COLOMBIAN EBA PROJECT

RAPID BIODIVERSITY ASSESSMENTS AND CONSERVATION EVALUATIONS IN THE COLOMBIAN ANDES: NORTHEAST ANTIOQUIA & HIGHLANDS OF SERRANÍA DE LOS CHURUMBELOS

EDITED BY THOMAS M. DONEGAN & PAUL G.W. SALAMAN

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"Rains flooded the forest, the rivers became torrents, and finally, after seventeen days, the men returned sick and exhausted to Pitalito."

January 1943, Prof. Richard E. Schultes exploration of the upper Río Villalobus (Davis 1996, pp. 310) ~location of fieldwork in 1999

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CONTENTS

2

CONTENTS	2
EXECUTIVE SUMMARY	3
RESUMEN EJECUTIVO	5
SPONSORS AND ACKNOWLEDGEMENTS	7
Abbreviations	7
INTRODUCTION	8
Physical geography	8
Serranía de los Churumbelos	8
Northeast Antioquia	10
Study sites	11
Serranía de los Churumbelos	12
Expedition translocation justification	12
Northeast Antioquia	12
Expedition field itinerary	12
Location of study sites and fieldwork effort	13
RAPID BIODIVERSITY ASSESSMENT	14
Plants ~ Botánica	14
Birds ~ Aves	15
Amphibians and reptiles ~ Herpetos	23
Mammals ~ Mamiferos	26
CONSERVATION ASSESSMENT	28
1. Serrania de los Churumbelos	28
Biological Importance	28
Conservation feasibility	20 20
2 Northeast Antioquie	29
2. Normeast Annoquia Biological Importance	30
Vulnerability assessment	30
Conservation feasibility	31
REFERENCES	32
APPENDICES	33
Appendix I: Systematic inventory of birds recorded in Serranía de los	00
Churumbelos	33
Appendix II: Systematic inventory of birds recorded in northeast Antioquia	36
Appendix III: Bird specimens collected during EBA '99 expedition in	
Serranía de los Churumbelos (July 1999) and northeast Antioquia	
(August 1999)	38
Appendix IV: Inventory of Reptiles and Amphibians captured at each site in	
Serranía de los Churumbelos	40
Appendix V: Expedition Budget	41
* -	

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EXECUTIVE SUMMARY

3

Colombian EBA Project '99 is an Anglo-Colombian student initiative which conducted rapid biodiversity surveys and conservation assessments in the Colombian Andes in the Summer of 1999. As a follow-up expedition to "Colombia '98", our experienced 5-person team completed six flora and fauna study sites at elevational steps along two altitudinal transects of the Central and Eastern Cordilleras of Colombia from July to September 1999.

The aim was to document as fully and effectively as possible the biodiversity of our study areas, using standardised methods in order to collect comparable data and have targeted searches for species at risk. Fieldwork concentrated on birds, plants, amphibians, reptiles and mammals. A 1000m transect was used at each study area along which mist-nets, were placed, and direct observations and collection occurred, with additional information gathered from informal interviews with local hunters. These assessments were urgently needed in order to obtain biological information, which is planned to lead to the conservation of two highly threatened and poorly-known regions.

This Preliminary Report presents the results and conservation assessment from two regions investigated in the Colombian Andes: (i) **Serranía de los Churumbelos**, eastern slope of the Cordillera Oriental (seven study sites including three locations from 1999; 350-700-1,100-1,500-1,900-2,200-2,450 m asl) and (ii) **northeast Antioquia**, Cordillera Central (three lowland and foothill sites; 300-800-1,550 m asl).

1. Serranía de los Churumbelos

Study Sites were situated at SS1 - lowland humid forest (300 m); SS2 - foothill humid forest (700 m); SS3 - premontane very humid forest (1,100 m); SS4 – upper premontane humid forest (1,450 m); SS5 – lower montane humid forest (1900 m); SS6 - montane cloud forest (2,200 m); SS7 – upper montane cloud forest (2,450 m). The three upper elevation sites were studied in 1999, to complete the altitudinal analysis of habitats and associated biota from Amazonia through foothills to montane forest on the eastern slope of the Cordillera Oriental, Colombia. A total of 45 fieldwork days with 324 person days effort was employed over the two years.

Detailed **botanical** descriptions of each site were completed. SS 3 to SS 7 were found to correspond closest to the Northern Andean characterisation, with SS 1 and SS 2 resembling Amazonia North Ecoregion. Several new species were discovered (in <u>Gesneriaceae</u>, <u>Piperaceae</u> and others). Increasing elevation corresponded to a lower canopy (30 to 10 m) and increasing epiphyte diversity. A high diversity of plant species in primary forest was encountered at all sites, excellent for conservation.

Using observation and mist-netting, a total of 421 **bird** species have been registered in Serranía de los Churumbelos, including the addition of 93 species in 1999 to those recorded in 1998. A total of 2,834 mist-net captures (1,057 in 1999) were made up of 229 species over 142,730 Mist-net Metre Hours. A total of two Threatened and 10 Near-Threatened species were recorded, with five Ecuador-Peru East Andes EBA (SS2 – SS4) and four Colombian Inter-Andean Slopes EBA (SS5 – SS7) endemics recorded. It is estimated that the probable total bird species inventory exceeds 550 species: an exceptional diversity, making the Serranía a global avian "hotspot" and extremely important for bird diversity.

A total of 46 species of **amphibians** (30 spp.) **and reptiles** (16 spp.) were recorded in 1998 and 1999. Many poorly-known species were recorded, with several significant range extensions including two new species for Colombia. Several unidentified individuals potentially relate to undescribed species. **Mammals** registered include Spectacled Bear *Tremarctos ornatus* and Mountain Tapir *Tapirus pinchaque*.

Our **Conservation assessment** draws attention to the many biological justifications, and critical urgency for conservation to be implemented in Serranía de los Churumbelos, as road construction projects and uncontrolled colonisation threaten the region. The Serranía de los Churumbelos encompasses an immense variety of ecosystems, with a complex topography and variable climatic conditions, influencing an outstandingly high biodiversity. The direct biological justifications for the implementation of conservation are many. The eastern slope of the Andes has been subject to great human population pressures and associated habitat degradation in recent years, but fortunately the Churumbelos Mountains have largely avoided the catastrophic human impact that other regions have suffered. However, threats to the area associated to the recently completed Mocoa-Bogotá highway, the proposed Puerto Asís-Florencia road, and the recent discovery and exploitation of petroleum and precious metals will lead to escalating human encroachment, exploitation and deforestation.

Colombian EBA Project '99 and Colombia '98 demonstrate the great conservation importance of, and looming threats to, the Serranía de los Churumbelos. Our conclusions strongly support the idea of legal protection. It is important to incorporate the entire altitudinal gradient from lowland humid forest to cloud forest, maximising the biodiversity of any protected area. Perhaps the most feasible protective measure would be in the form of a Parque Régional Natural administered by CRC. Another plan already proposed by the Colombian National Parks Authority following our work involves extending Parque Nacional Natural Cueva de los Guácharos into the Churumbelos. The third phase of the project is now being implemented to develop a conservation strategy for the entire Serranía, involving the CRC, expedition team members, the Parks Authority, and local communities. The final report will specify a conservation strategy for future investigations and protection of the Serranía de los Churumbelos.

4

2. Northeast Antioquia

In the north-eastern Cordillera Central and mid-Magdalena valley, Study Sites were situated at SS1 - lowland humid forest (300 m); SS2 - foothill humid forest (800 m); and SS3 - premontane humid forest (1,550 m). A total of 14 fieldwork days with 70 person days effort in August 1999.

Detailed **botanical** descriptions of each site were completed, with SS 1 and SS 2 resembling Northern Colombia-Nechí Ecoregions and SS3 containing characteristics of the North Andean Ecoregion. Good primary forest, with a high variety of plant species was encountered at all sites, although increasing epiphyte content and changing flora groups was most prominent between SS1/2 with SS3.

A total of 318 **bird** species were registered with observation and mist-netting, with a total of 811 mist-net captures of 92 species. Avifauna assemblages showed close affinities between SS1 and SS2, with SS3 being highly distinct. A total of 3 Threatened and 6 Near-Threatened species were recorded, with 11 Endemic Bird Area endemics. Notably range and/or elevation extensions for 40 species were recorded. The most notable find was a new species for science in the genus *Lipaugus*. Conservation measures in this area should be instigated as a matter of extreme urgency, especially in lowland areas to protect the Blue-knobbed Curassow *Crax alberti* and premontane areas for the new species of *Lipaugus* and many other Threatened species.

12 species of **amphibians** (9 spp.) and **reptiles** (3 spp.) were recorded, including several range extensions, and one species described as recently as 1997. With several poorly-known or unknown species on both transects, SS2 and SS3 in particular appear important areas for conservation, based on limited herpetological results. **Mammals** recorded include the first evidence of Spectacled Bear *Tremarctos ornatus* in Serranía de San Lucas, and sightings of 6 Primates (5 of which are Threatened species): Silvery-brown Bare-face Tamarin *Saguinus leucopus*, Lemurine Night Monkey *Aotus* (*l.) lemurinus*, White-fronted Capuchin Monkey *Cebus albifrons*, Red Howler Monkey *Alouatta seniculus*, Common Woolly Monkey *Lagothrix lagothricha* and (White-bellied?) Spider Monkey *Ateles sp. (belzebuth?)*. Jaguar *Panthera onca* was photographed in captivity.

Conservation assessment: The conservation situation in the north-eastern Antioquia (Central Cordillera and Serranía de San Lucas) is an ecological catastrophe. Gold-mining was rampant across the region, contaminating freshwater and endangering wildlife in even the remotest of locations. Subsequent colonisation and deforestation has been on a scale unseen in Colombia in recent years. The region suffers from local government apathy, severe political turmoil, coca and coffee production, and frequent armed conflict. Based on the difference between aerial maps in 1995 and surveys in 1999, we consider that at least 30% forest cover has been lost in Serranía de San Lucas area and surrounding lowlands; an area once considered the largest tract of forest in north-western South America.

The future plight of the endemic Blue-knobbed Curassow and other species endemic to the northern lowlands of Colombia is very bleak. And above 1000 m, only a few isolated forest patches survive. However, owing to the foresight of one farmer, Luis Angel Ramirez, 300 ha of primary premontane humid forest at 1,500 - 1,820 m. has been set aside with all forms of human intervention prohibited, despite immense social and economic pressures. This land was recently purchased by the local environmental authority, CORANTIOQUIA. It is hoped that this newly-protected region can be extended and enforced further into the highly-threatened lowland and foothill areas.

RESUMEN EJECUTIVO

5

El **Proyecto EBA de Colombia '99** es una iniciativa estudiantil Anglo-Colombiana que llevó a cabo evaluaciones rápidas de la biodiversidad y de la conservación en los Andes colombianos durante julio-agosto de 1999. Esto como una continuación a la expedición "Colombia '98", nuestro equipo de cinco experimentadas personas completaron seis sitios de estudio de flora y fauna a lo largo de dos gradientes altitudinales, uno en la Cordillera Central de Colombia y otro en la Oriental.

El objeto era documentar efectiva y completamente, como fuera posible la biodiversidad de nuestras áreas en estudio, usando métodos estandarizados con el fin de colectar datos comparables y prestar especial atención a especies con riesgo. El trabajo de campo se concentró en aves, plantas, anfibios, reptiles y mamíferos. Un transecrto de 1000 m. fue usado en cada sitio de estudio, a lo largo del cual se instalaron las redes de niebla y donde se realizaron las observaciones, además se colectó información adicional suministrada por los cazadores locales. Estas evaluaciones eran requeridas urgentemente con el fin de obtener información biológica básica, la cual es planeada para liderar la conservación de dos regiones altamente amenazadas y pobremente conocidas. Este reporte preliminar presenta los resultados y la evaluación de conservación de dos regiones investigadas en los Andes de Colombia: (i) **Serranía de los Churumbelos**, en el flanco este de la Cordillera Oriental (siete sitios de estiudio, incluyendo tres localidades en 1999; 350-700-1,100-1,500-1,900-2,200-2,450 msnm) y (ii) **Nordeste de Antioquia** en la Cordillera Central (tres sios en bosques bajos y de piedemonte; 300-800-1,550 msnm)

1. Serranía de los Churumbelos

Sitios de Estudio (SS) se situaron en SS 1-bosque húmedo tropical (300m); SS 2-bosque húmedo tropical/premontano (700 m); SS 3-bosque muy húmedo premontano bajo (1,100 m); SS 4-bosque muy húmedo premontano (1,450 m); SS 5-bosque húmedo montano bajo (1,900m); SS 6-bosque montano bajo de niebla (2,200m); SS 7-bosque de neblina (2,450 m). Las tres elevaciones superiores fueron estudiadas este año parta completar el análisis altitudinal de los hábitats y la biota asociada desde la Amazonía a través del piedemonte hasta el bosque montano en el costado este de la Cordillera Oriental, Colombia. Un total de 45 dias de campo con 324 persona-día de esfuerzo empleado en los dos años.

Descripciones **botánicas** detalladas de cada sitio fueron completadas. De SS 3 a SS 7 se encontró que correspondían más cercanamente a la caracterización del Norte de los Andes, con SS 1 y SS 2 caracterizando la Ecoregión de la Amazaonia del Norte. Varias especies nuevas fueron descubiertas (i.e. Gesneriaceae, Piperaceae, etc.). Al aumentar la elevación se presentó una disminución en la altura del dosel promedio (30 a 10 m) y se incrementó la abundancia y diversidad de epífitas. Una alta diversidad de plantas en bosque primario fue encontrada en todos los sitios.

Empleando observaciones y captura con redes de niebla, un total de 421 especies de **aves** fueron registradas en la Serranía de los Churumbelos, incluyendo una adición de 93 especies con respecto a 1998. Un total de 2,834 capturas (1,057 en 1999) fueron realizadas de 229 especies durante 142,730 horas-red-metro. Un total de dos especies amenazadas y diez casi amenazadas fueron registradas, con cinco especies del área de endemismo de aves (EBA) de los Andes Orientales de Ecuador -Perú (SS2 - SS4) y cuatro especies del EBA de las laderas interandinas de Colombia (SS5 - SS7) fueron registradas. Se estima que el probable inventario total de las especies de aves excedería las 550 especies: una excepcional diversidad, la cual hace de la Serranía un "hotspot" ornitológico global de extrema importancia para la conservación de la diversidad aviar.

Cuerenta y seis especies de **anfibios** (30 spp.) y **reptiles** (16 spp.) fueron registrados en 1998 y 1999. Muchas especies pobremente conocidas fueron registradas, incluyendo algunas significativas extensiones de rango de distribución (incluyendo dos especies nuevas para Colombia) y algunos individuos no identificados a la fecha, los cuales pueden estar relacionados a especies no descritas. Algunos **Mamíferos** registrados incluyen al Oso de Anteojos *Tremarctos ornatus* y el Tapir de montaña *Tapirus pinchaque*.

Nuestra evaluación de Conservación presta especial atención a muchas justificaciones biológicas y a la urgente y crítica acción de conservación que en la Serranía de los Chrumbelos se requiere implementar, ya que proyectos de construcción de vías y colonización incontrolada están amenazando la región La Serranía de los Chrumbelos alberga una inmensa variedad de ecosistemas con una compleja topografía y variaciones climáticas variables. La cual influye en el mantenimiento de una alta biodiversidad. Las directas justificaciones biológicas para la implemantación de la coservación son numerosas. El costado este de los Andes ha sido sujeto de gran presión por las poblaciones humanas y asociada degradación de hábitat en años recientes, pero afortunadamente las montañas de los Churumbelos han escapado, en gran parte, al impacto catastrófico humano, que otras regiones han sufrido. Sin embargo, las amenazas asociadas a la recientemente terminada via Mocoa-Bogotá, el proyecto

Puerto Asis-Florencia, y el reciente descubrimiento y explotación de petróleo y metales preciosos, llevarán a una invasión humana en escala, a una explotación y deforestación.

6

El proyecto EBA de Colombia 99 y Colombia '98 demostraromn la gran importancia de conservacion, y las amenazas que se ejercen, en la Serranía de los Churumbelos. Nuestras conclusiones soportan fuertemente la idea de protección legal. Es importante incorporar el gradiente altitudinal entero desde las tierras bajas hasta el bosque nublado, maximizando la diversidad de cualquier area protegida. Tal vez la medida de protección más factible sería la formación de un Parque Regional Natural administrado por la CRC. Otro plan propuesto por las autoridades ambientales colombianas del sistema de parques nacionales, es la de continuar nuestro trabajo, lo cual incluye una extensión del Parque Nacional Natural Cueva de los Guácharos hacia los Churumbelos. La tercera fase del proyecto está ahora siendo implementada para desarrollar una estrategia de conservación para la totalidad de la Serrania, involucrando la CRC, los miembros de la expedición, las autoridades de Parques y las comunidades locales. El reporte final especificará una estrategia de conservacion para futuras investigaciones y protección de la Serranía de los Churumbelos.

2. Nordeste Antioqueño

En el costado noreste de la Cordillera Central y en el valle medio del río Magadalena, se estudiaron tres sitios: SS 1- bosque húmedo tropical (300 m); SS 2 - bosque húmedo tropical/premontano (800 m); y SS 3 - bosque húmedo premontano (1,550 m). Un total de 14 días de trabajo de campo con 70 días-persona de esfuerzo en agosto de 1999. Detalladas descripciones **botánicas** de cada sitio fueron completadas, con SS 1 y SS 2, pertenecientes a la Ecoregión de Nechí-Colombia y SS 3, con características de la Ecoregión del Norte de los Andes. Buen bosque primario, con una alta variedad de especies de plantas fue encontrado en todos los sitios, aunque el incremento del epifitismo y el cambio en la compopsición de flora fue más prominente entre los SS 1/2 y SS 3.

Un total de 318 especies de **aves** fueron registradas con observaciones y captura con redes de niebla con un total de 811 capturas de 92 especies. El ensamble de la avifauna mostró gran afinidad entre SS 1 y SS 2; el SS 3 fue altamente distintivo. Un total de 3 especies amenazadas y 6 casi amenazadas fueron registradas, con 11 endémicos. Además notables extensiones altitudinales o de rango de distribución fueron reportadas para 40 especies. El más notable hecho fue el descubrimiento de una nueva especie para la ciencia del género *Lipaugus*. Medidas de coservación en esta área deben ser tratadas como un asunto de extrema urgencia, especialmente en tierras bajas para proteger al Paujil de Pico Azul *Crax alberti*. y el bosque subandino para la nueva especie. Doce especies de **anfibios** (9 spp.) y **reptiles** (3 spp.) fueron registrados, incluyendo algunas extensiones de rango y una especie descritra recientemente en 1997. Con algunas especies pobremente conocidas o desconocidas en ambos transectos, SS 2 y SS 3 en particular son importantes áreas para la conservación, basados en resultados herpetológicos limitados. Los **mamíferos** registrados incluye la primera evidencia del Oso de Anteojos *Tremarctos ornatus* en la Serranía de San Lucas. Y observaciones de 6 especies de primates (5 de los cuales están amenazados): Tití maicero *Saguinus leucopus*, Marteja *Aotus cf. lemurinus*, Mono maicero *Cebus albifrons*, Mono aullador *Alouatta seniculus*, Mono cariblanco *Lagothrix lagothricha*, Mono araña *Ateles sp.* El Jaguar *Panthera onca* fue fotografiado en cautiverio.

Evaluación de la Conservación: La situación de conservación en el noreste de Antioquia (Cordillera Central y Serranía de San Lucas) es una catástrofe ecologica. La minería del oro es agresiva en toda la región, contaminando las aguas y poniendo en peligro la vida silevestre aún en localidades remotas. La colonización subsecuente y la deforestación se han presentado en una escala no vista en Colombia en recientes años. La región sufre de la apatía del gobierno, severa coyuntura política, cultivos extensivos de café y coca, y frecuentes combates armados. Basados en la diferncia entre los mapas aéreos de 1995 y la evaluación de 1999, consideramos que se ha perdido al menos el 30 % de la cobertura boscosa de la Serranía de San Lucas y áreas adyacentes, un área cosiderada como el parche de bosque más grande de noroeste de Suramérica.

El incierto futuro de el endémico paujil de pico azul y otras endémicas de las tierras bajas del norte de Colombia es muy oscuro. Además por encima de 1000 m., sólo pocos parches de bosque permanecen. Sin embargo, debido a la visión de un campesino, Luis Angel Ramírez, se han conservado 300 ha de bosque humedo premontano primario, entre 1500-1820 msnm, donde se ha prohibido todas las formas de intervención humana, a pesar de las inmensas presiones económicas y sociales. Esta finca fue recientemente comprada por la autoridad ambiental local CORANTIOQUIA. Se espera que esta región, recientemente protegida, pueda ser extendida y fortalecida entre las áreas de piedemonte y de tierras bajas, altamente amenazadas.

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Abbreviation	S		
EBA	Endemic Bird Area (Stattersfield et al. 199	7)	
m	metres;	km	kilometre
sp.	species (spp. in plural form)	SS	Study Site (sitio de estudio)

INTRODUCTION

Paul Salaman and Thomas Donegan

8

Physical Geography

Colombia lies in the northwest corner of South America at the base of the Central American isthmus. It stretches from the Caribbean Sea to the Río Amazon and from the Río Orinoco to the Pacific Ocean, covering 1,141,748 km². The western half of the country encompasses the northern Andean mountain chain, featuring the most complex topography in South America. This topography supports an extremely wide variety of ecosystems and high levels of endemism localised to specific parts of the country. Colombia contains a large proportion of the planet's biodiversity, including 20% of all bird species, in what is just 0.77% of the Earth's land surface (Gentry 1993).

Serranía de los Churumbelos

The Serranía de los Churumbelos is situated where Colombia's two greatest mountain ranges, the Cordilleras Central and Oriental, collide. The Cordillera Oriental extends from Serranía de Perijá (10°30'N) to just east of Mocoa (1°09'N; 6°37'W), with an average ridgeline of 2,500 m, and is the widest of the three Andean cordilleras that characterise Colombia. At about 1°32'N 76°14'W the Cordillera Oriental divides. The main ridge, Picos Fragua, links up to the Cordillera Central and forms the headwaters to the Río Magdalena. A second range spurs southwards and abruptly ends at the Río Caquetá, to form the Serranía de los Churumbelos. This range is 60 km long, 25-30 km wide at the base and rising to around 3,000 m, with an average ridgeline of 1,500 m. The East slope of this main Andean range in Colombia forms a 190 km-long "wall" to the Ecuadorian frontier, with an average 2,000 m sharp descent from the High Andes into the Amazonian basin.

Serranía de los Churumbelos is located entirely in the Department of Cauca, southern Colombia and was biologically unknown until the Colombia '98 expedition. The Churumbelos are characterised by their distinctive geology - a large anticline with a north-east to south-west axis, formed by various sedimentary rocks, principally limestone, conglomerates and shales, together with igneous intrusions and associated fringe metamorphic rocks. The resultant topography is spectacular, with rivers eroding along the weak points of the anticline axis to form steep linear drainage patterns, with the Río Fragua and Río Mandiyaco flowing from north to south. However, the most distinctive features are erosional remnants of limestone that form large flat "mesetas" or Table Mountains. Unlike most tabletop mountains, they have deep organic and underlying clay soils and a dense forest covering. The mesetas are surrounded by 50-200 m sheer cliffs overshadowing steep slopes, intersected by streams and scarred by numerous landslides of up to 400 metres length.

The western flank of the Churumbelos gently shelves into the Río Mandiyaco and Río Villalobos, where a sharp spine called Serranía de Otún rises, parallel to los Churumbelos. The eastern flank abruptly rises out of the vast flat Amazonian plain at 300 metres altitude and steeply climbs to almost 3,000 metres. This ridge receives high levels of rainfall from vast Amazonian convectional cloud formations. These cloud formations have formed steep valleys, which drop straight into the Amazonian plains, producing large alluvial fans at their bases. Extensive aerial photographs and video footage were taken of the southern half of the Serranía during a helicopter flight sponsored by Argosy International in 1998.

Vegetation: The Serranía de los Churumbelos encompasses several major vegetation zones rising from 250 m to c.2,800 m with various influences from the Amazon and Andes. These zones correspond closely to the prevailing climate and altitude change. The local conditions (temperature, humidity, and rainfall) vary considerably over the Serranía, but the principal life zones in the region are:

- Tropical Lowland humid forest (ca.3,000 mm rainfall/year, Amazonian lowlands at 250 m to ca.900 m)
- Tropical Premontane (subtropical) humid forest (ca.4,000 mm rainfall/year, ca.900-1,800 m)
- Tropical Montane humid [cloud] forest (>3,000 mm rainfall/year, ca.1,800 m-2,800 m)

In additional, with detailed rainfall information, there is probably a localised narrow belt of;

• Foothill pluvial forest (>4,000 mm rainfall/year, foothills; ca.500-700 m)

The most important forest ecosystems in the Serranía are Tropical Montane Cloud Forests (TMCF), which occur over a relatively narrow altitudinal zone. Whilst TMCF normally occurs above 2,000 m in the Andes, insular mountains such as Serranía de los Churumbelos, have an atmospheric environment characterised by persistent cloud cover at the vegetation level to as low as 1,200 m, and very high levels of biodiversity.



Figure 1: Map of central Colombia with Cauca and Antioquia biodiversity study transects marked.



Figure 2: Northeast Antioquia showing 3 study sites in north-eastern Cordillera central



Figure 3: Bota Caucana, eastern Cauca and southern Huila Departments showing 7 study sites.

Northeast Antioquia

The Central Cordillera of Colombia is a 650 km-long mountain range that spurs northwards from the bifurcation of the northern Andes at the Macizo Colombiano - Serranía de los Churumbelos - at 2° N. The Central Cordillera's diverse topography, broad altitudinal span and great climatic variations support a wide variety of ecosystems and associated high levels of endemism. Topographical and ecological isolation from other Andean ranges by the arid Cauca and Magdalena river valleys, which flank the Cordillera, has accentuated local endemism. Above 1000 m asl, the c.41,000 km² Central Cordillera supports 29 Endemic Bird Area species: one of the greatest concentrations of montane range-restricted bird species in the world.

The Central Cordillera's rich volcanic soils and mild climate have attracted human colonisation and exploitation for many centuries. Farming of Colombia's most important economic commodity, coffee, is based on the subtropical slopes of the Central Cordillera. Today, this supports the greatest population concentration in the country, including major cities such as Medellín, Ibagué, Pereira and Armenia. During the past century, relatively good infrastructure has encouraged many bird collectors to explore the Central Cordillera. Whilst our avifaunal knowledge of the Central Cordillera is relatively good compared to e.g. the eastern slope of the Andes (Salaman *et al.* in prep.), the Central Cordillera has demonstrated its ability to reveal new species for science in all taxa, even within recent years.

Sixteen of the Cordillera's 29 range-restricted bird species are considered globally threatened (Stattersfield *et al.* 1997) - a stunning proportion that gives much alarm for ornithological conservation. The plight of these species is directly reflected in the continued severe landscape modification and lack of protected areas in the region. Furthermore, most of the few protected areas in the Central Cordillera are situated on the highest massifs dominated by páramo and snow-capped peaks (e.g. Parque Natural National Los Nevados), thus the subtropical forests remain at considerable risk. Less than 10% of original forest cover in the Central Cordillera remains (Henderson *et al.* 1997), but we estimate this figure to be closer to 4% at 1000-2000 m elevations.

For a long time, Northeastern Antioquia has been heavily colonised by gold-miners and subsequently agriculturists, particularly coffee-growers and cattle-ranchers. Above 1000 m asl, the region is almost completely deforested, with just a few isolated forest patches surviving. However, owing to the dedication and foresight of one local farmer, Luis Angel Ramirez, 300 ha of primary forest has been set aside with all forms of human intervention prohibited, despite immense social and economic pressures. This unaltered forest fragment, called

10

La Forzosa, encompasses pristine upper premontane humid forest (1500-1820 m asl) within the watershed of the Quebrada La Soledad. This pristine forest fragment, where SS3 was situated, has very recently been purchased by the local environmental authority, CORANTIOQUIA, following previous work by AC, JO *et al* (Cuervo *et al.* 1999). CORANTIOQUIA are considering plans to protect further forested areas in the region, possibly extending downslope.

Study sites

Serranía de los Churumbelos

A small expedition team in 1999 was essential in overcoming complex logistical problems in the Serranía de los Churumbelos highlands. Whilst aerial photographs and LANDSAT maps had assisted our site allocation, terrain and vegetation meant that enormous efforts were necessary to cut trails to new Study Sites.

All seven study sites were within one continuous tract of primary forest on the eastern and southern slope of the mountain range. Forest classification follows Holdridge (1967). Note SS1-4 were studied in 1998 by 'Colombia '98' team members. Details of biological results from these sites are found in Salaman and Donegan (eds.) (1998).

SS1: Puerto Bello (14-21 July 1998), Municipality of Piamonte, Dpto. Cauca ($01^{\circ}08'14^{"}N$, $76^{\circ}16'55"$ W; 350 m); Tropical Lowland humid forest (*c*.3,000 mm rainfall/year) situated in the westernmost Amazonian lowlands and the base of the Churumbelos foothills. A new road had been constructed to the village of Puerto Bello in the last five years and deforestation was evident along the roadside. Our 1,200 m transect extended from the forest edge through a transition from tall, selectively logged forest to primary forest with a canopy at *c*. 30 m.

SS2: Río Nabueno (24-30 July 1998), Municipality of Piamonte, Dpto. Cauca ($01^{\circ}06'48''$ N, $76^{\circ}24'86''W$; 700 m). An extensive tract of primary Tropical Lower Premontane (subtropical) humid forest (*c*.4000 mm rainfall/year) on a steep eastern flank of Serranía de los Churumbelos was studied. The transect was an old hunters' trail from Río Nabueno and which climbed steeply to a flat ridgetop in the Churumbelos. The site was pristine primary forest, with vegetation strongly influenced by the high rainfall and steep terrain with ridge-top effects, with a relatively low canopy (*c*. 20 m) and dense understorey.

SS3: Alto Río Hornoyaco (3-9 August 1998), Municipality of Santa Rosa, Dpto. Cauca ($01^{\circ}13'59''N$, 76°31'58''W; 1,100 m); Tropical Premontane very humid forest (*c.*>4,000 mm rainfall/year). The southern base of Serranía de los Churumbelos rises steeply from the Caquetá valley and is heavily dissected by several southward flowing streams, including the Río Hornoyaco. A 700 m transect ran through 400 m of primary forest on steep slopes, then into dense young secondary forest (3-5 years growth) up to a 4 ha pasture clearing. This forest was similar in floristic composition and stratifications to montane forest.

SS4: Villa Iguana (11-17 August 1998), Municipality of Santa Rosa, Dpto. Cauca ($01^{\circ}14'18''N$, 76°31'11"W; 1,450 m); Tropical Lower Montane humid [cloud] forest (*c*.3,000 mm rainfall/year). Our transect extended 800m over a plateau between two table mountains (mesetas), and brief surveys of Alto Cagadero meseta at 1,600 m were also undertaken. The forest at this site is remarkable in containing many elements characteristic of a forest over 600 m higher in altitude, having a high abundance and diversity of vascular epiphytes, bryophytes and a low canopy (*c*.12 m).

SS5: Nabú (4-9 July 1999), Finca Playon, Vereda La Petrolera, Municipality of Santa Rosa, Dpto. Cauca ($01^{\circ}36$ 'N, $76^{\circ}16$ 'W; 1,900 m); Tropical Lower Montane humid forest (*c*.2,500 mm rainfall/year). The northwestern flank of the Serranía de los Churumbelos is flanked by the Río Villalobos and Mocoa-Pitalito highway. From La Petrolera at Km 90 along the Mocoa-Pitalito road, a trail crosses the Río Villalobos and provides access to the northwestern edge of the Serranía. Our transect extended 800 m along a ridge of primary forest, characterised by a dense understorey, dense arboreal epiphytes, and a canopy of *c*.20-25 m dominated by white oak (*Quercus* spp.).

SS6: Tatauí (10-14 July 1999), Finca Playon, Vereda La Petrolera, Municipality of Santa Rosa, Dpto. Cauca ($01^{\circ}37$ 'N, $76^{\circ}16$ 'W; 2,200 m); Tropical Montane cloud forest (*c*.2,500 mm rainfall/year). Ascending 2 km above SS5, a 600 m transect along a flat ridgeline was studied. The sites dense low understorey (*c*.3 m high) was dominated by terrestrial bromeliads and *Sphagnum* spp. mosses and a canopy level of *c*.7 m, is a stunted forest physiognomy, similar to treeline elfin forest, and influenced by perpetual mists and strong lateral winds.

SS7: El Dorón (16-20 July 1999), El Cable telecom station, Municipality of Santa Rosa, Dpto. Cauca (01°40'N, 76°14'W; 2450 m); Tropical Upper Montane humid [cloud] forest (c.2,000 mm rainfall/year). SS7 was located above two telecommunication towers at Km 100 along the Mocoa-Pitalito road on the Cauca / Huila department border, where a ridge formed the watershed of the Río Villalobos and tributaries of the Río Magdalena. Our transect ran from an abandoned military installation clearing through primary forest with some selective logging and clearings made by soldiers. The forest physiognomy was dominated by stunted white oak (*Quercus* spp.) to c.15 m with large canopy epiphyte burdens, and an understorey dominated by flowering Ericaceae, epiphytes and bushes.

Expedition translocation justification

Whilst good forest was surveyed at SS7, the continued ascent of the Churumbelos was suspended to security situation deterioration. As stated in our proposal, the EBA team intended to conduct fieldwork in Serranía de los Churumbelos, with four to five additional Study Sites. However, after a deterioration in the security situation, including cessation of all transportation and a prolonged major guerrilla-military battle (c.10 km from our study site) (see *El Tiempo* newspaper from 18-22 July), the volatile situation dictated that we withdrew from the zone. This decision was made less difficult given that almost all of our biological objectives had been successfully achieved. However, with funds, time and equipment in place, we decided to mount further studies.

As the Evaluation of Biodiversity in the Andes (EBA) Project, we looked for a further site within our aims: unprotected, poorly-known and with high threat levels. The Northeastern Antioquia site was chosen following suggestions of AC and JO, who had previously conducted work in the region and recorded an astonishing number of rare and Threatened species. CORANTIOQUIA were considering extending the recently-established protected zone there, thus a rapid biodiversity assessment by the EBA team could help speed up this process.

Northeast Antioquia Transect

SS1: Apollo 13 (3-8 August 1999), Finca La Esperanza, Vereda Río Bagre, Municipality of Segovia, Dpto. Antioquia (7°21'14" N; 74°40'95" W; 300 m). Lowland humid forest (c.2,000 mm rainfall/year) located south-east of the gold-mining commune of Puerto Lopez. Despite extensive recent forest clearance for agriculture and gold mining, ridge and steep slopes generally still contain remnants of primary forest, although this is selective logged and intensive hunted for food. A lowland forest patch (c.1500 m x 500 m) straddling three ridges about a low peak (base camp), formed the basis of our transect. The forest core was in good condition with minimal selective logging, and several trees with DBH of >10 m. The canopy was c.35 m with emergents to c. 40 m, high subcanopy and understorey to c.5 m. The understorey was sparsely vegetated, although characterised by dense *Heliconia* spp. thickets and spiny palm clusters, whilst there was a low abundance and diversity of epiphytes. Considerable tree fruiting activity was noted.

SS2: Alto de los Tarros (20-24 August 1999), Reserva Regional Bajo Cauca-Nechí, Vereda La Tirana, Municipality of Anorí, Dpto. Antioquia (7°18'49"N; 75°05'85" W, 800 m). This site lay within an extensive forest fragment (ca. 45,000 ha) of foothill humid forest (c.3,000 mm rainfall/year), lying between the Río Anorí and Río Nechí. A little-used trail along a high ridge through primary forest in the Río Anorí watershed was used as a transect, 27 km north of Anorí and 45 km directly west of SS1. The site was strongly influenced by lowland flora and fauna as the nearest terrain below 1,000 m was c.15 km distant. The forest physiognomy is similar to SS1, although with lower vegetation strata (canopy c.30 m), more broken canopy by treefalls on steep slopes, higher epiphytes abundance and notably more woody stem plants in the understorey. The forest was much less disturbed than SS1 and within a larger forest fragment, resulting in more animal activities and forest-restricted species than SS1.

SS3: Alto Combate (26-29 August 1999), Reserva Regional La Forzosa, Vereda Las Ánimas, Municipality of Anori, Dpto. Antioquia (6°59'58 N; 75°08'33 W; 1,550 m). Premontane humid forest (*c*.3,000 mm rainfall/year). La Forzosa encompasses 300 ha of primary premontane humid forest in the Quebrada La Soledad watershed beside the Medellín–Anorí road, 10 km south of Anorí, 37 km south of SS2 and 68 km southwest of SS1. The site has been undisturbed by logging or hunting in the past three decades. Historical evidence (>100 years) of indigenous land use at the site survives, e.g. canalised stream courses. The forest retains characteristics of primary forest, although along the transect, large trees (DBH >150 cm) are largely absent on a thick organic topsoil, suggesting historical selective logging (c. 50 years prior) without complete clearance. A 300 m transect was cut ascending a ridge through dense understorey, while surveys were also conducted along the Quebrada La Soledad. Upper slope and ridgetop forest was extraordinary, reminiscent of timberline forest, being stunted and gnarled (similar to Churumbelos SS6) with a canopy height from 5-8 m, and terrestrial and arboreal epiphytes abundant, especially mosses, lichens and bromeliads, probably influenced by strong lateral winds. Vegetation on the lower slopes and valleys were typical of forest at 1500 m., with a canopy to 15-20 m and a moderately dense understorey composed of woody stem bushes and sparse herbaceous cover, with a moderate abundance of arboreal epiphytes.

Expedition Field Itinerary

Serranía de los Churumbelos

July 1st	Expedition group meets in Pitalito, Dept. Huila. Preparations take place.
July 3rd	Depart Pitalito (1 hour bus ride and 2 hour trek) and arrive at SS5.
July 4 th	Fieldwork at SS5: Nabú, Municipality of Santa Rosa, Dpto. Cauca (6 days)
July 9 th	Packed camp and moved to SS 2 (2 hour trek). Set up camp at SS6.
July 10 th	Fieldwork at SS6: Tatauí, Municipality of Santa Rosa, Dpto. Cauca (5 days)
July 14 th	Packed camp and returned to Pitalito for supplies

July 15 th	Depart Pitalito (1 hour bus ride) and arrive at SS7.
July 16 th	Fieldwork at SS7: El Dorón, Municipality of Santa Rosa, Dpto. Cauca (5 days)
July 20 th	Packed camp and returned to Pitalito after guerrilla-military battle escalates.
July 21 st	Regional TV and radio interviews with team members about project
July 22 nd	Depart for Bogota (PS) to deposit specimens and Medellín, Antioquia (TD, CG, AC).
Northeast Antioquia, no	orthern Cordillera central
July 23^{rd} - 27^{th}	Preparing expedition and obtaining permission from CORANTIOQUIA
July 28 th	Depart Medellín for Caucasia (6 hours taxi) and El Bagre (5 hours boat)
July 30 th	Depart El Bagre with community and political permission. Arrive in Puerto Lopez.
August 2 nd	Depart Puerto Lopez with community permission for SS1 (7 hour trek)
August 3 rd	Fieldwork at SS1: Apollo 13, Municipality of Segovia (5 days)
August 8 th	Packed camp and returned to El Bagre
August 11 th	Departed El Bagre (by boat and taxi).
August 12 th	Arrived back in Medellín via Caucasia. Preparation for Municipio Anori study.
August 16 th	AC and JO arrived in Anori to prepare logistics and permission.
August 18 th	TD, CG, PS arrive and entire team departs Anori for Verada La Tirana (10 hours trek)
August 19 th	Depart Verada La Tirana for Alto de los Tarros (3 hours trek). Set up camp at SS2.
August 20 th	Fieldwork at SS2: Alto de los Tarros, Municipio Anori (5 days)
August 24 th	Packed camp (p.m.) and departed for Verada La Tirana.
August 25 th	Depart Verada La Tirana for Anori (11 hours trek).
August 25 th	Depart Anori for Alto Combate (2 hour trek). Set up camp at SS3.
August 26 th	Fieldwork at SS3: Alto Combate, Municipality of Anori (4 days)
August 29 th	Depart SS3 (midday) and return to Medellín.
September 1st	Finished expedition.

Location of sites and fieldwork effort

Table 1: Summary of location and field effort at each study site in Serranía de los Churumbelos, Cauca, 1998-1999. (Note SS1-4 at Serranía de los Churumbelos completed in 1998 by the Colombia '98 Expedition.)

Location	Days at site	Person-days	Co-ordinates	Altitude	Forest type
SS 1: Puerto Bello	8	108	01° 08' 14 N	350 m	Lowland humid forest
			76° 16' 55 W		
SS2: Rio Nabueno	7	88	01° 06' 48 N	700 m	Foothill humid forest
			76° 24' 86 W		
SS3: Alto Río Hornoyaco	7	71	01° 13' 59 N	1,100 m	Premontane very humid forest
			76° 31' 58 W		
SS4: Villa Iguana	7	77	01° 14' 18 N	1,450 m	Upper Premontane humid [cloud] forest
_			76° 31' 11 W		
SS5: Nabú	6	20	1° 36' 71N	1,900 m	Lower Montane humid forest
			76° 16' 23 W		
SS6: Tatauí	5	20	1° 36'892 N	2,200 m	Montane cloud forest
			76° 15'91 W		
SS7: El Dorón	5	20	1° 40' 41 N	2,450 m	Upper montane cloud forest
			76° 14' 21 W		

Table 2: Summar	y of location and fi	eld effort at each stu	ly site in northeast	Antioquia,	Cordillera	Central, 1999.
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Location	Days at sit	e Person-days	Co-ordinates	Altitude	Forest type
SS 1: Apollo 13	5	25	7° 21' 14 N	300 m	Lowland humid forest
			74° 40' 95 W		
SS2: Alto los Tarros	5	25	7° 18' 49 N	800 m	Foothill humid forest
			75° 05' 85 W		
SS3: Alto Combate	4	20	6° 59' 58 N	1,550 m	Premontane humid forest
			75° 08' 33 W		

RAPID BIODIVERSITY ASSESSMENT

Plants ~ Botánica

Carlos Eduardo Gonzales Orozco

Summary

The botanical fieldwork involved two complimentary methods: firstly, work along a linear transect in order to characterise the vegetation-type of each site; secondly, non-systematic collection of interesting plant species to supplement those found along the transect, concentrating on Gesneriaceae. From both sites, probable new species have been discovered in this family. However, identification to species or genus level has not been completed for most of the collection. Detailed descriptions of each site are presented below, with a list of families encountered. Good primary forest was encountered in all study sites, ideal for conservation.

Metodología

El método utilizado fué de transecto linear (Gentry 1993), que permite realizár un análisis estructural del Bosque; además, mediante colecta al azar se conoció la diversidad florística. La caracterización ecológica se basó en el tipo de bosque observado, se presentaron bosques secundarios, primarios que posteriromente fueron entresacados y primarios.

Resultados

Las estaciones estudiadas fueron respectivamente:

Serranía de los Churumbelos

SS 1: Puerto Bello, 350 m, Bosque Húmedo ~ Lowland humid forest

Bosque sobre relieve ondulado, se observan algunas laderas contiguas al lugar de trabajo que van de 30 a 40 % de pendiente. Vegetación con árboles emergentes de 35 m y el dosél aproximadamente a 30 m, alta cantidad de lianas, estrato arbustivo con juveniles de hasta 3-4 metros y baja presencia del estrato herbaceo. Por condiciones ambientales Corresponde a la zona de vida Bosque Húmedo tropical bh-T (Holdridge 1967), la humedad es media-alta, epifitismo bajo y cantidad de luz media-baja. Bio-geograficamente la estación es considerada como piedemonte amazónico por características estructurales típicas del bosque, como las anteriormente descritas.

Las familias botánicas más representativas fueron: Lecythidaceae, Moraceae, Myristicaceae, Sapindaceae, Sapotaceae, Rubiaceae y las de menor representación son Lauraceae, Guttiferae, Papilionaceae, Caesalpinaceae, Mimosaceae, Piperaceae, Gesneriaceae, Melastomataceae, Lauraceae, Olacaceae, Passifloraceae, Myrsinaceae, Convolvulaceae, Eriocaulaceae, Loranthaceae, Flacourtiaceae, Anacardiaceae, Araliaceae, Palmae, Burseraceae, Bombacaceae, Sabiaceae, Myrtaceae, Boraginaceae, Monimiaceae, Bromeliaceae, etc. Algunas especies de Cedrela sp y Guarea sp son las de mayor presión antrópica por la excelente calidad de su madera y fácil comercio.

SS 2: Río Nabueno, 700 m, Bosque humedo Premontano ~ Lower Premontane humid forest

El paisaje está dominado por relieve quebrado con escarpes que van de 25 a 35 % de pendiente, algúnos lugares con planicies cortas. Vegetación bien conservada, árboles emergentes a 25 m y el dosél se mantiene a 20 m, la cantidad de lianas es media en relación a la estación uno. El estrato arbustivo con diámetros dominantes de 10 cm, árboles de gran envergadura están en mediana cantidad, el epifitismo es medio-bajo. Existe buena cantidad de arbustos, hierbas, helechos y algunas orquídeas. El bosque presenta una baja presion antropica debido a 1 difícil acseso de la zona de trabajo.

Las principales familias presentes fueron: Lauraceae, Melastomataceae, Piperaceae, Rubiaceae y las de menor representatividad son Acanthaceae, Annonaceae, Apocynaceae, Araceae, Araliaceae, Burseraceae, Bromeliaceae, Campanulaceae, Cecropiaceae, Ericaceae, Gesneriaceae, Guttiferae, Lauraceae, Meliaceae, Mimosaceae, Monimiaceae, Myrtaceae, Myrsinaceae, Olacaceae, Orchidaceae, Palmae, Passifloraceae, Rutaceae, Sapindaceae, Vochysiaceae etc.

SS 3: Alto Río Hornoyaco, 1,100 m, Bosque muy humedo Premontano ~ Premontane very humid forest

La vegetación esta caracterizada por 3 estratos, árboles emergentes a 20 m y el dosél a 18 m aproximadamente, predominan árboles de mediana envergadura, epifitismo medio-alto devido a que se presenta constantemente la influencia de la lluvia horizontal lo cual ayuda a mantener esta característica, disminuye notablemente la presencia de las lianas. Aparecen individuos como Weimmania sp y Hedyosmun sp indicandonos la presencia de

14

un Bosque Andino, posiblemente bosque muy humedo Premontano bmh-Pm (Holdridge 1967) también se presenta un incremento en la cantidad de individuos de Orquideas y Helechos, la luminosidad es media. Dominancia de árboles con diametros más delgados y una buena conservación del ecosistema.

Las familias de mayor predominio son Guttiferae, Lauraceae, Moraceae, Rubiaceae, Sapindaceae y las de menor representatividad son Acanthaceae, Anacardiaceae, Annonaceae, Apocynaceae, Araliaceae, Araceae, Begoniaceae, Boraginaceae, Burseraceae, Campanulaceae, Cecropiaceae, Elaeocarpaceae, Euphorbiaceae, Ericaceae, Flacourtiaceae, Gesneriaceae, Hippocastanaceae, Leguminosae, Loranthaceae, Maranthaceae, Melastomataceae, Meliaceae, Myristicaceae, Myrsinaceae, Myrtaceae, Musaceae, Palmae, Passifloraceae, Sapotaceae, Sabiaceae, Solanaceae, Sterculiaceae, etc.

SS 4: Villa Iguana, 1450 m, Bosque humedo nublado Premontano ~ Upper Premontane humid [cloud] forest

Paisaje dominado por la presencia de mesetas con cornizas entre 200 a 275 % de pendiente, cortas laderas. Los principales árboles emergentes se encuentran a 20 m y el dosél está entre 15 -20 m, arbolitos hasta de 10 m, poca o baja presencia de lianas lo cual es inversamente proporcional al elevado epifitismo, incluyendo en este una buena cantidad de Bromelias y orquídeas; por el alto epifitismo y la presecia de vientos frecuentes , la caida de árboles viejos es frecuente y en contados casos árboles jovenes lo cual en algunas partes del bosque encontramos claros , nos indica que en estos sitios existe una dinámica muy intensa, contrastante a lo anterior, las zonas del bosque que estan mejor protegidas presentan mayor cantidad de árboles con diámetros mayores demarcando así la gran influencia de los vientos en el mantenimiento de este tipo de ecosistema boscoso. Posee características marcadas de un Bosque nublado sin rastros de haber sufrido intervención alguna por parte del hombre.

Las familias con mayor predominio son Bromeliaceae, Ericaceae, Guttiferae, Lauraceae, Melastomataceae, Orchidaceae, Rubiaceae y las de menor representación son Acanthaceae, Annonaceae, Araceae, Araliaceae, Begoniaceae, Bignoniaceae, Bombacaceae, Caesalpinaceae, Campanulaceae, Cecropiaceae, Euphorbiaceae, Flacourtiaceae, Gesneriaceae, Moraceae, Myrtaceae, Myrsinaceae, Meliaceae, Olacaceae, Papilionaceae, Rosaceae, Sabiaceae etc.

SS5: Nabú, 1900 m, Bosque Montano Húmedo ~ Lower Montane humid forest

Relieve inter-andino con estribaciones suaves, paisaje de laderas con pendientes entre 20- 25 m. El ecosistema presenta antropización en la parte baja, lo cual lo condiciona como en **estado de riesgo: Altamente Crítico**, ya que presenta entresaca selectiva de algunas especies maderables de las familias Lauraceae y Meliaceae. Los árboles emergentes son de 20 a 25 metros y un sotobosque de 10 a 12 metros de alto. El epifitísmo se presenta con mayor cobertura sobre los troncos de las especies arbóreas y algunas veces en ramas de arbustos. Hay poca entrada de luz al suelo del bosque lo cual proporciona condiciones optimas para la producci¢n de biomasa y mantenimiento de la temperatura en el ecosistema.

La estructura esta representada principalmente por: Helechos, Monocotiled¢neas Araceae (Anthurium sp.), Orchidaceae, Palmae, Dicotiledoneas Actinidaceae (Saurauia sp.), Araliaceae (Shefflera sp.), Begoniaceae (Begonia sp.), Bombacaceae (Matisia sp., Ochroma sp.), Burseraceae, Cunoniaceae (Weimannia sp.), Ericaceae (Cavendishia sp.), Euphorbiaceae, Fagaceae (Quercus sp.), Gesneriaceae (Alloplectus, Besleria, Columnea y Episcia), Guttiferae (Clusia sp.), Hippocastanaceae (Billia colombiana), Lauraceae (Nectandra y Ocotea), Melastomataceae (Blakea, Miconia y Meriania sp.), Meliaceae (Cabralea sp.), Monimiaceae (Siparuna sp.), Moraceae (Ficus sp. Cecropia sp.), Rubiaceae.

SS6: Tatauí, 2,250 m, Bosque Montano (nublado) Medio ~ Montane humid [cloud] forest

Relieve con pendientes fuertes entre 30-35 m. El ecosistema se encuentra en buen estado de conservación ya que no es accesible por estar cerca de los filos de las estibaciones suaves del piedemonte de la cordillera oriental. El ecositema representa condiciones de recurso hídrico primario . Est a expuesto a condiciones ambientales altamente desecantes por la influencia directa de los vientos del valle del Río Villalobos.

Bosque ralo o achatado, la parte alta es a 7 metros y el sotobosque a 4 metros. Presenta gran cantidad de epifitismo en el tronco y las ramas bajas , principalmente especies de musgos y hepíticas, lo cual tiene implicaciones ecológicas importantes. Las plantas presentan adaptaciones a la desecación como hojas gruesasy ramas fuertes, estructuralmente es heterogeneo. Tiene c.5 especies de bromelias distribuidas en el suelo y árboles. Las condiciones de vientos no permiten la presencia de familias como Gesneriaceae, y si las hay solamente con un género *Besleria* sp. El suelo es el principal reservorio de agua y humedad, es altamente lixivigado. **Estado de riesgo: Bajo Crítico**. La estructura esté representada principalmente por: Musgos, Hepáticas, Monocotiledóneas, Palmae (*Wettinia* sp.), Orchidaceae (*Pleurothalis, Masdevallia y Elleanthus* sp.), Bromeliaceae, Dicotiledóneas, Araliaceae (*Schefflera* sp.1, sp.2), Campanulaceae (*Centropogon* sp.), Compositae (*Acharis* sp.), Chletraceae (*Chletra* sp.), Cunoniaceae (*Weimannia* sp.) Ericaceae (*Cavendishia, Pernetya*), Guttiferae (*Clusia* sp.1, sp.2), Lauraceae (*Nectandra* sp.), Melastomataceae (*Miconia* sp.1, sp.2), Myrsinaceae

(Myrsine sp., Cybianthus sp., Grammadenia sp.), Myricaceae (Myrica sp.), Theaceae (Ternstroemia sp.), Winteraceae (Drimis sp.)

SS7: El Dorón, 2,500 m, Bosque Montano (nublado) ~ Montane cloud forest

Relieve con escarpes suaves, con pendientes de 20 m. El ecosistema presenté características con intervenci¢n tardía de 5 años y se ubica como factor de **estado de riesgo: Altamente Crítico**, por estar cercano a la principal arteria vial de la zona y por la proximidad a la frontera agrícola.

La parte alta del bosque esta entre 15-20 metros y el sotobosque a 10 metros. El epifitísmo esta distribuido por todo la estructura de los árboles pero principalmente en las ramas finales y en la parte alta del tronco. Asociación de Quercetum, *Quercus humboldtii*, con especies asociadas como *Clusia* aff. *multiflora* y *Miconia* sp. La estructura esté representada principalmente por: Musgos, Hepáticas, Monocotiledóneas Araceae (*Anthurium* sp.), Palmae, Orchidaceae, Dicotiledóneas, Anacardiaceae, Araliaceae (*Oreopanax* sp.), Cunoniaceae (*Weimannia* sp.), Caprifoliaceae (*Viburnum* sp.), Guttiferae (*Clusia* sp.), Fagaceae (*Quercus* sp.), Rubiaceae (*Palicourea* sp.), Melastomataceae (*Miconia* sp.).

Northeast Antioquia

SS1: Apollo 13, 350 m, Lowland humid forest ~ Bosque húmedo Tropical (B-hT).

Colinas de bajas alturas que están ubicadas en el piedemonte occidental de la Serranía; paisaje de montañas quebradas de poca altura, pendientes entre 15-20 grados. La vegetación presenta tres estratos verticalmente:

- A- Estrato arbóreo (30-35 m) con individuos de troncos grandes, raices tablares y follajes amplios que dominan la estructura de la comunidad y aportan estabilidad al la dinámica del dosél del bosque. La presencia de lianas es notoria, ya que se desarrollan principalmente en la parte más alta. Las principales especies son: CARYOCARACEAE Caguí amarillo- Caryocar amygdaliferum Mutis, Caguí rojo- Caryocar glabrum (Aublet.) Pers.; BIGNONIACEAE Chingalé Jacaranda copaia (Aublet.) D. Don.; LEGUMINOSAE Guayacán jobo- Centrolobium paraense Tul., Suribio- Pithecelobium sp.; LECYTHIDACEAE Abarco- Cariniana pyriformis Miers., Coco olleto Lecythis sp., Coco cristal-Eschweilera sp., BOMBACACEAE Ceiba bonga- Ceiba pentandra (L.) Gaertn.; ANACARDIACEAE Caracolí- Anacardium excelsum (B. et B.) Skeels; MELIACEAE Cedro- Cedrela sp., Caoba- Sweitenia sp.; MORACEAE Guaímaro- Brisimum cf. potabile Ducke, Sande- Brosimum utile H.B.K.
- B- Estrato medio o sub-dosél (15-30 m) En esta capa del bosque se observan mayor cantidad de individuos y especies, se disminuyen la cantidad de árboles de troncos gruesos. Las principales especies son: SAPOTACEAE Caimo- Pouteria pedicellosa Milbr., Pouteria pomifera (Eyma) Baheni; BURSERACEAE Caraño- Dacryodes colombiana Cuatr., VOCHYSIACEAE Dormilón- Vochysia ferruginea Mart.; ANACARDIACEAE Ffresno- Matayba trianae Dugand.; MELIACEAE Mazábalo- Carapa guianensis Aubl.; BIGNONIACEAE Polvillo- Tabebuia guayacan (Seem.) Helsm.; MYRISTICACEAE Sangre de toro- Virola sebifera Aublet.
- C- Estrato bajo (0-20 m) Se presentan la mayoría de especies que regulan y aportan estabilidad al ecosistema, aumenta la cantidad de individuos de diámetros menores. Las principales especies son: OCHNACEAE Alejandro- Cespedezia macrophylla Seem.; MYRTACEAE Arrayán- Myrcia sp., Balsillo- Cordia nodosa; GUTTIFERAE Carate- Vismia sp.; EUPHORBIACEAE Cargamanto- Hieronyma cf. chocoensis Cuatr, Zoquete- mabea cf. occidentalis benth; SIMAROUBACEAE Cedrón- Simaba cedron Planch.; MORACEAE Yarumo- Pourouma sp, Pseudolmedia sp; ANNONACEAE Escobo- Xylopia sp., Yaya amarilla- Annona sp., Yaya anón- Guatteria sp; MELASTOMATACEAE Coronillo -Bellucia sp., Niguíto-Miconia sp, MIMOSOIDEAE Guamo- Inga sp; ULMACEAE Guácimo- Guazuma ulmifolia Lam; MYRISTICACEAE Zoquete- Iryanthera ulei Warb.

SS2: Alto de los Tarros, 800 m, Foothill humid forest

The site was strongly influenced by lowland flora and fauna as the nearest terrain >1,000 m asl was c.15 km distant. The forest physiognomy is similar to SS1, although with lower vegetation strata (canopy c.30 m), more broken canopy by treefalls on steep slopes, higher epiphytes abundance and notably more woody stem plants in the understorey.

SS3: Alto Combate, 1,550 m Bosque humedo (nublado) Premontano ~ Premontane humid [cloud] forest

Bosque montano medio de los Andes Centrales de Colombia. Paisaje mixto de pequeños valles y cordilleras. Relieve montañoso, de escarpes pronunciados y pendientes entre 20-30 grados. Selva Andina con dosél a 20 metros y sotobosque abajo de los 10 metros. El hàbitat presenta características de un pobre nivel de epifitismo, sin embargo presenta las familias predominantes como: Epifitas: Araceae, Bromeliaceae, Poaceae, Gesneriaceae.Las principales familias predominantes en orden de importancia para la comunidad boscosa: Arboles y arbustos: Melastomataceae, Guttiferae, Araliaceae, Myristicaceae, Rubiaceae, Myrtaceae, Annonaceae, Bombacaceae, Hippocastanaceae, Gesneriaceae, Ericaceae Leguminosae, Palmae.

Birds ~ Aves

Paul Salaman, Thomas Donegan, Andrés Cuervo, & José Ochoa.

Summary

A total of 421 bird species were recorded in **Serranía de los Chrurumbelos** using observation and mist-netting, including the addition of 93 species to the list from 162 species recorded in 1999. A total of 2,834 mist-net captures (1,057 in 1999) of 229 species were captured over 142,730 MNH. Avifauna assemblages showed close affinities between SS1-SS2; SS3-SS4 and SS5-SS6-SS7. A total of 2 Threatened and 10 Near-Threatened species were recorded, with five Ecuador-Peru East Andes EBA and four Colombian Inter-Andean Slopes EBA endemics. Over 100 species recorded represent major range/altitude extensions. It is estimated that the probable total number of resident bird species exceeds 550 species: an exceptional diversity, making the Serranía a global avian "hotspot" and meriting conservation action for the region.

In **Northeast Antioquia**, a total of 318 bird species were recorded, with 811 mist-net captures of 92 species. Avifauna assemblages showed close affinities between SS1 and SS2, with SS3 distinct. A total of 3 Threatened and 6 Near-Threatened species were recorded, with 11 EBA endemics. Notable range and/or elevation extensions for 40 species were recorded. The most notable find was a new species for science in the genus *Lipaugus*. Conservation measures in this area should be instigated as a matter of extreme urgency, especially in lowland areas to protect the Blue-knobbed Curassow *Crax alberti*.

Resumen

Un total de 421 especies de aves fueron registradas en la **Serranía de los Churumbelos** empleando observaciones y captura con redes de niebla, incluyendo una adición de 93 especies de 162 registradas en 1999. Un total de 2,834 capturas (1,057 en 1999) fueron realizadas de 229 especies durante 142,730 horas-red-metro. El ensamble de la avifauna mostró cercanas afinidades entre SS1 y SS2, SS3 y SS4, SS5 a SS7. Un total de dos especies amenazadas y diez casi amenazadas fueron registradas, con cinco especies del área de endemismo de aves (EBA) de los Andes Orientales de Ecuador -Perú (SS2 - SS4) y cuatro especies del EBA de las laderas internadinas de Colombia (SS5 - SS7) fueron registradas. Se estima que el número de especies residentes excede 550 especies: una exepcional diversidad, la cual hace de la Serranía un "hotspot" ornitológico global de extrema importancia para la conservación de la diversidad aviar.

En el **Nordeste Antioqueño** un total de 318 especies de aves fueron registradas con observaciones y captura con redes de niebla con un total de 811 capturas de 92 especies. El ensamble de la avifauna mostró gran adfinidad entre SS 1 y SS 2. El SS 3 fue altamente distintivo. Un total de 3 especies amenazadas y 6 casi amenazadas fueron registradas, con 11 endemicos. Además notables extensiones altitudinales o de rango de distribución fueron reportados para 40 especies. El más notable hecho fue el descubrimiento de una nueva especie para la ciencia del género *Lipaugus*. Medidas de coservación en esta área debe ser tratado como un asunto de extrema urgencia, especialmente en tierras bajas para proteger al Paujil de Pico Azul *Crax alberti* y el bosque subandino para la nueva especie.

Introduction

Surveying and documenting the poorly-known avifauna of the tropics can play an important role in assisting biological conservation. Birds are excellent preliminary indicators for biological conservation, because avian taxonomy and geographical distribution has already been widely documented. Conservation of tropical birds and their entire ecosystem requires an in-depth knowledge of species' ecology; for example their ability to survive habitat alteration; their specific habitat requirements; and variations in their abundance due to changing environmental conditions. Without such information conservation efforts may be significantly undermined.

Methods

To determine the composition and relative abundance of bird communities at each study site, a two-fold standardised effort was employed by 3-4 ornithologists (Andrés Cuervo, Thomas Donegan, and Paul Salaman at all sites; José Ochoa in northeast Antioquia sites only):

1. Intensive diurnal non-systematic field observations, supplemented with tape recording and playback of skulking and nocturnal birds, were conducted by 2-4 team members at all times. This was preferable to the use of point counts or variable circular plots, where any population estimates would be highly inaccurate in such a short time, and would create biases strongly in favour of highly-recognisable and vocal species. With targeted intensive, non-systematic observation data, relatively constant at each site, a more complete

inventory was achieved without the constraints of routine transects.

2. Diurnal mist-netting (246-368 m along transects) was conducted at each site. At SS1 (Churumbelos) two transects were conducted as artificial poles allowed easy and fast net installation.

These methods complement one other well to produce a good first-cut assessment at each site. Additional information from local hunters was collected. Our primary aim in the field was to produce comprehensive species inventories for each site and to assess the current status and ecological requirements of poorly known, rare and threatened species.

Results

(i) Serranía de los Churumbelos

421 bird species were recorded in Serranía de los Chrurumbelos, including the addition of 93 species from a total of 162 species recorded during 48 ornithological person-days in 1999. A total of 2,834 mist-net captures (1,057 in 1999) and over 229 species were caught over 142,730 MNH. The bird species inventory with mist-net captures for each site is presented in Appendix I. A breakdown of bird results and fieldwork effort for all sites is provided in Table 3. A total of two Threatened and 10 Near-Threatened species were recorded, with five Ecuador-Peru East Andes EBA and four Colombian Inter-Andean Slopes EBA endemics. Specific information and recommendations on each Red Data Book and EBA species recorded will be presented in the forthcoming final report.

Various species were tape-recorded, with tapes deposited with Wildlife Sounds, National Sound Archives (British Library) and the Center for Bioacoustics, Texas A&M University. A total of 41 birds were collected (from a combination of mist-netting mortality and a few selectively-taken specimens) and have been deposited at ICN, Universidad Nacional, Bogotá (see Appendix III). For many species, a great deal of information, from ecology and range distribution to biometrics and plumage variations, was collected, and will be presented in the final report (March 2000) and in scientific publications (e.g. Salaman *et al.* in prep.).

It is estimated that the probable total number of resident bird species exceeds 550 species: an exceptional diversity, making the Serranía a global avian "hotspot" and meriting conservation action for the region.

Location	Person	Total	Forest	PB ²	\mathbf{RN}^2	\mathbf{AH}^2	VI ²	$\mathbf{N}\mathbf{A}^2$	TA ²	ED^2	RDB sp. ³	Mist-	MNH ⁴	Total	Re-	Sp.
	-days'	sp.	Sp. ¹									net hrs		caps.s	traps	caps.
Puerto Bello (SS1)	40	165	120	75	78	37	17	9	7	12	0	72.30	32,535	611	119	60
Río Nabueno (SS2)	35	137	125	78	35	48	23	20	6	9	2NT; 1E	60.00	27,000	660	164	85
Alto Hornoyaco (SS3)	35	114	101	37	48	25	46	23	6	9	1T; 2NT;4E	45.00	19,710	297	31	75
Villa Iguana (SS4)	35	106	100	17	23	46	12	48	16	30	1T; 2NT;2E	60.00	26,280	209	32	47
Nabú (SS5)	18	106	101	9	20	23	48	18	31	56	1T; 2NT;3E	52.00	19,130	386	-	59
Tatauí (SS6)	15	60	58	7	6	6	16	31	4	49	1NT	40.00	9,840	212	-	39
El Dorón (SS7)	15	109	99	12	9	9	30	56	49	24	4NT; 3E	30.30	8,235	459	-	49
Totals ⁵	193	421 / 797	352 / 704								2T;10NT	360.00	142730	2,834	375	229/ 414

Table 3: Summary of ornithological fieldwork effort and results, Churumbelos 1998-1999.

¹ Forest dependant species (total less characteristically open country species)

² Uniqueness (in bold) and overlap between sites in represented in the number of species

³ RDB= Red Data Book sp. (Collar *et al.* 1992); T= Threatened; N= Near-threatened; E= EBA sp.

⁴ MNH = Mist-Net Hours per meterage (1 metre of net per hour = 1).

⁵ Where two numbers appear in the totals, the first number refers to the total number of species in the Churumbelos. The second number is the sum of the column (i.e. a total of every site-species).

Distributional patterns

Appendix I illustrates species distributional patterns from the lowlands to highlands in the Cordillera Oriental for certain groups, particularly within families and genera. For example, within the genera *Dendrocincla*, *Thripadectes*, *Mionectes*, *Henicorhina* and *Cyclarhis*, clear altitudinal species replacements are seen. Avifauna assemblages showed close affinities between SS1 to SS2, SS3 to SS4, and SS5 to SS7.

In 1998, "unique" species (only recorded at one site) from SS1 to 4 respectively were 76, 37, 29 and 48. In 1999, all these figures are reduced with new data from higher elevations, SS4 significantly so. From the three study sites in 1999, a high degree of overlap was recorded. Of the 162 species recorded, 36% were recorded at either all three sites or at SS5 and SS7 only. Only a small number of species (60) were recorded at SS6 owing to harsh climatic conditions and terrain with associated stunted forest along the ridgetop.

Only two species, Orange-bellied Euphonia *Euphonia xanthogaster* and Andean Solitaire *Myadestes ralliodes* (0.5%), recorded at all sites, and 21% average uniqueness at each site. Two other species, Black Vulture *Coragyps atratus* and White-collared Swift *Streptoprocne zonaris*, were present at all but one site. SS1 had the highest uniqueness (45%). Of the 1999 sites, SS7 (22%) had the highest uniqueness. Table 1 illustrates the extent of species overlap between sites. Sites 1 & 2; 3 & 4; and 5 & 6 & 7 show closest affinities. The overlap between sites shows a consistent pattern, with affinities decreasing with increasing elevational distance from each site. The affinity between SS1 and SS7 shows a surprising deviation from this trend, because of the partially secondary habitat which only these sites shared, leading to a greater than expected similarity. SS6 also provides deviations from the norm, as with only 60 species, overlaps with other sites are low.

Site species richness totals reveal a general decrease in diversity along the altitudinal gradient, from SS1 in the Amazonian foothills to SS7 in upper premontane Andean forest (although SS6 is much reduced for reasons already stated). This may be attributed to three important factors: decreasing habitat structural complexity (physiognomy); decrease in productivity and reduced biomass; and decrease in area size with altitude, therefore less available space. However, when non-forest-dependent species are excluded from each site's species richness total (*c*.69 characteristically open-country species), all site inventory totals are similar (with the exception of SS6 as previously explained). Forest-dependent accounted for 84% (352) of all species recorded. The exceptionally high level of species congruity to forest at all sites (with the exception of SS1 and SS7 which encompassed some non-forest areas) is a reflection each study area's forest situation. Interestingly, significantly lower person-effort in 1999 (3 ornithologists) verses 1998 (5 ornithologists) did not result in any significant changes in species richness measured, e.g. 106 species recorded at both SS4 (1998) and SS5 (1999). With comparable results between years, considerable benefits of the smaller team included large savings and easier logistics.

Taking into account variations in fieldwork effort, several patterns of avifauna distribution emerge:

- overall avian species richness gradually declines along the altitudinal gradient from 350 m to 2,450 m,
- forest-dependent species richness remains almost constant with increasing elevation;
- the majority of threatened species were encountered at premontane and lower montane elevations.
- range-restricted species define Study Site zoogeographical affiliations, with two major zoogeographic regions, the *Northern Andean* (NAN) and *Amazonia North* (AMN), strongly influencing the Serranía;
 a) SS 1 & SS 2 (below 1,000 m) = great biological affinities to AMN zoogeographic region.
 - b) SS 3 SS 7 (above 1,000 m) = close biological affinities to the NAN zoogeographic region.
- greater definition can be assigned as a large proportion of species originate from two zoogeographic subregions; *Eastern Slope Andes* (within NAN) and *Río Negro West* (within AMN).

Study site avifauna summaries

The principal avian elements and interesting species recorded at each site from 1999 are summarised below. A general summary of all sites (including those from 1998) is presented in *Cotinga* (Salaman *et al.* 1999).

SS5 - Nabú, 1,900 m

A total of 106 species were recorded, with <u>Thraupidae</u> (14 sp.) predictably diverse, but with surprisingly high diversity in <u>Tyrannidae</u> (16 sp.) and <u>Furnariidae</u> (10 sp.). Two individuals of the Vulnerable¹ Hooded Antpitta *Grallaricula cucullata* were captured and photographed at this site. Other poorly-known species and important range extensions noted include Red-billed Parrot *Pionus sordidus*, Spectacled Prickletail *Siptornis striaticollis*, Scalloped Antthrush *Chamaeza turdina* and White-capped Tanager *Sericossypha albocristata*.

SS6 - Tatauí, 2,200 m

A significantly reduced avian richness was recorded (60 species), with few arboreal insectivores e.g. Furnariidae and Dendrocolaptidae. However, the ridgetop physiognomy facilitated improved canopy observations, and a greater number of supercanopy species, e.g. Psittacidae and Accipitridae, were recorded. Nectivorous birds were encouraged by the high density of terrestrial flowering Bromelia, with Trochilidae the most dominant family. *Diglossa* flowerpiercers (four spp.) dominated multi-species foraging flocks. The Near-Threatened Black-and-Chestnut Eagle *Oroaetus isidorei* was observed soaring over the forest. Other notable range extensions include Andean Potoo *Nyctibius maculosus* and Flammulated Treehunter *Thripadectes flammulatus*. A male Purple Honeycreeper *Cyanerpes caerulus* observed foraging on bromeliads on an exposed summit peak at 2,300m, presents a substantial elevation extension from 1,400 m.

SS7 - El Dorón, 2500 m

A total of 109 species were recorded, despite observations being hampered by several days of military-guerrilla combat at 10km distance. Trochilidae were extremely abundant and diverse with 15 species recorded, including the poorly-known Gorgeted Woodstar *Acestrura heliodor* and Rufous-vented Whitetip *Urosticte ruficrissa*, endemic to EBA 044. Three Galliformes, especially vulnerable to human settlement, were recorded; Wattled

Guan Aburria aburri (Near-Threatened), Chestnut Wood-Quail Odontophorus hyperythrus (Near-Threatened), and Sickle-winged Guan Chaemepetes goudotii. Dusky-headed Brush-Finch Atlapetes fuscoolivaceus (Near-Threatened) was observed twice briefly in scrub growth around the communication installations, in multi-species foraging flocks. Other interesting range extensions include Ashy-tailed Swift Chaetura andrei, Stygian Owl Asio stygius and Ocellated Tapaculo Acropternis orthonyx.

Species at risk

Two threatened species were recorded; Military Macaw Ara militaris (observed daily in large flocks up to 12 birds at SS3 and SS4) and Hooded Antpitta Grallaricula cucullata (two caught and photographed at SS5). Ten Near-Threatened species were recorded; Pink-throated Brilliant Heliodoxa gularis (SS2); Ecuadorian Piedtail Phlogophilus hemileucurus (SS3); Scaled Fruiteater Ampelioides tschudii (SS4); Fiery-throated Fruiteater Pipreola chlorolepidota (SS3-4); Lanceolated Monklet Micromonacha lanceolata (SS2); Black-billed Mountain-Toucan Andigena nigrirostris (SS5, SS7); Black-and-Chestnut Eagle Oroaetus isidorei (SS6); Chestnut Wood-Quail Odontophorus hyperythrus (SS5-7); Wattled Guan Aburria aburri (SS7); and Dusky-headed Brush-Finch Atlapetes fuscoolivaceus (SS7).

Nine EBA species were recorded; Napo Sabrewing *Campylopterus villaviscensio* (SS3) (EBA 044; Ecuador-Peru East Andes); Ecuadorian Piedtail *Phlogophilus hemileucurus* (SS3) (EBA 044); Pink-throated Brilliant *Heliodoxa gularis* (044) (SS2); Rufous-vented Whitetip *Urosticte ruficrissa* (SS4, SS7) (044, EBA 040; Colombian inter-Andean slopes); Golden-winged Tody-Flycatcher *Todirostrum calopterum* (SS3) (066; Upper Amazon-Napo lowlands); White-streaked Antvireo *Dysithamnus leucostictus* (SS3, SS4) (044); Chestnut Wood-Quail *Odontophorus hyperythrus* (SS5, SS7) (040); Hooded Antpitta *Grallaricula cucullata* (SS5) (040); and Dusky-headed Brush-Finch *Atlapetes fuscoolivaceus* (SS7) (040).

Five endemics originated from the Ecuador–Peru East Andes EBA (044), and four endemics (one shared) from the Colombian Inter-Andean Slopes EBA (040). The five EBA 044 species represent a significant northerly range-extension as well as the northward enlargement of the EBA's zone of influence. EBA 044 characterises sites from SS2-SS4 (650 – 1450 m) whereas EBA 040 characterises SS5-SS7 (1800 – 2500 m).

Mist-netting results

Mist-netting was very successful with 2,834 captures (1,777 in 1998; 1,057 in 1999) over 37 days of net deployment (an average of 77 birds per day) - a significant capture rate for the tropics. The most productive site for mist-netting was SS7, with over 200 individuals caught in one day, whilst SS2 produced over 100 captures on three consecutive days. The most abundant species caught across all sites are summarised in Table 4.

Between bird families, Trochilidae (Hummingbirds) dominated captures, with 784 captures (28% overall) of 38 species, closely followed by Tyrannidae (Tyrant-Flycatchers) with 619 captures (22% overall) of 56 species (33 captured). Dendrocolaptidae (Woodcreepers) and Thamnophilidae (Typical Antbirds) both represented 7% of captures, but interestingly species diversity was very different, with 12 versus 27 species respectively. Thamnophilidae diversity showed strong affinities to altitude with greatest diversity represented at 300 m with 48% captures /12 spp. declining to 7% captures /3 spp. at 1,450 m and <1% captures/ 2 species at 2,450 m. Furthermore, Thamnophilidae diversity correlated strongly with terrestrial ant diversity (J. Bustos in Salaman and Donegan, 1998). The mist-net data will be further examined and a full report presented in the final report.

Table 4	l : '	The mos	t abuı	ıdant	species	mist-	netted	in	Serranía	de	los	Churumbelos	(all	those	with	>20	captu	ires)

Species	# of captures	Buff-tailed Sicklebill Eutoxeres condamini
Olive-striped Flycatcher Mionectes olivaceus	212	White-flanked Antwren Myrmotherula axillaris
Streak-necked Flycatcher Mionectes striaticollis	182	Blue-rumped Manakin Pipra isidorei
Blue-crowned Manakin Pipra coronata	137	Purple Honeycreeper Cyanerpes caeruleus
Wedge-billed Woodcreeper Glyphorhynchus spin	rurus 135	Spotted Barbtail Premnoplex brunnescens
Speckled Hummingbird Adelomyia melanogenys	109	Straight-billed Hermit Phaethornis bourcieri
Collared Inca Coeligena torquata	78	Ocellated Woodcreeper Xiphorhynchus ocellatus
Long-tailed Hermit Phaethornis longirostris	71	Black-faced Antbird Myrmoborus myotherinus
Ochre-bellied Flycatcher Mionectes oleagineus	65	White-crowned Manakin Pipra pipra
Andean Solitaire Myadestes ralloides	64	Bluish Flower-Piercer Diglossa caerulescens
Pale-tailed Barbthroat Threnetes leucurus	61	Black-throated Tody-Tyrant Hemitriccus granadensis
Emerald-bellied Puffleg Eriocnemis alinae	60	Tourmaline Sunangel Heliangelus exortis
Orange-bellied Euphonia Euphonia xanthogaste	r 55	Blue-fronted Lancebill Doryfera johannae
Greenish Puffleg Haplophaedia aureliae	54	
White-plumed Antbird Pithys albifrons	49	
Golden-headed Manakin Pipra erythrocephala	37	
Tawny-bellied Hermit Phaethornis sympatophon	rus 32	
Golden-winged Manakin Masius chrysopterus	32	
Bronzy Inca Coeligena coeligena	31	

(ii) Northeast Antioquia Transect

A total of 318 species were recorded in 60 person-days, with 258 species registered in study sites and the remainder (60) found in secondary areas surrounding our study sites. Fieldwork in Anorí aims at providing a firm foundation for future mid-elevation and montane surveys. Additional fieldwork by JO and AC has been on-going at 1800 m in 1999 (Cuervo *et al.* 1999). Much important data was collected in this transect, providing an insight into bird distributional patterns at the northern base of the Central Andes. A summary of results from all standard sites is provided in Table 5 below.

Location	Person-	Total sp.	For.	1 ²	2^2	3 ²	RDB sp. ³	Mist-net	MNH ⁴	Total	Retraps	Species
	days'	recorded	Sp. ¹					hrs		captures		caught
Apollo 13 (SS1)	24	149 (55a)	96	74	64	22	3 T; 3 N; 7 E	51.00	18,768	433	105	45
Alto de los Tarros (SS2)	20	108 (27b)	91	64	33	22	1 N; 7 E	46.00	16,670	260	43	46
Alto Combate (SS3)	16	97	86	22	22	65	4T; 2N; 4 E	33.00	9176	118	15	33
Totals	60	258 (317)					7T; 8 N; 11 E	130	44,614	811	163	92/124

Table 5: Summary of ornithological fieldwork effort and results from northeast Antioquia in 1999.

¹ Forest dependant species (total less characteristically open country species)

² Uniqueness (in bold) and overlap between sites in represented in the number of species

³ RDB= Red Data Book sp. (Collar *et al.* 1992); T= Threatened; N= Near-threatened; E= EBA species.

⁴ MNH = Mist-Net Hours per meterage (1 metre of net per hour = 1).

⁵ Figures in parentheses refers to observations from forest outside of the immediate study site.

Species observed en route to SS1 and SS2 are noted in Appendix II and in parentheses in Table 5 as coming from "a" and "b", respectively. Of these observations, 60 species were not recorded within the study sites. Of the 258 species, eleven (4%) were recorded at all three sites. This small number was largely because 65 of the 98 species (67%) recorded at SS3 were unique to the site. SS1 and SS2 showed a large overlap, with 64 species recorded at both sites (43% of SS1; 59% of SS2).

Study site avifauna summaries

The principal avian elements and interesting species recorded at each site are summarised below.

SS1 - Apollo 13; 300 m

A total of 149 species were recorded, including many secondary forest and open-country species. The Threatened endemic Saffron-headed Parrot *Pionopsitta pyrilia*, was relatively regularly seen in small groups of between 2-10 feeding in the canopy. The presence of *C. alberti* was confirmed here by the two landowners of the study site forest, with one sighting three days prior to our arrival. Despite intensive searching, we were unable to locate the species. White-mantled Barbet *Capito hypoleucus* (Vulnerable) was observed several times in multi-species foraging flocks in the high canopy. An adult Near-Threatened Plumbeous Hawk *Leucopternis plumbea* was captured, representing a significant range extension from the Pacific slope of the Western Andes.

SS1a - Puerto Lopez area, 150 m

Brief observations were conducted in scrubby overgrown growth surrounding the town and along rivers on the journey to and from the zone. A small number of birds were captured during a day spent demonstrating our work to a local school. A total of 110 species were recorded here, including 55 species not seen at SS1. Northern Screamer *Chauna chavaria* (Vulnerable) was observed from a boat along the Río Nechí. A pair of Blue-billed Curassow *Crax alberti* and *Chauna chavaria* were photographed in captivity. Some hunters reported killing as many as twenty *C. alberti* within the past few years. Live trapped birds (typically chicks) are sold for up to US\$100 (greater than average monthly income). Unless conservation action is undertaken soon, this Nechí endemic may soon become extinct.

SS2 - Alto de los Tarros; 800 m

A total of 108 species were recorded, with notably less secondary species than at SS1. Notable species included Colombian Tinamou *Crypterellus columbianus*, Ferruginous Pygmy-Owl *Glaucidium brasilianum* (range extension from the Carribean coast) and Near-Threatened Nechí endemic, Sooty Ant-Tanager *Habia gutturalis* (7 individuals caught and photographed).

SS2b - Anorí trail to Alto de los Tarros trail, 650-1,600 m

Amongst 60 species recorded, important records include the first record for the Cordillera Central of Least Grebe *Podiceps dominicus* and sightings of Colombian Chachalaca *Ortalis colombiana* (sspp. of Variable Chachalaca *O. motmot*).

SS3 - Alto Combate; 1,550 m

Of 97 species recorded, five were Threatened or Near-Threatened: Wattled Guan *Aburria aburri* (Near-Threatened); Chestnut Wood-Quail *Odontophorus hyperythrus* (Near-Threatened); Parker's Antbird *Cercomacera parkeri* (Vulnerable); Red-bellied Grackle *Hypopyrrhus pyrohypogaster* (Vulnerable) and Purplish-mantled Tanager *Iridosornis porphyrocephala* (Near-Threatened). The first record for the Cordillera Central was made of Rufous-browed Tyrannulet *Phylloscartes superciliaris*. Finally, a new species for science in the genus *Lipaugus* was collected and is currently being described (Cuervo *et al.* in prep.).

Conclusions

These two expeditions have provided the first comprehensive analysis of altitudinal distribution patterns of birds on the eastern slope of the Andes in southern Colombia from 300 m to 2,500 m and northern slope of the Cordillera Central from 300 to 1,550 m.

The analysis of our results will be completed by the time of the Final Report. From preliminary analyses our ornithological fieldwork of **Serranía de los Churumbelos** tentatively reveals the following conclusions:

- The Serranía de los Churumbelos is a global avian "hotspot"– extremely important for bird diversity. It is estimated that the total bird species inventory contained within the Serranía would exceed 550 species;
- The region encompasses a very interesting assemblage of avian taxa; including some of Colombia's most poorly known species and communities showing a high degree of subspecies endemism, which highlights the need for conservation attention and further study;
- Changes in species compositions and shifts in community structure with increasing altitude revealed by this rapid study emphasise various interesting trends that warrant further scientific investigation;
- The vast majority of species recorded (83%) are forest-dependant, thus impending forest destruction over the Serranía de los Churumbelos will irrevocably destroy critical habitat needed for these many species.

Ornithological results merit the recommendation that the Serranía de los Churumbelos be considered for immediate conservation action.

Preliminary results from **Northeast Antioquia** demonstrate a clear need for protective measures. A more detailed ecological analysis of results from Anori will be presented in further EBA publications once further studies have taken place into premontane elevations c.1,000-1,300 m and above 1,700 m. A detailed conservation assessment for the region to be presented to CORANTIOQUIA will take into account future studies, and will be published on the EBA website on the Internet in due course.

This region contains many poorly-known species, not least one new species for science (*Lipaugus* sp. nov.), a species described as recently as 1997 (*Cercomacera parkeri*) and the Critically Endangered *Crax alberti*. The ecological catastrophe in the lowlands suggests a bleak future for these three species, unless conservationists and others act quickly and decisively. The conservation initiative commenced by CORANTIOQUIA in the La Forzosa forest fragment is extremely important in protecting many outstanding species including the *Lipaugus* sp. nov. Hopefully this new protected area can gradually be extended to cover a broader elevational span.

Amphibians and Reptiles ~ Herpetos

Thomas Donegan

Collection identified by Dr. John D. Lynch, Instituto de Ciencias Naturales, Universidad Nacional.

Summary

A collection of herptiles was made at each site, using random encounters and night searches. Species inventories are presented below and in Appendix IV. A number of new distributional records are presented, including newly-described species and several forms which relate to undescribed, unstudied or unknown species.

Introduction

Colombia is one of the most diverse countries in the world in terms of herpetofauna. 475 species of reptiles are known from the country, making Colombia the fourth most diverse country in the world in this group (Sanchez *et al.* 1995). Colombia is known to host at least 620 species of Amphibians, the world's No. 1 species total (Conservation International, 1997). But even this figure must be an underestimate, evidenced by the high rate of new discoveries. For instance, Lynch and Ruiz-Carranza (1996) considered that around 30 of the estimated 100 frog species of the genus *Eleutherodactylus* in the west Andes to be undescribed. Relative ease of identification and continuing new discoveries make herptiles a particularly exciting group to study on an expedition such as this. It was therefore considered a worthwhile use of expedition time to collect any herptiles encountered by team members, and additionally for TD to conduct 2-3 night searches for a few hours at each site.

The Amazonian regions surrounding the Serranía de los Churumbelos were surveyed briefly for amphibians and reptiles in 1988 (Piamonte for 2 days - see ICN Herpetology Collection). However, until Colombia '98 and the EBA Project, the upper elevations remained completely unknown. No herptile surveys have taken place around Anori or in the foothills of San Lucas.

Methodology

Herptiles were sampled non-systematically, non-intensively and non-comprehensively, combining the efforts of all team members and using the following three techniques:

(i) Night Searches; Two to three night searches were conducted at each site by TD. Where possible, transects were cut along a c. 400 m length of a stream. Potential herptile habitats were left undisturbed where possible, allowing for navigation along the stream with minimal disturbance. Alternatively or additionally, the main mist-net transect was used for searches. Once located (usually by voice), herptiles were placed in plastic zip-bags with a little water, and left overnight for inspection the following morning.

(ii) Random encounters; All team members and guides were instructed in herpetological capture techniques and were asked to catch any herptiles encountered and put them in plastic specimen bags supplied.

Identification Protocol; For each individual caught the following were noted:

- Time, location and micro-habitat caught;
- Measurements of Eye-Nose; Body; Eye Dimensions; Head width; tail and scale counts (for Reptilia);
- General morphological / colour description taken

Some photographs were taken: A specimen was taken of each morphospecies caught. Due to the lack of identification guides, and the real chance of discovery of new species, this was considered necessary. One of Colombia's leading herpetologists, Dr John Lynch, has identified the collection, which is now catalogued at ICN.

Results and Discussion

(i) Serranía de los Churumbelos

A species list combining results from 1999 is provided in Appendix IV. The species caught at Serranía de los Churumbelos in 1999 were as follows.

Species	SS5 (1800 m)	SS6 (2100 m)	SS7 (2450 m)
Class Amphibia, Order Anura (I	Frogs and Toads)		
Leptodactylidae			
Eleutherodactylus sp.	5 (2)	1	2
Eleutherodactylus w-nigrum	3 (3)		(1)
Class Reptilia, Order Squamata,	Suborder Sauria (Liz	zards)	
Iguanidae			
Phenacosaurus heterodermus			1
Class Reptilia, Order Squamata,	Suborder Ophidia (S	(nakes)	·
Colubridae			
Chironius monticola		1	

KEY: 1(2) means 1 specimen taken; 2 individuals captured and released.

It was strange that at SS5-7, where a fair number of frogs were captured, that only two species were encountered: *E. sp.* in the forests, and *E. w-nigrum* in secondary growth. *E. sp.* has not yet been identified. It was common at all sites, found on the forest floor or in low undergrowth, and was active both at day and night. Dr. John Lynch is currently undertaking a study into *Eleutherodactylus* frogs of the Cordillera Oriental. These specimens will be useful for that study, relating to an unstudied / unknown / unidentified / undescribed species. The two Reptilia are expected to be present.

A disappointing diversity and number of herptiles were recorded at Churumbelos SS5-7, compared to the more lowland sites. This is considered to be due to (i) 4 team members compared to 14 last year for random encounters; (ii) the lack of entomologists using pitfall traps which produced many specimens in 1998; (iii) the lack of a bat specialist also looking for frogs at night; (iv) predominantly herptile-poor ridge-top habitat (especially at SS6); and (v) decreasing biodiversity with increased altitude.

(ii) Anori

The pulles captured were as follows (sume key as above).
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Species	SSA (200 m)	SS1 (250 m)	SS2 (800 m)	SS3 (1550 m)
Class Amphibia, Order Anura (Frogs and Toad	s)			
Bufonidae				
Bufo marinus	3 (lots)	(lots)		
Dendrobatidae				
Dendrobates truncatus		1 (8)		
Leptodactylidae				
Eleutherodactylus fallax			1	
Eleutherodactylus frater sp.?				2
Eleutherodactylus raniformis			2	
Eleutherodactylus sp.			1	
Eleutherodactylus taeniatus			1	
Hylidae				
Smilisca phaeota		1		
Class Amphibia, Order Gymnophiona (Caecelia	ns)			
Typhlonectidae				
Typhlonectes natans	1			
Class Reptilia, Order Squamata, Suborder Saur	ia (Lizards)			
Iguanidae				
Anolis (fusco-oratus) tolimensis?			2	
Anolis sp.?				1
Class Reptilia, Order Squamata, Suborder Oph	idia (Snakes)			
Colubridae				
Clelia clelia	(1)	1		

The collection from Anori and the lowlands of San Lucas was more productive than in the Churumbelos, probably due to sites being located in more favourable habitat with more streams for transects and less ridge-top effects.

Dendrobates truncatus presents a downslope elevation extension to 250 m, with previous records only as low as 530 m (Ruiz-Carranza *et al.* 1996). *Eleutherodactylus fallax* is recently described (1997) from the northern Central Cordillera. The record at SS2 thus provides an important new site for the species. *Eleutherodactylus frater*, apparently the most closely-related species to this specimen, is known only from the Cordillera Oriental and Serranía de Macarena (Ruiz-Camarra *et al.*, 1996). Thus, this record is either a significant range extension or may relate to an undescribed form. Likewise, *E. sp.* remains undescribed, unknown or unstudied.

Conclusions

The ongoing effort to document and describe the Amphibia and Reptilia of Colombia is a Herculean task which is only partly completed. A large amount of new distributional data has been collected both this year and in 1998, with no previous herpetological studies in either Serranía de los Churumbelos or the Anori area. Perhaps more importantly, several forms have been collected which remain undescribed, or for which no description yet exists. These await further study. Herptile surveys have thus produced some important results which can only increase our knowledge of *la naturaleza Colombiana*.

Herptiles are a group which demonstrate well the need for more effective conservation of the Andean forests of Colombia. Unless protective measures become effective, undescribed species will become extinct before we have the chance to know that they once existed. Even from this brief non-comprehensive study, it is clear that both Anori and the Churumbelos, containing several poorly-known or undescribed forms in pristine forest, would be excellent new sites in which to implement conservation measures.

Mammals ~ Mamíferos

Andrés Cuervo, José Ochoa and Thomas Donegan

Summary

Using opportunistic sightings, a small number of night searches and talks with local people, a large number of Threatened large mammal species and important new ecological and distributional data was recorded. Of all the Study Sites, SS2 at Anorí is of the most critical importance to conservation with six Primate species recorded, of which five are considered Threatened with extinction by the IUCN.

Introduction

Mammals form an important part of forest ecosystems, yet as relatively little is known of their ecology and distribution in the Neotropics, further studies are important in establishing species distributions and the ecological role of mammals within the forest community. Mammal fieldwork aimed to compile a basic large mammal species inventory for each site. Although the richest diversity in Neotropical mammals is found in <u>Chiroptera</u> and <u>Rodentia</u>, large mammal surveys gives a global idea of the status of forest and hunting pressures and are a good tool for approaching this group of vertebrates. Furthermore, Threatened species analyses in the Neotropics concentrate on large mammal groups which are relatively well-known and capable of identification.

Methodology

Observations for large mammal species were largely opportunistic. Whilst observation transects were being conducted as part of bird surveys, any mammals viewed were identified and recorded. Additionally, AC and JO conducted 1-2 mammal searches at night, and TD looked for mammals whilst making herptile searches. Whilst in local towns and villages, talks with local people focused on large mammals as well as birds. Several species in captivity were observed and photographed, following leads from local people.

Identification was made possible using Emmons and Feer (1997) and further with Tirira (1999). It was considered a productive use of expedition resources to spend a small amount of time identifying species and collecting ecological information on the mammals found in Study Sites, many of which are Threatened and are charismatic species which could potentially act as 'umbrella' species for protective measures. Due to general low encounter rates, these methods were considered more resource-efficient than employing a mammal-specialist.

Results

A large number of Bat, Rat and Squirrel species were observed at all sites. However, the vast majority of these were not capable of being identified by team members and no collection was made. A small number of bat specimens were taken and preserved in alcohol in Serranía de los Churumbelos SS6 from mist-net captures. These have been deposited at the ICN mammalogy collection. Below follows a synopsis of the large mammals recorded at all sites.

(i) Serranía de los Churumbelos

At SS5, an Olingo *Bassaricyon sp.* was observed once at dusk. It was very inquisitive, moving through the lower canopy towards our torchlights. At SS6, another member of the Racoon family, the **Kinkajou** *Potos flavus* was heard calling once. This represents an elevation extension with previous records only to 1,750 m. At SS7 evidence of the presence of **Spectacled Bear** *Tremarctos ornatus* was noted, with several trees extensively scarred with claw-marks, specially palm sprouts. **Puma** *Puma concolor* and **Mountain Tapir** *Tapirus pinchaque* were recognised in informal interviews with local people.

(ii) Northeast Antioquia transect

At **SS1** and **SS2**, large number of Primates were recorded. **Silvery-brown Bare-face Tamarin** *Saguinus leucopus*, an IUCN Vulnerable endemic of the Nechí basin of Colombia, was the most common primate at SS1, where several 'record' photographs and tape recordings were taken. Smaller numbers were also observed at SS2. Individuals were observed in primary forest and frequently in disturbed secondary forest. Up to 12-18 individuals would forage together in the subcanopy and lower canopy, calling regularly with high-pitched squeaks. Three individuals of the IUCN 'Vulnerable' Lemurine Night Monkey *Aotus.(l.) lemurinus* were spotted roosting during the day in a cavity in the top of a c. 5 m. high dead tree trunk at SS2. White-fronted Capuchin Monkey *Cebus albifrons* was observed in an active group of up to 8 individuals. Several females were carrying young on their back. Red Howler Monkey *Alouatta*

seniculus (IUCN Vulnerable) was heard more often than seen at SS1 and SS2, but was observed several times in small groups (c. 5-7) eating fruit in the canopy. Small parties (up to 6-8 individuals) of the Vulnerable **Common Woolly Monkey** *Lagothrix lagothricha* were observed on a few occasions at SS2 moving quickly through the canopy feeding on fruit. Solitary individuals were also observed feeding in the subcanopy (JO). This is the most significant primate record as this species is very poorly known west of the Andes, with only one specimen of a juvenile of this species from Nechí area (Hernández-Camacho, pers. comm.). (White-bellied) Spider Monkey *Ateles sp.*, apparently the *belzebuth* species, another IUCN Red List species, was recorded several times at SS2 in groups up to 8 individuals, and their voices were frequently heard all day. One individual of this species was observed in captivity along the Anori - Cruces 'road', beside the Anorí river. These records represent a significant range extension, with previous Colombian records only from east of the Andes in Colombia (Emmons and Feer, 1997). However, photographic confirmation is needed, because of the possible occurrence of *Ateles geoffroyi*

Kinkajou *Potos flavus* was heard and observed once during a mammal night-search at SS1. **Central American Agouti** *Dasyprocta punctata* was observed once and heard calling at SS2. Local hunters note the presence of this species both at SS1 and SS2. The Anteater, **Northern Tamandua** *Tamandua mexicana* was observed on one occasion at about 18:00 hrs, walking along the nest transect at SS1. This follows a sighting of **Southern Tamandua** *Tamandua tetradactyla* from SS1 at Serranía de los Churumbelos in 1998.

Whilst in Puerto López, an immature **Jaguar** *Panthera onca* was observed and photographed in captivity, bound for illegal trade. Evidence of the species' presence was noted at SS1 and SS2 where pungent territorial odours and scratching on trees probably referred to this species. **Red Brocket Deer** *Mazama americana* was also photographed in captivity at Puerto López. **Paca** *Agouti paca*, **Nine-banded Long-nosed Armadillo** *Dasypus novemcinctus* and **Northern Naked-tailed Armadillo** *Cabassous centralis* were common items on restaurant menus in Puerto López. C. centralis "Cola de trapo", was considered by local hunters to be less common than *D. novemcinctus*.

At Anori **SS3**, no large mammals were recorded during our fieldwork. However, a comprehensive inventory of large mammal species produced from surveys at 1700-1820 m, close to SS3 is provided in Cuervo *et al.* (1999).

Conclusions

Although important records have been made, our mammal analysis is restricted in that small mammals such as bats and rodents – the most diverse and abundant groups in the mammal community - were not studied. However, with only a small additional effort to other fieldwork, which focused on birds and plants, much useful new data has been collected.

Sites for a number of Threatened species have been determined, with important new distributional and ecological data recorded on several mammal species. Of all the Study Sites, SS2 at Anori is of critical importance to conservation with a great diversity of Primates including 5 species considered threatened with extinction by the IUCN. The forest fragments studied presently encompass a relatively safe haven for the large fauna of the region. Almost all of these species are now much reduced in range due to landscape modification, making these study areas very important sites for conservation.

CONSERVATION ASSESSMENT

Paul Salaman and Thomas Donegan

This report is aimed at providing initial biological data and an account of our activities. Detailed conservation assessments with firm justifications backed will be provided for both study regions in future work. However, general conservation priorities have emerged from our two study transects. The following conservation priorities are based on our preliminary results, as well as discussion sessions held on-site by team members.

1. Serranía de los Churumbelos

Biological Importance

General biological findings reveal two major zoogeographic regions, the *Northern Andean* (NAN) and *Amazonia North* (AMN), which strongly influence the biodiversity of Serranía de los Churumbelos. A large number of species were recorded in birds and plants, resulting in the conclusion that two distinct biodiversity groups are defined: SS 1 & SS 2 (below 1,000 m) = great biological affinities to AMN zoogeographic region. SS 3 - SS 7 (above 1,000 m) = close biological affinities to the NAN zoogeographic region.

Using avian taxa, greater definition can be assigned to the biological compositions, with a large proportion of species restricted to the *Eastern Slope Andes* (within NAN) or *Río Negro West* (within AMN) zoogeographic subregions.

Whilst the entire Eastern slope of the Andes is influenced by these two zoogeographic regions, it is interesting to encounter such a high species diversity in Serranía de los Churumbelos. The Serranía encompasses an immense variety of ecosystems and micro-habitats, reflected its extraordinarily high biodiversity, and encouraged by its complex topography, made up of steep east-facing and gentle west-facing slopes and meseta landforms.

The direct biological justifications for the implementation of conservation are many, and are outlined in greater detail under each group where possible. Over 550 species of birds are estimated to occur in the Serranía, including at least 12 Threatened or Near-Threatened species and 10 restricted-range species. Furthermore, at least 15 bird spp. known from only 1 other location in Colombia were recorded. Two frogs represent the first record in each case for Colombia, with several unidentified herptiles potentially relating to undescribed taxa.

Vulnerability assessment

The eastern slope of the Andes in Colombia, as well as adjacent Ecuador, has been subject to enormous human population pressures and associated habitat degradation in recent years. Despite mounting human pressures on the eastern slope of the Andes in Colombia, research activities have largely neglected this region. Past collections have been particularly sparse along the eastern slope of the Andes, owing to historical difficulties with access. However, recent leaps in infrastructure development, although heavily exploited by human colonisers, have not seen a growth in biological research owing to fears regarding political instability and the widespread cultivation of coca.

The large expanse of virgin tropical lowland to montane forests in the Serranía is extremely important. Andean forests in Colombia have been considerably reduced in the last 50 years (Hamilton 1997). Only 15% of premontane and montane forests of Colombia remained intact two decades ago (Orejuela 1985), and these have certainly undergone further drastic reductions in recent years. Although no statistics are available, the foothills of the East Andes have undergone a massive transformation to agriculture in recent decades. Whilst premontane and montane forests contain a greater concentration of endemic, range-restricted and threatened species, protection of a full altitudinal span of forest types would be an efficient use of resources, given that the diversity of the Churumbelos is contained within such a restricted area. Furthermore, destruction of foothill Amazonian forest will have serious effects for many mobile species that may depend on the area for seasonal food resources.

What is most disturbing is the lack of protected areas on the eastern slope of the Andes in Colombia. Parque Natural Nacional Cueva de los Guácharos provides some protection to the forests of the region although is a small Park (c.5,000 ha) and suffers greatly from illegal colonists (Salaman pers. obs.). Fortunately, whilst much of the Andean Cordilleras and Eastern Andean slopes have undergone irreversible changes, Serranía de los Churumbelos has largely avoided the catastrophic human impact that other regions have suffered. However, this is changing rapidly as Serranía de los

Churumbelos is increasingly viewed as a treasure box of mineral (petroleum and precious metals) and natural resources (timber and rich organic soils for agriculture).

Mocoa has historically been a poor frontier town owing to a treacherous and often impassable single road access from Pasto, Nariño. However, within the last 10 years this has changed on completion of the Bogotá-Mocoa highway. The final road section from Mocoa to Pitalito was a major breakthrough for the regional economy, allowing the fast and reliable transportation of goods from Mocoa to the heart of Colombia. A ten-year sustained economic boom has attracted many immigrants that have colonised rural areas, including marginal lands on the fringe of Serranía de los Churumbelos. The most significant recent development is the development and ongoing paving of the Mocoa to Pitalito road, running parallel to the Serranía. This is scheduled to be completed by 2002 and will greatly facilitate rapid transportation links between Mocoa and the rest of the country, thus further stimulating economic growth and demand, particularly along the road from which SS5-7 were accessed. In addition, further road infrastructure projects are planned in the region, including a new major highway from the Ecuadorian border near Puerto Asís to Villavicencio. This proposed road would pass along the edge of the eastern base of the Serranía from Villagarzón to San José de Fragua and Florencia in Caquetá.

It is clear that the Serranía de los Churumbelos will shortly become the focus for large-scale deforestation and colonisation. Thus, there is a very real sense of urgency for conservation action to be implemented now, if it is to be effective in the region.

Conservation feasibility

Colombia '98 and Colombian EBA Project '99 demonstrate the great conservation importance and potential vast threats that are looming for the Serranía de los Churumbelos. Considering the mounting threats and unique biological properties of the Serranía, we unhesitatingly propose that legal protection in the form of establishing a protected area is the only option available to ensure the future protection of the forests in the Churumbelos.

Two options are already under consideration by local authorities. Firstly, the CRC are considering establishing a regionally-administered protected area in the Serranía (Luis Alfonso Ortega *in litt.* 1999). The second alternative would be a significant southerly extension of PNN Cueva de los Guácharos to encompass Picos Fragua down the central spine of los Churumbelos to the Río Caquetá. All of this land is property of the state (uncolonised and virgin forest) and largely non-conflictive with local communities that are currently only within a short distance from new roads bordering the mountain range. Importantly, the National Park could expand 20 fold (to over 100,000 ha.) with minimal increases of costs of infrastructure or administration.

The MMA (Ministerio del Medio Ambiente), who control the designation of National Parks and state environmental policies, have now proposed to enact this expansion of PNN Cueva de los Guácharos to encompass parts of the Churumbelos based on the recommendations of Colombia '98 and Colombian EBA Project '99.

Defining the precise boundaries of any protected area is a difficult decision. We consider it important to incorporate the entire altitudinal gradient from lowland humid forest to cloud forest, maximising the biodiversity protected. Colonists dominate the peripheral zone of the Serranía and, once informed of the threats and value of the Serranía, tentatively appear supportive of protection of a core area. A map of critical areas requiring conservation and proposed expansion of PNN Cueva de los Guácharos will be presented in the future reports.

2. Northeast Antioquia Transect

Biological Importance

The three sites studied by the EBA project in northeast Antioquia each have different, but highly compelling biological importance and conservation worth.

The forested areas around SS1 are immensely important as a fairly extant remnant of forest in the Nechí Endemic Bird Area. The forest of this EBA has been almost completely converted to farmland, resulting in a perilous position for endemics to this biogeographical zone. Blue-knobbed Curassow *Crax alberti*, in particular, is in critical danger of extinction, largely due to the heavy persecution by hunting for food which has followed infiltration by colonisers and gold-panners to the region. A lack of any protected area in the range of this species and other Nechí endemics creates much cause for concern.

Around SS2, most of the important species registered are mammals. With six species of Primate recorded, five of which are globally endangered, the premontane elevations of the northern base of the Cordillera Central are of great importance to the conservation of some of the Americas' most endangered and charismatic species. Protected areas are also urgently needed for bird species such as Sooty Ant-Tanager *Habia gutturalis* and White-mantled Barbet *Capito hypoleucus* as none of the Nechí basin is officially protected.

The patch of forest known as La Forzosa, in which SS3 was situated, has already been purchased by CORANTIOQUIA, following work there earlier this year by AC, JO *et al.* Other Threatened species recorded by them, in addition to the 6 Threatened or Near-Threatened species recorded by us in the higher elevations, include Black Tinamou *Tinamus osgoodi* (Data-Deficient) and Multicoloured Tanager *Chlorochrysa nitidissima* (Vulnerable) (Cuervo *et al.*, 1999). Furthermore, the new species of *Lipaugus* Piha currently being described is being recommended for Critically Endangered status (Cuervo *et al.* in prep.) based on the very limited fragments of forest at 1500-1800 m elevation in the Cordillera Central and critical threat levels.

Vulnerability assessment

The Colombian economy's major resource, coffee farming, is centred on the subtropical slopes of the Central Cordillera, and supports a high population concentration featuring major cities such as Medellín and Armenia. As is often the case, the subtropical forests of the zone and their communities have borne the brunt of economic development, with 16 of the Central Cordillera's 29 range-restricted bird species considered globally threatened (Stattersfield *et al.* 1997). The plight of these species is directly reflected in continued severe landscape modification and lack of protected areas in the region. Furthermore, as most of the few protected areas in the Central Cordillera are situated on the highest massifs dominated by páramo (e.g. Parque Natural National Los Nevados), the subtropical forests remain at considerable risk. Less than 10% of original forest cover in the Central Cordillera remains (Henderson *et al.* 1997), but we estimate this figure to be closer to 4% between 1000-2000 m elevations where only a few isolated forest fragments survive.

The existence of the patch of forest at La Forzosa owes much to the conscientious efforts of Luis Angel Ramirez in preventing hunters from entering the land and in resisting commercial pressures towards deforestation. CORANTIOQUIA have been instrumental in ensuring that this special forest is protected, paying Luis Angel Ramirez as a guard and initiating a programme with local communities. It is hoped that this scheme can be continued to ensure that the regional reserve is effectively enforced with the respect and support of local people. With so many exceptionally rare species, prospects for ecotourism appear good if security concerns can successfully be allayed.

Infrastructure in the Anori region continues to be improved with the recent paving of half of the main road from Antioquia opening up communications routes to farming communities. Beyond Anori downslope, there exists a large fragment of premontane forest known as La Morena, in which SS2 was situated. This largely primary forest is being slowly infiltrated by sprawling expansion of farms. We hope that CORANTIOQUIA's innovative programme can be extended to help reduce the rate of infiltration, due to the wealth of threatened species present in the foothills.

Despite forest coverage maps suggesting continuous forest in northeast Antioquia and Sur de Bolivar, the region has been heavily fragmented within the past ten years. Most fluvial systems have been devastated by heavy mechanised gold-mining, which has resulted in numerous stagnant pools encouraging mosquitoes and a recent malaria epidemic.

Subsequent to mining, valley slopes have been deforested for bananas, cattle pasture, maize and other crops. The illicit coca *Erythroxylon* spp. is not grown on the western slopes of Serranía de San Lucas due to prohibition by ELN guerillas who currently control the zone. Ridges and steep slopes generally still contain remnant patches of primary forest, although selective logging has impacted significantly through the region's forests. As lower farmed slopes become less productive, clearings are encroaching on important watershed forest patches.

Whereas action taken and planned in the higher elevations around Anori offers some hope to conservationists, the situation in the Puerto Lopez region at the foothills of San Lucas is an ecological catastrophe. Our maps from 1995 showed almost complete forest cover in the San Lucas foothills extending into the northern lowlands. However, based on talks with local people and our own observations, we estimate that just 4 years later, at least 30% of the forest extant in 1995 is now no more. Usually, colonisation follows closely alongside major roads, with forests not opened up until infrastructural improvements facilitate more rapid human access. However, in the San Lucas foothills, loggers are currently extracting timber from a distance up to 2-3 days' horse-ride from the nearest dirt road. Having walked for c. 7 hours from Puerto Lopez, we were only able to reach intervened forest. This unprecedented rate of human intervention is being caused by a 'gold rush' of colonists to the zone. News of the discovery of gold in the region has spread, leading to a cosmopolitan population of prospectors from all around the country. Whereas the amounts of gold potentially available are low in value (a typical worker can expect to find only up to 5000 pesos (\$3) worth of gold per day), the potential for a big discovery continues to attract more and more colonists. And in order to support the population explosion resulting from the gold rush, uncontrolled deforestation (for firewood and subsistence farming) and hunting (for food) are causing unsustainable pressures on remaining forests. Unless action is taken urgently, forestdependant species in the northern lowlands of Colombia such as Crax alberti, will soon become extinct. Sadly, the eastern foothills of Serranía de San Lucas are now effectively 'gone'. Plans for protection are probably best centred further South around Segovia where primary forest still exists, but should be initiated and enforced as a matter of extreme urgency before the tragic deforestation and environmental disaster of Puerto Lopez spread.

Conservation feasibility

In the La Forzosa forest, CORANTIOQUIA have already initiated a (so far) successful conservation programme. Our forthcoming recommendations will set out options for the protected area to be extended downslope to encompass forests surrounding SS2. As CORANTIOQUIA and our own talks with local communities have shown, this is a feasible plan which has attracted support from local communities, local government and farming unions.

The conservation feasibility of the lowland areas is less certain. At present, the current authorities in the zone (the ELN [National Liberation Army] guerillas) have developed several conservation-minded initiatives which will ensure some degree of protection to biological communities at least in the short term. Hunting of certain endangered species (e.g. Tapir) has been prohibited with severe penalties for breach of these "regulations". More importantly, the ELN have set aside protected forested areas within Serranía de San Lucas into which entry is prohibited. These areas are situated on watershed lines to protect drinking water from infestation by Mercury, Cyanide and other bi-products from mining processes. Some of these unofficial "Nature Reserves" are protected by landmines. Although primarily designed for health reasons to prevent water pollution, these areas also act as an effective conservation strategy for the endangered species in the zone. With efficient and sometimes brutal enforcement of protected zones, these areas are more than the 'paper parks' often found in government-controlled areas. However, the conflict in Colombia is such that one can never be sure who will have control of these regions in the future, and whether local communities will continue with water cleanliness schemes when they need firewood to cook, hunting for food and see the potential benefits of farming.

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Appendix I: Systematic inventory of birds recorded in Serranía de los Churumbelos, 1998-1999

Taxonomy and nomenclature largely follows Stotz *et al.* (1996), Ridgely and Tudor (1989 and 1994), Sibley and Monroe (1990 and 1993), and Ridgely and Greenfield (in prep.). **Sequence** follows Hilty and Brown (1986).

Key: Species observed / caught at each site:

- 1 Study Site 1; Puerto Bello, 300 m
- 2 Study Site 2; Río Nabueno, 700 m
- 3 Study Site 3; Alto Río Hornoyaco, 1,100 m
- 4 Study Site 4; Villa Iguana, 1,450 m
- 5 Study Site 5; Nabú, 1,900 m
- 6 Study Site 6; Tatauí, 2,200 m
- 7 Study Site 7; El Dorón, 2,500 m

Species	1	2	3	4	5	6
Great Tinamou Tinamus maior	x					
Little Tinamou Crypturellus soui	x	x				
Undulated Tinamou Crypturellus undulatus	x	~				
Snowy Egret Egretta thula	~	x				
Turkey Vulture Cathartes aura	x	x				
Greater Yellow-headed Vulture Cathartes malambrotus	~	x	x	x		
Black Vulture Coragyns atratus	x	x	x	~	x	x
Osprev Pandion haliaetus	x					
American Swallow-tailed Kite Elanoides forficatus	x		x	x	x	
White-tailed Kite Elanus leucurus	x					
Plumbeous Kite Ictinia plumbea	x			x		x
Sharp-shinned Hawk Accipiter striatus					1	x
Tiny Hawk Accipiter superciliosus		1				
Roadside Hawk Buteo magnirostris	х		Х		х	x
Black Hawk-Eagle Spizaetus tyrannus		x				
Black-and-Chestnut Eagle Oroaetus isidorei						х
Laughing Falcon Herpetotheres cachinnans	х	х				
Barred Forest-Falcon Micrastur ruficollis			1	х		
Lined Forest-Falcon Micrastur gilvicollis	х	1				
Collared Forest-Falcon Micrastur semitorquatus		х				
Wattled Guan Aburria aburri						
Sickle-winged Guan Chamapetes goudotii						
Marbled Wood-Quail Odontophorus gujanensis	х	2				
Chestnut Wood-Quail Odontophorus hyperythrus					х	
Gray-necked Wood-Rail Aramides cajanea	х					
Purple Gallinule Porphyrio martinica	х					
Wattled Jacana Jacana jacana	х					
Band-tailed Pigeon Columba fasciata						х
Pale-vented Pigeon Columba cayennensis		х				
Ruddy Pigeon Columba subvinacea				х	х	
Ruddy Ground-Dove Columbina talpacoti	х					
Ruddy Quail-Dove Geotrygon montana	1	6				
White-throated Quail-Dove Geotrygon frenata			4		х	
Military Macaw Ara militaris			Х	х		
Dusky-headed Parakeet Aratinga wedellii	х					
Maroon-tailed Parakeet Pyrrhura melanura	х	х			х	
Barred Parakeet Bolborhynchus lineola						х
Blue-headed Parrot Pionus menstruus	х					
Red-billed Parrot Pionus sordidus					х	х
Scaly-naped Parrot Amazona mercenaria						х
Mealy Parrot Amazona farinosa	х		X			
Squirrel Cuckoo Piaya cayana	х	х	х		х	
Black-bellied Cuckoo Piaya melanogaster		х				
Smooth-billed Am Crotophaga ani	х					
Striped Cuckoo Tapera naevia						
Great Horned Owl Bubo virginianus					х	
Spectacied Owi Pulsatrix perspiculata	х		v			
Andeen Buomy Oul Clausidium indiaii		1	л			
Andean Fyginy-Owi Giauciaium jarainii					х	
Siygian Owi Asio siygius						
Andeen Detee Nuctibius griseus					л	
Pauraque Nyctidromus albicollis	x					^
Band-winged Nightiar Caprimulaus longirostris	^				x	
I vre-tailed Nightiar Uronsalis lyra				x	^	
White-collared Swift Strentonrocne zonaris	x	x		x x	x	v
Chestnut-collared Swift Cynseloides rutilus	Â	^		А	^	L ^
Chapman's Swift Chaetura chapmani		x		v		
Grav-rumped Swift Chaetura cinereiventris		x		x		
Ashy-tailed Swift Chaetura andrei				^		
Short-tailed Swift Chaetura brachvura	x	x				
1						

	White-tipped Swift Aeronautes montivagus				х			
	Rufous-breasted Hermit Glaucis hirsuta	10	1					
	Pale-tailed Barbthroat Threnetes leucurus	11	49	1				
	Green Hermit Phaethornis guy		3	9	2	20		~
	Lawny-bellied Hermit Phaethornis sympatophorus	20	20	4	9	20		5
	White-bearded Hermit Phaethornis hispidus	1	39	4				
	Straight-billed Hermit Phaethornis hourcieri	10	14					
	White-tipped Sicklebill Eutoxeres aquila	10	6	5	3	4		
<i>a</i> 1	Buff-tailed Sicklebill Eutoxeres condamini	9	18	3	2	•		
ш.	Blue-fronted Lancebill Doryfera johannae	3	12	5	1			
nd	Green-fronted Lancebill Doryfera ludoviciae							7
/•	Gray-breasted Sabrewing Campylopterus largipennis	7	2					
(1n	Napo Sabrewing Campylopterus villaviscensio			9	6			
	White-necked Jacobin Florisuga mellivora		2					
	Brown Violetear Colibri delphinae		2					
	Black-throated Mango Anthracothorax nigricollis	х		-				
	Violet-headed Hummingbird Klais guimeti			2				
	Fork-tailed Woodnymph Thalurania furcata	6	14					
	Golden-tailed Sapphire Chrysuronia oenone		14	х	1	24	20	4
	Speckied Hummingbird Adelomyta metanogenys				7	24	20	40
	Ecuadorian Piedtail Phlogophilus hamilgucurus			3	'			0
	Could's Iswelfront Heliodoxa aurascans	1	6	5				
	Fawn-breasted Brilliant Heliodoxa rubinoides	1	0			5		1
	Violet-fronted Brilliant Heliodoxa leadbeateri				7	6		•
	Black-throated Brilliant Heliodoxa schreibersii		4	2				
	Pink-throated Brilliant Heliodoxa gularis		3					
	Bronzy Inca Coeligena coeligena				3	18	7	3
	Collared Inca Coeligena torquata					1	11	60
-	Buff-tailed Coronet Boissonneaua flavescens							20
	Tourmaline Sunangel Heliangelus exortis						X	2
	Emerald-bellied Puffleg Eriocnemis alinae						19	4
	Greenish Puffleg Haplophaedia aureliae					14	14	20
	Buii-booted Racket-tall Ocreatus (underwoodil) dadde				х		1	2
	Plue threated Sulph Addiogeneus kingi					2	5	12
	Wedge-billed Humminghird Schistes geoffrovi				л	1	5	1.
	Gorgeted Woodstar Acestrura heliodor							1
	Golden-headed Ouetzal Pharomachrus auriceps			x		x		
	Pavonine Quetzal Pharomachrus pavoninus	x	x					
	White-tailed Trogon Trogon viridis	x	х					
	Masked Trogon Trogon personatus					2		
	Black-throated Trogon Trogon rufus	1	3					
	Blue-crowned Trogon Trogon curucui			х				
	Violaceous Trogon Trogon violaceus		х					
	Amagan Kingfisher Chlorogarila amagang	x	x					
	Creen-and-rufous Kingfisher Chlorocaryle inda	1	л					
	Pyomy Kingfisher Chlorocerlye aenea	1	x					
	Rufous Motmot Baryphthengus martii	10	1	1				
	Great Jacamar Jacamerops aurea	2						
	Pied Puffbird Notharchus tectus	x						
	Black-streaked Puffbird Malacoptila fulvogularis			1				
	Lanceolated Monklet Micromonacha lanceolata		2					
	Black-fronted Nunbird Monasa nigrifrons	х						
	White-fronted Nunbird Monasa morphoeus	х	х					
	Yellow-billed Nunbird Monasa flavirostris	х						
	Swallow-wing Chellaoptera tenebrosa	X 1	10					
	Lemon-throated Barbet Fubucco richardsoni	1	10	y				
	Red-headed Barbet Eubucco hourcierii			x				
1	Crimson-rumped Toucanet Aulacorhynchus haematonygus			î.	1	x		
1	Chestnut-eared Araçari Pteroglossus castanotis	x						
1	Many-banded Araçari Pteroglossus pluricinctus	х						
1	Lettered Araçari Pteroglossus inscriptus	х						
	Azara Araçari Pteroglossus azara	х	х					
1	Golden-collared Toucanet Selenidera reinwardtii	2	4					
1	Black-billed Mountain-Toucan Andigena nigrirostris		1			1		х
	renow-ridged Toucan Ramphastos culminatus		1					
	Cuvier's Toucon Ramphastos autori		×	X	X	X		
	Sealed Piculet Picumus squamulatus	х	х	1				
	Lafesnave's Piculet Picumnus lafresnavi			x				
	Spot-breasted Woodpecker Colaptes punctigula	x						
	Crimson-mantled Woodpecker Piculus rivolii					x	x	х
	Golden-olive Woodpecker Piculus rubiginosus				2	x		
	Yellow-throated Woodpecker Piculus flavigula		х					
	White-throated Woodpecker Piculus leucolaemus			х				
	Chestnut Woodpecker Celeus elegans	1						
1	Acorn Woodpecker Melanerpes formicivorous					х		х
1	Yellow vonted Woodpecker Melanerpes cruentatus	х						
1	Crimson-crosted Woodworker Commendation				х	х		
1	Red-necked Woodnecker Campenhilus rubricallis	x	v					
1	Powerful Woodpecker Campenhilus nollens	^	î.			x		y
	Tyrannine Woodcreeper Dendrocincla tyrannina					2	1	3
	Plain-brown Woodcreeper Dendrocincla fuliginosa	7	1	6	x			
	Wedge-billed Woodcreeper Glyphorhynchus spirurus	66	46	4	19			
	Southern Barred-Woodcreeper Dendrocolaptes certhia	1	2					
	Black-banded Woodcreeper Dendrocolaptes picumnus	2	1	Х				
	Rusty-breasted Woodcreeper Xiphocolaptes orenocensis	х						
1	Strong-billed Woodcreeper X. promeropirhynchus					Х		

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7

Ocellated Woodcreeper Xiphorhynchus ocellatus	5	17	1				
Buff-throated Woodcreeper Xiphorhynchus guttatus	1			_			
Olive-backed Woodcreeper Xiphorhynchus triangularis			4	7	4		х
Spot-crowned Woodcreeper Lepidocolaptes affinis					2		
Brown-billed Scythebill Campylorhamphus pusillus				1	1		
Elegant Spinetail Synallaxis (azarae) elegantior			_	1	х		х
Dusky Spinetail Synallaxis moesta			5				
Rufous Spinetail Synallaxis unirufa							1
Ash-browed Spinetail Cranioleuca curtata					1		
Spectacled Prickletail Siptornis striaticollis					1		
Pearled Treerunner Margarornis squamiger					x	1	3
Rusty-winged Barbtail Premnornis guttuligera					9		
Spotted Barbtail Premnoplex brunnescens			11	10	4		
Streaked Tuftedcheek Pseudocolaptes boissonneautii					1	2	х
Chestnut-winged Hookbill Ancistrops strigilatus	х			2			
Enterted Foliage-gleaner Syndactyta subataris	4	2		3	4		
Elementated Foliage-gleaner Automotits ochroidemus	4	2				1	
Stringd Treehunter Thripadecies Jiammulaius		2				1	
Striped Treenunter Innpadectes notosticus		3	1	5	1		
Plain Venone Various minutus		1	2	5	1 V		
Crew threasted Leastcore Salamumus albiquiarie		1	1		л		
Towny throated Leaftesser Scienting maximum			1	~			
Short-billed Leaftosser Sclerurus rufigularis	6		1	л			
Black-tailed Leaftosser Sclerurus caudacutus	3	1					
Sharn-tailed Streamcreener Lochmias nematura	5	1		1			
Undulated Antshrike Frederickeng unduligerg	x	1					
Black-capped Antshrike Thamnonhilus schistaceus	^	3					
White-shouldered Antshrike Thamnophilus aethions	2	~					
Uniform Antshrike Thamnophilus unicolor	Ĩ			5	5		x
Antbird sp. Myrmeciza sp. nov.?	1			-			
Russet Antshrike Thamnistes anabatinus			2				
Plain Antvireo Dysithamnus mentalis			5				
White-streaked Antvireo Dysithamnus leucostictus			1	x			
Dusky-throated Antshrike Thamnomanes ardesiacus	12						
Plain-throated Antwren Myrmotherula hauxwelli	1						
Stipple-throated Antwren Myrmotherula haematonota		2	1				
Foothill Antwren Myrmotherula (haematonota) spodionota			10				
Ornate Antwren Myrmotherula ornata			2				
White-flanked Antwren Myrmotherula axillaris	16	14					
Slaty Antwren Myrmotherula schisticolor				4			
Long-tailed Antbird Drymophila caudata							x
Dusky Antbird Cercomacra tyrannina		1	2				
White-backed Fire-eye Pyriglena (leuconota) castanoptera			7	6	2		
Black-faced Antbird Myrmoborus myotherinus	13	9					
Spot-winged Antbird Schistocichla leucostigma	2	х	2				
Sooty Antbird Myrmeciza fortis	1						
Eastern Wing-banded Antbird Myrmornis torquata	4						
White-plumed Antbird Pithys albifrons	30	12	7				
White-cheeked Antbird Gymnopithys leucaspis	8						
Hairy-crested Antbird Rhegmatorhina melanosticta		1					
Spot-backed Antbird Hylophylax naevia		1	3				
Scale-backed Antbird Hylophylax poecilinota	3		1				
Short-tailed Antthrush Chamaeza campanisona			5	6			
Scalloped Antthrush Chamaeza furdina					1		
Chestnut-crowned Antpitta Grallaria ruficapilla							х
White-bellied Antpitta Grallaria hypoleuca			v	х	х		х
Thrush-like Antpitta Myrmothera campanisona			х	~			
Ucoded Antritte Carllarizula annullate				Э	2		
Northern White-crowned Tensculo, Contalonus atvatur			v	v	2		
Foundation winter crowned Tapaculo Scytatopus attallas			Α	2			
Unicoloured Tanaculo sn. Scytalonus unicolor sp				4	x	1	x
Andean Tanaculo sp. Scytalopus magellanicus sp.					~	*	1
Ocellated Tapaculo Acropternis orthonyx							x
Golden-headed Manakin Pipra erythrocephala	22	14		1			
White-crowned Manakin Pipra pipra	5	6	11				
Blue-rumped Manakin Pipra isidorei	1	6	20				
Blue-crowned Manakin Pipra coronata	62	74	1				
Golden-winged Manakin Masius chrysopterus		1	3	10	14	3	1
White-bearded Manakin Manacus manacus	х						
Striped Manakin Machaeropterus regulus	3	1	1				
Green Manakin Chloropipo holochlora	4	7	1				
Wing-barred Piprites Piprites chloris		2					
Fiery-throated Fruiteater Pipreola chlorolepidota			Х	х			
Green-and-black Fruiteater Pipreola rieferii					5	3	5
Scaled Fruiteater Ampelioides tschudii				1			
Dusky Piha Lipaugus fuscocinereus						1	1
Screaming Piha Lipaugus vociferans	1						
Gray-taned Pina Lipaugus subalaris		4					
Fium-throated Counga Counga maynana		х					
Pad muffed Empirerum Principal and States	х						
Amogenien Umbrelle bird C							
Andesn Cook of the rock Project reserving		X	1				~
Black-canned Tyrannulet Phyllomyjac nigroganil		4	1	4	X 1	5	2
Ashy-headed Tyrranulet Phyllomyias ainersions					1	5	2
Golden-faced Tyrannulet Zimmarius chrysons			2	1	1 Y		
White-throated Tyrannulet Mecocerculus leuconhrus			~	y v	A		
Sulphur-bellied Tyrannulet Mecocerculus minor			1	А	4	1	6
Streak-necked Flycatcher Mionectes striaticollis			1	8	73	29	72
Olive-striped Flycatcher Mionectes olivaceus	119	63	28	2	. 5		. 2
	12	23	20	-			
Ochre-bellied Flycatcher Mionectes oleagineus	47						

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4	7	4		x	
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Slaty-capped Flycatcher Leptopogon superciliaris Variegated Bristle-Tyrant Pogonotriccus poecilotis			1	х	3		
Bronze-olive Pygmy-Tyrant Pseudotriccus pelzelni			x	4	5		
Rufous-headed Pygmy-Tyrant Pseudotriccus ruficeps					3	1	
Scale-crested Pygmy-Tyrant Lophotriccus pileatus			4	х	X 1		
Ruious-crowned Tody-Tyrant Poecilotriccus ruficeps					1	12	
White-eved Tody-Tyrant Hemitriccus zosterops	1	6			5	12	
Golden-winged Tody-Flycatcher Todirostrum calopterum	-		1				
Olivaceous Flatbill Rhynchocyclus olivaceus	3	3					
Gray-crowned Flycatcher Tolmomyias poliocephalus		1					
Yellow-olive Flycatcher Tolmomylas sulphurescens Western Vellew mergined Elyepteher Tolmomylag assimilie	1	v	1				
Western Tenow-margined Flycatcher Totmomytas assimuts White-throated Snadebill Platyrinchus mystaceus		Λ.		13			
Ornate Flycatcher Myiotriccus ornatus		x	3	2			
Ruddy-tailed Flycatcher Terenotriccus erythrurus		2					
Cinnamon Tyrant Neopipo cinnamomea	1						
Tawny-breasted Flycatcher Mytobius villosus			4		2		
Playescent Flycatneer Mylophobus flavicans			1	1	3		
Handsome Flycatcher Myiophobus (pulcher) bellus			•	•	1		
Cinnamon Flycatcher Pyrrhomyias cinnamomea				х	2	1	
Smoke-colored Pewee Contopus fumigatus				х	х		
Vermilion Flycatcher Pyrocephalus rubinus	х					4	
Smoky Bush-Tyrant Myjotheretes fumigatus					x	4 x	
Rufous-tailed Tyrant Knipolegus poecilurus				x	^	^	
Long-tailed Tyrant Colonia colonus			x				
Cliff Flycatcher Hirundinea ferruginea			х	х			ļ
Bright-rumped Attila Attila spadiceus		1					
Grayisn Mourner Rhytipterna simplex		5					
Short-crested Flycatcher Mylarchus ferox Pale-edged Flycatcher Mylarchus cephalotes	х		x	v			
Swainson's Flycatcher Mylarchus swainsoni	x		^	^			ļ
Dusky-capped Flycatcher Myiarchus tuberculifer		1	1	x			
Great Kiskadee Pitangus sulphuratus	х						
Boat-billed Flycatcher Megarynchus pitangua	х						
Social Flycatcher Mylozetetes similis		х					
Golden-crowned Flycatcher Mylozeteles uterventris	х			x			
Piratic Flycatcher Legatus leucophaius	x			~			
Variegated Flycatcher Empidonomus varius	х						
Sulphury Flycatcher Tyrannopsis sulphurea	х						
Tropical Kingbird Tyrannus melancholicus	х			_			ļ
Barren Becarn Pachyramphus versicolor Black-and-white Becard Pachyramphus alboarisour		v	х	х	х		
Pink-throated Becard Pachyramphus minor	x	x					ļ
Black-tailed Tityra Tityra cayana	x			х			ļ
White-winged Swallow Tachycineta albiventer	x						ļ
Blue-and-white Swallow Notiochelidon cyanoleuca	х			х	х		ļ
White thighed Swallow Atticora fasciata	х						ļ
winte-unglieu Swallow Weochellaon Itolalis Southern Rough-winged Swallow Stelaidontervy ruficallis	x	x	х	x			ļ
Collared Jay Cyanocorax viridicyana	^	Â		Â	x		ļ
Violaceous Jay Cyanocorax violaceus	x	x	x				
Green Jay Cyanocorax yncas							
Rufous Wren Cinnycerthia unirufa						x	
Sepia-orown Wren Campularling for the formation					3	3	
Southern House Wren Troglodytes (aedon) musculus	x		x				
Mountain Wren Troglodytes solstitialis	Â				1		
White-breasted Wood-Wren Henicorhina leucosticta	7	2	9				ļ
Gray-breasted Wood-Wren Henicorhina leucophrys				1	12		ļ
Southern Nightingale-Wren Microcerculus marginatus	11	x	x				
Musician Wren Cyphorhinus aradus	2	7	1	0	30	11	
Snotted Nightingale-Thrush Catharus dryas	5	x	6	5	50	11	
Pale-eved Thrush Platycichla leucops		2	0	5			
Great Thrush Turdus fuscater		1				х	
Glossy-black Thrush Turdus serranus						4	
Chestnut-bellied Thrush Turdus fulviventris				2	5	2	
Black-billed Thrush Turdus ignobilis	5	6					ļ
Collared Gnatwren Microbates collaris	3	3					ļ
White-browed Gnatcatcher Polioptila (plumbea) bilineata	5	2	3				ļ
Rufous-browed Peppershrike Cyclarhis gujanensis	х	х	х	х			ļ
Black-billed Peppershrike Cyclarhis nigrirostris					x	х	ļ
Brown-capped Vireo Vireo leucophrys		2		х	2		ļ
rawny-crowned Greeniet Hylophilus ochraceiceps Crested Oronendola Psarocolius decumanus	x	5 v					
Black-billed Oropendola Psarocolius aecumanus	Λ	Â		x	x		
Russet-backed Oropendola Psarocolius alfredi	x	3	2				
Olive Oropendola Gymnostinops yuracares	х						
Yellow-rumped Cacique Cacicus cela	х	3					
Red-rumped Cacique Cacicus haemorrhous	х						
Mountain Cacique Cacicus uropyglatis					x		ļ
Velvet-fronted Grackle Lampronsar tanagrinus	x				^		ļ
i ci co no ci conce ci conce ci concernationali concernational			x				
Moriche Oriole Icterus chrysocephalus					1		ļ
Moriche Oriole Icterus chrysocephalus Oriole Blackbird Gymnomystax mexicanus	х						J
Moriche Oriole Icterius chrysocephalus Oriole Blackbird Gymnomystax mexicanus Red-breasted Blackbird Sturnella militaris	x x						

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4 4

3

х

1 x

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x 6 x 3

x

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Citrine Warbler Basileuterus luteoviridis						1
Russet-crowned Warbler Basileuterus coronatus					14	
Buff-rumped Warbler Basileuterus fubricauda	v			х	14	
Capped Conebill Conirostrum albifrons	^					
Bananaquit Coereba flaveola			4		x	
Bluish Flower-Piercer Diglossa caerulescens				х		19
Masked Flower-Piercer Diglossa cyanea				х	4	3
Deep-blue Flower-Piercer Diglossa glauca White-sided Flower-Piercer, Diglossa albilatara				х	4	1
Purple Honevcreeper Cyanerpes caeruleus	x	26		x		x
Red-legged Honeycreeper Cyanerpes cyaneus	х					
Green Honeycreeper Cyanerpes spiza	х					
Blue Dacnis Dacnis cayana	х	х	37			
Golden-collared Honeycreeper Iridophanes pulcherrima Block-foced Docnis, Dachis lineata		v	х	х		
Vellow-bellied Dachis Dachis flaviventer	x	л				
Swallow Tanager Tersina viridis	x					
Orange-bellied Euphonia Euphonia xanthogaster	12	3	14	5	15	3
Thick-billed Euphonia Euphonia laniirostris	X	х		5		
Ruious-bellied Euphonia Euphonia rufiventris	1		4	2	v	
Orange-eared Tanager Chiorochrysa camparaea Onal-rumped Tanager Tangara velia	x		4	3	х	
Paradise Tanager Tangara chilensis	x	x	х			
Green-and-gold Tanager Tangara schrankii		2				
Speckled Tanager Tangara guttata		x				
Yellow-bellied Tanager Tangara xanthogastra		4	2			
Solden Tanager Tangara arinus Saffron-crowned Tanager Tangara yanthocenhala			3	x	x	
Golden-eared Tanager Tangara chrysotis			1	x	^	
Flame-faced Tanager Tangara parzudakii				х	x	
Metallic-green Tanager Tangara labradorides					х	
Blue-necked Tanager Tangara cyanicollis			1	х		
Masked Lanager Langara nigrocincia Golden-naned Tanager Tangara ruficervix				v	х	
Bay-headed Tanager Tangara gyrola		1	х	~		
Scrub Tanager Tangara vitriolina			Х			
Beryl-spangled Tanager Tangara nigroviridis				х	1	1
Blue-and-black Tanager Tangara vassorii				_		
Colden-crowned Tanager Iridosornis and is				х		5
Blue-winged Mountain-Tanager Anisognathus flavinucha				x	1	5
Hooded Mountain-Tanager Buthraupis montana						2
Blue-gray Tanager Thraupis episcopus	х		х			
Palm Tanager Thraupis palmarum	х		~			
Silver-beaked Tanager Ramphocelus carbo Masked Crimson Tanager Ramphocelus piarogularis	x		0			
Vermilion Tanager Calochaetes coccineus	x		x	x		
White-winged Tanager Piranga leucoptera			х			
Red-hooded Tanager Piranga rubriceps						
Olive Tanager Chlorothraupis carmioli		10	3			
Fulvous Shrike-Tanager Lanio fulvus White lined Tengger Tachyphonys rufus	v	3	2			
Flame-crested Tanager Tachyphonus rujus	л	x				
Fulvous-crested Tanager Tachyphonus surinamus	x	4				
Rufous-crested Tanager Creurgops verticalis				х	1	
Yellow-backed Tanager Hemithraupis flavicollis	х	х				
wnite-capped Tanager Sericossypha albocristata					x 2	X 1
Vellow-throated Bush-Tanager Chlorospingus opninaumicus			8	x	x	1
Grey-hooded Bush-Tanager Cnemoscopus rubrirostris			0	~	~	x
Grass-green Tanager Chlorornis riefferii						3
Magpie Tanager Cissopis leveriana	х	х				
Oleaginous Hemispingus Hemispingus frontalis	_				12	
Slate-colored Grosbeak Pitylus grossus	x	3				
Buff-throated Saltator Saltator maximus	x	5	2			
Blue-black Grosbeak Cyanocompsa cyanoides	6	5				
Yellow-browed Sparrow Ammodramus aurifrons	х					
Blue-black Grassquit Volatinia jacarina	X					
Yellow-bellied Seedeater Sporophila (americana) murallae	х					
Chestnut-bellied Seedeater Sporophila castaneiventris	x					
Slaty Finch Haplospiza rustica					2	4
Rufous-collared Sparrow Zonotrichia capensis						
Chestnut-bellied Seed-finch Oryzoborus angolensis	х		~			
Orange-Dilled Sparrow Arremon aurantitrostris			2			
Slaty Brush-Finch Atlapetes schistaceus						x
Chestnut-capped Brush-Finch Atlapetes brunneinucha				3	6	
Olive Finch Lysurus castaneiceps			5	х		

Appendix II: Systematic inventory of birds recorded in northeast Antioquia.

Taxonomy and nomenclature largely follows Stotz *et al.* (1996), Ridgley and Tudor (1989 and 1994), Sibley and Monroe (1990 and 1993), and Ridgley and Greenfield (in prep.). **Sequence** follows Hilty and Brown (1986).

Key: Species observed and caught at each site:

- SS1: Finca La Esperanza, Municipio Segovia, 3 8 August, 350m
- SS2: Alto los Tarros, Municipio Anori. 19 23 August, 700m
- SS3: Reserva La Forzosa, Municipio Anori, 26 29 August, 1550 m
- (a) Puerto Lopez, Rio Tigui and Rio Nechi: Secondary growth and riverine. 1-3, 11-12 August. 200-400 m
- (b) Anori, Cruces, La Tyrana and roads between. Sec. growth and riverine 17-19 and 24 August 600 1600 n

Species		SS1	SS2	SS3
Great Tinamou Tinamus major		X	x	
Colombian Tinamou Crypterellus columbianus			x	
Little Tinamou Crypturellus soui		x (a)	x (b)	х
Least Grebe Podiceps dominicus			(b)	
Neotropic Cormorant Phalacrocorax brasilianus		(a)		
Cocoi Heron Ardea cocoi		(a)		
Great Egret Casmerodias alba		(a)		
Snowy Egret Egretta thula		(a)		
Striated Heron Butorides striatus		(a)		
Capped Heron Pilherodius pileatus		(a)		
Common Cattle Egret Bubulcus ibis		(a)		
Fasciated Tiger-Heron Tigrisoma fasciatum	N	(a)		
Wood Stork Mycteria americana		(a)		
Roseate Spoonbill Ajaia ajaja		(a)		
Northern Screamer Chauna chavaria	N	(a)		
Turkey Vulture Cathartes aura		x (a)	x (b)	х
Lesser Yellow-headed Vulture Cathartes burrovianus		(a)		
Black Vulture Coragyps atratus		x (a)	x (b)	x
King Vulture Sarcoramphus papa		x (a)	x (b)	
Osprey Pandion haliaetus		(a)		
American Swallow-tailed Kite Elanoides forficatus		x (a)		
White-tailed Kite Elanus (caeruleus) leucurus		(a)		
Double-toothed Kite Harpagus bidentatus		X		
Plumbeous Kite Ictinia plumbea		(a)	x	
Plumbeous Hawk Leucopternis plumbea	N	х		
Semiplumbeous Hawk Leucopternis semiplumbea			x	
white Hawk Leucopternis albicollis		X		х
Savanna Hawk Buteogallus meridionalis		(a)		
Gray-lined Hawk Asturina nitida		X	(L)	
Roadside Hawk Buteo magnirostris		x (a)	(D)	X
Black Hawk-Eagle Spizaetus tyrannus		X	n (h)	x
Ked-throated Caracara Daptrius americanus		X	X (D)	X
Loughing Folgen, Hamatathana archimana		x (a)	(0)	
Parred Forest Falcon Migrastur suficallis		X	X	X
American Kestral Ealco snarvarius		(2)		A V
Bat Falcon Falco rufigularis		(a) v (a)		^
Colombian Chachalaca Ortalis colombiana		л (а)	(b)	x
Chestnut-winged Chechelece Ortalis garrula		(2)	(0)	A.
Crested Guan Penelone purpurascens		(u) x	x	
Wattled Guan Aburria aburri			~	x
Blue-knobbed Curassow Crax alberti	ΤЕ	(x)	(x)	
Crested Bobwhite Colinus cristatus	-	(a)	(/	
Marbled Wood-Ouail Odontophorus guianensis		X	x	
Chestnut Wood-Quail Odontophorus hyperythrus				х
Tawny-faced Quail Rhynchortyx cinctus			х	
Purple Gallinule Porphyrio martinica		(a)		
Sunbittern Eurypyga helias		х		
Wattled Jacana Jacana jacana		(a)		
Southern Lapwing Vanellus chilensis		(a)		
Collared Plover Charadrius collaris		(a)		
Spotted Sandpiper Actitis maularia			(b)	
Pectoral Sandpiper Calidris melanotos			(b)	
Feral (Rock) Pigeon Columba livia		(a)	(b)	
Scaled Pigeon Columba speciosa		х		
Pale-vented Pigeon Columba cayennensis		(a)		
Band-tailed Pigeon Columba fasciata			(b)	
Plumbeous Pigeon Columba plumbea			х	
Ruddy Pigeon Columba subvinacea			х	Х
Eared Dove Zenaida auriculata		(a)		
Common Ground-Dove Columbina passerina		(a)		
Plain-brested Ground-Dove Columbina minuta		(a)		
Ruddy Ground-Dove Columbina talpacoti		x (a)	4	
White-tipped Dove Leptotila verreauxi		x (a)	(b)	
Blue Ground-Dove Claravis pretiosa		a		
Kuday Quali-Dove Geotrygon montana		X		

wth and riverine 17-19 and 24 August 600 -	160	0 m	
Violaceous Quail-Dove Geotrygon violacea	х		
Olive-backed Quail-Dove Geotrygon veraguensis	х		
Brown-throated Parakeet Aratinga pertinax	x (a)		
Orange-chinned Parakeet Brotogeris jugularis	x (a)	(b)	
Red-winged Parrotlet Touit dilectissima			х
Saffron-headed Parrot Pionopsitta pyrilia N	х	х	
Blue-headed Parrot Pionus menstruus	x (a)		
Red-lored Parrot Amazona autumnalis	x (a)		
Yellow-crowned Parrot Amazona ochrocephala	(a)		
Orange-winged Parrot Amazona amazonica	(a)		
Mealy Parrot Amazona farinosa	x (a)	X	
Striped Cuckoo Tapera naevia	(a)	(b)	х
Squirrel Cuckoo Piaya cayana		(b)	х
Smooth-billed Ani Crotophaga ani	x (a)		х
Groove-billed Ani Crotophaga sulcirostris	(a)		
Spectacled Owl Pulsatrix perspicillata	x		
Ferruginous Pygmy-Owl Glaucidium brasilianum		х	
Mottled Owl Strix virgata	x	X	Х
Owl sp.			х
Band-winged Nightjar Caprimulgus longirostris	- / `	- 0	х
white-collared Swift Streptoproche zonaris	x (a)	x (b)	х
Chestnut-collared Swift Cypseloides rutilus			х
Gray-rumped Swift Chaetura cinereiventris	x	a	
Band-rumped Swift Chaetura spinicauda		(b)	
Rufous-breasted Hermit Glaucis hirsuta	x (a)		
Band-tailed Barbthroat Threnetes ruckeri	x		
Long-tailed Hermit Phaethornis (superciliosus) longirostris*	x	X	
Pale-bellied Hermit Phaethornis anthophilus	x		
Green Hermit Phaethornis guy		X	х
Little Hermit Phaethornis longuemareus	x	X	
Tooth-billed Hummingbird Androdon aequatorialis		X	
White-tipped Sicklebill Eutoxeres aquila		X	х
Green-fronted Lancebill Doryfera ludoviciae			х
White-necked Jacobin Florisuga mellivora	x (a)	X	
Black-throated Mango Anthracothorax nigricollis	(a)		-
Blue-tailed Emerald Chlorostilbon mellisugus	x		?
Red-billed Emerald Chlorostilbon gibsoni	x		
Blue-chested Hummingbird Amazilia amabilis	x		
Green-crowned woodnymph Thalurania colombica		X	X
Andean Emerald Amazilia franciae	- (-)	X (h)	х
Ruious-tailed Hummingbird Amazilia tzacati	x (a)	(b)	
Bronze-tailed Plumeleteer Chalybura urochrysia	x	X	
Green-crowned Brilliant Heliodoxa jacula		х	х
Greenish Puffleg Haplophaedia aureliae			Х
Booted Racket-tail Ocreatus underwoodu			Х
Purple-crowned Fairy Heliothryx barroti	x		
Contared Frogon Trogon collaris	- (-)		х
Machad Trogon Trogon metanurus	x (a)	X	
Diaskeu i rogon 1 rogon personatus			х
Black-throated Trogon Trogon rufus	()	X	
Violocoora Trogon Trogon viridis	x (a)	X	
Violaceous Irogon Irogon violaceus	X		
Kingen Kingfisher Megaceryle torquata	(a)		
Amazon Kinglisher Chloroceryle amazona	(a)		
Bufene Metmet Demokel mene menti	x (a)		х
Rulous wolmot Baryphinengus martu	X		
Difference toiled Leasement Calbular Cal			X
White needed Duffbird Nethareless		X	
Plack broasted Duffind Nethers'	X	X	
Black-Breasted Fullibled Notharchus pectoralis	X	X	
winte-winskered Fundird Malacoptila panamensis	X	X	
wnite-ironted Nunbird Monasa morphoeus	x (a)		
Spot-crowned Barbet Capito maculicoronatus	x (a)		
White-mantied Barbet Capito hypoleucus T E	x (a)	Х	
Reg-neaged Barbet Eubucco bourcierii			x
Crimson-rumped 1 oucanet Aulacorhynchus haematopygus	- / >	- 0	х
Contared Araçari Pteroglossus torquatus	x (a)	x (b)	
Curon-inroated Toucan Ramphastos citreolaemus	x (a)	х	

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36

COLOMBIAN EBA PROJECT REPORT SERIES NO. 2

37

TIOTTIEAST ATTIOQUIA ATTO CITUTUTIDEIOS TIIQITIATIO	northeast Antio	guia and	Churumbelos	s highlands
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Spot-brassted Woodpecker Coloupts punctional x x White-throated Woodpecker Piculus line x x Cimanon Woodpecker Celexis torcauts x x Reartiful Woodpecker Melanerpes inbringingits x x Red-crowned Woodpecker Cennikornis junigatis x x Red-crowned Woodpecker Competitions hardinalocuos x(a) x Red-crowned Woodpecker Competitions hardinalocuos x(a) x Crimson-rested Woodpecker Competitions hardinalocuos x(a) x Olivaceous Woodcreeper Dealocuical fulfigitiona x x Strong-hilled Woodcreeper Xiphocolaptes promeropirity-clus x x Spotted Woodcreeper Xiphorhynchus grimm x x Spotted Woodcreeper Xiphorhynchus reingularis x x Spotted Woodcreeper Xiphorhynchus reingularis x x Spotted Woodcreeper Liphorhynchus reingularis x x Spotted Barbtai Promopolics transecons (a) (b) x Spotted Woodcreeper Liphorhynchus traingularis x x Spotted Barbtai Promopolics transecons x <	Chestnut-mandibled Toucan Ramphastos swainsonii		x (a)	x (b)	
Golden-green Woodpecker Piculus line x Cinnamo Woodpecker Celeus loricatus x Readtiful Woodpecker Melanerpes rubriscipillus x(a) Red-crowned Woodpecker Melanerpes rubriscipillus x(a) Sondy-brown Woodpecker Melanerpes rubriscipillus x(a) Crimson-Created Woodpecker Compephilus melanoloucos x(a) Crimson-Billed Woodpecker Compephilus melanoloucos x(a) Crimson-Billed Woodpecker Compephilus melanoloucos x(a) Crimson-Billed Woodpecker Compephilus haematogater x Vordge-Filled Woodreeger Clyphorbroulus spirarus x Strong-Billed Woodreeger Clyphorbroulus spirarus x Northern Barred-Woodreeger Clyphorbroulus spirarus x Strong-Billed Woodreeger Xliphorbroulus prizus x Back-strijed Woodreeger Xliphorbroulus prizus x Brown-Billed Scythelli Campibolrynchus lacelloretis x Spotted Woodreeger Xliphorbroulus prizus x Brown-Billed Scythelli Campibolrynchus lacelloretis x Spotted Boordreeger Sliphorbroulus prizus x Spotted Boordreeger Sliphorbroulus prizus x Spotted Boordreeger Sliphorbroulus prizus x Brown-Billed Scythelli Campibolrynchus la	Spot-breasted Woodpecker Colaptes punctigula		x (a)		х
 vmmenzated Woodpecker Pearlies interes (chrysnichen) pulcher E x x x Reautiful Woodpecker Ademerpses (chrysnichen) pulcher E x x x Redersowed Woodpecker Venilionis fixili Stoby-hown Woodpecker Venilionis fixili Crimson-Belle Woodpecker Compephilus handnoizeuss x (a) Crimson-Belle Woodpecker Compephilus handnoizeuss x (b) Reinsenbelle Woodpecker Compephilus handnoizeuss x (c) Rinsenbelle Woodpecker Compephilus handnoizeuss x (c) Northern Barred-Woodreeper Silphoet/mothus spinras X x Strongshild Woodreeper Cilphoet/mothus spinras X x Spotied Woodreeper Silphoet/mothus spinras X x Straight-hild Woodreeper Silphoet/mothus spinras X x Straight-hild Woodreeper Silphoet/mytechts straingularis X x Straight-hild Woodreeper Silphoet/mytechts straingularis X x Straight-hild Woodreeper Silphoet/mytechts straingularis X x Spotied Barbial Teremopic brannescens X x Striped Woodhunter Piloteitiador rufas X x Striped Woodhunter Mytechtenia scillatorias X x Striped Woodhunter Mytechtenia scillatorias X x Striped Woodhunter Biloteitiador rufas X x 	Golden-green Woodpecker Piculus chrysochloros		х		
Common Voorpeent Calify Control A A Red-crowned Woodpecker Melanerges rubricupillus X(a) X Red-crowned Woodpecker Melanerges rubricupillus X(a) X Red-crowned Woodpecker Venillomis fungingus X X Crimsson-rested Woodpecker Compephilus hacmatogaster X X Crimsson-billed Woodpecker Compephilus hacmatogaster X X Divacous Woodcreeper Zuphoorlynchus ginimus X X Strong-billed Woodpecker Compephilus hacmatogaster X X Syntherb Barred Woodcreeper Zuphoorlynchus ginimus X X Syntherb Barred Woodcreeper Zuphoorlynchus lachrymous X X Syntherbilled Woodcreeper	Cinnemon Woodpecker Calcus loricatus		v	X	
Ref-rowned Woodpecker Venilorins funigatos x x Snoky-brown Woodpecker Venilorins funigatos x x Ref-runged Woodpecker Venilorins funigatos x x Crimson-Fielded Woodpecker Campephilus Indendogues x x Pain-brown Woodreeper Elendrocicle fulfiginosa x x Offvacous Woodreeper Silphorbynchus spirarus x x Strong-billed Woodreeper Chyphorbynchus spirarus x x Strong-billed Woodreeper Xilphorbynchus ingularus x x Spotted Woodreeper Xilphorbynchus paintongularus x x Stroked-beaded Woodreeper Xilphorbynchus fulfogunous x x Dive-backed Woodreeper Xilphorbynchus rungularus x x Stroked-beaded Woodreeper Xilphorbynchus suitus x x Stroked-beaded Woodreeper Alphorbynchus suitus x x Strokedanalpynalist suitus x	Beautiful Woodpecker Melanerpes (chrysauchen) pulcher	Е	X	X	
Snoky-brown Woodpecker Venilornis Jarkii x x Crimson-crested Woodpecker Campephilus heamatogaster x x Crimson-crested Woodpecker Campephilus heamatogaster x x Chinson-crested Woodpecker Campephilus heamatogaster x x Chinaco-cons Woodcreeper Statesomas griscicupilus x x x Strong-billed Woodcreeper Statesomas griscicupilus x x x Spotted Woodcreeper Statesomas griscicupilus x x x Spotted Woodcreeper Xiphorhynchus scriptinchus x x x Spotted Woodcreeper Xiphorhynchus scriptincupius x x x Streaked-headed Woodcreeper Liphicolagtes soulcetti x x x Streaked-headed Woodcreeper Liphicolagtes soulcetti x x x Streaked-headed Woodcreeper Liphicolagtes soulcetti x x x Streaked-headed Woodcreeper Liphicolagtes x x x Streaked-headed Woodcreeper Liphicolagtes x x x Streaked-headed Woodcreeper Liphicolagtes x x x	Red-crowned Woodpecker Melanerpes rubricapillus		x (a)		
Red-rumped Woodpecker Vonition metanoleucos x (a) Crimson-bellied Woodpecker Compehilus metanoleucos x (a) Palin-brown Woodcreeper Compehilus metanoleucos x (a) Olivacous Woodcreeper Sithacomus griscicapillus x (b) Strong-billed Woodcreeper Sithacomus griscicapillus x (b) Northern Barred-Woodcreeper Sithaconiques promeropirhynchus x (c) Strong-billed Woodcreeper Xiphorhynchus framous x (c) Strong-billed Woodcreeper Xiphorhynchus frangularis x (c) Stradet-Hoaded Woodcreeper Xiphorhynchus frangularis x (c) Streaked Woodcreeper Xiphorhynchus posillus (b) Streaked-Haedd Woodcreeper Xiphorhynchus posillus (c) Reven-billed Scythebill Camphylorhynchus posillus (c) Pale-breated Spinelal Symultaxis altracers (c) Spotted Barbtail Premojek bruinascens (a) Striped Woodhaunter Hylocities subulatis x (a) Ruff-fronted Foliage-gleaner Automolus ochrolaemus x (a) Ruff-fornted Foliage-gleaner Automolus ochrolaemus x (a) Striped Woodhaunter Hylocities subulatis x (a) Ruff-fornted Foliage-gleaner Automolus ochrolaemus x (a) Striped Woodhaunter Hylocities subulatis x (a) <td>Smoky-brown Woodpecker Veniliornis fumigatus</td> <td></td> <td></td> <td></td> <td>х</td>	Smoky-brown Woodpecker Veniliornis fumigatus				х
Crimon-erested Woodpecker Compephilus metanoleacos (* 6) Crimon-bellied Woodpecker Compehilus metanologater (* 7) Plain-brown Woodcreeper Stephorlynchus spinnus (* 8) Strong-billed Woodcreeper Glynchronchus spinnus (* 8) Strong-billed Woodcreeper Glynchronchus spinnus (* 8) Strong-billed Woodcreeper Glynchronchus spinnus (* 8) Strong-billed Woodcreeper Alphorlynchus level Spotted Woodcreeper Stephorlynchus level Strong-billed Woodcreeper Alphorlynchus level Strong-billed Woodcreeper Lepidocolaptes souleyetii (* 8) Streaked-headed Woodcreeper Lepidocolaptes souleyetii (* 8) Streaked-headed Woodcreeper Alphorlynchus level Strong-billed Synallusis acarae Spotted Barbtail Premoples brinnescens Subted Barbtail Premoples brinnescens Stap-wingel Foliage-gleaner Philodor fucientis (a) (b) Azara's Spinetail Synallusis acarae Stap-wingel Foliage-gleaner Almomolus ochrolemus (a) (b) Fasciated Antshrike Thamophilus nuicolennus (b) Fasciated Leaflosser Scleruns maxicanus (c) Stap-wingel Foliage-gleaner Almonglus ochrolemus (b) Fasciated Antshrike Thamophilus nuicolenti (c) Stap-wingel Antshrike Thamophilus nuicolent (c) Stap-wingel Antshrike Thamophilus nuicolent (c) Stap-Antered Antshrike Thamophilus nuicolent (c)	Red-rumped Woodpecker Veniliornis kirkii		x		
Chain-brown Woodcreeper Dendrocincla fulginosa x x Olivaceous Woodcreeper Sitasomus griseicapillus x x x Strong-Dilled Woodcreeper Sitasomus griseicapillus x x x Strong-Dilled Woodcreeper Sitasomus griseicapillus x x x Spotted Woodcreeper Sitasomus griseicapillus x x x Spotted Woodcreeper Liphochynchus suringularis x x x Straight-Dilled Woodcreeper Liphochynchus prisus x x x Black-striped Woodcreeper Liphochynchus pusillus x x x Brown-Dilled Scythebill Campbyloritynchus pusillus x x x Brown-Dilled Scythebill Campbyloritynchus pusillus x x x Spotted Brobalescheare Philodor fuscipennis x x x Stary-winger Golinge-gleaner Philodor fuscipennis	Crimson-crested Woodpecker Campephilus melanoleucos		x (a)	x	
Off-accous Woodcreeper Situsomus griscicapillus x x x Wedge-billed Woodcreeper Xiphoriynchus spirurus x x Strong-billed Woodcreeper Xiphoriynchus spirurus x x Strong-billed Woodcreeper Xiphoriynchus prima x x Straight-billed Woodcreeper Xiphoriynchus prima x x Straight-billed Woodcreeper Xiphoriynchus prima x x Olive-backed Woodcreeper Xiphoriynchus prima x x Streaked-headed Woodcreeper Xiphoriynchus prima x x Streaked-headed Woodcreeper Xiphoriynchus prima x x Streaked-headed Woodcreeper Xiphoriynchus prima x x Spotted Barbail Synallaxis arace x x x Spotted Barbail Synallaxis arace x x x Spotted Barbail Premoplex brunnescens x x x Suff-ortoated Foliage-gleaner Automolus ochrohaemus x x x Pain Antorike Cynholianus lineatis x x x Pascited Antshrike Cynholianus lineatis x x x <td< td=""><td>Plain-brown Woodcreeper Dendrocincla fuliginosa</td><td></td><td>x</td><td>x</td><td></td></td<>	Plain-brown Woodcreeper Dendrocincla fuliginosa		x	x	
Wedge-Dilled Woodcreeper Xipheoclapter pronerpithynchus x x Northern Barred-Woodcreeper Xipheoclapter pronerpithynchus x x Spotted Woodcreeper Xipheorynchus carpitropyrthus x x Spotted Woodcreeper Xipheorynchus lachrymosus x x Black-striped Woodcreeper Xiphorynchus lachrymosus x x Brack-actived Woodcreeper Lipidocolaptes sonleyetii x x Streaked-beaded Woodcreeper Lipidocolaptes sonleyetii x x Pate-breasted Spinetall Synallaxis albescens (a) (b) Arara's Spinetall Synallaxis albescens (a) (b) Arara's Spinetall Synallaxis albescens (a) (b) Staty-winged Foliage-gleaner Philydor fuscipennis x x Buff-fronted Foliage-gleaner Philydor fuscipennis x x x Staty-winged Foliage-gleaner Philydor fuscipennis x x x Staty-winged Foliage-gleaner Philydor fuscipennis x x x Staty-winged Leaflosses Sclerurus mexicanus x x x Stady-throatel Leaflosses Sclerurus mexicanus x x x Stady-throatel Leaflosses Sclerurus mexicanus <td>Olivaceous Woodcreeper Sittasomus griseicapillus</td> <td></td> <td></td> <td>x</td> <td>х</td>	Olivaceous Woodcreeper Sittasomus griseicapillus			x	х
Strong-billed Woodcreeper Xiphocolaptic promeropirtynchus x x Spotted Woodcreeper Xiphorhynchus erythropyrrhus x x Straight-billed Woodcreeper Xiphorhynchus lachrymosus x x Black-striped Woodcreeper Xiphorhynchus lachrymosus x x Streaked-haedd Woodcreeper Xiphorhynchus iningularis x x Brown-billed Scythebill Camphylorhynchus paillus x x Brown-billed Scythebill Camphylorhynchus paillus x x Pale-breasted Spinetall Synallaxis albescens (a) (b) Azara's Spinetall Synallaxis albescens (a) x x Spitted Barbiall Premuojack Immessemis x x x x Spitted Barbiall Premuojack Immessemis x x x x x Buff-fronted Foliage-gleaner Automolus ochrolaemus x x x x x Rain Atomso Renops minutus x x x x x Parciated Antishrike Thamnophilus mitisriatus x x x x Pana Antrico Dysithamus menablis x	Wedge-billed Woodcreeper Glyphorhynchus spirurus		х	х	
Nortiern Barred-Woodcreeper ID. (certina) sanctitionae* x x Straight-billed Woodcreeper Xiphorhynchus picus x x Black-striped Woodcreeper Xiphorhynchus picus x x Olive-backed Woodcreeper Xiphorhynchus picus x x Streaked-headed Woodcreeper Xiphorhynchus picullus x x Parberbacked Barbail Synallus agrace x x x Spotted Barbail Synallus agrace x x x x Striped Woodhammer Hiocitae subulatus x x x x Barf-fronted Foliag-gleaner Philidor fuscipennis x x x x Bard-striped Hamophilus minitarians x x x x Parensted Antshrike Thamophilus ariticularis x x x Checker-throated Leaflosser Scleruns maxicanus x x x Parenstath Re Thamophilus unit	Strong-billed Woodcreeper Xiphocolaptes promeropirhynchus		х		
Sported TvodarCeeper Application primes (*) Black-striped Woodcreeper Application primes (*) Black-striped Woodcreeper Application primes (*) Streaked-headed Woodcreeper Lepidocolaptes souleyetii x (*) Brown-billed Scythebill Camphylorhynchus pusillus (*) Brown-billed Scythebill Camphylorhynchus pusillus (*) Brown-billed Scythebill Camphylorhynchus pusillus (*) Azara's Spinetail Synallaxis abscens (*) Sported Barbial Premoplex brunnescens (*) Striped Woodnaunter Hylocisites subulatus (*) Striped Woodnaunter Hylocisites subulatus (*) Subty-Winged Poliage-gleaner Philydor fuscipennis (*) Subty-Winged Poliage-gleaner Philydor fuscipennis (*) Subty-Winged Poliage-gleaner Automolus ochrolaemus (*) Subty-Winged Poliage-gleaner Automolus ochrolaemus (*) Subty-Winged Leaflosser Sclerurus mexicanus (*) Scaly-throated Leaflosser Sclerurus mexicanus (*) Scaly-throated Leaflosser Sclerurus mexicanus (*) Scaly-throated Leaflosser Sclerurus mexicanus (*) Subty-Winged Autoshrek Thamophilus unitorior (*) Bar-crested Antshrike Thamophilus unitorior (*) Subty Antshrike Thamophilus unicolor (*) Subty Antshrike Thamophilus unicolor (*) Subty Antshree Myrmotherula axiliaris (*) Subty Antshree Myrmotherula axiliaris (*) Subty Antshreen Myrmotherula axiliaris (*) Subty Antshre	Northern Barred-Woodcreeper D. (certhia) sanctithomae*		х	X	
Black-striped Woodcreeper Xiphorhynchus lachrymosus x x Olive-backed Woodcreeper Lipidocolunges soulcyciti x Brown-billed Scythebill Camphylorhynchus pusillus x Brown-billed Scythebill Camphylorhynchus pusillus x Pale-breasted Spinetall Synallaxis abarce (a) Spotted Barbtall Premnoples brunnescens (a) Striped Woodcreeper Philidor fuscipennis x x Staty-minged Foliage-gleaner Philidor fuscipennis x x Buff-fronted Foliage-gleaner Philidor fuscipennis x x Staty-minged Foliage-gleaner Philidor fuscipennis x x Staty-minged Foliage-gleaner Philidor fuscipennis x x Staty-forated Leaftosser Scleruns mexicanus x x Stasty Antwen Stringer Wanderstein (a) x Bar-crested Antshrike Cymbilonus lineatus x x Plain Actops Antshrike Cymbilonus lineatus x x Plain Antrop Synthamous mentalis (b) x Checker-throated Antwren Mymonherula atiliaris x (a) x Staty Antwen Mymonherula atiliaris x (a) x Staty Antwen Mymonherula atiliaris x (b)	Straight-billed Woodcreeper Xiphorhynchus erynnopyrmus		х	л	
Olive-backed Woodcreeper Lepidocolaptes souleyettixStreaked-headed Woodcreeper Lepidocolaptes souleyettixStreaked-headed Woodcreeper Lepidocolaptes souleyettixPale-breasted Spinetall Synallaxis adbescens(a)Arara's Spinetall Synallaxis adracexSpotted Barbtail Prennoplex brannescensxStriped Woodhanuter Hylocitises subulatusxStap-winged Foliage-gleaner Philydor fuscipennisxBuff-fronted Foliage-gleaner Philydor fuscipennisxBuff-fronted Foliage-gleaner Autonolus controleemusxTamy-throated Leaftosser Scienurus macicanusxStap-winged Leaftosser Scienurus guatenalensisxBard-fronted Foliage-gleaner Mutonolus controleemusxSagetted Antshrike Thamophilus unitisriatusxTamy-throated Leaftosser Scienurus guatenalensisxStap-ensited Antshrike Thamophilus unitorioxUniform Antshrike Thamophilus unitorioxWeistern Slaty Antshrike Thamophilus unitorioxWitter flanked Antwren Myrmotherula avillarisx (a)Streaked Antwren Myrmotherula suifunarginatusxXxParker's Antbird Cercomacra parkerixDot-winged Antwren Herpsilochnus rufimarginatusxXxRufous-winged Antwren Myrmoterila avillarisxStreaked Antwren Myrmoterila avillarisxDot-winged Antwren Myrmotherila suifunasisxDot-winged Antwren Myrmotherila suifunasisxStreaked Antwren Myrmotherila suifunasisxStreaked Ant	Black-striped Woodcreeper Xiphorhynchus lachrymosus		х	х	
Streaked-headed Woodcreeper Lepidocolaptes souleyetii x Pale-breasted Spinetail Synallaxis albescens (a) (b) Azara's Spinetail Synallaxis albescens (a) (b) Striped Moothaunter Hylocitises subulatus x x Spotted Barbial Prennoplex brunnescens x x Buff-fronted Foliage-gleaner Philydor fuccipennis x x Buff-fronted Foliage-gleaner Automolus ochrolaemus x x Staty-winged Foliage-sleaner Automolus ochrolaemus x x Fasciated Antshrike Cymbilainus lineatus x x Fasciated Antshrike Cymbilainus lineatus x x Fasciated Antshrike Thamophilus multistriatus x x Checker-throated Antwene Myrnothenala fulviventris x (a) x Pain Acrops Myrnothenala exiliatris x (a) x Staty Antwene Myrnothenala exiliatris x (a) x Staty Antwene Myrnothenala exiliatris x (b) x Pain Acrops Myrnothenala exiliatris x (a) x Streaked Antwene Myrnothenala exiliatris x (a) x Streaked Antwene Myrnothenala exiliatris x (b) x	Olive-backed Woodcreeper Xiphorhynchus triangularis				х
Brown-billed Synthesili Camphyloritynchus pusitlas	Streaked-headed Woodcreeper Lepidocolaptes souleyetii		х		
Pare of the second syndian is directed by a second seco	Brown-billed Scythebill Camphylorhynchus pusillus Pala broasted Spineteil Syngllaris albaseans		(0)	(b)	х
Spotted Barbtail Premosplex brainnescens x x Striped Woodhaunter Hyloctistes subulatis x x Staty-winged Foliage-gleaner Philiador rufus x x Buff-throated Foliage-gleaner Philiador rufus x x Buff-throated Foliage-gleaner Philiador rufus x x Buff-throated Foliage-gleaner Philiador rufus x x Sage-throated Leaflosser Sclerurus maticanus x x Sasch-throated Leaflosser Sclerurus maticanus x x Bar-crested Antsbrike Cymbilainus lineatus x x Bar-crested Antsbrike Thannophilus atrinuche* x (a) x Vestern Staty Antsbrike Thannophilus atrinuche* x (a) x Vestern Staty Antsbrike Thannophilus aurinamensis x (b) x Rufus-winged Antwren Myrnotherula auliaris x (a) x Staty Autwren Myrnotherula surinamensis x (b) x Rufus-winged Antwren Heryslochums nuffiaraginatus x x Dot-winged Antwren Heryslochums nuffiaraginatus x x Dot-winged Antwren Heryslochums nuffiaraginatus x x Dot-winged Antwren Heryslochums nuffiaraginatus x </td <td>Azara's Spinetail Synallaxis azarae</td> <td></td> <td>(a)</td> <td>(0)</td> <td>x</td>	Azara's Spinetail Synallaxis azarae		(a)	(0)	x
Striped Woodhaunter Hylocistes subulatusxxxSlaty-winged Foliage-gleaner Philiador juscipennisxxxBiff-fronted Foliage-gleaner Automolus ochrolaemusxxxPlain Xenops Xenops minutusxxxxStramy-throated Leaftosser Sclerurus mexicanusxxxScaly-throated Leaftosser Sclerurus guatemalensisxxxBraciated Antshrike Chamophilus multistriatusxxxBar-crested Antshrike Thamophilus multistriatusxxxWestern Slaty Antshrike Thamophilus anticolorxxxValiform Antshrike Thamophilus anticolorxxxVinterflanked Antwren Myrmotherula fubviventrisx (a)xxStraked Antwren Myrmotherula schisticolorxxxDot-winged Antwren Herpsilochmus rufimarginatusxxxDot-winged Antwren Formicivora griseaxxxParker's Antbird Cercomacra prakerixxxDusky Antbird Gendarca tyranninaxxxSpotted Antbird Myrmeciza exsualx (a)xxBlackaced Antbird Myrmeciza exsualx (a)xxSpotted Antbird Formicarius analisxxxBlackaced Antbird Myrmeciza exsualx (a)xxChestnut-backed Antbird Myrmeciza exsualx (a)xxSpotted Antbird Myrmeciza exsualx (a)xxBlackaced Antbird Myrmecica exsualx (b) <td< td=""><td>Spotted Barbtail Premnoplex brunnescens</td><td></td><td></td><td></td><td>x</td></td<>	Spotted Barbtail Premnoplex brunnescens				x
Slaty-winged Foliage-gleaner Philiydor fuscipennisxxBuff-tronted Foliage-gleaner Autonolus ochrolaenusxxPlain Renops Xenops minutusxxTawny-throated Leaftosser Sclerurus guatenalensisxxScaly-throated Leaftosser Sclerurus guatenalensisxxScaly-throated Leaftosser Sclerurus guatenalensisxxScaly-throated Leaftosser Sclerurus guatenalensisxxStartersted Antshrike Thamnophilus atrinucha*x (a)xWestern Slaty Antshrike Thamnophilus atrinucha*x (a)xWitterfankter Dysikhamus mentalisxxUniform Antshrike Thamnophilus anicolorxxPlain Antivren Dysinhomus mentalisx (a)xStaty Antwren Myrmotherula siliarisx (a)xStaty Antwren Myrmotherula siliarisx (a)xStaty Antwren Myrmotherula siliarisx (b)xRufous-winged Antwren Herpsilochums ngfinarginatusxxDot-winged Antwren Herpsilochums angfinarginatusxxParker's Anthird Ceromacra parkerixxDuli-manted Anthird Myrmeciza exsulx (a)xDuli-manted Anthird Myrmeciza exsulx (a)xSpotted Anthird Myrmeciza exsulx (a)xSpotted Anthird Myrmeciza exsulx (b)xRufous-vented Tapacologs.x (c)xSpotted Anthird Myrmeciza exsulx (c)xSpotted Anthird Myrmeciza exsulx (c)xSpotted Anthird Granlaris hypoleucax (c) </td <td>Striped Woodhaunter Hyloctistes subulatus</td> <td></td> <td></td> <td>х</td> <td>х</td>	Striped Woodhaunter Hyloctistes subulatus			х	х
Built-Incode Foliage-gleaner Automolus ochrolaemus x x Plain Xenops Xenops minutus x x x Self-throaded Leaflosser Sclerurus mexicanus x x x Scaly-throated Leaflosser Sclerurus mexicanus x x x Bar-crested Antshrike Cymbilainus lineatus x x x Bar-crested Antshrike Thanmophilus atrinucha* x (a) x x Vestern Staty Antshrike Thanmophilus atrinucha* x (a) x x Checker-throated Antwren Myrmotherula atilaris x (a) x x Staty Antwren Myrmotherula aschisticolor x x x Staty Antwren Myrmotherula aschisticolor x x x Parker's Anthird Recorbing agrixea x x x Dot-winged Antwren Merorhopias quixensis x x x Dui-wanited Antwren Merorhopias quixensis x x x Dui-wanited Anthren Formicityra grisea x x x Dui-wanited Antwren Merorhopias quixensis x x x Dui-wanited Anthren Myrmocherica essul x (a) x x	Slaty-winged Foliage-gleaner Philydor fuscipennis		х	х	
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Tamp-IntegrationAATamy-throated Leaftosser Sclerurus mexicanusxxScaly-throated Leaftosser Sclerurus guatemalensisxxFasciated Antshrike Thamnophilus antinichatsxxWestern Staty Antshrike Thamnophilus antinichat*x (a)xWestern Staty Antshrike Thamnophilus anticolorxxUniform Antshrike Thamnophilus anticolorxxUniform Antshrike Thamnophilus anticolorxxChecker-throated Antwren Myrmotherula fulviventrisx (a)xStreaked Antwren Myrmotherula axilianisx (a)xStreaked Antwren Myrmotherula axilianisxxDot-winged Antwren Herpsilochums angfinarginatusxxDot-winged Antwren Herpsilochums angfinarginatusxxDot-winged Antwren Formicivora griseaxxDull-mantled Anthird Myrmeciza aensolicaxxBull-mantled Anthird Myrmeciza aensolicaxxBull-mantled Anthird Myrmeciza aensolicaxxBicolored Anthird Myrmeciza aensolicaxxBicak-faced Manakin Pipra pipraxxBicak-faced Manakin Pipra pipraxxBicak-faced Manakin Pipra pipraxxColden-headed Manakin Pipra pipraxxWhite-cowned Manakin Pipra pipraxxWhite-fanked Manakin Macaeropterus regulusxxBica-faced Anthrush Formacristas manacusx (a)xBica faced Anthrush Forma pipraxxColden-hea	Plain Xenops Xenops minutus		x	x	x
Scaly-throated Leaftosser Sclerurus guatemalensis x Fasciated Antshrike Cymbilainus lineatus x Bar-crested Antshrike Thannophilus atrinucha* x (a) Western Slaty Antshrike Thannophilus atrinucha* x (a) Plain Antivero Dysithamus mentalis x Checker-throated Antwren Myrmotherula axillaris x (a) Staty Antwren Myrmotherula axillaris x (a) Stary Antwren Myrmotherula schilaticolor x Streaked Antwren Myrmotherula schilaticolor x Streaked Antwren Myrmotherula schilaticolor x Streaked Antwren Merpsilochnus rufimarginatus x Dol-winged Antwren Herpsilochnus rufimarginatus x Dol-winged Antwren Formicivera grisea x Parker's Antbird Cercomacra prakeri x Dull-mantled Antbird Myrmeciza exsul x (a) Dull-mantled Antbird Myrmeciza exsul x (a) Bicolored Antbird Grallaria hypoleuca x Rufous-vented Tapaculo sp. Scytalopus femoralis sp. x Golden-headed Manakin Pipra pipra x x White-crowned Manakin Pipra pipra x x Wite-crowned Manakin Manacus manacus x (a) x	Tawny-throated Leaftosser Sclerurus mexicanus		X	X	•
Fasciated Antshrike Cymbilaimus lineatus x Bar-crested Antshrike Thannophilus multistriatus x Western Slaty Antshrike Thannophilus unicolor x Plain Antvireo Dysithamnus mentalis x Checker-throaded Antwren Myrmotherula fulviventris x (a) x White-flanked Antwren Myrmotherula axillaris x (a) x Stay Antwren Myrmotherula axillaris x (a) x Streaked Antwren Myrmotherula stiliaris x (b) Rufous-winged Antwren Herpsilochmus rufimarginatus x Dot-winged Antwren Pormicivora grisea x Parker's Antbird Cercomacra parkeri x Dul-mantled Antwire Myrmotize assull x (a) Dul-mantled Antbird Myrmeciza laemosticta x Spotted Antbird Gymnophys bicolor x (a) Spotted Antbird Hynophys neovioles x Back-faced Anthird Myrmeciza laemosticta x Bay-backed Anthird Myrmeciza laemosticta x Bay-backed Anthylita Grallaria hypoleuca x Rufous-vented Tapaculo Sp. Scytalopus femoralis sp. x Golden-headed Manakin Pipra crythrocephala x x Velvety Manakin Pipra crythrocephala x x Striped Manakin Maacus manacus	Scaly-throated Leaftosser Sclerurus guatemalensis		х		
Bar-crested Antshrike Thannophilus antinucha* x Western Slaty Antshrike Thannophilus atrinucha* x (a) x Vuliform Antshrike Thannophilus unicolor x Plain Antvireo Dysithamnus mentalis x Checker-throated Antwren Myrmotherula axillaris x (a) x Sity Antwren Myrmotherula axillaris x (a) x Sity Antwren Myrmotherula axillaris x (a) x Sity Antwren Myrmotherula axiliaris x (b) Rufous-winged Antwren Myrmotherula surinamensis (b) Rufous-winged Antwren Microthopias quixensis x Parker's Antbird Cercomacra parkeri x Chesturi-backed Antbird Myrmeciza leanosticta x Dull-mantled Antbird Myrmeciza leanosticta x Dull-mantled Antbird Myrmeciza leanosticta x Spotted Antbird Gymopithys bicolor x x Spotted Antbird Hylophylas naevioides x x Bay-backed Antpitta Grallaria hypoleuca x x Rufous-vented Tapaculo Sp. Scytalopus femoralis sp. x x Golden-headed Manakin Manacus manacus x (a) x x White-crowned Manakin Manacus manacus x (a) x x	Fasciated Antshrike Cymbilaimus lineatus			х	
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White-flanked Antwren Myrmotherula axillaris x (a) x Slaty Antwren Myrmotherula schisticolor x Streaked Antwren Myrmotherula surinamensis (b) Rufous-winged Antwren Herpsilochmus rufimarginatus x Dot-winged Antwren Microrhopias quixensis x x Parker's Antbird Cercomacra parkeria x x Dulsy Antbird Cercomacra parkeria x x Bicolored Antbird Myrmeciza exsul x (a) x Bull-mantled Antbird Myrmeiza laemosticta x x Back-faced Antpirta Grallaria hypoleuca x x Bay-backed Antpirta Grallaria hypoleuca x x Rufous-wented Tapaculo sp. Scytalopus femoralis sp. x x Golden-headed Manakin Pipra erythrocephala x x Velvety Manakin Pipra (coronata) velutina (*) x x Striped Manakin Machaeropterus regulus x x Golden-winged Manakin Manacus manacus x (a) x	Checker-throated Antwren Myrmotherula fulviventris		x (a)	х	~
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Streaked Antwren Myrmotherula surmamensis (b) Rufous-winged Antwren Herpsilochnus rufimarginatus x Value-tringed Antwren Microrhopias quixensis x Value-tringed Antwren Formicivora grisea x Parker's Antbird Cercomacra parkeri x Dusky Antbird Cercomacra tyramina x Chestnut-backed Antbird Myrmeciza exsul x (a) Dull-mantled Antbird Myrmeciza laemosticta x Spotted Antbird Gymopithys bicolor x x Spotted Antbird Hylophylax naevioides x x Black-faced Antthrush Formicarius analis x x Bay-backed Antpitta Grallaria hypoleuca x x Rufous-vented Tapaculo sp. Scytalopus femoralis sp. x x Golden-headed Manakin Pipra erythrocephala x x White-cowned Manakin Maisus chrysopterus x x Golden-winged Manakin Maisus chrysopterus x x Golden-higed Manakin Mainacus manacus x (a) x Striped Manakin Machaeropterus regulus x x Green Manakin Machaeropterus regulus x x Rufous Piha Lipaugus unirufus x x	Slaty Antwren Myrmotherula schisticolor				x
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Chestnut-backed Antbird Myrmecize assul x (a) Dull-mantled Antbird Myrmecize laemosticita x Dull-mantled Antbird Myrmecize laemosticita x Spotted Antbird Gymnopithys bicolor x x Spotted Antbird Hylophylax naevioides x Black-faced Anthrush Fornicarius analis x Bay-backed Antpitta Grallaria hypoleuca x Rufous-vented Tapaculo sp. Scytalopus femoralis sp. x Golden-headed Manakin Pipra erythrocephala x x White-crowned Manakin Pipra erythrocephala x x Velvety Manakin Pipra (coronato) velutina (*) x x Golden-winged Manakin Masius chrysopterus x x Green Manakin Machaeropterus regulus x x Green Manakin Chioropipo holochlora x x Thrush-like Mourner Schiffornis turdinus x x Rufous Pha Lipaugus smirufus x x Piha Lipaugus sp. nov. x x Bue Cotinga Cotinga nattererii x x Yellow-conved Tyrannulet Zimmunus elatus x x Yellow-conved Tyrannulet Zimmulus elatus x x <t< td=""><td>Dusky Antbird Cercomacra tyrannina</td><td></td><td>х</td><td></td><td></td></t<>	Dusky Antbird Cercomacra tyrannina		х		
Duinmantied Antbird Myrinectra identositicia x Biscolored Antbird Gymnopithys bicolor x Spotted Antbird Hylophylax naevioides x Back-faced Anthrush Fornicarius analis x Bay-backed Antpitta Grallaria hypoleuca x Rufous-vented Tapaculo sp. Scytalopus femoralis sp. x Golden-headed Manakin Pipra erythrocephala x x White-crowned Manakin Pipra pipra x x Golden-winged Manakin Masius chrysopterus x x White-bearded Manakin Manacus manacus x (a) x Striped Manakin Machaeropterus regulus x x Green Manakin Machaeropterus regulus x x Green Manakin Machaeropterus regulus x x Piha Lipaugus unirufus x x Piha Lipaugus sp. nov. x x Bue Cotinga Cotinga nattererii x x Yellow-cowned Tyrannulet Zimmerius viridiflavus x x Yellow-cowned Tyrannulet Zimmerius viridiflavus x x Yellow-cowned Tyrannulet Tyrannulus elatus x x Yellow-cowned Tyrannulet Phyloscartes superciliosis x <t< td=""><td>Chestnut-backed Antbird Myrmeciza exsul</td><td></td><td>x (a)</td><td></td><td></td></t<>	Chestnut-backed Antbird Myrmeciza exsul		x (a)		
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Black-faced Antthrush Formicarius analis x Bay-backed Antpitta Grallaria hypoleuca x Rufous-vented Tapaculo sp. Scytalopus femoralis sp. x Rufous-vented Tapaculo sp. Scytalopus femoralis sp. x Golden-headed Manakin Pipra erythrocephala x White-crowned Manakin Pipra erythrocephala x White-berded Manakin Masius chryspotents x Golden-headed Manakin Masius chryspotents x White-berded Manakin Masius chryspotents x Striped Manakin Macius manacus x (a) Striped Manakin Machaeropterus regulus x Green Manakin Chloropipo holochlora x Thrush-like Mourner Schiffornis turdinus x Rufous Piha Lipaugus sp. nov. x Bue Cotinga Cotinga nattererii x Purple-throated Fruitcrow Querula purpurata x Brown-capped Tyrannulet Zimmerius viridiflavus x Yellow-crowned Tyrannulet Zimmerius viridiflavus x Yellow-bellied Elenaia Elaenia flavogaster (a) (b) Olive-striped Flycatcher Mionectes oleagineus x x Marbu-belaed Briste-Tyrant Myiornis atricapillus x x Sala	Spotted Antbird Hylophylax naevioides		x	~	
Bay-backed Antpitta Grallaria hypoleucaxRufous-vented Tapaculo sp. Scytalopus femoralis sp.xColden-headed Manakin Pipra erythrocephalaxWhite-crowned Manakin Pipra apipraxVelvety Manakin Pipra (coronata) velutina (*)xXXGolden-winged Manakin Masius chrysopterusxWhite-bearded Manakin Masius chrysopterusxStriped Manakin Manacus manacusx (a)Striped Manakin Machaeropterus regulusxGreen Manakin Achaeropterus regulusxKufous Piha Lipaugus unirufusxRufous Piha Lipaugus sp. nov.xBlue Cotinga Cotinga nattereriixPurple-throated Fruitcrow Querula purpurataxKxYellow-cowned Tyrannulet Zimmerius viridiflavusxYellow-bellied Elaenia Elaenia flavogaster(a)(b) was tripe flycatcher Mionectes olivaceusxXXYellow-bellied Flycatcher Mionectes olegineusxXXScale-crested Pygmy-Tyrant Lophorticcus ophthalnicusxSate-headed Tody-Flycatcher Todirostrum nigricepsxXXSouthern Bentbill Rhynchocyclus olivaceus(a)Black-headed Tody-Flycatcher Todirostrum sylvia(a)Common Tody-Flycatcher Todirostrum nigricepsxXXSuthern Bentbill Rhynchocyclus olivaceusxXXSuthern Bentbill Rhynchocyclus olivaceusxXXSuthern Bentbill Rhynchocyclus olivaceusx	Black-faced Antthrush Formicarius analis		х		
Rufous-vented Tapaculo sp. Scytalopus femoralis sp. x x Golden-headed Manakin Pipra arythrocephala x x x White-crowned Manakin Pipra arythrocephala x x x Velvety Manakin Pipra (coronata) velutina (*) x x x Golden-winged Manakin Masius chrysopterus x x x White-crowned Manakin Machaeropterus regulus x x x Striped Manakin Machaeropterus regulus x x x Green Manakin Machaeropterus regulus x x x Hufous Piha Lipaugus sp. nov. x x x Rufous Piha Lipaugus sp. nov. x x x Purple-throated Fruitcrow Querula purpurata x x x Brown-capped Tyrannulet Zimmerius viridiflavus x x x Yellow-crowned Tyrannulet Zimmerius viridiflavus x x x Yellow-bellied Elaenia Elaenia flavogaster (a) (b) x Yellow-corwned Tyrannulet Phylloscartes superciliosis x x Marbie-faced Bryten-thronocters oleagineus x x Scale-crested P	Bay-backed Antpitta Grallaria hypoleuca				х
Colden-neaded Manakin Pipra eryinrocephalaxxVelvety Manakin Pipra eryinrocephalaxxVelvety Manakin Pipra (coronata) velutina (*)xxGolden-winged Manakin Masius chrysopterusxxWhite-corwand Manakin Masius chrysopterusxxWhite-bearded Manakin Manacus manacusx (a)xStriped Manakin Machaeropterus regulusxxGreen Manakin Mchaeropterus regulusxxGreen Manakin Mchaeropterus regulusxxInrush-like Mourner Schiffornis turdinusxx (b)Rufous Piha Lipaugus sunirdiusxxPha Lipaugus sp. nov.xxBlue Cotinga Cotinga nattereriixxPurple-throated Fruitcrow Querula purpuratax (a)xGolden-faced Tyrannulet Ornithion brunneicapillumx (a)xGolden-faced Tyrannulet Zimmerius viridiflauusxxYellow-crowned Tyrannulet Zimmerius viridiflauusxxYellow-bellied Elaenia Elaenia flavogaster(a)(b)xOthre-bellied Flycatcher Mionectes oleagineusxxxRufous-browed Tyrannulet Phylloscartes superciliosisxxxBlack-capped Pygmy-Tyrant Lophotriccus pileatusxxxSouthern Bentbill Oncostoma olivaceumxxxBlack-headed Tody-Flycatcher Todirostrum ngricepsxxOlivaceous Flabill Rhynchocyclus olivaceusxxOlivaceous Flabill Rhynchocyclus olivaceusxx	Rufous-vented Tapaculo sp. Scytalopus femoralis sp.				х
Yelvety Manakin Toph ppan x Colden-winged Manakin Masius chrysopterus x Golden-winged Manakin Masius chrysopterus x Striped Manakin Manacus manacus x (a) Striped Manakin Manacus manacus x (a) Striped Manakin Machaeropterus regulus x Green Manakin Chloropipo holochlora x Thrush-like Mourner Schiffornis turdinus x Rufous Piha Lipaugus unirufus x Piha Lipaugus sp. nov. x Blue Cotinga Cotinga nattererii x Golden-faced Tyrannulet Zimmerina viridiflavus x Yellow-cowned Tyrannulet Zimmerins viridiflavus x Yellow-clined Elaenia flavogaster (a) Olive-striped Flycatcher Mionectes oleagineus x X X Rufous-browed Tyrannulet Phylloscartes superciliosis x Marbe-faced Bristle-Tyrant Dophotriccus pileatus x Southern Bentbill Oncostoma olivaceum x Black-headed Tody-Flycatcher Todirostrum nigriceps x Common Tody-Flycatcher Todirostrum sylvia (a) Black-headed Tody-Flycatcher Todirostrum sylvia (a) Southern Bentbill Oncostoma olivaceum	White-crowned Manakin Pipra erythrocephala		X	X	v
Golden-winged Manakin Masius chrysopterus x White-bearded Manakin Manacus manacus x (a) Striped Manakin Manacus manacus x (a) Striped Manakin Manacus manacus x (a) Striped Manakin Chloropipo holochlora x Green Manakin Chloropipo holochlora x Thrush-like Mourner Schiffornis turdinus x x (b) Rufous Piha Lipaugus unirufus x x Piha Lipaugus sp. nov. x Blue Cotinga Cotinga nattererii x Purple-throated Fruitcrow Querula purpurata x (b) Brown-capped Tyrannulet Ornithion brunneicapillum x (a) Golden-faced Tyrannulet Tyrannulus elatus x Yellow-cowned Tyrannulet Tyrannulus elatus x Yellow-bellied Elaenia Elaenia flavogaster (a) (b) Ochre-bellied Flycatcher Mionectes oleagineus x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x Black-capped Pygmy-Tyrant Lophoris curicapillus x x Scale-crested Pygmy-Tyrant Kayiornis atricapillus x x Black-leaded Tody-Flycatcher Todirostrum nigriceps x x Black-headed Tody-Flycatcher Todirostrum sylvia	Velvety Manakin Pipra (coronata) velutina (*)		х	x	~
White-bearded Manakin Manacus manacus x (a) Striped Manakin Machaeropterus regulus x Green Manakin Machaeropterus regulus x Green Manakin Chloropipo holochlora x Thrush-like Mourner Schiffornis turdinus x (b) Rufous Piha Lipaugus unirufus x Pha Lipaugus sp. nov. x Blue Cotinga nattererii x Purple-throated Fruitcrow Querula purpurata x Brown-capped Tyrannulet Ornithion brunneicapillum x (a) Golden-faced Tyrannulet Zimmerius viridiflavus x Yellow-crowned Tyrannulet Jinnerius viridiflavus x Yellow-bellied Elaenia Elaenia flavogaster (a) Olive-striped Flycatcher Mionectes olivaceus (a) Rufous-browed Tyrannulet Phylloscartes superciliosis x Marble-faced Bristle-Tyrant Myiornis atricapillus x X X Black-capped Pygmy-Tyrant Lophotriccus pileatus x Scale-crested Pygmy-Tyrant Lophotricstrum nigriceps x Sude-headed Tody-Flycatcher Todirostrum nigriceps x Ourber-bellid Rhynchocyclus olivaceus (a) Black-apped Pygmy-Tyrant Lophotriccus pileatus x	Golden-winged Manakin Masius chrysopterus				x
Striped Manakin Machaeropterus regulus x Green Manakin Chloropipo holochlora x Ihrush-like Mourner Schiffornis turdinus x x (b) Rufous Piha Lipaugus unirafus x x Piha Lipaugus sp. nov. x x Blue Cotinga Colinga nattererii x x Purple-throated Fruiterow Querula purpurata x x Brown-capped Tyrannulet Ornithion brunneicapillum x (a) x Golden-faced Tyrannulet Zimmerius viridiflavus x x Yellow-crowned Tyrannulet Tyranmulus elatus x x Yellow-bellied Elaenia flavogaster (a) (b) x Olive-striped Flycatcher Mionectes olvaceus (a) x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x x Black-cappe Pygmy-Tyrant Myiornis atricapillus x x x Scale-crested Pygmy-Tyrant Lophotriccus pileatus x x x Black-headed Tody-Flycatcher Todirostrum nigriceps x x x Outrentereum (a) x x x Southern Bentbill Oncostoma olivaceus x	White-bearded Manakin Manacus manacus		x (a)		
Green Manakin Chioropipo holochloraxThrush-like Mourner Schiffornis turdinusxxRufous Piha Lipaugus simifuitsxxPiha Lipaugus simifuitsxxPiha Lipaugus sp. nov.xxBlue Cotinga Colinga nattereriixxPurple-throated Fruitcrow Querula purpuratax(b)Brown-capped Tyrannulet Ornithion brunneicapillumx (a)Golden-faced Tyrannulet Intervision stridiflavusxxYellow-crowned Tyrannulet Jranmulus elatusxxYellow-bellied Elaenia Elaenia flavogaster(a)(b)Noitw-striped Flycatcher Mionectes olivaceus(a)xRufous-browed Tyrannulet Phylloscartes superciliosisxxRufous-browed Tyrannulet Phylloscartes superciliosisxxScale-crested Prgmy-Tyrant Lophotriccus pileatusxxSouthern Bentbill Oncostoma olivaceumxxBlack-eaped Tody-Flycatcher Todirostrum nigricepsxCCommon Tody-Flycatcher Todirostrum nigricepsxCOlivaceous Flatbill Rhynchocyclus olivaceusxXOlivaceous Flatbill Rhynchocyclus olivaceusxXState-headed Tody-Flycatcher Todirostrum sylvia(a)xState-headed Tody-Flycatcher Todirostrum sylviaxXOlivaceous Flatbill Rhynchocyclus olivaceusxXState-headed Tody-Flycatcher Todirostrum sylviaxXOlivaceous Flatbill Rhynchocyclus olivaceusxXState-headed Tody-Flycatcher Todi	Striped Manakin Machaeropterus regulus			х	
An end Advanced Schuppens laranus X X Rufous Piha Lipaugus unirufuts X X Piha Lipaugus sp. nov. X X Blue Cotinga Coinga nattererii X X Purple-throated Fruitcrow Querula purpurata X K Brown-capped Tyrannulet Ornihion brunneicapillum X (a) Colden-faced Tyrannulet Jumerius viridiflavus X Yellow-crowned Tyrannulet Jumerius viridiflavus X X Yellow-crowned Tyrannulet Jumerius viridiflavus X Yellow-belied Elaenia Elaenia flavogaster (a) (b) X Olive-striped Flycatcher Mionectes oleagineus X X Rufous-browed Tyrannulet Phylloscartes superciliosis X X Black-capped Pygmy-Tyrant Lophotriccus ophthalmicus X X Scale-crested Pygmy-Tyrant Lophotriccus pileatus X X Southern Bentbill Oncostoma olivaceum x X Black-leaded Tody-Flycatcher Todirostrum nigriceps X X Common Tody-Flycatcher Todirostrum sylvia (a) X Slate-headed Tody-Flycatcher Todirostrum sylvia (a) X Olivaccous Flatbill Rhynchocyclus olivaceus X	Green Manakin Chloropipo holochlora		v	X x (b)	
Piha Lipaugus sp. nov. x Blue Cotinga Cotinga nattererii x Purple-throated Fruitcrow Querula purpurata x Brown-capped Tyrannulet Ornithion brunneicapillum x (a) Brown-capped Tyrannulet Zimmerius viridiflavus x Yellow-crowned Tyrannulet Zimmerius viridiflavus x Yellow-bellied Elaenia Elaenia flavogaster (a) (b) x Olive-striped Flycatcher Mionectes olivaceus (a) (b) x Olive-sbried Flycatcher Mionectes olegineus x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x Black-capped Pygmy-Tyrant Lophotriccus phthalmicus x x Scale-crested Pygmy-Tyrant Lophotriccus phtalmicus x Black-headed Tody-Flycatcher Todirostrum nigriceps x Common Tody-Flycatcher Todirostrum sylvia (a) Brownish Flycatcher Cnipodectes subbrunneus x Olivaceous Flabill Rhynchocyclus olivaceus x Vhite-throated Spadebill Platyrhinchus mystaceus x Ornate Flycatcher Myotriccus ornatus x Rufous-breated Spadebill Platyrhinchus mystaceus	Rufous Piha Lipaugus unirufus		x	x (0)	
Blue Cotinga Cotinga nattererii x Purple-throated Fruitcrow Querula purpurata x Brown-capped Tyrannulet Ornithion brunneicapillum x (a) Golden-faced Tyrannulet Zimmerius viridiflavus x Yellow-crowned Tyrannulet Zimmerius viridiflavus x Yellow-bellied Elaenia Elaenia flavogaster (a) (b) Olive-striped Flycatcher Mionectes olivaceus (a) x Ochre-bellied Flycatcher Mionectes oleagineus x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x Back-capped Pygmy-Tyrant Myiornis atricapillus x x Scale-crested Pygmy-Tyrant Lophatriccus pileatus x x Black-headed Tody-Flycatcher Todirostrum nigriceps x x State-headed Tody-Flycatcher Todirostrum sylvia (a) x Brownish Flycatcher Cnipodectes subbrunneus x x Olivaceous Flatbill Rhynchocyclus olivaceus x x Olivaceous Flatbill Rhynchocyclus olivaceus x x Olivaceous Flatbill Rhynchocyclus olivaceus x x Olivaceous Flatbill Rhynchocycl	Piha Lipaugus sp. nov.				x
Purple-throated Fruitcrow Querula purpurata x (b) Brown-capped Tyrannulet Ornithion brunneicapillum x (a) - Golden-faced Tyrannulet Zimmerius viridiflavus x - Yellow-corowned Tyrannulet Jrunnulus elatus x - Yellow-bellied Elaenia Elaenia flavogaster (a) (b) x Olive-striped Flycatcher Mionectes olivaceus (a) x x Ochre-bellied Flycatcher Mionectes olegaineus x x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x x Back-capped Pygmy-Tyrant Myiornis atricapillus x x x Scale-crested Pygmy-Tyrant Lophotriccus pileatus x x x Black-headed Tody-Flycatcher Todirostrum nigriceps x x x Common Tody-Flycatcher Todirostrum sylvia (a) - x Blach-headed Tody-Flycatcher Todirostrum sylvia (a) - x Olivaceous Flatbill Rhynchocyclus olivaceus x x - Olivaceous Flatbill Rhynchocyclus olivaceus x -	Blue Cotinga Cotinga nattererii			х	
Brown-capped Tyrannulet Ornithion brunneicapillum x (a) Golden-faced Tyrannulet Zimmerius viridiflavus x Gyelow-crowned Tyrannulet Zimmerius viridiflavus x Yellow-convend Tyrannulet Zimmerius viridiflavus x Yellow-bellied Elaenia Elaenia flavogaster (a) x Yellow-bellied Elaenia Elaenia flavogaster (a) x x Othre-striped Flycatcher Mionectes olivaceus (a) x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x Black-capped Pygmy-Tyrant Dylontriccus phthalmicus x x Black-capped Pygmy-Tyrant Ophoris atricapillus x x Southern Bentbill Oncostoma olivaceum x x Black-headed Tody-Flycatcher Todirostrum nigriceps x x Common Tody-Flycatcher Todirostrum sylvia (a) x Brownish Flycatcher Cnipodectes subbrunneus x x Olivaceous Flatbill Rhynchocyclus olivaceus x x White-throated Spadebill Platyrhinchus mystaceus x x Ornate Flycatcher Terenotriccus erythrurus x x	Purple-throated Fruitcrow Querula purpurata		x	(b)	
Source of Prannuet Limiter Unimerities Writightwiss X Yellow-crowned Tyrannulet Tyrannulus elatus X Yellow-bellied Elaenia Elaenia flavogaster (a) (b) Yellow-bellied Elaenia Elaenia flavogaster (a) (b) x Otire-striped Flycatcher Mionectes olivaceus (a) x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x Marbie-faced Bristle-Tyrant Pogonotriccus ophthalmicus x x Black-capped Pygmy-Tyrant Myiornis atricapillus x x Scale-crested Pygmy-Tyrant Lophotriccus pileatus x x Southern Bentbill Oncostoma olivaceum x x Black-headed Tody-Flycatcher Todirostrum nigriceps x x Common Tody-Flycatcher Todirostrum nigriceps x x Olivaceous Flatbill Rhynchocyclus olivaceus x x Olivaceous Elatbill Rhynchocyclus olivaceus x x Orizoeous Flatbill Rhynchocyclus onivaceus x x Olivaceous Flatbill Rhynchocyclus orizons x x Orizoeous Flatbill Rhynchocyclus orizons x x Orinate Flycatcher Myiotriccus ornatus x <t< td=""><td>Brown-capped Tyrannulet Ornithion brunneicapillum</td><td></td><td>x (a)</td><td>v</td><td></td></t<>	Brown-capped Tyrannulet Ornithion brunneicapillum		x (a)	v	
Yellow-bellied Elaenia Elaenia flavogaster (a) (b) x Olive-striped Flycatcher Mionectes oleagineus (a) x x Ochre-bellied Flycatcher Mionectes oleagineus x x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x Marbie-faced Bristle-Tyrant Pogonotriccus ophthalmicus x x Black-capped Pygmy-Tyrant Myiornis atricapillus x x Scale-crested Pygmy-Tyrant Lophotriccus pileatus x x Black-headed Tody-Flycatcher Todirostrum nigriceps x x Common Tody-Flycatcher Todirostrum nigriceps x x Olivaceous Flatbill Rhynchocyclus olivaceus x x Olivaceous Flatbill Rhynchocyclus olivaceus x x State-headed Tody-Flycatcher Todirostrum sylvia (a) x Slate-headed Tody-Flycatcher Todirostrum sylvia x x Olivaceous Flatbill Rhynchocyclus olivaceus x x Olivaceous Flatbill Rhynchocyclus onivaceus x x Olivaceous Flatbill Rhynchocyclus onivaceus x x Ornate Flycatcher Myiotriccus ornatus x x Ruddy-tail	Yellow-crowned Tyrannulet Tyrannulus elatus		х	Á	
Olive-striped Flycatcher Mionectes olivaceus (a) x x Ochre-bellied Flycatcher Mionectes oleagineus x x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x Marble-faced Bristle-Tyrant Pogonotriccus ophthalmicus x x Black-capped Pygmy-Tyrant Lophotriccus ophthalmicus x x Scale-crested Pygmy-Tyrant Lophotriccus pileatus x x Southern Bentbill Oncostoma olivaceum x x Black-headed Tody-Flycatcher Todirostrum nigriceps x x Common Tody-Flycatcher Todirostrum sylvia (a) x Slate-headed Tody-Flycatcher Todirostrum sylvia x x Olivaceous Flatbill Rhynchocyclus olivaceus x x Olivaceous Flatbill Rhynchocyclus olivaceus x x Olivaceous Flatbill Rhynchocyclus onivaceus x x Olivaceous Flatbill Rhynchocyclus olivaceus x x Ornate Flycatcher Myiotriccus ornatus x x Ruddy-tailed Flycatcher Terenotriccus erythrurus x x	Yellow-bellied Elaenia Elaenia flavogaster		(a)	(b)	х
Ochre-bellied Flycatcher Mionectes oleagineus x x Rufous-browed Tyrannulet Phylloscartes superciliosis x x Marble-faced Bristle-Tyrant Myiornis atricapillus x x Black-capped Pygmy-Tyrant Myiornis atricapillus x x Scale-crested Pygmy-Tyrant Lophotriccus pileatus x x Black-headed Tody-Flycatcher Todirostrum nigriceps x x Common Tody-Flycatcher Todirostrum sylvia (a) x Slate-headed Tody-Flycatcher Todirostrum sylvia x x Olivaceous Flatbill Rhynchocyclus olivaceus x x Olivaceous Flatbill Rhynchocyclus olivaceus x x Olivaceous Flatbill Rhynchocyclus olivaceus x x Ornate Flycatcher Myiotriccus onatus x x Ornate Flycatcher Myiotriccus onatus x x	Olive-striped Flycatcher Mionectes olivaceus		(a)	x	х
Rutous-browed Tyrannulet Phylloscartes superciliosis x Marble-faced Bristle-Tyrant Pogonotriccus ophthalmicus x Black-capped Pygmy-Tyrant Mionis atricapillus x x Scale-crested Pygmy-Tyrant Lophotriccus pileatus x x Southern Bentbill Oncostoma olivaceum x x Black-headed Tody-Flycatcher Todirostrum nigriceps x x Common Tody-Flycatcher Todirostrum sylvia (a) x Slate-headed Tody-Flycatcher Todirostrum sylvia (a) x Olivaceous Flatbill Rhynchocyclus olivaceus x x Olivaceous Flatbill Rhynchocyclus olivaceus x x Ontrade Spadebill Platyrhinchus mystaceus x x Ornate Flycatcher Terenotriccus erythrurus x x	Ochre-bellied Flycatcher Mionectes oleagineus		х	х	
Mathematical District Fyrant Togonomicus opinitumicus X Black-capped Pygmy-Tyrant Moionis atricapillus X Scale-crested Pygmy-Tyrant Lophotriccus pileatus X Southern Bentbill Oncostoma olivaceum X Black-headed Tody-Flycatcher Todirostrum nigriceps X Common Tody-Flycatcher Todirostrum nigriceps X Slate-headed Tody-Flycatcher Todirostrum sylvia (a) Brownish Flycatcher Colipodectes subbrunneus X Olivaceous Flatbill Rhynchocyclus olivaceus X White-throated Spadebill Platyrhinchus mystaceus X Ornate Flycatcher Myiotriccus ornatus X Ruddy-tailed Flycatcher Terenotriccus erythrurus X	Kulous-browed Tyrannulet Phylloscartes superciliosis				x
Scale-created Pygmy-Tyrant Lophonic unsequinitia x Southern Bentbill Oncostoma olivaceum x Black-headed Tody-Flycatcher Todirostrum nigriceps x Common Tody-Flycatcher Todirostrum nigriceps x Slate-headed Tody-Flycatcher Todirostrum sylvia (a) Brownish Flycatcher Chipodectes subbrunneus x Olivaceous Flatbill Rhynchocyclus olivaceus x White-throated Spadebill Platyrhinchus mystaceus x Ornate Flycatcher Teenotriccus erythrurus x	Black-capped Pygmy-Tyrant Myiornis atricanillus		x	x	х
Southern Bentbill Oncostoma olivaceum x Black-headed Tody-Flycatcher Todirostrum nigriceps x Common Tody-Flycatcher Todirostrum sylvia (a) Slate-headed Tody-Flycatcher Todirostrum sylvia (a) Brownish Flycatcher Cnipodectes subbrunneus x Olivaceous Flatbill Rhynchocyclus olivaceus x White-throated Spadebill Platyrhinchus mystaceus x Ornate Flycatcher Terenotriccus erythrurus x	Scale-crested Pygmy-Tyrant Lophotriccus pileatus		4	~	x
Black-headed Tody-Flycatcher Todirostrum nigriceps x Common Tody-Flycatcher Todirostrum sylvia (a) Slate-headed Tody-Flycatcher Todirostrum sylvia (a) Brownish Flycatcher Cnipodectes subbrunneus x Olivaceous Flabill Rhynchocyclus olivaceus x White-throated Spadebill Platyrhinchus mystaceus x Ornate Flycatcher Terenotriccus erythrurus x	Southern Bentbill Oncostoma olivaceum			х	
Common Tody-Flycatcher Todirostrum cinereum (a) Slate-headed Tody-Flycatcher Todirostrum sylvia (a) Brownish Flycatcher Cnipodectes subbrunneus x Olivaceous Flabill Rhynchocyclus olivaceus x White-throated Spadebill Platythinchus mystaceus x Ornate Flycatcher Myiotriccus ornatus x Ruddy-tailed Flycatcher Teenotriccus erythrurus x	Black-headed Tody-Flycatcher Todirostrum nigriceps		х		
State-neaded Tody-Fryeatcher Lodirostrum sylvia (a) Brownish Flycatcher Cnipodectes subbrunneus x Olivaceous Flatbill Rhynchocyclus olivaceus x White-throated Spadebill Platythinchus mystaceus x Ornate Flycatcher Myiotriccus ornatus x Ruddy-tailed Flycatcher Terenotriccus erythrurus x	Common Tody-Flycatcher Todirostrum cinereum		(a)		
Divaceous Flatbill Rhynchocyclus olivaceus x Olivaceous Flatbill Rhynchocyclus olivaceus x White-throated Spadebill Platythinchus mystaceus x Ornate Flycatcher Myiotriccus ornatus x Ruddy-tailed Flycatcher Terenotriccus erythrurus x	State-neaded Tody-Flycatcher Todirostrum sylvia Brownish Elycatcher Chinedaataa aukkeenee		(a)	v	
White-throated Spadebill Platyrhinchus mystaceus x Ornate Flycatcher Myiotriccus ornatus x Ruddy-tailed Flycatcher Terenotriccus erythrurus x	Olivaceous Flatbill Rhynchocyclus olivaceus		x	X	
Ornate Flycatcher Myiotriccus ornatus x Ruddy-tailed Flycatcher Terenotriccus erythrurus x	White-throated Spadebill Platyrhinchus mystaceus				x
Ruddy-tailed Flycatcher Terenotriccus erythrurus x	Ornate Flycatcher Myiotriccus ornatus				х
	Ruddy-tailed Flycatcher Terenotriccus erythrurus		х		

Black-tailed Flycatcher Myiobius atricaudus	х	х	
Long-tailed Tyrant Colonia colonus	х		
Cattle Tyrant Machetornis rixosus	(a)		
Bright-rumped Attila Attila spadiceus	х		
Speckled Mourner Laniocera rufescens		х	
Pale-edged Flycatcher Myiarchus cephalotes		х	
Dusky-capped Flycatcher Myiarchus tuberculifer	х		
Great Kiskadee Pitangus sulphuratus	(a)	(b)	
Rusty-margined Flycatcher Myiozetetes cayanensis	x (a)	(b)	-
Streaked Flycatcher Myiodynastes maculatus	x		
Piratic Flycatcher Legatus leucophaius	(a)	<i>a</i>)	
Tropical Kingbird Tyrannus melancholicus	x (a)	(b)	x
Barred Becard Pachyramphus versicolor		х	
Cinereous Becard Pachyramphus rufus	x	(L)	
Climation Becard Factyramphus climationeus		(0)	
Maskad Tityra Tityra samifasaiata	v	л	
Black-crowned Tityra Tityra inquisitor	A V		
White-winged Swallow Tachycineta albiventer	(a)		
Brown-chested Martin Progne tapera	(a)		
Blue-and-white Swallow Natiochelidon cyanoleuca	(a)	(b)	x
White-thighed Swallow Neochelidon (tibialis) minima	(u)	(b)	
Southern Rough-winged Swallow Stelgidonteryx ruficollis	x (a)	x (b)	x
Black-chested Jay Cyanocorax affinis	x (a)	x (b)	x
Green Jay Cyanocorax yncas			x
White-capped Dipper Cinclus leucocephalus		(b)	
Bicolored Wren Campylorhynchus griseus	x (a)		
Band-backed Wren Campylorhynchus zonatus	x		
Sooty-headed Wren Thryothorus spadix		х	Х
Black-bellied Wren Thryothorus fasciatoventris	x (a)		
Bay Wren Thryothorus nigricapillus	X	(b)	x
House Wren Troglodytes aedon			x
Grey-breasted Wood-Wren Henicorhina leucophrys			х
White-breasted Wood-Wren Henicorhina leucosticta	x (a)	x	
Southern Nightingale-Wren Microcerculus marginatus	x	x	
Song Wren Cyphorhinus phaeocephalus	х	х	
Tropical Mockingbird Mimus gilvus		(b)	
Andean Solitaire Myadestes ralloides			x
Great Thrush Turdus fascater			x
Glossy-black Thrush Turdus serranus			X
Plool billed Thrush Turdus ignobilis			x
Black-blied Tillusii Turaus ignobuls			
Tawny-faced Gnatwren Microbates cinereiventris	x	х	
Tawny-faced Gnatwren Microbates cinereiventris Long-billed Gnatwren Ramphocaenus melanurus	x x (a)	х	
Dates onted Thirds Tarbas grabotis Tawny-faced Gnatwren Microbates cinereiventris Long-billed Gnatwren Ramphocaenus melanurus Slate-throated Gnateatcher Polioptila schistaceigula Defens hene d Duscustich of Child Schistaceigula	x x (a)	x	
Sate-throated Gnatwren Microbates cinereiventris Long-billed Gnatwren Ramphocaenus melanurus Slate-throated Gnatcatcher Polioptila schistaceigula Rufous-browed Peppershrike Cyclarhis gujanensis Dack Edu Bernarchelles Code activities and activities	x x (a) x	x x x	
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Dates one d'Initian Tarian (gnobilis) Tawy-faced Gnatwren Microbates cinereiventris Long-billed Gnatearcher Poliopilla schistaceigula Rufous-browed Peppershrike Cyclarlis nigrirostris Black-billed Peppershrike Cyclarlis nigrirostris Tawny-crowned Greenlet Hylophilus ochraceiceps Slate-throated Whitestart Myloborus miniatus Buffreumoed Workberg Basiluntary thuiscauda	x (a) x (a)	x x x x	x
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Datesonice Tritical Fighbolits Tawny-faced Gnatwren Microbates cinereiventris Long-billed Gnatwren Ramphocaenus melanurus Slate-throated Gnatcatcher Polioptila schistaceigula Rufous-browed Peppershrike Cyclarits gujanensis Black-billed Peppershrike Cyclarits nigrirostris Tawny-crowned Greenlet Hylophilus ochraceiceps Slate-throated Whitestart Myioborus miniatus Buff-rumped Warbler Basileuterus fulvicauda Shiny Cowbird Molothrus bonariensis Crested Oronendola Psarcoclius Acumanus	x (a) x (a) (a) (a)	x x x (b) (b) x (b)	x x x x
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Yellow-thorated Bush-Tanager Chlorospingus flavigularis			х
Oleaginous Hemispingus Hemispingus frontalis			х
Buff-throated Saltator Saltator maximus	х	x (b)	
Black-winged Saltator Saltator atripennis			х
Grayish Saltator Saltator coerulescens	х	(b)	
Blue-black Grosbeak Cyanocompsa cyanoides	х		
Yellow-thorated Brush-Finch Atlapetes gutturalis			х
Yellow-faced Grassquit Tiaris olivaea			х
Blue-black Grassquit Volatinia jacarina	х	(b)	
Slate-colored Seedeater Sporophila schistacea	?		

Yellow-bellied Seedeater Sporophila nigricollis		x (a)	(b)	х
Ruddy-breasted Seedeater Sporophila minuta	(a)			
Lesser Seed-Finch Oryzoborus angolensis	x (a)			
Black-striped Sparrow Arremonops conirostris	(a)		х	
Rufous-collared Sparrow Zonotrichia capensis			(b)	
TOTAL		205 (55a)	135	99

Appendix III: Bird specimens collected during EBA '99 expedition in Serranía de los Churumbelos (July 1999) and the northeast Antioquia (August 1999).

Collectors: Paul G. W. Salaman (PS), Andres M. Cuervo Maya (AM), Jose Ochoa (JO) and Thomas Donegan (TD).

The following information was obmitted from each specimens account, but available on request; colouration of iris, bill, and legs; fat; stomach content; notes. All bird specimens and material depoisted at ICN, Universidad Nacional.

Northeast Antioquia, northern Cordillera central

SS1 APOLLO 13. Finca La Esperanza, Vda Rio Bagre Malena, Mpio Segovia SS2 ALTO LOS TARROS. Oba. La Moranita, Vda. La Tirana, Mpio Anori SS3 ALTO COMBATE. Reserva La Forzosa, Mpio Anori

Eastern Cordillera, Serrania de los Churumbelos, Bota Caucana, Cauca.

SS5 NABU, Finca Playon, Vda. La Petrolera, Mpio. Santa Rosa SS6 TATAUI, Finca Playon, Vda. La Petrolera, Mpio. Santa Rosa SS7 EL DORON, El Cable telcom station, Mpio. Santa Rosa

EBA#	Collector	site	Species	Ossifica.	sex	gonadas
EBA1	PS 01	SS5	Hemispingus frontalis	partial	m	>1.0
EBA2	AC 01	SS5	Myophobus pulcher (bellus)	partial	m	6.3
EBA3	AC 02	SS5	Haplospiza rustica	100%	m	3.5
EBA5	PS 02	SS5	Wedge-billed Hummingbird	-	f	>0.5
EBA6	AC 03	SS5	Bristle-tyrant spp. (?)	-	m	5.0
EBA7	AC 04	SS5	Baileuterus tristratus	100%	m	7.1
EBA8	PS 03	SS5	Foliage-gleaner spp. (?)	100%	f	>0.2
EBA9	PS 04	SS5	Hooded Antpitta	100%	m	2.5
EBA10	AC 05	SS5	Common Bush-tanager	100%	m	-
EBA11	AC 04	SS5	Rusty-winged Treerunner	100%	m	8.9
EBA12	PS 05	SS5	Ecuadorian Bristle-tyrant (?)	30-40%	m	1.2
EBA13	PS 06	SS5	Rufous-tailed Antthrush	50%	m	7.2
EBA14	PS07	SS5	Blue-winged Mountain-tanager	100%	f	< 0.1
EBA15	PS 08	SS5	Golden-winged Manakin	40%	m	1.0
EBA16	AC 06	SS5	Long-tailed Sylph	100%	m	2.5
EBA17	AC 07	SS5	Andean Solitaire	90%	m	3.5
EBA18	AC08	SS5	Golden-winged Manakin	-	-	-
EBA19	PS 09	SS5	Streaked tuftedcheek	100%	f	1.5
EBA20	AC 09	SS5	Ashy-headed Tyrannulet	70%	m	6.0
EBA21	AC 10	SS5	Speckled Hummingbird	80%	m	9.0
EBA22	AC 11	SS5	Black-capped tyrannulet	>20%	m	0.5
EBA23	AC 12	SS5	Spectacled Prickletail	100%	f	3.9
EBA24	PS 10	SS6	Tapaculo spp. (Unicolored)	0-10%	f	1.7
EBA25	AC 13	SS6	Citrine Warbler	40%	m	5.7
EBA26	PS 11	SS6	Collared Inca	0%	m	2.2
EBA27	TD 1	SS6	Andean Solitaire	0%		
EBA28	PS 12	SS6	Dusky Piha	100%	m	9.7
EBA29	AC 14	SS6	Cinamon Flycatcher	>20%	?	
EBA30	PS 13	SS6	Flammulated Treehunter	100%	f	9.7
EBA31	AC15	SS7	Black-throated Tody-tyrant	>20%	?	

EBA32	AC16	557	Collared Inca	90%	t	
EBA33	PS14	SS7	Emerald-bellied Puffleg		m	
EBA34	PS15	SS7	Rufous-vented Whitetip		m	
EBA35	AC17	SS7	Buff-tailed Coronet		m	
EBA36	AC19	SS7	Speckled hummer			
EBA37	AC20	SS7	Speckled hummer		?	
EBA38	PS18	SS7	Speckled hummer			
EBA39	AC18	SS7	Tourmaline Sunangel		m	
EBA40	PS17	SS7	Tourmaline Sunangel		?	
EBA41	PS16	SS7	Tapaculo spp. (Andean?)		f	
EBA42	AC19	SS1	Checker-throated Antwren	>25%	f	
EBA43	AC20	SS1	Long-tailed Hermit	m	2.3	
EBA44	JO1	SS1	Golden-headed Manakin	100%	m	2.0
EBA45	AC21	SS1	Little Hermit	10070		2.0
EBA46	AC22	551	White-breasted Wood-wren	100%	f	53
EBA40 EBA47	AC22 PS10	551	Ped billed Emerald	10070	1	5.5
EDA47	F519 DS20	551	Long tailed Harmit			2.4
EDA40	PS20	551		1000/	n n	5.4
EBA49	PS21	551	Checker-throated Antwren	100%	I	0.5
EBA50	PS22	SSI	Golden-headed Manakin	100%	t	
EBA51	PS23	SSI	Golden-headed Manakin	100%	m	4.5
EBA52	PS24	SS1	Golden-headed Manakin	100%	m	4.1
EBA53	PS25	SS1	Golden-headed Manakin	100%	m	4.4
EBA54	PS26	SS1	Ochre-bellied Flycatcher	>25%	m	0.6
EBA55	PS27	SS1	Ochre-bellied Flycatcher	100%	f	0.8
EBA56	PS28	SS1	Ochre-bellied Flycatcher	80%	m	2.6
EBA57	PS29	SS1	Wedge-billed Woodcreeper	100%	m	2.1
EBA58	PS30	SS1	Wedge-billed Woodcreeper	100%	f	< 0.5
EBA59	AC23	SS2	Striped Foliage-gleaner	100%	m	9.4x5.3
EBA60	PS34	SS2	White-tipped Sicklebill		f	>0.5
EBA61	AC24	SS2	Bronze-tailed Plumeleteer		f	2.7
EBA62	102	552	Buddy-tailed Elycatcher	50%		2.7
EBA63	JO2 DS35	552	Dull mantled Anthird	100%	m	3.3×1.3
EDA64	1555	552	Green manalin	0.0%		2.8x2.0
EDA04	AC25	552	Tooth hilled Humminshird	90%		2.0X2.0 5.2x2.6
EDA03	P350	332 552	Wedge hilled Wegderer	1000/	m	3.3X2.0
EBA66	AC26	552	wedge-billed woodcreeper	100%	m	1.3
EBA6/	AC27	SS2	Andean Emerald		m	3.4x2.0
EBA68	PS37	SS3	Green-crowned Woodnymph		m	3.1
EBA69	PS38	SS3	White-throated Spadebill	100%	m	1.4
EBA70	PS39	SS3	Buff-fronted Foliage-gleaner	95%	m	1.5
EBA71	PS40	SS3	Parker's Antbird	100%	m	1.5
EBA72	PS41	SS3	Green-crowned Woodnymph		m	2.2
EBA73	PS42	SS3	House Wren	50%	f	3.9
EBA74	PS43	SS3	Green-crowned Woodnymph		m	2.3
EBA75	PS44	SS3	Yellow-throated Bush-tanager	100%	m	4.2
EBA76	AC28	SS3	Lipaugus sp. nov.	100%	m	
EBA77	AC29	SS3	Parker's Anthird	100%	f	4.4
EBA78	PS45	SS 3	Parker's Anthird	100%	f	4.2
FBA79	PS46	553	Olive-striped /Streak-necked Elycatcher	25%	f	5.6
EBA80	PS47	553	Striped Foliage-gleaner (?)	20%	m	1.8
EBA81	DS/18	522	Striped Foliage gleaner	50%	f	1.0
EDAOI	DS40	555	West Andeen Emerald	50%	1	4.0
	F549	333	VVEST Allocali Ellerald	1000/	in c	1./
EBA86	P\$50	553	Lipaugus sp. nov.	100%	I	
EBA87	AC30	883	Green-crowned Woodnymph		t cr c	3.3 (0.7)
EBA88	skeleton	SS1	Seedeater spp.		t/1mm?	
EBA89	PS31	SS1	Buff-throated Foliage-gleaner (?)			
EBA90	PS32	SS1	Dusky Antbird		f	
EBA91	PS33	SS1	Pale-bellied Hermit			
EBA92	skeleton	SS3	Orange-bellied Euphonia		f	
EBA93	skeleton	SS3	Green-crowned Woodnymph		m	

Appendix IV: Inventory of Reptiles and Amphibians captured at each site in Serranía de los Churumbelos

		Colombia	a '98	EBA '99			
Species	SS1	SS2 (650	SS3	SS4	SS5	SS6	SS7
	(350 m)	m)	(1000m)	(1400m)	(1800m)	(2100m)	(2450m)
Class Am	phibia, Or	der Anura	(Frogs an	d Toads)			
Bufonidae							
Bufo marinus	4(3)						
Bufo sp.			1				
Bufo "thyphonius" sp. 1	4	4					
Bufo "thyphonius" sp. 2		2					
Dendrophrynyscus minutus	1						
Centrolenidae							
Centrolene audax				1			
Cochranella cochrani			1				
Dendrobatidae	1						
Epipeaobates nannell	1	2 *					
Epipeaobates trivittatus		2 **					
Leptodactylidae	1	1					
Adenomera anarede Elouthorodaotulus "nomusianus"	1	1		1			
Eleutherodactylus lanthanites		2		1			
Eleutherodactylus ockendeni	1	1					
Eleutherodactylus sp. 1	1	1	1	1			
Eleutherodactylus sp. 2			1	1			
Eleutherodactylus sp. 2 Eleutherodactylus sp. 3			1	1			
Eleutherodactylus sp. 4			1				
Eleutherodactylus sp. 5			1				
Eleutherodactylus sp. 6			-		5(2)	1	2
Eleutherodactylus sulcatus		3		1	- ()		
Eleutherodactylus w-nigrum					3 (3)		(1)
Physalaemus petersi	1						
Hylidae							
Hyla boans	1						
Hyla geographica	1 (3)						
Hyla lanceforis	1						
Hyla punctata	1						
Hyla triangulum	1						
Scinax cruentomma	1						
Microhylidae		1					
Synapturanus rabus (?)		I					
Kanidae	1						
Rana paimipes		annata Ga					
Class Repulia,	Order Squ	lamata, Su	border Sa	uria (Liza	ras)		
Gerkonidae		1					
Cympophthalmidae		1					
Leposoma parietale			1	1			
Neusticurus cochrani			1	2			
Neusticurus ecoleopus			1	1			
Prionodactylus argulus			1	1			
Iguanidae			1				
Anolis nitens scypheus		1					
Anolis punctatus (?)	1	-					
Anolis trachvderma	1						
Morunasaurus annularis			1				
Phenacosaurus heterodermus							1
Teiidae							
Ameiva ameiva	1						
Class Reptilia,	Order Squ	amata, Sul	border Op	hidia (Sna	kes)		
Colubridae							
Atractus elaps	1						
Chironius monticola						1	
Drymoluber dichrous		1					
Helicops angulatus	1						
Imantodes cenchoa			2				
TOTAL SPECIES PER SITE	20	10	11	9	2	2	3
KEY: 3(4) means 7 individuals cap	tured; 3 c	collected,	, and 4 re	leased; *	1tadpole	also colle	cted

Appendix V: Expedition Budget

Royal Geographical Society 1000 Albert Reckitt Charitable Trust 700 from AJ Burton Charitable Trust) 800 Albert Reckitt Charitable Trust 750 British Ortinlobogisst Union 400 Percy Staden Memorial Society 400 Percy Staden Memorial Society 200 Percy Staden Memorial Society 200 Percy Staden Memorial Society 200 Percy Staden Memorial Society 200 AS Butter Charitable Trust 200 Percy Fart for Endangered Species 200 AS Butter Charitable Trust 100 Expedition Budget 200 Expedition Budget 200 Expedition Budget 200 Expedition Budget 200 Expedition Budget 200 Percsonal Contributions (@f750 per UK member) 1500 Expedition Budget 200 Percexpedition Expenses 2 Admin / Fundraising 100 Internation Budget 200 Pre-Expedition Reconsistence Trip International Travel 809 Medical 700 Pre-Expedition Reconsistence Trip International Travel 809 Medical 700 Purchase of Maps 7 Photographic (includes development) 700 Purchase of Maps 7 Otor JL 200 Transport to and from Study Sites (Taxi) 155 Hotel Accommodation 225 Hiter of local guides 200 Expenses in Bogotá for 3 days 700 Purchase of Maps 70	Money received		£
Cambridge Expeditions Fund (including £700 from AJ Burton Charitable Trust) 800 Abert Reckit Charitable Trust 750 British Ornithologiss' Union 400 Porcy Sladen Memorial Society 400 PD Lindeth Charitable Trust 250 World Phesant Assocation 200 AS Burler Charitable Trust 100 Interest on Bank Account 20 Total Raised (inc. Duke of Edinburgh Royal Soc. of St. George Award -amount not to be disclosed) 4402 Personal Contributions (@C750 per UK member) 1500 Expedition Expenses <u>6</u> Admin / Fundriashing 215 Insurance (Equipment premium on personal policy) 26 Pre-Expedition Expenses <u>6</u> Admin / Fundriashing 215 Insurance (Equipment premium on personal policy) 26 Pre-Expedition Expenses <u>6</u> Expedition Expenses <u>6</u> Expedition Expenses <u>6</u> Febrographic (includes development) 200 TOTAL 200 TOTAL 200 Toral Control Strong Strong 200 Transport to and from Study Sties (Taxi) 155 Hotel Accommodation 225 Hiter of Local guides 130 Transport to and from Study Sties (Taxi) 155 Hotel Accommodation 255 Hotel Accommodation 255 Hiter of Local guides 130 Toral from Study Sties (Taxi) 155 Hotel Accommodation 155 Transport to Adrong Funder / gasoline etc 180 Food an offree Accommodation 155 Transport to Adrong Funder / gasoline etc 180 Food an offree Study Sties (Taxi) 155 Transport to Adrong Study Sties (Taxi) 155 Transport to Adrong Study Sties (Taxi) 155 Transport to Adrong Study Sties (Taxi) 155 Transport to / from Study Sties (Taxi) 155 Transport to / from Study Sties (Mule) 155 Transport to / from Study Sties (Mule) 155 Transport to / from Adrof (Bus) 175 Transport to / from Ad	Royal Geographical Society	10	000
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British Ornithologists' Union 400 Prory Sladen Memorial Society 400 PD Linderh Charitable Trust 250 World Phesan Assocation 200 People's Trust for Endagered Species 200 Personal Contributions (@t750 per UK member) 20 Personal Contributions (@t750 per UK member) 20 Personal Contributions (@t750 per UK member) 20 Perseptition Expenses 2 Expedition Expenses 2 Expedition Expenses 2 Expedition Reconaissance Trip 100 International Travel 20 Protect 200 Prote Expedition Protein 200 Prote	Albert Reckitt Charitable Trust		750
Percy Staken Memorial Society 400 400 400 400 400 400 400 400 400 40	British Ornithologists' Union	2	400
PD Lindeth Charitable Trust 250 World Phesan Assocation 200 People's Trust for Endangered Species 3200 AS Butler Charitable Trust 100 Interest on Bank Account 22 Total Raised (inc. Duke of Edinburgh Royal Soc. of St. George Award -amount not to be disclosed) 4400 Expedition Expenses 200 Expedition Expenses 200 Admin / Fundmaising 2115 Insurance (Equipment premium on personal policy) 26 Pre-Expedition Reconaissance Trip 100 International Travel 899 Medical 300 Fieldwork Equipment for 30 Prediction Expenses 2 2 Fieldwork Equipment premium on personal policy) 26 Pre-Expedition Reconaissance Trip 100 International Travel 899 Medical 300 Fieldwork Equipment 675 Photographic (includes development) 270 TOTAL 2185 Expedition Expenses 2 2 L CHURUMBELOS 2 Fuence 2 Fue	Percy Sladen Memorial Society	2	400
World Pheasant Assocution 200 AS Butler Charitable Trust 100 Interest on Bank Account 2 Total Raised (inc. Duke of Edinburgh Royal Soc. of St. George Award -amount not to be disclosed) 4402 Personal Contributions (@:750 per UK member) 5902 Expedition Dudget 5902 Pre-expedition Expenses € Admin / Fundmising 215 Insurance (Equipment premium on personal policy) 26 Pre-Expedition Econalisance Trip 100 International Travel 899 Medical 30 Fieldwork Equipment 675 Photographic (includes development) 240 TOTAL 2185 Expedition Expenses 400 Transport to and from Study Sites (Taxi) 155 Hord for Sudy Sites (Taxi) 155 Hord for Study Sites (Taxi) 155 Hord Infore Study Sites (Taxi) 155 Noral fieldwork equipment / gaoline etc 180 Food in field 180 Transport to and from Study Sites (Taxi) 160 Taxi to Medellín / Expenses in Medellín 160 Taxi to Caucasia - El Bagre / back 310 Expenses in Socian et Caucasia - El Bagre / back 110 Transport to / from Study Sites (Mule) <td>PD Lindeth Charitable Trust</td> <td></td> <td>250</td>	PD Lindeth Charitable Trust		250
People's Trust for Endangered Species 200 AS Butler Charitable Trust 100 Interest on Bank Account 2 Total Raised (inc. Duke of Edinburgh Royal Soc. of St. George Award -amount not to be disclosed) 4402 Personal Contributions (@£750 per UK member) 1500 Expedition Expenses € Admin / Fundraising 215 Insurance (Equipment premium on personal policy) 26 Per-Expedition Reconsisance Trip 100 International Travel 899 Medical 30 Fledwork Equipment 675 Photographic (includes development) 248 TOTAL 2185 Expedition Expenses € I CHURUMBELOS 210 Transport to and from Study Sites (Taxi) 155 Hire of local guides 130 Evandition of the Supenses in Medellín 160 Toxi Caucasia - El Bagre / back 130 Evanto Modellin / Expenses in Medellín 160 Toxi Caucasia - El Bagre / back 130 Ford an field 160 Toxi Caucasia - El Bagre / back 130 Evantos in Medellín / Expenses in Medellín 160 Tasi oto Medellín / Expenses in Medellín 160 Toxi Caucasia - El Bagre / back 130 <td>World Pheasant Assocation</td> <td>2</td> <td>200</td>	World Pheasant Assocation	2	200
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Photographic (includes development) 240 TOTAL 2185 Expedition Expenses in Bogotá for 3 days 70 Purchase of Maps 40 Transport to and from Pitalito (Bus) 70 Purchase of Maps 40 Transport to and from Pitalito (Bus) 2110 Transport to and from Pitalito (Bus) 255 Hite of local guides 130 Extra local fieldwork equipment / gasoline etc 180 Food in field 180 TOTAL SPENT IN CHURUMBELOS: £1220 (\$3.350.000 pesos @\$2.750/£) A NORI 71 Transport to Medellín / Expenses in Medellín 160 Expenses in El Bagre (2 days) 80 Food and other expenses in Puerto Lopez (6 days) 280 Food and other expenses in Puerto Lopez (6 days) 70 Transport to / from Anorí (Bus) 70 Transport to / from Anorí (Bus) 70 Transport to / from Study Sites (Mule) 85 Fitre of local guides 180 Extra local fieldwork equipment / gasoline etc 180 Food in field 180 TOTAL SPENT IN ANORI 1640 Extended 180 Extra local fieldwork equipment / gasoline etc 180 Food and other expenses in Puerto Lopez (6 days) 280 Fourto Lopez Accommodation 155 Transport to / from Anorí (Bus) 70 Transport to / from Anorí (Bus) 70 Transport to / from Anorí (Bus) 70 Transport to / from Study Sites (Mule) 85 Fitre of local guides 180 Extra local fieldwork equipment / gasoline etc 180 Food in field 180 TOTAL SPENT IN ANORI 1640 Expenses in Medellín / Bogotá 170 Report Production (estimated) 430 Copying and distributing slides 120 Colombian Airport Tax (x2) 57 TOTAL OST -EXPEDITION: £CT £DT Summary totals: £CT £DT Total Raised 4402 Fre-expedition 2185 Churumbelos 1500 Fre-expedition 515 Total SPENT IN ADORI 5	Fieldwork Equipment	(675
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