solitaire	H	40			7:08
20/06/2012	Noe	none	clear	FP-01	Golden Tanager	H	25			7:08
20/06/2012	Noe	none	clear	FP-01	Moustached Antpitta	H	50			7:08
20/06/2012	Noe	none	clear	FP-01	Crimson-rumped Toucanet	H	30			7:08
20/06/2012	Noe	none	clear	FP-01	Rufous-breasted Antthrush	H	70			7:08
20/06/2012	Noe	none	clear	FP-01	Rufous-breasted Antthrush	H	70			7:08
20/06/2012	Noe	none	clear	FP-01	Glistening-green Tanager	H	25			7:08
20/06/2012	Noe	none	clear	FP-01	Streaked-capped Treehunter	H	20			7:08
20/06/2012	Noe	none	clear	FP-01	Tyrannine Woodcreeper	H	40			7:08
20/06/2012	Noe	none	clear	FP-02	Three-striped Warbler	H	50			7:25
20/06/2012	Noe	none	clear	FP-02	Three-striped Warbler	H	50			7:25
20/06/201	Noe	none	clear	FP-	Tyrannine	H	40			7:25

2				02	Woodcreeper					
20/06/2012	Noe	none	clear	FP-02	Andean Solitaire	H	20			7:25
20/06/2012	Noe	none	clear	FP-02	Orange-bellied Euphonia	H	25			7:25
20/06/2012	Noe	none	clear	FP-02	Booted Rocket-tail	H	20			7:25
20/06/2012	Noe	none	clear	FP-02	Esmeraldas Antbird	H	50			7:25
20/06/2012	Noe	none	clear	FP-03	Andean Solitaire	H	30			7:40
20/06/2012	Noe	none	clear	FP-03	Three-striped Warbler	H	20			7:40
20/06/2012	Noe	none	clear	FP-03	Three-striped Warbler	H	20			7:40
20/06/2012	Noe	none	clear	FP-03	Slate-throated Whitestart	H	25			7:40
20/06/2012	Noe	none	clear	FP-03	Nariño Tapaculo	H	30			7:40
20/06/2012	Noe	none	clear	FP-03	Uniform Antshrike	H	15			7:40
20/06/2012	Noe	none	clear	FP-03	Rufous-breasted Antthrush	H	60			7:40
20/06/2012	Noe	none	clear	S-02	Tricoloured Brush-finch	H	40			7:53
20/06/2012	Noe	none	clear	S-02	White-sided Flowerpiercer	H	40			7:53
20/06/2012	Noe	none	clear	S-02	Brown-capped Vireo	H	30			7:53
20/06/2012	Noe	none	clear	S-02	Slaty Spinetail	H	50			7:53
20/06/2012	Noe	none	clear	S-02	Ornate Flycatcher	H	30			7:53
20/06/2012	Noe	none	clear	S-02	Rufous-breasted Antthrush	H	60			7:53
20/06/2012	Noe	none	clear	S-02	Smoke-collored Peewee	H	30			7:53
20/06/2012	Noe	none	clear	S-02	Mountain Woodcreeper	H	40			7:53
20/06/2012	Noe	none	clear	S-02	Uniform Antshrike	H	40			7:53
20/06/201	Noe	none	clear	S-02	Immaculate	H	40			7:53

2					Antbird					
20/06/2012	Noe	none	clear	S-02	Andean Solitaire	H	50			7:53
20/06/2012	Noe	none	clear	FP-04	Slate-throated Whitestart	H	20			8:06
20/06/2012	Noe	none	clear	FP-04	Squirrel Cuckoo	H	100			8:06
20/06/2012	Noe	none	clear	FP-04	Nariño Tapaculo	H	30			8:06
20/06/2012	Noe	none	clear	FP-04	Violet-tailed Sylph	H	30			8:06
20/06/2012	Noe	none	clear	FP-04	Russet-crowned Warbler	H	30			8:06
20/06/2012	Noe	none	clear	FP-04	Flavescent Flycatcher	H	25			8:06
20/06/2012	Noe	none	clear	FP-04	Gray-breasted Wood-Wren	H	25			8:06
20/06/2012	Noe	none	clear	FP-04	Roadside Hawk	H	50			8:06
20/06/2012	Noe	none	clear	FS-04	Russet-crowned Warbler	H	20			8:20
20/06/2012	Noe	none	clear	FS-04	Orange-bellied Euphonia	H	10			8:20
20/06/2012	Noe	none	clear	FS-04	Scale-crested Pygmy-Tyrant	H	25			8:20
20/06/2012	Noe	none	clear	FS-04	Brown-capped Vireo	H	40			8:20
20/06/2012	Noe	none	clear	FS-04	Slate-throated Whitestart	H	20			8:20
20/06/2012	Noe	none	clear	FS-04	Blue-winged Mountain Tanager	H	30			8:20
20/06/2012	Noe	none	clear	FS-04	White-tailed Tyrannulet	H	35			8:20
20/06/2012	Noe	none	clear	FS-04	White-sided Flowerpiercer	H	20			8:20
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/201	Noe	none	clear	FP-	Andean Cock	H	20			6:31

2				50	of the Rock					
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	S	5	10	P	6:31
21/06/201	Noe	none	clear	FP-	Andean Cock	S	5	10	P	6:31

2				50	of the Rock					
21/06/2012	Noe	none	clear	FP-50	Andean Cock of the Rock	S	1	10	FL	6:31
21/06/2012	Noe	none	clear	FP-50	Blue-winged Mountain Tanager	H	50			6:31
21/06/2012	Noe	none	clear	FP-50	Slate-throated Whitestart	H	50			6:31
21/06/2012	Noe	none	clear	FP-50	Brown Capped Virio	H	18			6:31
21/06/2012	Noe	none	clear	FP-50	Mountain Wren	H	20			6:31
21/06/2012	Noe	none	clear	FP-50	Rufous-breasted Antthrush	H	60			6:31
21/06/2012	Noe	none	clear	FP-49	Andean Cock of the Rock	H	15			6:46
21/06/2012	Noe	none	clear	FP-49	Mountain Woodcreeper	H	15			6:46
21/06/2012	Noe	none	clear	FP-49	Rufous-breasted Antthrush	H	60			6:46
21/06/2012	Noe	none	clear	FP-49	Violet-tailed Sylph	H	15			6:46
21/06/2012	Noe	none	clear	FP-49	Olive Finch	H	25			6:46
21/06/2012	Noe	none	clear	FP-49	Three-striped Warbler	H	30			6:46
21/06/2012	Noe	none	clear	FP-49	Rufous-breasted Antthrush	H	20			6:46
21/06/2012	Noe	none	clear	FP-49	Uniform Antshrike	H	15			6:46
21/06/2012	Noe	none	clear	FP-49	Booted Racket-tail	S	10	5	F	6:46
21/06/2012	Noe	none	clear	FP-49	Toucan Barbet	S	6	10	P	6:46
21/06/2012	Noe	none	clear	FP-49	Beryl-spangled Tanager	S	15	20	FL	6:46
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59

21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Cock of the Rock	H	100			6:59
21/06/2012	Noe	none	clear	FP-48	Andean Solitaire	H	25			6:59
21/06/2012	Noe	none	clear	FP-48	Blue-winged Mountain Tanager	H	15			6:59
21/06/2012	Noe	none	clear	FP-48	Blue-winged Mountain Tanager	S	10	15	P	6:59
21/06/2012	Noe	none	clear	FP-48	Blue-winged Mountain Tanager	S	10	15	P	6:59
21/06/2012	Noe	none	clear	FP-48	Blue-winged Mountain Tanager	S	10	15	P	6:59
21/06/2012	Noe	none	clear	FP-48	Blue-winged Mountain Tanager	S	25	15	F	6:59
21/06/2012	Noe	none	clear	FP-48	Rufous-breasted Antthrush	H	20			6:59
21/06/2012	Noe	none	clear	FP-48	Olive Finch	H	20			6:59

21/06/2012	Noe	none	clear	FP-48	Plumbeous Pigeon	H	70			6:59
21/06/2012	Noe	none	clear	FP-48	Three-striped Warbler	H	50			6:59
21/06/2012	Noe	none	clear	FP-48	Orange-bellied Euphonia	H	15			6:59
21/06/2012	Noe	none	clear	FP-48	Rufous-breasted Antthrush	H	35			6:59
21/06/2012	Noe	none	clear	FP-48	Slate-throated Whitestart	S	15	15	FL	6:59
21/06/2012	Noe	none	clear	FP-48	Slate-throated Whitestart	S	25	15	F	6:59
21/06/2012	Noe	none	clear	FP-48	Mountain Woodcreeper	S	10	15	P	6:59
21/06/2012	Noe	none	clear	FP-47	Rufous-breasted Antthrush	H	60			7:11
21/06/2012	Noe	none	clear	FP-47	Golden-crowned Flycatcher	H	25			7:11
21/06/2012	Noe	none	clear	FP-47	Orange-bellied Euphonia	H	25			7:11
21/06/2012	Noe	none	clear	FP-47	Orange-bellied Euphonia	H	25			7:11
21/06/2012	Noe	none	clear	FP-47	Booted Rocket-tail	H	15			7:11
21/06/2012	Noe	none	clear	FP-47	Rufous-breasted Antthrush	H	70			7:11
21/06/2012	Noe	none	clear	FP-47	Chestnut-capped Brush-finch	H	15			7:11
21/06/2012	Noe	none	clear	FP-47	Brown-capped Virio	H	15			7:11
21/06/2012	Noe	none	clear	FP-47	Dark-backed Woodquail	H	100			7:11
21/06/2012	Noe	none	clear	FP-47	NONE	S				7:11
21/06/2012	Noe	none	clear	FP-46	Booted Rocket-tail	H	15			7:24
21/06/2012	Noe	none	clear	FP-46	Golden-crowned	H	25			7:24

					Flycatcher					
21/06/2012	Noe	none	clear	FP-46	Slate-throated Whitestart	H	25			7:24
21/06/2012	Noe	none	clear	FP-46	Gray-breasted Wood-Wren	H	25			7:24
21/06/2012	Noe	none	clear	FP-46	Gray-breasted Wood-Wren	H	25			7:24
21/06/2012	Noe	none	clear	FP-46	Andean Cock of the Rock	H	80			7:24
21/06/2012	Noe	none	clear	FP-46	Dark-backed Woodquail	H	70			7:24
21/06/2012	Noe	none	clear	FP-46	Dark-backed Woodquail	H	70			7:24
21/06/2012	Noe	none	clear	FP-46	Dark-backed Woodquail	H	70			7:24
21/06/2012	Noe	none	clear	FP-46	Dark-backed Woodquail	H	70			7:24
21/06/2012	Noe	none	clear	FP-46	Rufous-breasted Antthrush	H	70			7:24
21/06/2012	Noe	none	clear	FP-46	Olive Finch	H	20			7:24
21/06/2012	Noe	none	clear	FP-46	Toucan Barbet	H	100			7:24
21/06/2012	Noe	none	clear	FP-46	NONE	S				7:24
21/06/2012	Noe	none	clear	FP-45	Golden-crowned Flycatcher	H	40			7:36
21/06/2012	Noe	none	clear	FP-45	Golden-crowned Flycatcher	H	40			7:36
21/06/2012	Noe	none	clear	FP-45	Rofous-breasted Antthrush	H	70			7:36
21/06/2012	Noe	none	clear	FP-45	Blue-winged Mountain Tanager	H	25			7:36
21/06/2012	Noe	none	clear	FP-45	Slate-throated Whitestart	H	30			7:36
21/06/2012	Noe	none	clear	FP-45	Three-striped Warbler	H	40			7:36
21/06/2012	Noe	none	clear	FP-45	Rofous-breasted Antthrush	H	50			7:36
21/06/201	Noe	none	clear	FP-	Andean	H	60			7:36

2				45	Solitaire					
21/06/2012	Noe	none	clear	FP-45	Orange-bellied Euphonia	H	35			7:36
21/06/2012	Noe	none	clear	FP-45	Orange-bellied Euphonia	H	36			7:36
21/06/2012	Noe	none	clear	FP-45	Gray-breasted Wood-Wren	H	80			7:36
21/06/2012	Noe	none	clear	FP-45	Gray-breasted Wood-Wren	H	81			7:36
21/06/2012	Noe	none	clear	FP-45	Toucan Barbet	H	100			7:36
21/06/2012	Noe	none	clear	FP-45	NONE	S				7:36
21/06/2012	Noe	none	clear	FP-44	Rufous-breasted Antthrush	H	100			7:49
21/06/2012	Noe	none	clear	FP-44	Rufous-breasted Antthrush	H	100			7:49
21/06/2012	Noe	none	clear	FP-44	Toucan Barbet	H	120			7:49
21/06/2012	Noe	none	clear	FP-44	Toucan Barbet	H	120			7:49
21/06/2012	Noe	none	clear	FP-44	Olive Finch	H	40			7:49
21/06/2012	Noe	none	clear	FP-44	Three-striped Warbler	H	60			7:49
21/06/2012	Noe	none	clear	FP-44	Violet-tailed Sylph	H	25			7:49
21/06/2012	Noe	none	clear	FP-44	Orange-bellied Euphonia	H	50			7:49
21/06/2012	Noe	none	clear	FP-44	Purple-bibbed Whitetip	S	4	5	P	7:49
21/06/2012	Noe	none	clear	FP-43	Three-striped Warbler	H	25			8:06
21/06/2012	Noe	none	clear	FP-43	Violet-tailed Sylph	H	20			8:06
21/06/2012	Noe	none	clear	FP-43	Gray-breasted Wood-Wren	H	20			8:06
21/06/2012	Noe	none	clear	FP-43	NONE	S				8:06
22/06/2012	Noe	none	clear	FS-11	Dusky Bush Tanager	H	10			6:10

22/06/2012	Noe	none	clear	FS-11	Dusky Bush Tanager	H	10			6:10
22/06/2012	Noe	none	clear	FS-11	Dusky Bush Tanager	H	10			6:10
22/06/2012	Noe	none	clear	FS-11	Scale-crested Pygmy Tyrant	H	15			6:10
22/06/2012	Noe	none	clear	FS-11	Rufous Breasted Antthrush	H	40			6:10
22/06/2012	Noe	none	clear	FS-11	Russet-crowned Warbler	H	50			6:10
22/06/2012	Noe	none	clear	FS-11	Gray-breasted Wood-Wren	H	25			6:10
22/06/2012	Noe	none	clear	FS-11	Gray-breasted Wood-Wren	H	25			6:10
22/06/2012	Noe	none	clear	FS-11	Nariño Tapaculo	H	30			6:10
22/06/2012	Noe	none	clear	FS-11	Rufous-breasted Antthrush	H	15			6:10
22/06/2012	Noe	none	clear	FS-11	Scale-crested Pygmy-Tyrant	S	8	10	p	6:10
22/06/2012	Noe	none	clear	FS-11	Slate-throated whitestart	S	10	15	P	6:10
22/06/2012	Noe	none	clear	FS-11	Beryl-spangled tanager	S	10	15	F	6:10
22/06/2012	Noe	none	clear	S-08	Dusky Bush-Tanager	H	15			6:25
22/06/2012	Noe	none	clear	S-08	Dusky Bush-Tanager	H	15			6:25
22/06/2012	Noe	none	clear	S-08	Dusky Bush-Tanager	H	15			6:25
22/06/2012	Noe	none	clear	S-08	White-sided Flower-piercer	H	30			6:25
22/06/2012	Noe	none	clear	S-08	Tricoloured Brush-finch	H	30			6:25
22/06/2012	Noe	none	clear	S-08	Rufous-breasted Antthrush	H	50			6:25
22/06/2012	Noe	none	clear	S-08	Booted Racket-tail	H	10			6:25
22/06/2012	Noe	none	clear	S-08	Toucan Barbet	H	50			6:25
22/06/201	Noe	none	clear	S-08	Band-tailed	S	40	40	Fl	6:25

2					Pigeon					
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	40	40	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	40	40	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	40	40	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	40	40	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	40	40	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/201	Noe	none	clear	S-08	Band-tailed	S	30	30	Fl	6:25

2					Pigeon					
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-08	Band-tailed Pigeon	S	30	30	Fl	6:25
22/06/2012	Noe	none	clear	S-09	Dusky Bush-Tanager	H	20			6:37
22/06/2012	Noe	none	clear	S-09	Gray-breasted Wood-Wren	H	25			6:37
22/06/2012	Noe	none	clear	S-09	Gray-breasted Wood-Wren	H	25			6:37
22/06/2012	Noe	none	clear	S-09	Rufous Breasted Antthrush	H	60			6:37
22/06/2012	Noe	none	clear	S-09	Nariño Tapaculo	H	25			6:37
22/06/2012	Noe	none	clear	S-09	Wattled Guan	H	100			6:37
22/06/2012	Noe	none	clear	S-09	Toucan Barbet	H	80			6:37
22/06/2012	Noe	none	clear	S-09	Golden-crowned Flycatcher	H	40			6:37
22/06/2012	Noe	none	clear	S-09	Band-tailed Pigeon	S	10	20	Fl	6:37
22/06/2012	Noe	none	clear	S-09	Band-tailed Pigeon	S	10	20	Fl	6:37
22/06/2012	Noe	none	clear	S-09	Band-tailed Pigeon	S	10	20	Fl	6:37
22/06/2012	Noe	none	clear	S-09	Band-tailed Pigeon	S	10	20	Fl	6:37
22/06/2012	Noe	none	clear	S-09	Band-tailed Pigeon	S	10	20	Fl	6:37
22/06/2012	Noe	none	clear	S-09	Golden Tanager	S	30	15	F	6:37
22/06/2012	Noe	none	clear	FS-12	Dusky Bush-Tanager	H	20			6:49
22/06/2012	Noe	none	clear	FS-12	Red-headed Barbet	H	10			6:49
22/06/2012	Noe	none	clear	FS-12	Gray-breasted Wood-Wren	H	40			6:49
22/06/2012	Noe	none	clear	FS-12	Wattled Guan	H	100			6:49
22/06/2012	Noe	none	clear	FS-12	Toucan Barbet	H	80			6:49
22/06/201	Noe	none	clear	FS-	Toucan Barbet	H	50			6:49

2				12						
22/06/2012	Noe	none	clear	FS-12	Toucan Barbet	H	50			6:49
22/06/2012	Noe	none	clear	S-10	Dusky Bush-Tanager	H	20			7:06
22/06/2012	Noe	none	clear	S-10	Long-tailed Antbird	H	50			7:06
22/06/2012	Noe	none	clear	S-10	Russet-crowned warbler	H	50			7:06
22/06/2012	Noe	none	clear	S-10	Glossy Black Thrush	H	35			7:06
22/06/2012	Noe	none	clear	S-10	Booted Racket-tail	H	15			7:06
22/06/2012	Noe	none	clear	S-10	Blue-winged Mountain Tanager	S	30	15	F	7:06
22/06/2012	Noe	none	clear	S-10	Band-tailed Pigeon	S	40	20	FL	7:06
22/06/2012	Noe	none	clear	S-10	Band-tailed Pigeon	S	40	20	FL	7:06
22/06/2012	Noe	none	clear	FS-13	Booted Racket-tail	H	10			7:20
22/06/2012	Noe	none	clear	FS-13	Dusky Bush Tanager	H	25			7:20
22/06/2012	Noe	none	clear	FS-13	Wattled Guan	H	80			7:20
22/06/2012	Noe	none	clear	FS-13	Red-billed Parrot	H	30			7:20
22/06/2012	Noe	none	clear	FS-13	Dark-backed Wood quail	H	80			7:20
22/06/2012	Noe	none	clear	FS-13	Nariño Tapaculo	H	25			7:20
22/06/2012	Noe	none	clear	FS-13	Toucan Barbet	H	70			7:20
22/06/2012	Noe	none	clear	FS-13	Golden-headed Quetzal	H	50			7:20
22/06/2012	Noe	none	clear	FS-13	Andean Solitaire	H	40			7:20
22/06/2012	Noe	none	clear	FS-13	Booted Racket-tail	S	5	15	P	7:20
22/06/2012	Noe	none	clear	FS-13	Booted Racket-tail	S	5	15	P	7:20
22/06/2012	Noe	none	clear	FS-14	Brown-capped Vireo	H	30			7:34

22/06/2012	Noe	none	clear	FS-14	Red-billed Parrot	H	30			7:34
22/06/2012	Noe	none	clear	FS-14	Nariño Tapaculo	H	30			7:34
22/06/2012	Noe	none	clear	FS-14	Violet-tailed Sylph	H	20			7:34
22/06/2012	Noe	none	clear	FS-14	Buff-tailed Coronet	S	15	10	P	7:34
22/06/2012	Noe	none	clear	FP-18	Plumbeous Pigeon	H	80			7:48
22/06/2012	Noe	none	clear	FP-18	Toucan Barbet	H	70			7:48
22/06/2012	Noe	none	clear	FP-18	Nariño Tapaculo	H	50			7:48
22/06/2012	Noe	none	clear	FP-18	Dusky Bush-Tanager	H	20			7:48
22/06/2012	Noe	none	clear	FP-18	Booted Racket-tail	H	10			7:48
22/06/2012	Noe	none	clear	FP-18	Golden Tanager	S	12	15	F	7:48
22/06/2012	Noe	none	clear	FP-18	Golden Tanager	S	12	15	F	7:48
22/06/2012	Noe	none	clear	FP-18	Blue-winged Mountain Tanager	S	20	10	F	7:48
22/06/2012	Noe	none	clear	FP-18	Blue-winged Mountain Tanager	S	20	10	F	7:48
22/06/2012	Noe	none	clear	FP-18	Tawny-bellied Hermit	S	2	2	FL	7:48
22/06/2012	Noe	none	clear	FP-18	Toucan Barbet	S	10	15	F	7:48
22/06/2012	Noe	none	clear	FP-18	Toucan Barbet	S	10	15	F	7:48
24/06/2012	Noe	none	clear	FP-28	Three-striped Warbler	H	50			6:53
24/06/2012	Noe	none	clear	FP-28	Andean Solitaire	H	60			6:53
24/06/2012	Noe	none	clear	FP-28	Andean Cock of the Rock	H	80			6:53
24/06/2012	Noe	none	clear	FP-28	Olive Finch	H	30			6:53
24/06/2012	Noe	none	clear	FP-28	Olive Finch	H	30			6:53
24/06/2012	Noe	none	clear	FP-28	Gray-breasted Wood-Wren	H	80			6:53

24/06/2012	Noe	none	clear	FP-28	Golden Crowned Fly Catcher	H	45			6:53
24/06/2012	Noe	none	clear	FP-28	Slate Throated White Star	H	35			6:53
24/06/2012	Noe	none	clear	FP-28	Rufous Breasted Antthrush	H	60			6:53
24/06/2012	Noe	none	clear	FP-28	Brown Inca	H	20			6:53
24/06/2012	Noe	none	clear	FP-28		S				6:53
24/06/2012	Noe	none	clear	FP-27	Uniform Antshrike	H	25			7:05
24/06/2012	Noe	none	clear	FP-27	Tawny-bellied Hermit	H	25			7:05
24/06/2012	Noe	none	clear	FP-27	Three-striped Warbler	H	25			7:05
24/06/2012	Noe	none	clear	FP-27	Andean Cock of the Rock	H	80			7:05
24/06/2012	Noe	none	clear	FP-27	Lineated Foliage-gleaner	H	30			7:05
24/06/2012	Noe	none	clear	FP-27	Tawny-bellied Hermit	S	5	5	FL	7:05
24/06/2012	Noe	none	clear	FP-26	Toucan Barbet	H	100			7:18
24/06/2012	Noe	none	clear	FP-26	Andean Solitaire	H	40			7:18
24/06/2012	Noe	none	clear	FP-26	Booted Racket-tail	H	20			7:18
24/06/2012	Noe	none	clear	FP-26	Slate Throated White Star	H	30			7:18
24/06/2012	Noe	none	clear	FP-26	Tawny-bellied Hermit	S	10	5	FL	7:18
24/06/2012	Noe	none	clear	FP-26	Wedge-billed Wood Creeper	S	30	10	P	7:18
24/06/2012	Noe	none	clear	FP-25	Immaculate Antbird	H	25			7:32
24/06/2012	Noe	none	clear	FP-25	Brown Inca	H	20			7:32
24/06/2012	Noe	none	clear	FP-25	Golden Crowned Fly Catcher	H	25			7:32
24/06/2012	Noe	none	clear	FP-25	Plumbeous Pigeon	H	80			7:32

24/06/2012	Noe	none	clear	FP-25	Plate-billed Mountain Toucan	H	100			7:32
24/06/2012	Noe	none	clear	FP-25	Orange-bellied Euphonia	H	50			7:32
24/06/2012	Noe	none	clear	FP-25	Orange-bellied Euphonia	H	50			7:32
24/06/2012	Noe	none	clear	FP-25	Gray-breasted Wood-Wren	H	25			7:32
24/06/2012	Noe	none	clear	FP-25	Booted Racket-tail	H	15			7:32
24/06/2012	Noe	none	clear	FP-25	Toucan Barbet	H	40			7:32
24/06/2012	Noe	none	clear	FP-25	Blue-winged Mountain Tanager	H	40			7:32
24/06/2012	Noe	none	clear	FP-25	Slate Throated White Star	H	20			7:32
24/06/2012	Noe	none	clear	FP-25	Mountain Woodcreeper	H	50			7:32
24/06/2012	Noe	none	clear	FP-25	Tyrannine Woodcreeper	H	70			7:32
24/06/2012	Noe	none	clear	FP-25	Mountain Wren	H	15			7:32
24/06/2012	Noe	none	clear	FP-25	Violet-tailed Sylph	S	2	4	FL	7:32
24/06/2012	Noe	none	clear	FP-24	Blue-winged Mountain Tanager	H	20			7:47
24/06/2012	Noe	none	clear	FP-24	Gray-breasted Wood-Wren	H	40			7:47
24/06/2012	Noe	none	clear	FP-24	Orange-bellied Euphonia	H	25			7:47
24/06/2012	Noe	none	clear	FP-24	Slate Throated White Star	H	30			7:47
24/06/2012	Noe	none	clear	FP-24	Violet-tailed Sylph	H	15			7:47
24/06/2012	Noe	none	clear	FP-24	Nariño Tapaculo	H	40			7:47
24/06/2012	Noe	none	clear	FP-24	Tyrannine Woodcreeper	H	20			7:47
24/06/2012	Noe	none	clear	FP-24	Violet-tailed Sylph	S	5	10	P	7:47

24/06/2012	Noe	none	clear	FP-24	Orange-bellied Euphonia	S	12	5	F	7:47
24/06/2012	Noe	none	clear	FP-24	Orange-bellied Euphonia	S	12	5	F	7:47
24/06/2012	Noe	none	clear	FP-23	Toucan Barbet	H	20			8:00
24/06/2012	Noe	none	clear	FP-23	Toucan Barbet	H	20			8:00
24/06/2012	Noe	none	clear	FP-23	Plumbeous Pigeon	H	50			8:00
24/06/2012	Noe	none	clear	FP-23	Brown Inca	H	15			8:00
24/06/2012	Noe	none	clear	FP-23	Rufous Breasted Antthrush	H	50			8:00
24/06/2012	Noe	none	clear	FP-23	Russet-crowned warbler	H	30			8:00
24/06/2012	Noe	none	clear	FP-23	Tyrannine Woodcreeper	H	20			8:00
24/06/2012	Noe	none	clear	FP-23	Gray-breasted Wood-Wren	H	30			8:00
24/06/2012	Noe	none	clear	FP-23	Slate Throated White Star	H	25			8:00
24/06/2012	Noe	none	clear	FP-23	Golden Tanager	H	20			8:00
24/06/2012	Noe	none	clear	FP-23	Red Billed Parrot	H	50			8:00
24/06/2012	Noe	none	clear	FP-23	Booted Raquet tail	H	10			8:00
24/06/2012	Noe	none	clear	FP-23	Metallic Green Tanager	H	20			8:00
24/06/2012	Noe	none	clear	FP-23	Golden Headed Quetzel	H	40			8:00
24/06/2012	Noe	none	clear	FP-23	Red Billled Parrot	S	20	30	FL	8:00
24/06/2012	Noe	none	clear	FP-23	Red Billed Parrot	S	20	30	FL	8:00
24/06/2012	Noe	none	clear	FP-22	Slate Throated White Star	H	25			8:13
24/06/2012	Noe	none	clear	FP-22	Red Billed Parrot	H	80			8:13
24/06/201	Noe	none	clear	FP-	Flavescent	H	25			8:13

2				22	Flycatcher					
24/06/2012	Noe	none	clear	FP-22	Russet-crowned warbler	H	40			8:13
24/06/2012	Noe	none	clear	FP-22	Orange-bellied Euphonia	H	15			8:13
24/06/2012	Noe	none	clear	FP-22	Immaculate Antbird	H	40			8:13
24/06/2012	Noe	none	clear	FP-22	Toucan Barbet	H	100			8:13
24/06/2012	Noe	none	clear	FP-22	Golden Headed Quetzel	S	15	15	FL	8:13
24/06/2012	Noe	none	clear	FP-22	Golden Headed Quetzel	S	15	15	FL	8:13
24/06/2012	Noe	none	clear	FP-22	Orange-bellied Euphonia	S	8	6	P	8:13
24/06/2012	Noe	none	clear	FP-21	Violet-tailed Sylph	H	15			8:28
24/06/2012	Noe	none	clear	FP-21	Russet-crowned warbler	H	20			8:28
24/06/2012	Noe	none	clear	FP-21	Nariño Tapaculo	H	40			8:28
24/06/2012	Noe	none	clear	FP-21	Flavescent Flycatcher	H	30			8:28
24/06/2012	Noe	none	clear	FP-21	Toucan Barbet	H	70			8:28
24/06/2012	Noe	none	clear	FP-21	Gray-breasted Wood-Wren	H	15			8:28
24/06/2012	Noe	none	clear	FP-21	Dusky bushed tanager	H	35			8:28
24/06/2012	Noe	none	clear	FP-21	Golden Headed Quetzel	H	80			8:28
24/06/2012	Noe	none	clear	FP-21	Slate Throated White Star	H	40			8:28
24/06/2012	Noe	none	clear	FP-21	Russet-crowned warbler	S	8	2	P	8:28
24/06/2012	Noe	none	clear	FP-21	Russet-crowned warbler	S	8	2	P	8:28

24/06/2012	Noe	none	clear	FP-21	Red Billed Parrot	S	5	20	FL	8:28
24/06/2012	Noe	none	clear	FP-21	Red Billed Parrot	S	5	20	FL	8:28
25/06/2012	Noe	none	cloudy, rain	S-03	Toucan Barbet	H	60			6:31
25/06/2012	Noe	none	cloudy, rain	S-03	White-tailed Tyrannulet	H	50			6:31
25/06/2012	Noe	none	cloudy, rain	S-03	Crimson-rumped Toucanet	H	70			6:31
25/06/2012	Noe	none	cloudy, rain	S-03	Gray-breasted Wood-Wren	H	40			6:31
25/06/2012	Noe	none	cloudy, rain	S-03	Gray-breasted Wood-Wren	H	25			6:31
25/06/2012	Noe	none	cloudy, rain	S-03	Dusky Brush Tananger	H	40			6:31
25/06/2012	Noe	none	cloudy, rain	S-03	Red-billed Parrot	S	50			6:31
25/06/2012	Noe	none	cloudy, rain	S-03	Red-billed Parrot	S	50			6:31
25/06/2012	Noe	none	cloudy, rain	S-03	Red-billed Parrot	S	50			6:31
25/06/2012	Noe	none	cloudy, rain	S-03	Band-tailed Pigeon	S	60	20	P	6:31
25/06/2012	Noe	none	cloudy, rain	S-04	Flavescent Flycatcher	H	25			6:47
25/06/2012	Noe	none	cloudy, rain	S-04	Flavescent Flycatcher	S	15	4	P	6:47
25/06/2012	Noe	none	cloudy, rain	S-04	Flavescent Flycatcher	S	15	4	P	6:47
25/06/2012	Noe	none	cloudy, rain	S-04	Slate Throated White Star	H	30			6:47
25/06/2012	Noe	none	cloudy, rain	S-04	Rufous Breasted Antthrush	H	30			6:47
25/06/2012	Noe	none	cloudy, rain	S-04	Gray-breasted Wood-Wren	H	40			6:47
25/06/2012	Noe	none	cloudy, rain	S-04	Tricoloured Brush-finch	H	50			6:47
25/06/2012	Noe	none	cloudy, rain	S-04	Olive Ground Yellow Throat	H	25			6:47
25/06/2012	Noe	none	cloudy, rain	S-04	Scale-Crested Pigmy Tyrant	H	50			6:47
25/06/2012	Noe	none	cloudy, rain	S-04	Gray-breasted Wood-Wren	H	25			6:47

25/06/2012	Noe	none	cloudy, rain	S-04	Violet-tailed Sylph	S	10	2	F	6:47
25/06/2012	Noe	none	cloudy, rain	S-04	Fawn-Breasted Brilliant	S	20	20	FL	6:47
25/06/2012	Noe	none	cloudy, rain	FS-05	Chestnut-capped Brush-finch	H	40			7:00
25/06/2012	Noe	none	cloudy, rain	FS-05	beryl-spangled tanager	H	15			7:00
25/06/2012	Noe	none	cloudy, rain	FS-05	Lineated Foliage-gleaner	S	10	10	P	7:00
25/06/2012	Noe	none	cloudy, rain	FS-05	Toni- bellied Hermit	H	25			7:00
25/06/2012	Noe	none	cloudy, rain	FS-05	Violet-tailed Sylph	H	20			7:00
25/06/2012	Noe	none	cloudy, rain	FP-05	Slate-throated whitestart	H	20			7:20
25/06/2012	Noe	none	cloudy, rain	FP-05	Violet-tailed Sylph	H	50			7:20
25/06/2012	Noe	none	cloudy, rain	FP-05	Toni- bellied Hermit	H	15			7:20
25/06/2012	Noe	none	cloudy, rain	FP-05	Rufous Breasted Antthrush	H	40			7:20
26/06/2012	Noe	none	clear	F-06	Toucan Barbet	S	4	15	F	6:08
26/06/2012	Noe	none	clear	F-06	Toucan Barbet	S	4	15	F	6:08
26/06/2012	Noe	none	clear	F-06	Crimson-rumped Toucanet	S	4	15	F	6:08
26/06/2012	Noe	none	clear	F-06	Crimaon-rumped Toucanet	S	4	15	F	6:08
26/06/2012	Noe	none	clear	F-06	Streak-necked Flycatcher	S	4	6	F	6:08
26/06/2012	Noe	none	clear	F-06	Andean Cock of the Rock	S	5	10	F	6:08
26/06/2012	Noe	none	clear	FP-06		S				6:20
26/06/2012	Noe	none	clear	FS-07	Brown Violetear	S	5	8	R	6:31
26/06/2012	Noe	none	clear	FS-07	Tropical Paroola	S	12	10	F	6:31

26/06/2012	Noe	none	clear	FS-07	Booted Racket-Tail	S	4	10	R	6:31
26/06/2012	Noe	none	clear	FS-07	Booted Racket-Tail	S	4	10	R	
26/06/2012	Noe	none	clear	FS-08		S				6:45
26/06/2012	Noe	none	clear	FS-09		S				7:00
26/06/2012	Noe	none	clear	FS-10		S				7:13
26/06/2012	Noe	none	clear	S-05	Ornate Flycatcher	S	15	10	R	7:26
26/06/2012	Noe	none	clear	S-05	Purple-Bibbed Whitetip	S	10	4	F	7:26
26/06/2012	Noe	none	clear	S-06	Booted Racket-Tail	S	10	8	R	7:39
26/06/2012	Noe	none	clear	S-06	Booted Racket-Tail	S	10	8	R	7:39
26/06/2012	Noe	none	clear	S-06	Tawny-Bellied Hermit	S	5	2	FL	7:39
26/06/2012	Noe	none	clear	S-07	Orange-Bellied Euphonia	S	15	10	F	7:55
26/06/2012	Noe	none	clear	S-07	Orange-Bellied Euphonia	S	15	10	F	7:55
26/06/2012	Noe	none	clear	S-07	Beryl-Spangled Tanager	S	20	10	F	7:55
26/06/2012	Noe	none	clear	S-07	Beryl-Spangled Tanager	S	20	10	F	7:55
26/06/2012	Noe	none	clear	FP-07	Golden Tanager	S	20	15	F	8:09
26/06/2012	Noe	none	clear	FP-07	Golden Tanager	S	20	15	F	8:09
26/06/2012	Noe	none	clear	FS-06	Gray-Breasted Wood-Wren	H	25			6:08
26/06/2012	Noe	none	clear	FS-06	Slate-Throated Whitestart	H	20			6:08
26/06/2012	Noe	none	clear	FS-06	Brown-Capped Vireo	H	30			6:08
26/06/2012	Noe	none	clear	FS-06	Booted Racket-Tail	H	10			6:08
26/06/2012	Noe	none	clear	FS-06	Rufous-Breasted	H	30			6:08

					Antthrush					
26/06/2012	Noe	none	clear	FS-06	Wedge- Billed Woodcreeper	H	25			6:08
26/06/2012	Noe	none	clear	FS-06	Tawny-Bellied Hermit	H	20			6:08
26/06/2012	Noe	none	clear	FS-06	Andean Solitaire	H	25			6:08
26/06/2012	Noe	none	clear	FP-06	Rufous-Breasted Antthrush	H	40			6:20
26/06/2012	Noe	none	clear	FP-06	Rufous-Breasted Antthrush	H	40			6:20
26/06/2012	Noe	none	clear	FP-06	Slate-Throated Whitestart	H	60			6:20
26/06/2012	Noe	none	clear	FP-06	Brown-Capped Vireo	H	20			6:20
26/06/2012	Noe	none	clear	FP-06	Uniform Antshrike	H	50			6:20
26/06/2012	Noe	none	clear	FP-06	Tropical Parula	H	30			6:20
26/06/2012	Noe	none	clear	FP-06	Gray-Breasted Wood-Wren	H	50			6:20
26/06/2012	Noe	none	clear	FP-06	Metallic-Green Tanager	H	20			6:20
26/06/2012	Noe	none	clear	FP-06	Three- Striped Warbler	H	25			6:20
26/06/2012	Noe	none	clear	FP-06	Slaty- Capped Flycatcher	H	25			6:20
26/06/2012	Noe	none	clear	FP-06	Orange-Bellied Euphonia	H	25			6:20
26/06/2012	Noe	none	clear	FP-06	Wedge- Billed Hummingbird	H	50			6:20
26/06/2012	Noe	none	clear	FP-06	Lineated Foliage-Gleaner	H	35			6:20
26/06/2012	Noe	none	clear	FP-06	Powerful Woodpecker	H	80			6:20
26/06/2012	Noe	none	clear	FS-07	Olive Finch	H	20			6:31
26/06/2012	Noe	none	clear	FS-07	Wattled Guan	H	100			6:31
26/06/2012	Noe	none	clear	FS-07	Gray-Breasted Wood-Wren	H	20			6:31
26/06/201	Noe	none	clear	FS-	Booted	H	15			6:31

2				07	Racket-Tail					
26/06/2012	Noe	none	clear	FS-07	Ornate Flycatcher	H	25			6:31
26/06/2012	Noe	none	clear	FS-07	Plain Antvireo	H	25			6:31
26/06/2012	Noe	none	clear	FS-07	Gray-Breasted Wood-Wren	H	30			6:31
26/06/2012	Noe	none	clear	FS-07	Lineated Foliage-Gleaner	H	25			6:31
26/06/2012	Noe	none	clear	FS-07	Orange-Bellied Euphonia	H	15			6:31
26/06/2012	Noe	none	clear	FS-07	Golden Tanager	H	20			6:31
26/06/2012	Noe	none	clear	FS-07	Rufous-Breasted Antthrush	H	45			6:31
26/06/2012	Noe	none	clear	FS-07	Gray-Breasted Wood-Wren	H	10			6:31
26/06/2012	Noe	none	clear	FS-07	Montane Woodcreeper	H	30			6:31
26/06/2012	Noe	none	clear	FS-08	Brown Violetear	H	25			6:45
26/06/2012	Noe	none	clear	FS-08	Brown Violetear	H	25			6:45
26/06/2012	Noe	none	clear	FS-08	Red- Headed Barbet	H	60			6:45
26/06/2012	Noe	none	clear	FS-08	Gray-Breasted Wood-Wren	H	40			6:45
26/06/2012	Noe	none	clear	FS-08	Gray-Breasted Wood-Wren	H	70			6:45
26/06/2012	Noe	none	clear	FS-08	Wattled Guan	H	100			6:45
26/06/2012	Noe	none	clear	FS-08	Violet- Tailed Sylph	H	50			6:45
26/06/2012	Noe	none	clear	FS-08	Narino Tapaculo	H	25			6:45
26/06/2012	Noe	none	clear	FS-08	Immaculate Antbird	H	80			6:45
26/06/2012	Noe	none	clear	FS-08	Plumbeous Pigeon	H	80			6:45
26/06/2012	Noe	none	clear	FS-08	Gray-Breasted Wood-Wren	H	30			6:45
26/06/2012	Noe	none	clear	FS-08	Gray-Breasted Wood-Wren	H	30			6:45

26/06/2012	Noe	none	clear	FS-08	Orange-Bellied Euphonia	H	20			6:45
26/06/2012	Noe	none	clear	FS-08	Chestnut-Capped Brush- Finch	H	25			6:45
26/06/2012	Noe	none	clear	FS-08	Rufous-Breasted Antthrush	H	60			6:45
26/06/2012	Noe	none	clear	FS-08	Golden-Headed Quetzal	H	80			6:45
26/06/2012	Noe	none	clear	FS-08	Brown-Capped Vireo	H	30			6:45
26/06/2012	Noe	none	clear	FS-08	Tropical Parula	H	30			6:45
26/06/2012	Noe	none	clear	FS-08	Golden-Headed Quetzal	H	25			6:45
26/06/2012	Noe	none	clear	FS-09	Immaculate Antbird	H	25			7:00
26/06/2012	Noe	none	clear	FS-09	Immaculate Antbird	H	25			7:00
26/06/2012	Noe	none	clear	FS-09	Slate-Throated Whitestart	H	20			7:00
26/06/2012	Noe	none	clear	FS-09	Immaculate Antbird	H	30			7:00
26/06/2012	Noe	none	clear	FS-09	Three- Striped Warbler	H	25			7:00
26/06/2012	Noe	none	clear	FS-09	Brown Violetear	H	40			7:00
26/06/2012	Noe	none	clear	FS-09	Rufous-Breasted Antthrush	H	60			7:00
26/06/2012	Noe	none	clear	FS-09	Gray-Breasted Wood-Wren	H	40			7:00
26/06/2012	Noe	none	clear	FS-09	Wattled Guan	H	80			7:00
26/06/2012	Noe	none	clear	FS-09	Booted Racket-Tail	H	15			7:00
26/06/2012	Noe	none	clear	FS-09	Brown Inca	H	10			7:00
26/06/2012	Noe	none	clear	FS-09	Tropical Parula	H	30			7:00
26/06/2012	Noe	none	clear	FS-09	Southern Nightingale-	H	40			7:00

					Wren					
26/06/2012	Noe	none	clear	FS-10	Spotted Woodcreeper	H	40			7:13
26/06/2012	Noe	none	clear	FS-10	Tricolored Brush- Finch	H	60			7:13
26/06/2012	Noe	none	clear	FS-10	Toucan Barbet	H	150			7:13
26/06/2012	Noe	none	clear	FS-10	Toucan Barbet	H	150			7:13
26/06/2012	Noe	none	clear	S-06	Tropical Parula	H	25			7:39
26/06/2012	Noe	none	clear	S-06	Ornate Flycatcher	H	40			7:39
26/06/2012	Noe	none	clear	S-06	Brown Inca	H	50			7:39
26/06/2012	Noe	none	clear	S-06	Crimson-Rumped Toucanet	H	80			7:39
26/06/2012	Noe	none	clear	S-06	Spotted Woodcreeper	H	60			7:39
26/06/2012	Noe	none	clear	S-06	Plumbeous Pigeon	H	80			7:39
26/06/2012	Noe	none	clear	S-06	Tropical Parula	H	30			7:39
26/06/2012	Noe	none	clear	S-06	Andean Solitaire	H	40			7:39
26/06/2012	Noe	none	clear	S-06	Toucan Barbet	H	80			7:39
26/06/2012	Noe	none	clear	S-06	Golden Tanager	H	25			7:39
26/06/2012	Noe	none	clear	S-06	Gray-Breasted Wood-Wren	H	40			7:39
26/06/2012	Noe	none	clear	S-07	Tropical Parula	H	25			7:55
26/06/2012	Noe	none	clear	S-07	Wattled Guan	H	80			7:55
26/06/2012	Noe	none	clear	S-07	Metallic-Green Tanager	H	20			7:55
26/06/2012	Noe	none	clear	S-07	Plumbeous Pigeon	H	80			7:55
26/06/2012	Noe	none	clear	S-07	Booted Racket-Tail	H	20			7:55
26/06/2012	Noe	none	clear	S-07	Beryl-Spangled Tanager	H	20			7:55
26/06/201	Noe	none	clear	S-07	Andean	H	80			7:55

2					Pygmy- Owl					
26/06/2012	Noe	none	clear	S-07	Golden-Winged Manakin	H	25			7:55
26/06/2012	Noe	none	clear	FP-07	Orange-Bellied Euphonia	H	50			8:09
26/06/2012	Noe	none	clear	FP-07	Tropical Parula	H	30			8:09
26/06/2012	Noe	none	clear	FP-07	Three- Striped Warbler	H	10			8:09
26/06/2012	Noe	none	clear	FP-07	Crimson-Rumped Toucanet	H	40			8:09
26/06/2012	Noe	none	clear	FP-07	White-Winged Tanager	H	30			8:09
26/06/2012	Noe	none	clear	FP-07	Rufous-Breasted Antthrush	H	70			8:09
26/06/2012	Noe	none	clear	FP-07	Slate-Throated Whitestart	H	30			8:09
26/06/2012	Noe	none	clear	FP-07	Bananaquit	H	15			8:09
26/06/2012	Noe	none	clear	FP-07	Golden Tanager	H	40			8:09
26/06/2012	Noe	none	clear	FP-07	Brown-Capped Vireo	H	35			8:09
26/06/2012	Noe	none	clear	FP-07	Gray-Breasted Wood-Wren	H	30			8:09
27/06/2012	Noe	none	clear	FP-19	Golden Headed Quetzel	H	40			6:06
27/06/2012	Noe	none	clear	FP-19	Golden Headed Quetzel	H	40			6:06
27/06/2012	Noe	none	clear	FP-19	Wattled Guan	H	50			6:06
27/06/2012	Noe	none	clear	FP-19	Toucan Barbet	H	60			6:06
27/06/2012	Noe	none	clear	FP-19	Toucan Barbet	H	60			6:06
27/06/2012	Noe	none	clear	FP-19	Toucan Barbet	H	60			6:06
27/06/2012	Noe	none	clear	FP-19	Dusky Bush Tanager	H	15			6:06

27/06/2012	Noe	none	clear	FP-19	Dusky Bush Tanager	H	15			6:06
27/06/2012	Noe	none	clear	FP-19	Plate-billed Mountain Toucan	H	80			6:06
27/06/2012	Noe	none	clear	FP-19	Slate Throated White Star	H	25			6:06
27/06/2012	Noe	none	clear	FP-19	Andean Solitaire	H	60			6:06
27/06/2012	Noe	none	clear	FP-19	Gray-Breasted Wood-Wren	H	20			6:06
27/06/2012	Noe	none	clear	FP-19	Gray-Breasted Wood-Wren	H	20			6:06
27/06/2012	Noe	none	clear	FP-19	Toucan Barbet	H	80			6:06
27/06/2012	Noe	none	clear	FP-19	Toucan Barbet	H	80			6:06
27/06/2012	Noe	none	clear	FP-19	Orange-Bellied Euphonia	H	15			6:06
27/06/2012	Noe	none	clear	FP-19	Rufous-Breasted Antthrush	H	50			6:06
27/06/2012	Noe	none	clear	FP-19		S				6:06
27/06/2012	Noe	none	clear	S-11	Dusky Bush Tanager	H	25			6:19
27/06/2012	Noe	none	clear	S-11	Dusky Bush Tanager	H	25			6:19
27/06/2012	Noe	none	clear	S-11	Gray-Breasted Wood-Wren	H	35			6:19
27/06/2012	Noe	none	clear	S-11	Olive-Crowned Yellow throat	H	60			6:19
27/06/2012	Noe	none	clear	S-11	Narino Tapaculo	H	80			6:19
27/06/2012	Noe	none	clear	S-11	Chesnut caped Brush-Finch	H	70			6:19
27/06/2012	Noe	none	clear	S-11	Tyrannine Woodcreeper	H	80			6:19
27/06/2012	Noe	none	clear	S-11	Brown Violetear	S	15	6	P	6:19
27/06/2012	Noe	none	clear	S-11	Booted Raquet tail	S	5	10	P	6:19
27/06/2012	Noe	none	clear	S-11	Band-tailed Pigeon	S	60	15	FL	6:19

27/06/2012	Noe	none	clear	S-11	Band-tailed Pigeon	S	60	15	FL	6:19
27/06/2012	Noe	none	clear	S-11	Band-tailed Pigeon	S	60	15	FL	6:19
27/06/2012	Noe	none	clear	S-11	Blue-winged mountain-Tanger	S	15	10	P	6:19
27/06/2012	Noe	none	clear	S-12	Blue-and-White swallow	S	40	20	FL	6:34
27/06/2012	Noe	none	clear	S-12	Red-billed Parrot	S	80	20	FL	6:34
27/06/2012	Noe	none	clear	S-12	Red-billed Parrot	S	80	20	FL	6:34
27/06/2012	Noe	none	clear	S-12	Brown Capped Virio	S	15	8	P	6:34
27/06/2012	Noe	none	clear	S-12	Toucan Barbet	H	80			6:34
27/06/2012	Noe	none	clear	S-12	Toucan Barbet	H	80			6:34
27/06/2012	Noe	none	clear	S-12	Toucan Barbet	H	80			6:34
27/06/2012	Noe	none	clear	S-12	Toucan Barbet	H	80			6:34
27/06/2012	Noe	none	clear	S-12	Dusky Bush-Tanager	H	35			6:34
27/06/2012	Noe	none	clear	S-12	Dusky Bush-Tanager	H	35			6:34
27/06/2012	Noe	none	clear	S-12	Russet-crowned warbler	H	25			6:34
27/06/2012	Noe	none	clear	S-12	Plumbeous Pigeon	H	80			6:34
27/06/2012	Noe	none	clear	S-12	Smoke-Colored Pewee	H	30			6:34
27/06/2012	Noe	none	clear	S-12	White-Sided Flowerpiercer	H	25			6:34
27/06/2012	Noe	none	clear	S-12	Tricolored Brush- Finch	H	50			6:34
27/06/2012	Noe	none	clear	S-12	Plate-billed Mountain Toucan	H	80			6:34
27/06/2012	Noe	none	clear	S-12	Gray-Breasted Wood-Wren	H	35			6:34
27/06/201	Noe	none	clear	FS-	Dusky Bush-	H	10			6:47

2				15	Tanager					
27/06/2012	Noe	none	clear	FS-15	Dusky Bush-Tanager	H	10			6:47
27/06/2012	Noe	none	clear	FS-15	Plumbeous Pigeon	H	50			6:47
27/06/2012	Noe	none	clear	FS-15	Golden-crowned Flycatcher	H	40			6:47
27/06/2012	Noe	none	clear	FS-15	White-sided Flowerpiercer	H	20			6:47
27/06/2012	Noe	none	clear	FS-15	Narino Tapaculo	H	20			6:47
27/06/2012	Noe	none	clear	FS-15	Masked Trogon	H	20			6:47
27/06/2012	Noe	none	clear	FS-15	Plate-billed Mountain Toucan	H	60			6:47
27/06/2012	Noe	none	clear	FS-15	Toucan Barbet	H	80			6:47
27/06/2012	Noe	none	clear	FS-15	Rufuss Breasted Anthrush	H	20			6:47
27/06/2012	Noe	none	clear	FS-15	Booted Raquet tail	H	10			6:47
27/06/2012	Noe	none	clear	FS-15	Russet-crowned warbler	H	35			6:47
27/06/2012	Noe	none	clear	FS-15	Plumbeous Pigeon	H	70			6:47
27/06/2012	Noe	none	clear	FS-15		S				6:47
27/06/2012	Noe	none	clear	S-15	Rosa Ground Warbler	H	55			6:47
27/06/2012	Noe	none	clear	S-15	Three colored Brass Finch	H	45			6:47
27/06/2012	Noe	none	clear	S-15	Dusky Bush Tanager	H	35			6:47
27/06/2012	Noe	none	clear	S-15	Crimson Rumpt	H	50			6:47
27/06/2012	Noe	none	clear	S-15	Slate Throated White Star	H	10			6:47
27/06/2012	Noe	none	clear	S-15	Road Side Hawk	H	70			6:47
27/06/2012	Noe	none	clear	S-15	Dark back wood Warbler	H	80			6:47
27/06/201	Noe	none	clear	S-15	Golden	S	12	10	P	6:47

2					Tanager					
27/06/2012	Noe	none	clear	S-15	Barrel Spangled Tanager	S	10	10	P	6:47
27/06/2012	Noe	none	clear	S-15	Barrel Spangled Tanager	S	10	10	P	6:47
27/06/2012	Noe	none	clear	S-15	Golden Headed Quetzel	S	20	10	P	6:47
27/06/2012	Noe	none	clear	FS-15	Russet-crowned warbler	H	20			7:17
27/06/2012	Noe	none	clear	FS-15	Russet-crowned warbler	H	20			7:17
27/06/2012	Noe	none	clear	FS-15	Red Billed Parrot	H	60			7:17
27/06/2012	Noe	none	clear	FS-15	Dusky Bush Tanager	H	30			7:17
27/06/2012	Noe	none	clear	FS-15	Booted Raquet tail	H	15			7:17
27/06/2012	Noe	none	clear	FS-15	Long Tailed Antbird	H	20			7:17
27/06/2012	Noe	none	clear	FS-15	Mountain Woodcreeper	H	40			7:17
27/06/2012	Noe	none	clear	FS-15	Golden Headed Quetzel	H	70			7:17
27/06/2012	Noe	none	clear	FS-15	Blue Winged Mountain Tanager	H	20			7:17
27/06/2012	Noe	none	clear	FS-15	Narino Tapaculo	H	30			7:17
27/06/2012	Noe	none	clear	FS-15	Toni- bellied Hermit	S	3	2	FL	7:17
27/06/2012	Noe	none	clear	FS-15	Violet tailed Sylph	S	4	10	P	7:17
27/06/2012	Noe	none	clear	S-14	Dusky Bush Tanager	H	10			7:32
27/06/2012	Noe	none	clear	S-14	Dusky Bush Tanager	H	10			7:32
27/06/2012	Noe	none	clear	S-14	Russet-crowned warbler	H	15			7:32
27/06/201	Noe	none	clear	S-14	Road Side	H	80			7:32

2					Hawk					
27/06/2012	Noe	none	clear	S-14	Brown Capped Virio	H	60			7:32
27/06/2012	Noe	none	clear	S-14	Violet tailed Sylph	H	30			7:32
27/06/2012	Noe	none	clear	S-14	Plate-billed Mountain Toucan	H	40			7:32
27/06/2012	Noe	none	clear	S-14	Plumbeous Pigeon	H	50			7:32
27/06/2012	Noe	none	clear	S-14	Toucan Barbet	H	70			7:32
27/06/2012	Noe	none	clear	S-14	Beryl-Spangled Tanager	S	4	10	P	7:32
27/06/2012	Noe	none	clear	S-14	Beryl-Spangled Tanager	S	20	5	E	7:32
27/06/2012	Noe	none	clear	S-14	Beryl-Spangled Tanager	S	10	8	F	7:32
27/06/2012	Noe	none	clear	S-14	Beryl-Spangled Tanager	S	10	8	F	7:32
27/06/2012	Noe	none	clear	FP-20	Plate-billed Mountain Toucan	H	25			7:45
27/06/2012	Noe	none	clear	FP-20	Plate-billed Mountain Toucan	H	25			7:45
27/06/2012	Noe	none	clear	FP-20	Orange-Bellied Euphonia	H	20			7:45
27/06/2012	Noe	none	clear	FP-20	Masked Floweredpiercer	H	20			7:45
27/06/2012	Noe	none	clear	FP-20	White-Sided Flowerpiercer	H	50			7:45
27/06/2012	Noe	none	clear	FP-20	Gray-Breasted Wood-Wren	H	25			7:45
27/06/2012	Noe	none	clear	FP-20	Blue Winged Mountain Tanager	H	30			7:45
27/06/2012	Noe	none	clear	FP-20	Blue Winged Mountain Tanager	H	30			7:45

27/06/2012	Noe	none	clear	FP-20	Blue Winged Mountain Tanager	H	30			7:45
27/06/2012	Noe	none	clear	FP-20	Plate-billed Mountain Toucan	S	20	15	P	7:45
27/06/2012	Noe	none	clear	FP-20	Plate-billed Mountain Toucan	S	20	15	P	7:45
27/06/2012	Noe	none	clear	FP-20	Beryl-Spangled Tanager	S	15	15	P	7:45
27/06/2012	Noe	none	clear	FP-20	Beryl-Spangled Tanager	S	15	15	P	7:45

Appendix C: Example Calculations

1. To calculate what percent of the bird data collected was of Toucan Barbets, I divided the number of Toucan Barbets by the total number of birds collected.

   For example with the 2011 data:

   $$\frac{44}{752} \approx 5.88\%$$

2. To calculate the average number of Toucan Barbet birds seen or heard per a location, I divided the number of birds recorded by the number of locations visited

   For example with the 2011 silvapasture density:

   $$\frac{11}{19} \approx 0.52$$

3. To calculate the percent of birds doing various activities at each type of forest, I divided the number of Toucan Barbets doing the activity by the number of birds recorded in that type of forest.

   For example with my 2012 data calculating the percent of birds found in Primary Forest that were feeding:

   $$\frac{2}{15} \approx 13.33\%$$