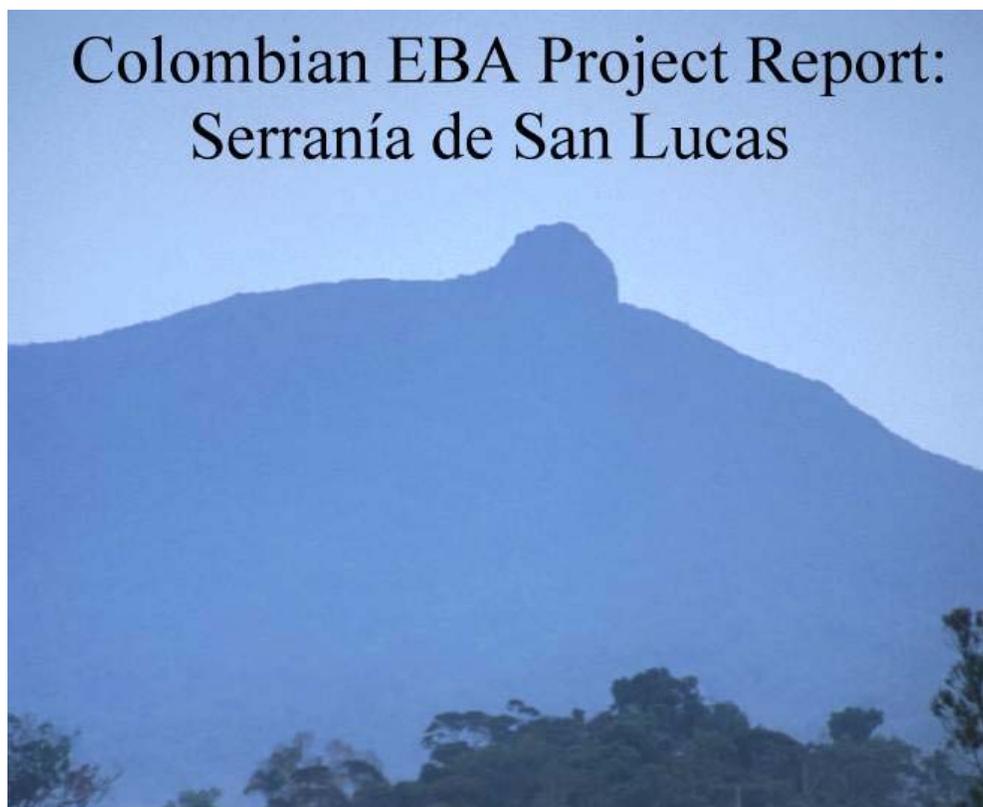


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# COLOMBIAN EBA PROJECT REPORT SERIES No. 3



## COLOMBIAN EBA PROJECT: PRESENTING THE FIRST BIOLOGICAL ASSESSMENT OF SERRANÍA DE SAN LUCAS



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Serranía de San Lucas is an isolated and biologically-unknown 110 km long mountain range, rising from sea level to c. 2,700 m in the departments of Antioquia and Bolivar, Colombia. Colombian EBA Project fieldworkers gained the first ever access to undertake biological surveys above 1,000 metres from March-April 2001. The results of our surveys, including the first biological and conservation assessment of the massif, are presented in this report.

## Summary

Serranía de San Lucas is an isolated and biologically-unknown 110 km long mountain range, rising from sea level to c. 2,700 m in the departments of Antioquia and Bolívar, Colombia. Colombian EBA Project gained the first ever access to undertake biological surveys above 1,000 metres from March-April 2001. Surveys were conducted between 1,000-1,400 m elevation and in the lowlands on the western and eastern slopes of the range.

A total of 374 bird species were recorded in Serranía de San Lucas using observation and mist-netting. Avifauna assemblages showed distinct differences between two lowland and two highland (subtropical) study sites. A total of 11 Threatened and near-threatened species were recorded and 100 species recorded represent major range or altitude extensions. The first ever botanical collections were taken from the Serranía and a high concentration of threatened mammals are reported, including a substantial range-extension for Spectacled Bear. The project results highlight the Serranía de San Lucas' global importance for biological diversity.

Serranía de San Lucas has been subject to a massive environmental and human catastrophe in recent years on an unimaginable scale - unlike anywhere else known to the fieldworkers in Latin America. This has been compounded by a combination of critical political and human factors: (1) unprotected natural resources undergoing uncontrolled exploitation; (2) the discovery of massive gold deposits in the 1990s; (3) one of the world's core coca production areas aggravated by intensive glyphosate fumigation efforts; and (4) political instability. This combination has resulted in uncontrolled ecological damage and almost complete outside neglect. Forest disturbance has marginally decreased with increased use of landmines, but has suffered greatly from fumigation.

There is a critical need for conservation action in Serranía de San Lucas. We propose a 5-point strategy:

- 1) Immediately stop fumigation,
- 2) Implement community environmental education and awareness programmes.
- 3) Protective measures I: conservation of the southern Serranía as a Bi-Departmental Natural Reserve,
- 4) Protective measures II: official conservation of La Teta.
- 5) Further rapid biological surveys are urgently necessary in the higher elevation cloud forests of La Teta.

We shall continue to achieve these goals in liaison with the local communities of Serranía de San Lucas.

## Sumario

La Serranía de San Lucas constituye un desconocido y biológicamente desconocido macizo de 110 km de largo que emergen desde el nivel del mar hasta los 2.700 m. en los departamentos de Antioquia y Bolívar, en Colombia. El proyecto EBA-Colombia logró por primera vez realizar monitoreos biológicos por encima de los 1.000 m. entre marzo y abril del 2001. Los estudios se realizaron entre los 1.000 y los 1.400 m. de elevación, así como en las planicies situadas al oriente y occidente de la serranía.

Mediante el uso de redes de niebla y observación con binóculos se obtuvo un registro de 374 especies de aves en la Serranía de San Lucas. Los ensambles de aves fueron distintos entre dos localidades de las zonas bajas y dos localidades de las zonas altas (subtropicales). Un total de 11 especies amenazadas y casi- amenazadas fueron encontradas y 100 registros representan extensiones de rango o de elevación mayores. Se obtuvieron las primeras colecciones botánicas en la historia de la serranía y se reportó una considerable concentración de mamíferos amenazados, incluyendo una importante extensión de rango para el oso de anteojos. Los resultados de la expedición resaltan la importancia global de la Serranía de San Lucas para la diversidad biológica.

La Serranía de San Lucas ha sido víctima de un importante impacto ambiental y humano en los últimos años, a escalas inimaginables – incomparable con cualquiera visto por trabajadores de campo en América Latina. Este se deriva de la combinación de factores políticos críticos, así como humanos: (1) recursos naturales desprotegidos bajo una descontrolada explotación; (2) el descubrimiento de importantes yacimientos de oro en la última década; (3) una de las mayores regiones cocaleras de Colombia, que adicionalmente sufre intensos esfuerzos de fumigación con glifosfato; y (4) problemas de orden público. La combinación de estos factores ha producido un descontrolado daño ecológico, el cual se ignora prácticamente en las afueras de la serranía. La deforestación ha disminuido substancialmente con el incremento en el uso de minas antipersonal, pero ha sufrido considerablemente las intensas fumigaciones.

Es críticamente necesario implementar acciones de conservación en la Serranía de San Lucas. Proponemos una estrategia de 5 puntos:

- 1) Detener inmediatamente las fumigaciones.
- 2) Desarrollar programas de concientización y educación ambientales en las comunidades.
- 3) Medida de protección I: conservación de la Serranía de San Lucas como una reserva bidepartamental.
- 4) Medida de protección II: Conservación oficial de la Teta de San Lucas.
- 5) Se requieren urgentemente futuros transectos de monitoreo en los más elevados bosques de nieblas de la Teta.

Necesitamos continuar y lograr estas metas en conjunto con las comunidades y organizaciones de la Serranía de San Lucas.

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### Individual support

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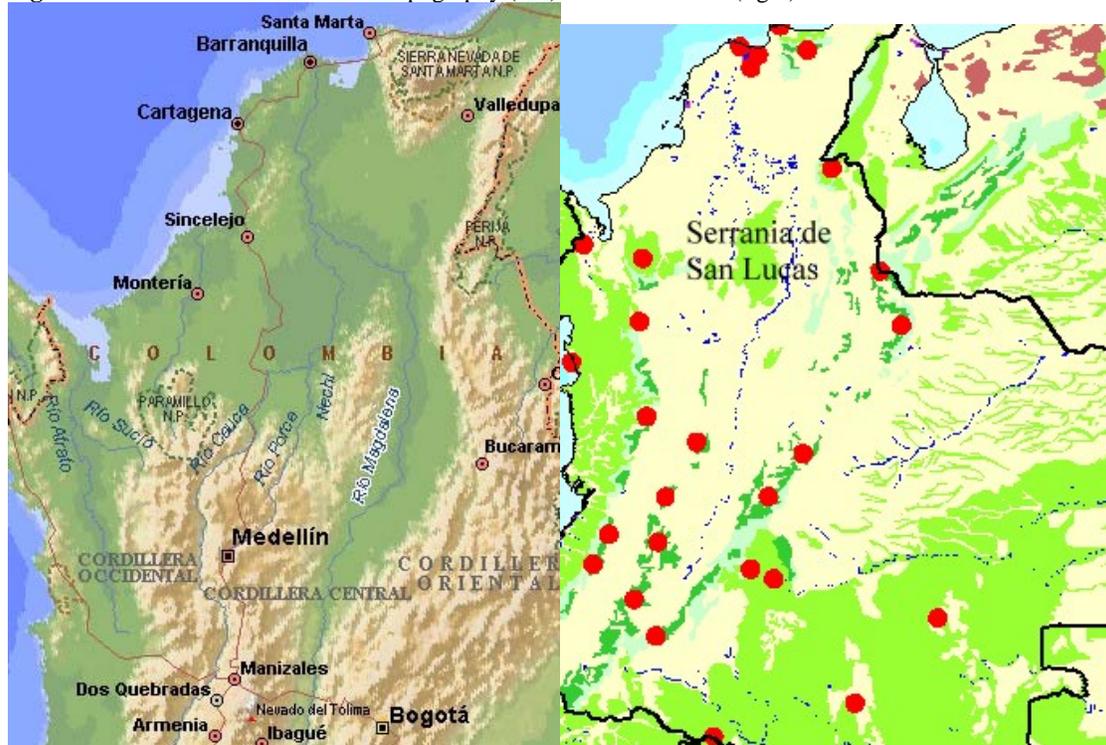


## Background

Serranía de San Lucas is an isolated and biologically-unknown mountain range, rising from sea level to *ca.*2,500 metres, in the departments of Antioquia and Bolívar, Northern Colombia (**Figure 1**). The massif is principally of metamorphic and igneous origins. It runs parallel to the Río Magdalena on its eastern slope, with Río Nechí and Río Cauca to the west. These mighty rivers isolate the mountain range from two of the main branches of the Andes - the Eastern and Central Cordilleras.

The origins of the massif are still unsure. Often ignored on maps altogether or passed-off as just a side arm of one of Colombia's three main Andean ranges, the Central Cordillera, San Lucas is clearly disjunct with unique topographical and geological properties. Some geologists hypothesize that it forms a link between the Sierra Nevada de Santa Marta and the Central Cordillera (Hilty and Brown 1986). For example, the massif exhibits a large-scale linear drainage pattern, with virtually all rivers flowing from southwest to northeast. This drainage is characteristic of heavily faulted bedrock, probably of metamorphic origin.

**Figure 1:** Central-northern Colombia topography (left) and forest-cover (right).



### The Nechí and San Lucas refugia

Haffer (1969) recognized the Nechí refugia from the Sinú and San Jorge rivers (Department of Córdoba) of the lower Río Cauca to the Río Nechí (Department of Antioquia). However, it is clear this area can be subdivided into two distinct refugia, separated by the Río Cauca – to the east the Nechí-San Lucas and to the west the Sinú-San Jorge. This classification is justified in many respects, for example the distribution of two primates of the genera *Saguinus*, whereby *Saguinus leucopus* [Cotton-top Tamarin] originates from the Sinú-San Jorge refuge, whilst *Saguinus oedipus* [White-footed Tamarin] is endemic to the Nechí-San Lucas, and separated by the Río Cauca. The deep arid valley of the Río Cauca has been a significant geographical barrier to many faunistic elements. The Nechí-San Lucas refugia is extremely poorly known. However, its boundaries are suspected to encompass the lower Río Cauca, the Río Nechí valley and Serranía de San Lucas.

*“One of the most interesting and virtually unexplored highland zones of Colombia is Serranía de San Lucas, with the majority of the serranía still covered by humid cloud forest. The southern part borders on Departments of Bolívar and Antioquia, to elevations of 2,500 m. We are dealing with one mountain that is extremely complicated and rugged. This zone is of enormous interest as its biota is unknown and will have many surprises. Furthermore, the south of Alto de Tamá, the highest area of the Serranía is only 800 m lower than the Western Cordillera. It is possible to gauge that the zone*

*supports a high level of biological endemism, probably with its closest affinities to the Andean Cordilleras, but there is no knowledge to suggest its biological roots. There have been several collections at low altitudes on Serranía de San Lucas. Carriker rose to the Hacienda del Volador, via San Pablo, at 1,300 m where a few birds were collected. Hershkovitz collected mammals in the Río San Pedro, to 900 m altitude. However, there has been no zoological or botanical collections at higher elevations on the Serranía.*” (Translated from Hernández-Camacho *et al.* 1997).

Suspected/ proven endemics in the Nechí – San Lucas refugia (Red Data Book species in bold)

#### Mammals

*Sciurus granatensis valdiviae*  
*Sciurus granatensis norosiensis*  
*Saguinus oedipus*

#### Birds

*Crax alberti*  
*Aratinga pertinax griseipectus*  
*Columba subvinacea ruberrima*  
*Amazilia castaneiventris*  
*Trogon comptus*  
*Brachygalba salmoni*  
*Electron platyrhynchum colombianum*  
*Capito hypoleucus*  
*Picumnus olivaceus malleolus*  
*Melanerpes chrysauchen pulcher*  
*Xiphocolaptes promeropirhynchus rostratus*  
*Gymnopithys bicolor ruficeps*

*Myrmeciza laemosticta palliata*  
*Myrmeciza laemosticta bolivari*  
*Clytoctantes alixi*  
*Microbates cinereiventris magdalenae.*  
*Microbates cinereiventris albapiculus*  
*Monasa morphoeus sclateri*  
*Pipra pipra bolivari*  
*Cyphorhinus thoracicus propinguus*  
*Phylloscartes lanyoni*  
*Aphanotriccus audax*  
*Myiobius barbatus semiflavus*  
*Dacnis egregia*  
*Chrysothlypis salmoni*  
*Habia gutturalis*  
*Hemithraupis flavicollis albigularis*  
*Gymnostinops guatimozinus*

#### Previous biological surveys

To date, conservation efforts in the region have been non-existent because, until now, the entire mountain range was biologically unknown. Melbourne A. Carriker, Jr. briefly surveyed the tropical foothill elevations for birds in 1947 (for a total of 26 days: Simití, 85 m; 28-31 Mar./6 days in Apr. and Santa Rosa area, 300-900 m [thought to be mainly below 800 m], 14 days in Apr./3 days in May) (Paynter 1997). No ornithological surveys have been conducted above 900 m to 2,350 m, thus only the tropical life zone is tentatively known. Only a small number of specimens were taken in the 1947 expedition, but even in this survey, four endangered species of birds were found - *Crax alberti*, *Amazilia castaneiventris*, *Capito hypoleucus* and *Clytoctantes alixi*. However, the mountains' most endangered highland elevations had never been surveyed.



#### Documented Conservation Priority

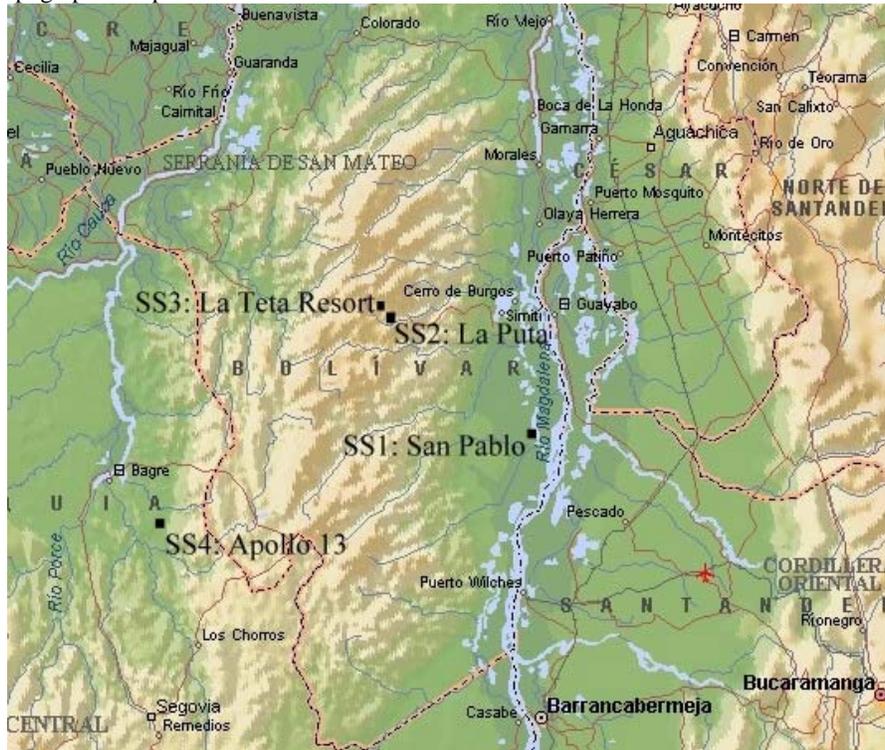
Sadly, the Serranía has been largely overlooked in conservation assessments. However, there have been many assessments within the wider region, which clearly demonstrate its importance. The San Lucas massif forms a large portion of the Nechí Endemic Bird Area: identified by *BirdLife International* as requiring “Critical Priority”, based on high biological importance and critical current threat levels (Stattersfield *et al.* 1997). *Key Areas for Threatened Birds in the Neotropics* (Wege and Long 1995) mentions Serranía de San Lucas (site CO 07), with 4 Threatened species (see below for further information), and highlights the need for surveys of remnant forest patches to check for the presence of these and other threatened (and endemic) birds.

A regional analysis of geographical priorities for biodiversity in Latin America by the Biodiversity Support Programme (1995) with WWF, CI, TNC, WCS, and WRI, highlighted Tropical Andes moist forest of Northern Andes (covering Serranía de San Lucas) as part of the most endangered ecosystems in the Americas. They assign it “Critical Ecoregion Conservation status” based on threat analysis and outstanding regional biodiversity. Four recent general maps of Colombia indicating different conditions highlighted the Serranía de San Lucas as a zone of “high endemism, very unknown, high diversity, and high conservation priority” (IVH 1997).

### Threats

In Colombia, Andean forests have been considerably reduced in the last 50 years (Hamilton 1997). 96% of the Colombian population lives in what used to be Andean forest (Box 1997). About 15% of premontane and montane forests of Colombia remained intact (Orejuela 1985, Cavalier and Etter 1995), and further undocumented drastic reductions are evident in recent decades. However, whilst most of the Andean forests have undergone irreversible changes, the San Lucas massif had, until recently, largely avoided the catastrophic human impact that other regions have suffered.

**Figure 2:** Topographic map of Serranía de San Lucas.



Only when carefully examining detailed topographic maps (Figure 1) and forest cover maps of Colombia (Figure 2) does the Serranía de San Lucas stand out as an isolated massif with the largest fragment of pristine humid lowland and premontane forest remaining in north-western South America. Forest cover maps of Colombia (IGAC 1995) revealed c. 500,000 ha of pristine and intact forests over San Lucas: one of the largest fragments of pristine humid lowland to montane forests remaining in the Andes (see **Figure 1**). However, deforestation is accelerating rapidly in the region. From our surveys, we considered that as much as 30% of the forest intact in 1995 to have gone. It is under increasing threat from a wide range of sources:

- Human population pressures in northern Colombia have forced the conversion of the Serranía de San Lucas' more marginal and previously less accessible areas for both subsistence and illicit crops.
- Many areas are under direct pressure from mining activities and development projects.
- Deforestation for timber and hunting has drastically increased.

The moist tropical forests of Northern Colombia have been subjected to extensive deforestation with almost complete forest clearance in the floodplains and foothills of the middle Magdalena and Cauca valleys since the 1950s (Collar *et al.* 1992). The endemic species concentrated in the Nechí EBA and Northern Colombia have already undergone extreme range contractions owing to extensive deforestation. Those species, such as Blue-knobbed Curassow *Crax alberti*, dependent on the Serranía de San Lucas, face severe danger of global extinction as remaining forests are fragmented and ranges contracted by deforestation and mining concessions.

Critically, the paucity of biological information has resulted in a complete lack of conservation attention, despite rapidly mounting threats. Once biological information exists, the conservation value of an area is drawn to the attention of national and international conservation organisations that can implement recommended protective measures. Colombian EBA Project's major goal was to assure that conservation strategies and actions could be anchored on sound biological information, and be implemented in the zone before it is too late.

## Itinerary

**Table 1:** Fieldwork in 2000

18 July	Team (Andres Cuervo, Thomas Donegan, José Manuel Ochoa and Paul Salaman) meet in Medellín, Antioquia, Colombia to organise expedition.
21 July	Due to security problems in the proposed study area of Alto Tamar, we decide to delay project a further week to see whether the situation improves. An aerial survey of Alto Tamar is conducted by TD, PS & JMO to investigate access and forest cover in the study zone. Pending permission to visit Alto Tamar, a week long field study is conducted at Tambito Nature Reserve, Cauca (2100-2600 m). JMO finalises permission/monitors the situation.
23-26 July	Bird inventories undertaken in Tambito Nature Reserve, Cauca (see <b>Appendix 2</b> ).
27 – 30 July	Expedition appears unfeasible due to security problems in the Yondó region (access to the study region). Expedition postponed. A week's fieldwork conducted in Serranía de los Churumbelos. Permits faxed from CRC for this fieldwork.
2-9 Aug	Fieldwork at Puerto Bello, Cauca, 350 m elevation includes 30 new species recorded for the Churumbelos massif (see <b>Appendix 3</b> ).
10 Aug	Team returns to Mocoa. Situation in lowlands surrounding Alto Tamar still is not stabilised. Expedition suspended until situation improves.

**Table 2:** Fieldwork in 2001

28 Feb	TD and Javier Bustos arrive in Bogotá from UK.
1-3 Mar	TD, JB try to obtain contacts in San Pablo and arrange equipment for reconnaissance trip.
4 March	TD, JB take night bus (8hrs) from Bogotá to Bucaramanga (Dpto Santander).
5 March	TD, JB take bus (4hrs) to Puerto Wilches and meet with Mayoral staff. Situation in San Pablo is calm, so take public speedboat upriver to San Pablo (1hr). Speak to UMATAM and Mayor of San Pablo, and obtain permission of military and police to conduct fieldwork in the region. <b>SS1a San Pablo, Río Magdalena and surrounding secondary growth (100 m)</b>
6 March	TD, JB hire jeep to investigate potential study sites in Bajo Taracue and Cañabral. Make contact with person who can introduce us to communities higher in Serranía, but very little good forest found in lowland zone. Produce c. 30 copies of various letters of support from universities and UMATAM with a summary of the project, and send them via Mayor's office to community leaders in the Serranía. <b>SS1b Bajo Taracue (100 m) and SS1c Cañabral (100 m).</b>
7-8 March	As probability of conducting fieldwork looks good, TD and JB return to Bogotá (via Barrancabermeja and Puerto Boyacá) for all expedition equipment. Purchase final items of equipment in Bogotá. TD and JB take night bus to Bucaramanga again with equipment.
9 March	Take bus to Puerto Wilches and speedboat to San Pablo. Further observations at <b>SS1a</b> .
10 March	Hire jeep to Canaletal and obtain permission of local communities for fieldwork in this zone. Spend day mist-netting and making observations of marshland habitat and lowland secondary growth. <b>SS1d Ciénaga Canaletal (100 m) and SS1e Ciénaga Simiticito (100 m)</b>
11 March	TD and JB go on reconnaissance trip to Vallecito below Alto Tamar, our proposed study area, with locals who introduced us to community leaders. Meet with community leaders and local people who appeared in favour of the project. Then spend several hours mist-netting and observations in Cañabral ( <b>SS1c</b> ).
12 March	Further observations at <b>SS1a</b> and <b>SS1d</b> in morning. AC, PS, Carlos Gonzalez take bus from Medellín to Barrancabermeja (7hrs). TD and JB meet with AC, PS and CG in Barrancabermeja and return by public speedboat to San Pablo (2hrs).
13 March	Full team goes with equipment by jeep to Vallecito (2hrs). Government initiated coca-fumigation in progress (though mostly platano & yuca affected) leading to security problems. Advised by community leaders that the situation has changed and that Alto Tamar is not an advisable location presently. Advised that further north may be feasible (above Santa Rosa).
14 March	Hire jeep to Santa Rosa (3hrs). Meet with UMATAM and Mayor. Obtain letter of support from UMATAM. The local situation is calm and high probability of conducting the project.
15 March	Take public jeep (3hrs) to La Punta (1200 m) with 3 community leaders. Advised not to enter mountains which are land mined, but to work along the road in secondary forest.
15-17 Mar	<b>SS2a:</b> fieldwork at <b>La Punta (1,000 – 1,400 m)</b> with 2 mist-nets deployed.
17-20 Mar	<b>SS2b:</b> fieldwork at <b>El Retén (1,400 m)</b> above La Punta with 10 mist-nets deployed.
21 Mar	<b>SS3:</b> fieldwork commences at <b>La Teta Resort (1,200 m)</b> with 10 mist-nets deployed.
3 April	Team leaves field to Santa Rosa. TD flies to Bucaramanga then by bus to Bogotá with collection. JB, AC, CG, PS via road and river to Medellín.

## Study Site Descriptions

The study sites are summarized in **Table 3**.

**SS1: San Pablo** (5-6, 9-12 March 2001), Municipality of San Pablo, Dpto. Bolivar ( $7^{\circ}59'00''$  N  $74^{\circ}13'33''$ W; 80 - 100 m). Aquatic habitats, open country and secondary growth were surveyed by TD and JB, largely by observations and with a small number of mist-nets, within several kilometres of the town in the following areas:

**SS1a** Río Magdalena and San Pablo: observations from boats between San Pablo and Barrancabermeja (5, 7, 9 & 12 March), and in secondary growth from San Pablo north to Ciénaga Canaletal (6, 9 and 12 March).

**SS1b** Bajo Taracue: old secondary growth (6 March).

**SS1c** Cañabral: poor secondary growth near San Pablo (6 & 11 March).

**SS1d** Ciénaga Canaletal: a large lake (*ca.*1.5 km wide) *ca.*2 km north of San Pablo, bordered on the south by secondary growth and farmland, and to the north by woodland dominated by bamboo and old secondary forest (10 & 12 March).

**SS1e** Ciénaga Simiticito: a small lake (*ca.*500 m wide) with adjacent secondary growth to the west of the village of Canaletal (10 March).

**Table 3:** Summary of location and field effort at each study site in Serranía de San Lucas, 1999-2001.

Location	Field day	Man-days	Co-ordinates	Altitude	Forest type
<b>SS1: San Pablo</b>	3	6	$7^{\circ}59'00''$ N $74^{\circ}13'33''$ W	50-250 m	aquatic habitats and 2 <sup>nd</sup> growth
<b>SS2: La Punta</b>	5	25	$8^{\circ}14'85''$ N $74^{\circ}22'07''$ W	1,000-1,400 m	2 <sup>nd</sup> growth and remnant forest patches
<b>SS3: La Teta Resort</b>	7	35	$8^{\circ}14'86''$ N $74^{\circ}22'11''$ W	1,300 m	2 <sup>nd</sup> growth forest
<b>SS4: Apollo 13</b>	5	25	$7^{\circ}21'14''$ N; $74^{\circ}40'95''$ W	300 m	lowland humid forest

**SS2: La Punta** (15-20 March 2001), located on the southeast slope of the Río San Pedro Frío valley, Municipality of Santa Rosa del Sur, Dpto. Bolivar ( $8^{\circ}14'85''$ N  $74^{\circ}22'07''$ W; 1000 - 1400 m). The valley slope is transected by a road (from Santa Rosa) descending 3 km from La Retén at 1,400 m to the small hamlet of La Punta (*ca.*10 houses at 1,300 m), from where a mule trail descends 2 km to the Quebrada La Romera and Río San Pedro Frío river. The path crosses the river (1,000 m), then ascends the lower slopes of La Teta mountain to the village of San Pedro Frío. The step valley slope has extensive patches of secondary growth and some heavily disturbed remnant forest patches. However, the slope is characterised by extensive areas of charred open country resulting from recent uncontrolled brush and forest burns (one almost engulfing the town). Owing to land-mined forest patches, observations were restricted to the road and mule trail both below (15-17 March) and above (17-20 March) La Punta. Mist-nets were deployed briefly across a small stream (Quebrada La Romera) to capture roosting swifts (17 March) and parallel to the road above La Punta (17 - 20 March), where remnant patches of disturbed primary forest (connected to forests covering La Teta Mountain) extend across the road.



**SS3: La Teta Resort** (22 March – 3 April 2001), located on the northwest slope of the Río San Pedro Frío valley, Municipality of Santa Rosa, Dpto. Bolivar ( $8^{\circ}14'86''$ N  $74^{\circ}22'11''$ W; 1,300 m). The mule trail from La Punta to San Pedro Frío ascends the slopes of La Teta peak (*ca.*2,500 m); the largest mountain in the Serranía de San Lucas, and passes by a small (*ca.*20 ha) fragment of primary forest and secondary growth in a stream valley, bordered by pasture and overgrown scrub. Observations and mist-netting were conducted predominantly along the forest borders and disused mule trails and on a ridge-top bordering the forest (10 nets).

**SS4: Apollo 13** (3-8 August 1999), Finca La Esperanza, Vereda Malena-Río Bagre, Municipality of Segovia, Dpto. Antioquia ( $7^{\circ}21'14''$  N;  $74^{\circ}40'95''$  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, ridge and steep slopes generally still contain remnants of primary forest, although this is selectively logged and intensively 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 *ca.*35 m with emergents to *c.* 40 m, high subcanopy and understorey to *ca.*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.

## Biodiversity studies

### Birds ~ Aves

#### Summary

A total of 374 bird species were recorded in **Serranía de San Lucas** using observation, tape recordings of vocalizations and mist-netting. Avifauna assemblages showed close affinities between SS1 and SS4 (lowland sites) vs. SS2-SS3 (subtropical sites). 278 species were recorded in the lowland sites, with 199 species in the subtropical sites. One hundred species recorded represent major range/altitude extensions. A total of 11 Threatened and Near-Threatened species were recorded. Future studies of the massif are urgently required at high elevations (1,500-2,600 m).

#### Introduction

Surveying and documenting the poorly-known avifauna of the tropics can play an important role in assisting biological conservation. 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 abundance due to changing environmental conditions. Without such information conservation efforts may be significantly undermined. Previous surveys by EBA Project members have led to the establishment of several protected areas. Our surveys in Serranía de San Lucas had similar ends in sight.

Colombia is of great ornithological importance as it supports the world's greatest diversity of birds, with 1,865 species, representing 20% of the World's species in less than 0.8% of the world's land surface (Salaman *et al.* 2001). A large proportion of Colombia's species are concentrated on the Central Andes. Research on the distribution and abundance of birds in this focal point of diversity is vital, as the deforestation which has so drastically altered habitats in other parts of the Colombian Andes is also impacting in what was until now a totally unknown region. The need for habitat protection is clearly a global and local priority as human pressures mount, thus rapid biological assessments are needed to identify sites for conservation. These must be based on the few relatively well-known groups of organisms, such as birds. Birds are excellent preliminary indicators for biological conservation, because avian taxonomy and geographical distribution has already been well documented, compared to other groups in the region. For these reasons intensive bird inventories were undertaken at each study site.

#### Methods

To determine the composition of bird communities at each study site, a two-fold effort was employed by the three ornithologists (AC, TD and PS):

1. Intensive diurnal non-systematic field observations, supplemented with tape recording and playback of skulking and nocturnal birds. 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. Ecological notes were taken where possible.
2. Diurnal mist-netting; *ca.*150 metres along transects at SS2-3, 436 m at SS4, and only single nets at SS1 for which results are based largely on observations only.



These methods complement one other well to produce a good first-cut assessment at each site. Additional information from local hunters was collected. Where two local people independently and reliably identified a species as present, this was added to the site's inventory (see **Appendix 1**). Our primary aim in the field was to produce comprehensive species inventories for each site in a short period of time, and to assess the current status and ecological requirements of poorly known, rare and threatened species.

## Results

A total of 374 bird species were recorded in Serranía de San Lucas, between 100 and 1,400 m elevation. A total of 916 mist-net captures (435 in 1999; 481 in 2000) provide much new biometric data on birds from the region, as well as a source of photographs for confirmation and evidence of important new records. The complete 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 1**. A total of four Threatened and seven Near-Threatened species were recorded, with five Nechí Endemic Bird Area endemics, and a new species of a monotypic family – Sharpbill *Oxyruncus cristatus* (Family Oxyruncidae) – for Colombia (**right**).

Various species were tape-recorded at SS4, with tapes deposited with Wildlife Sounds, National Sound Archives (British Library). A total of 50 birds were collected and deposited at ICN, Universidad Nacional, Bogotá. For many species, a great deal of information on ecology, range distribution, biometrics and plumage variations was collected, and will be presented in forthcoming scientific publications.

**Table 4:** Summary of ornithological fieldwork effort and results, Serranía de San Lucas, 1999-2001.

Location	Person -days'	Total sp. (reported)	RDB sp. <sup>1</sup>	SS1 <sup>3</sup>	SS2 <sup>3</sup>	SS3 <sup>3</sup>	SS4 <sup>3</sup>	Mist- net hrs	MNH <sup>2</sup>	Total caps.	Sp. Caps.
SS1: San Pablo	12	163 (6)	2 T	<b>56</b>	55	54	89	7	252	16	5
SS2: La Punta	18	161 (1)	3 NT; 2 T	55	<b>22</b>	121	69	38	12,600	136	48
SS3: La Teta Resort	30	160 (1)	1 T; 2 T	54	121	<b>20</b>	39	84	54,036	329	73
SS4: Apollo 13	44	203 (0)	3 T; 4 NT	89	69	39	<b>74</b>	62	27,036	435	45
<b>Totals</b>	<b>107</b>	<b>374</b>	<b>4 T; 7 NT</b>					<b>191</b>	<b>93,924</b>	<b>916</b>	<b>173</b>

<sup>1</sup> RDB= Red Data Book sp. (Collar *et al.* 1992); T= Threatened; N= Near-threatened.

<sup>2</sup> MNH = Mist-Net Hours per meterage (1 metre of net per hour = 1).

<sup>3</sup> Uniqueness (in bold) and overlap between sites is represented in the number of species

The most diverse bird groups were Tyrannidae (Tyrant-Flycatchers) with 48 species (137 captures or 15% of total), followed by Thraupinae (Tanagers) with 24 species (67 captures or 7%); Trochilidae (Hummingbirds) with 20 species (166 captures or 18%); Thamnophilidae (Antbirds) with 19 species (52 captures or 6%); the Finch subfamilies (Emberizinae and Carduellinae together) with 18 species (170 captures or 19%); Warblers (Parulinae) with 17 species (39 captures or 4%); and Accipitridae (Hawks and Eagles) with 16 species (1 capture). Although not so diverse, Pipridae (Manakins) were abundant, especially at SS4, with six species comprising 132 captures (14%).



Thirty-two species (8.5%) were recorded at all sites, whilst 172 (46%) of species were unique to just one site, illustrating stark differences between sites. Sites' species richness totals across the elevational gradient show no coherent pattern as species totals vary with inconsistent fieldwork effort and varying habitat types more than with elevational changes in forest structure. 104 species were recorded in lowland and highland life-zones (37% of lowland species; 52% of subtropical species). Two clear bird distribution patterns emerge:

### (i) Lowland sites: SS1 & SS4

SS1 and SS4, both below 300 m, produced a combined total of 277 species, of which 62.5% (174 spp.) are unique to the lowlands. There is a high degree of uniqueness for each site (SS1 – 34% / SS4 – 36%), although the each site differed greatly in the composition of species, with SS1 dominated by aquatic and non-forest species versus primarily forest-dependant species at SS4. Furthermore, SS1 was influenced by the presence of Nearctic migrants, which were absent from SS4 (studied in the Nearctic summer).

### (ii) Subtropical sites: SS2 & SS3

SS2 and SS3, both above 1,000 m, produced a combined total of 200 species, of which 48% (96 spp.) are unique to the highlands. They showed a much greater overlap than the lowland sites, with high similarity (75%) and low levels of uniqueness (both 12%). This is largely expected considering that (i) they encompassed similar roadside secondary habitats, and (ii) were geographically and elevationally closely associated (just *ca.* 3 km apart).

### Study site avifauna summaries

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

#### SS1: San Pablo - 50-250 m

Lying beside the main transportation route of the Río Magdalena, the San Pablo area is densely populated with small secondary growth forest patches and largely intensive agriculture (including African Oil Palm). Non-forest species dominated the avifauna, including 22 species of open-country Tyrannidae (13 of which were observed in San Pablo's central Plaza!). A number of aquatic habitats beside the Río Magdalena were surveyed, including several large Ciénaga's. The San Pablo region has not been exposed to pollutants to the same extent as the Cauca and Nechí on the west slope of the Serranía, which were in poor condition due to intensive mineral extraction activities taking place directly in water courses. Ardeidae, Anhingidae, Anatidae, Aramididae, Laridae and Rynchopidae were all abundant. Particularly abundant in this area was the Threatened Northern Screamer *Chauna chavaria* with over 30 individuals observed. Many local people reliably identified Blue-knobbed Curassow *Crax alberti* as present in the region historically, but very rare now as forest in the region was much reduced. Several range extensions were recorded including Black-Hawks *Buteogallus anthracinus* and *B. urubitinga*, Grey-rumped Swift *Chaetura cinereiventris* and Hooded Tanager *Nemosia pileata*.

#### SS2: La Punta 1,000-1,400 m

A total of 160 species observed here includes numerous range extensions and three near-threatened species. Tyrannidae was the most abundant family (24 spp.) with Parulinae and Thraupinae subfamilies (13 spp. each) also diverse.



Despite the subtropical elevation of the site, the avifauna was predominately characteristic of the lowlands and upper tropical zone. Few subtropical and no montane species were present, suggesting that forest edge and open country species of the lowlands had expanded their elevational range following forest

disturbances of subtropical habitats. However, a large number of significant range extensions were largely of Andean species previously known from the main Central Cordillera but unknown from the San Lucas massif.

Significant range extensions include: Lesser Swallow-tailed Swift *Panyptila cayennensis*, Rufous-crested Coquette *Lophornis delattrei*, Green Thorntail *Popelairia conversii*, Blue-tailed Emerald *Chlorostilbon mellisugus*, and Black-headed Brush-Finch *Buarremon atricapillus*, whilst Spotted Nightingale-Thrush *Catharus dryas* and Tropical Pewee *Contopus cinereus* both represent the second records for the Central Andes. Several captured Three-striped Warblers *Basileuterus tristriatus* with bright yellow underparts may relate to an undescribed subspecies.

A White-collared Swift *Streptoprocne zonaris* roost (nesting colony?) was discovered under an enormous boulder in a stream, where two individuals were captured in a mist-net placed near the entrance. Two Near-Threatened species were common here: Sooty Ant-Tanager *Habia gutturalis* (many observations and 4 captures) and surprisingly, the Wattled Guan *Aburria aburri* (many observations), whilst the Near-Threatened Saffron-headed Parrot *Pionopsitta pyralia* was observed once. The Threatened Parker's Antbird *Cercomacera parkeri* was heard calling on two occasions and Blue-knobbed Curassow *Crax alberti* is reported by farmers as calling in January/February in the forested valleys.

#### SS3: La Teta Resort, 1300 m

A total of 160 species were recorded across the ten days fieldwork is composed of both forest dependant and open country species. Mist-net captures were dominated by granivores (Emberizinae and Fringillidae), composing 39.5% of captures, with the Near-Threatened Large-billed Seedfinch *Oryzoborus crassirostris* notably abundant in degraded habitats, casting doubt on its status. Also captured (twice) and observed several times was the Vulnerable White-mantled Barbet *Capito hypoleucus* (photo below). Many range extensions were recorded at this site, most significantly Black-and-White Hawk-Eagle *Spizastur melanoleucus*, Ashy-tailed Swift *Chaetura andrei* and Pale-vented Thrush *Turdus obsoletus*. The most notable species recorded here was as Sharpbill *Oxyruncus cristatus*: the first for Colombia and a range extension of ca. 450 km from the Darien of

Panama.

**SS4: Apollo 13, 300 m**

This was the more pristine of the lowland sites, but was nonetheless situated in a disturbed forest fragment. Together with degraded forest habitats in adjacent areas and towns (Puerto López) a total of 203 species were recorded. Within the forest fragment of Apollo 13, a total of 149 mainly forest dependant species were recorded. The highest diversity was found in Tyrannidae (18 species), Trochilidae (12 species) and Thamnophilidae (11 species). The Near-Threatened Saffron-headed Parrot *Pionopsitta pyrilia* was observed daily in flocks of approximately 10 individuals at this site. A Plumbeous Hawk *Leucopternis plumbea* was captured presenting an important easterly range extension of ca.150 km for this Near-Threatened species. The Threatened Blue-knobbed Curassow *Crax alberti* was reliably observed by one of our guides during fieldwork, but not observed by project fieldworkers. Its population appears to be relatively intact in the region, although subject to great threats by deforestation and hunting (see accounts below). Sooty Ant-Tanager *Habia gutturalis* and White-mantled Barbet *Capito hypoleucus* were other important Threatened species also present at this site. A total of 109 species were recorded in secondary growth and aquatic habitats included 69 non-passerines. Northern Screamers *Chauna chavaria* and two Blue-knobbed Curassows *Crax alberti* were observed in captivity near El Bagre. The Near-Threatened Fasciated Tiger-Heron *Tigrisoma fasciatum* was also recorded at this site.

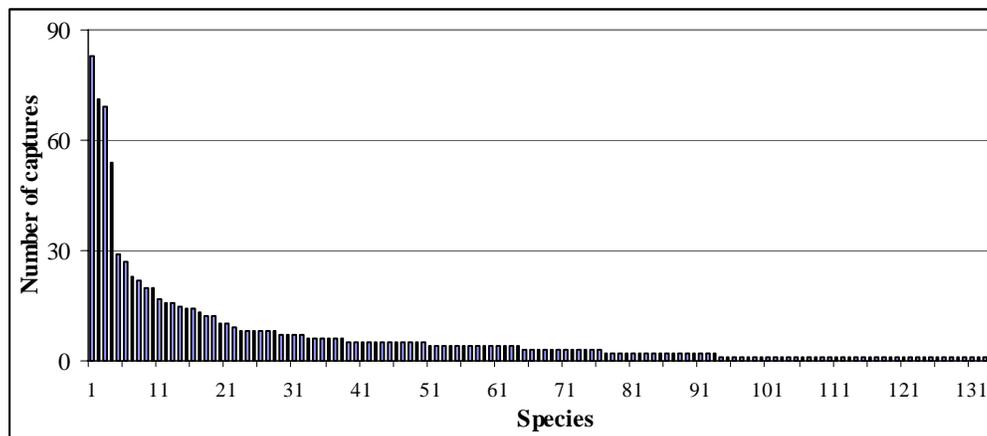
**Mist-netting report**

A total of 916 mist-net captures (435 in 1999; 481 in 2001) of 135 species were caught at all four sites. Extensive biometric data was collected, and complimented by a detailed set of photographs for each species. The rank-ordered relative abundance curve for the 135 species is presented in **Figure 3**, and illustrates the rapid decline in captures with a long tail of “rare” species (63% of species represented by <5 captures), typical of tropical mist-net studies.

**Table 5:** The most abundant species mist-netted in Serranía de San Lucas (all those with 10 or more captures).

Species	# of captures	Species	# of captures
Golden-headed Manakin <i>Pipra erythrocephala</i>	83	Crimson-backed Tanager <i>Ramphocelus dimidiatus</i>	20
Ochre-bellied Flycatcher <i>Mionectes oleagineus</i>	71	Green-crowned Woodnymph <i>Thalurania fannyi</i>	17
Yellow-bellied Seedeater <i>Sporophila nigricollis</i>	69	Dull-coloured Grassquit <i>Tiaris obscura</i>	16
Long-tailed Hermit <i>Phaethornis longirostris</i>	54	Little Hermit <i>Phaethornis longuemareus</i>	16
Blue-crowned Manakin <i>Pipra coronata</i>	29	Swainson’s Thrush <i>Catharus ustulatus</i>	15
Blue-black Grassquit <i>Volatinia jacarina</i>	27	Streaked Saltator <i>Saltator striatipectus</i>	14
Wedge-billed Woodcreeper <i>Glyphorhynchus spirurus</i>	23	Ruddy-tailed Flycatcher <i>Terenotriccus erythrurus</i>	14
Large-billed Seedfinch <i>Oryzoborus crassirostris</i>	22	Green Hermit <i>Phaethornis guy</i>	13
Band-tailed Barbthroat <i>Threnetes ruckeri</i>	20	Checker-throated Antwren <i>Mymotherula fulviventris</i>	12
		Bicoloured Antbird <i>Gymnopithys bicolor</i>	12

**Figure 3:** Rank order of relative abundance for each species for all study sites.



Nineteen species represented by >10 captures (**Table 5**) account for 59.7% of the entire sample size; a proportion similar to previous tropical mist-net studies (Karr 1990). Some 125 species (92.6% of sample) meet Karr’s (1971) definition of rarity (<2% of sample). This apparently high level lies within typical levels of Neotropical studies of 78-88% of species (e.g. Karr *et al.* 1990). There are four extremely abundant species by mist-nets; two frugivores, a granivore, and a nectarivore. The sample composition is skewed towards both forest-dependant species from SS4 (e.g. *Pipra erythrocephala*) and open-country species from SS1-3 (e.g. *Sporophila nigricollis*).

### Threatened species recorded in Serranía de San Lucas

Detailed accounts are provided of Threatened and Near-Threatened species (i.e. in danger of global extinction), classified by BirdLife International. The protection of Threatened species also helps protect the forests in which they live, its biological communities and other non-threatened species. A total of 11 endangered species (4 Vulnerable and 7 Near-Threatened species) were recorded in Serranía de San Lucas.

#### Northern Screamer *Chauna chavaria*

Status: Vulnerable

Venezuela. Single birds, pairs and small groups are typically seen perched high on the tops of tall emergent vegetation, bushes and trees, or above floating vegetation. A few observations along the Río Nechí and Río Cauca at Caucasia and El Bagre, but common in dense aquatic vegetation of cienagas in the río Magdalena valley from Tronca Magdalena, ca.15 km south of Puerto Berrio (a pair represent ca. 40 km southwards range extension) northwards to Simití (12 individuals). At Ciénaga Canaletal, ca.20 individuals were observed high in vegetation (disturbed woodland) on the north side and 6 individuals on the south side of the lake. The population at Ciénaga Canaletal is estimated at 60-80 individuals, with individuals wondering over 1.5 km distant from the lake.

It is bizarre that such dense and visible populations of Northern Screamer occur so close to densely populated zones and adjacent agriculture areas. This enormous bird is neither shy nor inconspicuous, so it is doubtful that this species could be considered threatened from hunting for sport or food. The species is not popularly consumed and its meat *may*, like Horned Screamer *A. cornuta*, smell repulsive. Nonetheless, several local people interviewed had hunted the bird for food and eggs were taken for food and “domestication” as pets. Several pairs were seen in captivity (El Bagre and Barrancabermeja), but it seems doubtful that taking young from captivity presents a grave risk to the species given the substantial wild populations.

In suitable wetland habitat in northern Colombia the species is locally common, particularly in cienagas and delta of the río Magdalena and río Atrato (P. Salaman *et al.* pers. obs.), suggesting a significant population, estimated at c. 50,000 individuals may survive. Although, the species is potentially undergoing a slow decline with the continued drainage of wetlands, the apparent lack of persecution together with extensive areas of suitable habitat remaining (no substantial plans exist to control the main rivers of northern Colombia), it is recommended that the Northern Screamer be classified as Near-threatened.

#### Plumbeous Hawk *Leucopternis plumbea*

Status: Near-Threatened

Rare and known from a few scattered locations of humid lowland forest to 800 m in eastern Panama, western Colombia, western Ecuador and extreme north-west Peru. One individual was captured at SS4, presenting an important easterly range extension of ca. 130 km from the base of the west Andes for this Chocó endemic. An additional recent observation is from Paramillo NP lowlands, in upper Rio Uré-San Pedro, in Montelíbano, Córdoba (Andrés Cuervo, 2001).

#### Colombian Chachalaca *Ortalis columbiana*

Status: Near-Threatened

Colombian Chachalaca has been largely extirpated from the Cauca and Magdalena valley slopes. Reported by many people as present around SS2 and SS3 (perhaps at higher elevation), but not encountered by fieldworkers. This species should not to be treated as Near Threatened, as it is common where it occurs.

#### Wattled Guan *Aburria aburri*

Status: Near-Threatened

During this study, Wattled Guan *Aburria aburri* was commonly heard at SS2 and SS3. We daily recorded several male *A. aburri* calling at night and twilight periods in a variety of forest patches, including poor and intervened secondary growth. For example, along a 4 km section of road with small forest patches we recorded up to seven males calling at dusk. The species' distinct whirring vocalisations were the most characteristic element of dawn and dusk choruses. This intense period of vocalizing activity for *Aburria* probably corresponds to the commencement of the breeding season during the wet season of April-June.

Wattled Guan is regarded as a Very High Conservation Priority by the *Cracid Specialist Group* (Brooks and Strahl 2000) and as Near-Threatened (Collar *et al.* 1992), due to high levels of hunting and deforestation in its range (e.g. c. 95% deforestation of the Colombian Central Andes (Carrizosa 1990)). It is described by hunters as extremely rare in most areas (Brooks and Strahl 2000). Any new site for the species is interesting, but one with such a healthy population is potentially of great importance for conservation.

Previous fieldwork by the authors at other sites in the Colombian Andes show *A. aburri* is typically highly secretive and found in very small numbers in primary forest sites. The species' high abundance levels in heavily degraded and fragmented forest in Serranía de San Lucas is very surprising, especially given the relatively populated rural areas. Note that these records present a northerly range extension for *A. aburri* of c. 120 km in the Central Cordillera, from Anorí in Dpto Antioquia, where EBA Project fieldwork previously located the species in 1999 (Cuervo *et al.* 1999, Salaman *et al.* 2000).

**Blue-knobbed Curassow** *Crax alberti*

Status: Critical

This critically endangered species, endemic to humid forest up to 1,200 m in northern Colombia, is threatened by habitat loss and hunting. Although we failed to observe this species in the wild, much good evidence was collected of extant populations in the lowlands on both sides of the Serranía. Many farmers and rural other local people at all sites identified *Crax alberti* from Hilty & Brown (1986), as historically being present in the lowland forests of the region. However, without exception, everyone noted the sharp decline in the species population, as it was widely consumed as a local delicacy and presently extremely rare but still hunted. At SS4 one of our guides saw the species at the site during the study. The species breeds in the dry season with its distinctive booming call reported in December–January from SS2 and SS4. A pair of locally captured birds was photographed in captivity near El Bagre.

The species is in grave danger of extinction on the eastern slope of Serranía de San Lucas, with the few remaining forest fragments suspected to hold few individuals. It is further threatened by intensive hunting activities, fumigation, deforestation, coca cultivation and forest fires. Ironically, land-mined forest patches are perhaps the best chances for the species survival as they deter hunting and forest clearance. Large forest patches of suitable habitat remain on the western flank of the Serranía, and probably remain the species global population stronghold.

*C. alberti* populations on both flanks of the San Lucas mountains are in urgent need of further investigation to determine the species' population and distribution more accurately. Also, most importantly, active forest protection and the implementation of effective conservation measures such as educational campaigns to limit hunting and provide resources to replace the need for habitat conversion are required.

**Saffron-headed Parrot** *Pionopsitta pyralia*

Status: Near-Threatened

This attractive forest-specialist is known only from lowland and foothill humid forest in Panama, Colombia and Venezuela, and due to deforestation now occupies a much-reduced range. The species was common at SS4, where fairly good lowland forest still remains. However, it was not recorded at any other site except SS2 where it was only observed twice. The record at SS2 (1,400 m) is an unusually high elevation for the species, and may be due to seasonal wandering previously noted in the species (Hilty & Brown 1986) in the dry season. Alternatively, the loss of lowland forests in the region of SS2 may have forced or restricted the species into remaining subtropical forests.

**White-mantled Barbet** *Capito hypoleucus carrikeri*

Status: Endangered

Two males and three females of this Colombian endemic were collected at 790 m near Santa Rosa by Carriker in 1947. It was found sympatric with Spot-crowned Barbet *Capito maculicoronatus* at SS4, where *hypoleucus* was much less common than its congener, with only a few observations. At SS3, a pair was observed on several occasions in the forest border, feeding together on fruits and seeds at mid-levels in the canopy. Both individuals were captured and photographed (right). Plumage was slightly different, with one individual's black face mask extending down across the bill to the chin, suggesting sexual dimorphism previously unrecorded in the species, with the female having slightly more black on the face (behind the mandible) as is the pattern in other members of the genus. With a small geographical range, these records in the San Lucas highlands are significant. The species' presence in secondary growth and degraded, heavily land-mined forest offers some hope to its continued existence, although active forest protection is required. We concur with Collar *et al.* (1992) that it is "essential" that lower montane forest in Serranía de San Lucas is offered some sort of protection to preserve this species.



White-mantled Barbet

**Parker's Antbird** *Cercomacra parkeri*

Status: Vulnerable

This recently described species (Graves 1997) is locally distributed above 1,000 m in the three cordilleras of Colombia, including Serranía de San Lucas. It was heard calling twice at SS2 and SS3, with vocalisations distinct from *C. tyrannina*, though its presence was not confirmed by capture or observation.

**Sooty Ant-Tanager** *Habia gutturalis*

Status: Near-Threatened

This species is endemic to the Nechí Endemic Bird Area of northern Colombia. It was common by voice and seen frequently in the understorey at SS2 and SS3. Four individuals were captured at SS2 (1,400 m) presenting

an upwards elevation extension for the species.

**Large-billed Seed-finch** *Oryzoborus crassirostris* Status: Near-Threatened

This species is uncommon and local across north and east Colombia (humid Caribbean lowlands west to Córdoba and locally east of the Andes) and throughout northwestern South America to the Guianas and Peru. This species was common at SS2 and abundant at SS3 with 21 mist-net captures. We concur with Stiles *et al* (1999) and recommend that this species be removed from Near-Threatened status. It thrives in disturbed and secondary growth areas and has a large range, suggesting a substantial population in Colombia. The principal cited threat to the species, the depletion of local populations by cage bird trappers, seems implausible.

**Other threatened species**

Four other endangered species are considered to occur in Serranía de San Lucas, but were not recorded during fieldwork:

**Chestnut-bellied Hummingbird** *Amazilia castaneiventris*

Status: Endangered

There are only four sites known for this poorly-known hummingbird: Three in Boyacá, one in Santander (all in the Eastern Cordillera) and Norosí in Serranía de San Lucas, where a male was collected by Carriker in 1947. One female collected in 1977 (Boyacá) was the only sighting for 35 years. We made several observations and captures of *A. tzactl*, but did not locate this species.

**Recurve-billed Bushbird** *Clytoctantes alixi*

Status: Endangered

This enigmatic species, with a characteristic heavily curved lower mandible, remains virtually unknown in life. It is known only from a small number of scattered lowland and foothill localities in northwest Venezuela and Northern Colombia. It is known to be present in our study area from ten birds collected near Simití in 1947. There have been no records since 1965 (Willis 1988), although Hilty and Brown (1986) believe that this may be due to its shy and secretive nature. Collar *et al.* (1992) consider the Serranía de San Lucas to be “an important area for this and other threatened bird species”, but that “surveys are first needed to determine the current status of the threatened species there, and of any remaining habitat” before protection is implemented. We did not locate the species at any of our study sites.

**Antioquia Bristle-Tyrant** *Phylloscartes lanyoni* Status: Endangered

Recently described (Graves 1988), this species is known from several localities in the foothills of the eastern slope of the Central Cordillera in Antioquia and Caldas. Collar *et al.* (1992) hypothesizes that the species formerly occupied much of the foothills of the northern Central Cordillera, and that the bird should be searched for in remnant patches of the area, including the Serranía de San Lucas. Stiles (1990) stated that this species' previous range probably extended as far as the Serranía de San Lucas, and that it is likely still to be found there. We did not record the species. However, it may well be present in better quality forest patches at SS3.



**Discussion**

Unfortunately, sites were studied for varying degrees of time, and consequently with varying effort, making it difficult to draw any solid conclusions about Serranía de San Lucas. However, the changes in fieldwork effort were due to factors totally outside our control as our movements in the field were impaired by the political situation. Also due to limitations, surveys at SS1 to SS3 were conducted in human-disturbed habitats, leading to many forest-dependant species (and often key conservation species) to be under-sampled or not encountered. However, many exceptional birds were recorded in these secondary habitats, giving us an insight into the conservation value of the zone, and suggesting that remaining primary forest in the higher elevations of the region will be of immense conservation value.

Whilst it is difficult to draw specific conclusions concerning the conservation value of each study site, the most relevant testament to the importance of the mountain range is the species inventory, which includes several key threatened species and an extraordinary high proportion of range extensions, according to Hilty & Brown (1986). Importantly, this study has provided the first insight into the highland avifauna of Serranía de San Lucas.

It is estimated that the probable total number of resident bird species in the Serranía greatly exceeds 500 species; once higher elevations and further forest species are taken into account: an exceptional diversity meriting conservation action for the region as a matter of extreme priority. 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.

Our preliminary results demonstrate a clear need for immediate conservation action and a more detailed ecological analysis is proposed for further EBA rapid assessments into premontane and montane elevations at ca.1,600–2,500 m. The ecological catastrophe in the Serranía suggests a bleak future for the eleven threatened bird species found present, unless conservationists and decision-makers act quickly. A conservation initiative is extremely important in protecting the remaining forests across a broad elevational span.

## Plants ~ Flora

Carlos Eduardo González

### Resumen

Se registraron alrededor de 100 especies distribuidas en 67 géneros y 45 familias. Los hábitats de estudio representaron zonas abiertas y de bosque secundario. Las zonas boscosas por debajo de 1400 m han prácticamente desaparecido y por encima de 1500 m están en una inminente amenaza. El mal uso de la tierra causado por la tala de bosques y los cultivos no naturales son las principales razones para la degradación de la diversidad de la deforestación lo cual ha causado condiciones de escases de agua y tierras estériles. Existe una alta probabilidad de que en un futuro no mayor a 20 años se presenten extinciones de especies desconocidas. Se hizo un nuevo registro de extencion geográfica y altitudinal para Colombia con la presencia de robledales, el "Roble" *Quercus humboldtii* Bonpland fue coleccionado a 1200 m sobre la vertiente oriental de la Serranía. Los bosques de la Serranía de San Lucas, en especial de la parte alta son desconocidos en su ecología, diversidad e inexplorados florísticamente. Esta area geográfica debe ser prioridad inmediata dentro de los planes de conservación de la biodiversidad de Colombia.



### Metodología

Las colecciones se hicieron por el método de colecta al azar. Se utilizaron las formas tradicionales de la preservación y toma de datos. Alguna información sobre usos medicinales fue tomada por medio de entrevistas a los campesinos o pobladores de la zona. Se tuvo en cuenta la variación altitudinal como punto de comparación para los registros. Los ejemplares coleccionados se encuentran en la colección de referencia del Herbario CAUP del Museo de Historia Natural de la Universidad del Cauca.

### Introducción

La Serranía de San Lucas es actualmente el mayor refugio de diversidad respecto a las formaciones boscosas al norte de las cordilleras de los Andes en Colombia. A pesar de ser una gran región de importancia para la conservación, es a la vez el sitio geográfica y biológicamente más expuesto a la pérdida de su diversidad.

Sobre el flanco oriental de la Serranía hay influencia directa de la cuenca mayor del río Magdalena; por causas antrópicas como las quemadas, deforestación, siembra de cultivos lícitos e ilícitos y otros factores propios hay daños naturales como una consecuencia al conflicto que se vive en la región. Como es normal a las anteriores razones, el bosque natural se ha visto afectado por su reducción en los hábitats que por debajo de 1,400 m actualmente ya no existen y por encima de 1,400 hasta 1,800 m todavía hay parches representativos de las comunidades y paisajes de la Serranía. Diferente es el caso de las zonas altas de la región las cuales se encuentran en perfecto estado de conservación pero igualmente en altísimo riesgo.

Respecto al objetivo de la expedición en la parte botánica, por situaciones de seguridad solamente fue posible realizar pocas colecciones en un gradiente entre 1.000 a 1.400 m con estaciones a 1.250, 1.350 y 1.400 m en bosques de rastrojo y bordes de caminos. A pesar de ser pocos los registros botánicos estos poseen un gran valor biológico ya que antes no existían registros arriba de 1,000 m, hasta la realización de esta exploración inicial. A continuación se presenta el listado preliminar de las colecciones que en un futuro estarán compiladas, mejoradas y ampliadas en González (in prep. *Novedades Florísticas para Colombia. Exploraciones Botánicas en la Serranía de San Lucas*).

**Resultados**

Este listado tiene determinaciones botánicas a niveles de familia, género y algunas especies. A la vez que son colecciones únicas, se pueden considerar como nuevos registros de distribución para la flora Colombiana y el neotropical. Se reportan entre 90 - 100 especies distribuidas en 67 géneros y 40 familias incluyendo especies de los principales grupos como monocotiledóneas, dicotiledóneas y pteridófitos.

**Table 6:** List of specimens collected at SS2 and SS3 in Serranía de San Lucas, 2001.

Numero de Colección	Familia ~ Family	Especie ~ Species	SS2a	SS2b	SS3
Cg-3421	Gesneriaceae	<i>Kohleria cf. spicata</i>		X	
Cg-3483	Gesneriaceae	<i>Drymonia turrialvae</i>			X
Cg-3453	Poaceae	<i>Lasiacis sp.</i>		X	
Cg-3346	Fagaceae	<i>Quercus humboldtii</i>		X	
Cg-3476	Lauraceae	<i>Ocotea calophylla</i>	X		
Cg-3473	Acanthaceae	<i>Mendocia lindavii</i>	X		
Cg-3474	Solanaceae	<i>Solanum acerifolium</i>	X		
Cg-3475	Asteraceae	<i>Calea sp.</i>	X		
Cg-3472	Tiliaceae	<i>Triumfetta sp.</i>	X		
Cg-3470	Lamiaceae	<i>Hyptis sp.</i>	X		
Cg-3471	Rubiaceae	<i>Coccocypselum lanceolatum</i>	X		
Cg-3467	Plantaginaceae	<i>Plantago major</i>	X		
Cg-3465	Chenopodiaceae	<i>Chenopodium ambrosioides</i>	X		
Cg-3462	Poligonaceae	<i>Rumex crispus</i>	X		
Cg-3437	Phytolacaceae	<i>Phytolacca rivinioides</i>	X		
Cg-3455	Clusiaceae	<i>Tovomita</i>		X	
Cg-3459	Boraginaceae	<i>Cordia sp.</i>		X	
Cg-3458	Solanaceae	<i>Solanum sp1.</i>		X	
Cg-3436	Poaceae	<i>Sporobolus sp.</i>	X		
Cg-3435	Melastomataceae	<i>Sp.</i>	X		
Cg-3434	Melastomataceae	<i>Miconia</i>	X		
Cg-3433	Malvaceae	<i>Sida sp1.</i>	X		
Cg-3432	Malvaceae	<i>Sida sp2.</i>	X		
Cg-3431	Rubiaceae	<i>Psychotria poeppigiana</i>		X	
Cg-3430	Verbenaceae	<i>Verbena litoralis</i>		X	
Cg-3429	Asteraceae	<i>Sp.</i>		X	
Cg-3428	Passifloraceae	<i>Passiflora sp.</i>		X	
Cg-3428a	Bamusoideae	<i>Sp.</i>			X
Cg-3488	Solanaceae	<i>Solanum sp2.</i>			X
Cg-3510	Gentianaceae	<i>Symbolanthus sp1.</i>			X
Cg-3466	Solanaceae	<i>Solanum sp3.</i>	X		
Cg-3468	Asteraceae	<i>Chromolaena sp.</i>	X		
Cg-3469	Verbenaceae	<i>Cyathula postrata</i>	X		
Cg-3448	Cyclanthaceae	<i>Cayaponia sp.</i>		X	
Cg-3441	Verbenaceae	<i>Cytharexylum sp?</i>		X	
Cg-3463	Solanaceae	<i>Solanum sp4.</i>	X		
Cg-3464	Loganiaceae	<i>Buddleja sp.</i>	X		
Cg-3509	Orchidaceae	<i>Epidendrum sp.</i>			
Cg-3489	Begoniaceae	<i>Begonia sp.</i>			X
Cg-3496	Araceae	<i>Xanthosoma sp.</i>			X
Cg-3438	Tiliaceae	<i>Heliocarpus americanus</i>		X	
Cg-3440	Gentianaceae	<i>Symbolanthus sp2.</i>	X		
Cg-3439	Asteraceae	<i>Sp.</i>	X		
Cg-3498	Monimiaceae	<i>Siparuna sp.</i>			X
Cg-3491	Piperaceae	<i>Piper heterotrichum</i>			X
Cg-3477	Piperaceae	<i>Piper reticulatum</i>			X
Cg-3478	Piperaceae	<i>Piper aduncum</i>			X
Cg-3482	Piperaceae	<i>Piper sp.</i>			X
Cg-3484	Piperaceae	<i>Piper cumanense</i>			X
Cg-3486	Piperaceae	<i>Piper cf. otophorum</i>			X
Cg-3493	Piperaceae	<i>Piper mutisii</i>			X
Cg-3445	Poaceae	<i>Sp.</i>		X	
Cg-3444	Asteraceae	<i>Bacharis trinervis</i>		X	
Cg-3443	Rubiaceae	<i>Hemiodia ocimifolia</i>		X	
Cg-3442	Melastomataceae	<i>Bellucia</i>	X		
Cg-3427	Rubiaceae	<i>Sp.</i>		X	
Cg-3426	Melastomataceae	<i>Miconia sp.</i>		X	
Cg-3425	Melastomataceae	<i>Sp.</i>		X	
Cg-3447	Helecho	<i>Sp.</i>		X	
Cg-3449	Acanthaceae	<i>Ruellia sp.</i>		X	
Cg-3450	Piperaceae	<i>Piper sp.</i>		X	
Cg-3451	Acanthaceae	<i>Sp.</i>		X	
Cg-3454	Asteraceae	<i>Sp.</i>		X	
Cg-3424	Melastomataceae	<i>Aciotis sp.</i>		X	

Cg-3423	Solanaceae	<i>Solanum sp5.</i>				X
Cg-3422	Melastomataceae	<i>Tibouchina sp.</i>				X
Cg-3420	Scrophulariaceae	<i>Scoparia dulcis</i>				X
Cg-3419	Asteraceae	<i>Sp.</i>				X
Cg-3461	Poaceae	<i>Sp.</i>				X
Cg-3460	Polygonaceae	<i>Polygonum</i>				X
Cg-3456	Solanaceae	<i>Solanum unbellatum</i>				X
Cg-3457	Euphorbiaceae	<i>Acalypha</i>				X
Cg-3480	Heliconiaceae	<i>Heliconia sp.</i>				X
Cg-3479	Melastomataceae	<i>Miconia aeruginosa</i>				X
Cg-3481	Commelinaceae	<i>Tradescantia sp.</i>				X
Cg-3485	Rubiaceae	<i>Hoffmania sp.</i>				X
Cg-3513	Boraginaceae	<i>Cordia sp2.</i>				X
Cg-3512	Caesalpiniaceae	<i>Dioclea sp.</i>				X
Cg-3508	Melastomataceae	<i>Clidemia hirta</i>				X
Cg-3507	Lycopodiaceae	<i>Huperzia sp.</i>				X
Cg-3506	Euphorbiaceae	<i>Croton sp.</i>				X
Cg-3505	Asteraceae	<i>Ellephantopus mollis</i>				X
Cg-3503	Loranthaceae	<i>Phoradendron undulatum</i>				X
Cg-3502	Asteraceae	<i>Lepidaploa canescens</i>				X
Cg-3501	Asteraceae	<i>Chromolaena sp.</i>				X
Cg-3500	Ochnaceae	<i>Sauvagesia erecta</i>				X
Cg-3499	Eriocaulaceae	<i>Tonina fluviatilis</i>				X
Cg-	Araceae	<i>Phillodendron sp.</i>				X
Cg-3495	Cyclanthaceae	<i>Asplundia sp.</i>				X

Estaciones de estudio: SS2a = La Punta; SS2b = El Retén; SS3 = La Teta Resort

### Notas sobre las observaciones geo-ambientales en San Lucas

Las condiciones climáticas de la Serranía parecen ser determinadas principalmente por la influencia de las mayores cuencas hidrográficas, la geomorfología y los declives. Sobre el flanco oriental en la cuenca del río Magdalena respecto al flanco occidental de la cuenca del río Cauca, las condiciones de humedad parecen ser menores posiblemente por que no hay contacto de los vientos que vienen del pacifico como se presenta en la cuenca del río Cauca y Nechí. Además, la topografía de las pequeñas colinas en la cuenca Cauca - Nechí es menos extendida que en la región del Magdalena, esto podría ser otra razón por la cual hay mayor presencia de humedad. Las anteriores inferencias son con base a la comparación de las características estructurales del bosque observadas en Julio de 1999 (Cuenca Cauca - Nechí) y Marzo de 2001 (Cuenca Magdalena) y su presencia de epifitismo.



Según comunicaciones personales de los pobladores de la región. Las temporadas de tiempo seco o verano son entre Diciembre y Febrero. Entre Marzo y Mayo hay una transición llamada veranillo, a partir de Junio hasta Agosto es temporada de lluvias y en Septiembre hasta Octubre hay de nuevo veranillo para terminar con el inicio del invierno en Noviembre.

Los vientos en la zona media sobre el flanco oriental de la Serranía suelen cambiar de dirección dependiendo de la hora del día. En las horas de la mañana vienen de Norte a Sur, mientras en las horas de la tarde cuando hay un enfriamiento del ambiente soplan del Nor-este al Sur- occidente. Respecto a las lluvias se observó que son más frecuentes después de la media tarde y en las mañanas las condiciones de lluvia son menores. La dirección de la precipitación fue generalmente de Norte a Sur y algunas veces, pero menos frecuente de occidente a nor-este. La parte alta de la serranía es la que presenta presencia constante de Niebla. En áreas de media altura es menor , pero también se presenta especialmente en las horas de la tarde cuando las lluvias inician.



### Perspectivas futuras

Principalmente se tiene como estrategia la realización y publicación del manuscrito “Novedades Florísticas para Colombia. Exploraciones Botánicas en la Serranía de San Lucas”; el cual constara de datos recopilados de registros anteriores hechos por otros autores y los actuales sobre el flanco oriental y occidental de la Serranía desde 350 m hasta 1500 m. También la posibilidad de futuras colecciones.

## Mammals ~ Mamíferos

### 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 *Chiroptera* and *Rodentia*, large mammal surveys give 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. 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

At **SS4** a 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 SS4, where several 'record' photographs and tape recordings were taken. 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' **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** *Ateles seniculus* (IUCN Vulnerable) was heard more often than seen at SS4, but was observed several times in small groups (c. 5-7) eating fruit in the canopy.



**Kinkajou** *Potos flavus* was heard and observed once during a mammal night-search at SS4. Local hunters note the presence of this species both at SS4. The Anteater, **Northern Tamandua** *Tamandua mexicana* was observed on one occasion at about 18:00 hrs, walking along the mist-net transect at SS4. Whilst in Puerto López (near SS4), a juvenile **Jaguar** *Panthera onca* was observed and photographed in captivity, bound for illegal trade. Evidence of the species' presence was noted at SS4 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*.

The most notable report by local hunters was the presence of **Spectacled Bear** *Tremarctos ornatus* (CITES Appendix I and Vulnerable) in the highlands of Serranía de San Lucas (SS2-3). Additionally, a young individual held by farmers was confiscated in 1998, at San Pedro Frío. Before the Pleistocene, the genus *Tremarctos* was distributed from the United States through Central America to South America. At present it only exists as a relict in South America, being endemic to the Andean region (Eisenberg 1989), with its range extending through the Andes from northern Colombia and Venezuela through to Peru and Bolivia, although not previously known from Serranía de San Lucas.



It is confined to premontane and montane habitats in the Andes and adjacent foothills; these include rain and cloud forest, and páramo, with its optimum habitat considered to be cloud forest, between 1,500 m and 2,200 m. Although previously unrecorded from Serranía de San Lucas, it is highly probable that these reports are reliable. If confirmed these would represent a substantial range extension for the species and potentially an important relict population. The major threats to its survival are: habitat loss because of the increasing human population in the Andes and deforestation for timber and plantation crops; hunting because they are often regarded as pests which raid crops; and for food, medicines and talismans. Hunting is illegal but law enforcement is difficult.

### 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, the high proportion of Threatened species at SS4 and reports of Spectacled Bear in the highlands indicates the critical importance to conservation with a great diversity of species considered threatened with extinction by the IUCN. The immediate priority for the Serranía is the survey of mammals in large fragments of highland primary forest, especially to confirm the presence of Spectacled Bear. Almost all of the species recorded are now much reduced in range due to landscape modification, making what forests remain critical conservation priorities.

### Additional groups: Amphibians, Reptiles, Insects

Due to land-mining making it impossible to work within forest, only a very small number of reptiles and amphibians were captured. At all sites, the pestilent toad *Bufo marinus*, was present. As the massif is totally unknown, even this record represents a range extension. At SS3, a fake coral *Atractus sp. (?)* was captured, and at SS4, a probable new species of frog in the *Eleutherodactylus unistrigatus* group was collected.

A small ant collection was made at each site which has not yet been identified.



## Conservation Discussion

### Biological importance of Serranía de San Lucas

The project results highlight that the Serranía de San Lucas is of global importance for biological diversity. The concentration of threatened birds and mammal species is of global concern, particularly considering the high proportion of range-restricted species of the Nechí lowlands. BirdLife International assigns “Critical Conservation Priority” to the Nechí lowlands: a poorly known region with severe habitat loss and lack of adequate protected areas.

Uniquely, the flora and fauna of Serranía de San Lucas is biological characterised by a lack of knowledge. Whilst this report makes the first headway to identifying the biological properties, affiliations and conservation threats of the mountain range, we have merely surveyed the tip of an iceberg. There is little doubt that surveys in the San Lucas highlands (above 2,000 m) would uncover a unique compliment of flora and fauna subspecies and species, with many probably unknown to science.

Despite the severe limitation of the project surveys in heavily modified and disturbed forest and non-forest habitats, many threatened species were encountered in secondary growth habitats. Undoubtedly, many additional threatened and range-restricted species are present in the pristine forest of the Serranía, particularly at higher elevations that were not surveyed.

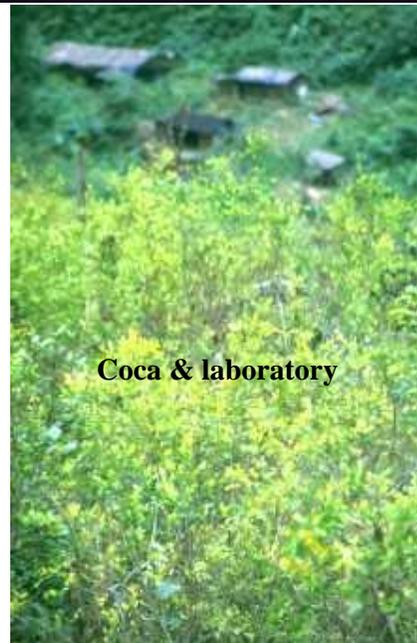


Forest fires at night

### Vulnerability assessment

Serranía de San Lucas has been subject to a massive environmental and human catastrophe in recent years on an unimaginable scale unlike anywhere else we have surveyed in Latin America. A unique combination of critical political and human factors compounds the problem:

- i) extensive unprotected natural resources (forests) in the densely populated lowland plain of northern Colombia have encouraged uncontrolled exploitation and forest losses;
- ii) the discovery of massive gold deposits in the San Lucas highlands in the 1990s produced a ‘gold rush’ of people to the region, which is widely reported to have resulted in chemical contamination of land and water courses as well as deforestation;
- iii) San Lucas lowlands is one of the world’s most important coca production areas, resulting in massive glyphosate fumigation of illicit and licit crops which has created enormous social and ecological problems and forces farmers to vacate sterile fields and clear forest to plant new crops,
- iv) political instability, anti-personnel land-mining and large numbers of displaced people.



Coca & laboratory

This combination has meant that the region has suffered uncontrolled ecological damage and complete governmental and institutional neglect (except military intervention). As well as environmental problems, the region clearly has an overwhelming human crisis, with poor infrastructure and a lack of basic education and medical facilities for over *ca.*100,000 human population in the San Lucas highlands (40,000 alone are in the vicinity of La Teta). Serious security problems in the region have placed the innocent rural population at great risk and has deterred government institutions from assisting their plight. The conservation threats are detailed as follows:

### i) Unprotected

There is only one National Park in the Nechí Endemic Bird Area: Parque Nacional Paramillo, in Córdoba and Antioquia departments protects the northern foothills of the Western Cordillera. Sadly, political instability about and inside the Park has prevented any effective protection and it is widely deforested and infested with illegal colonists, as witnessed during aerial surveys over the park by EBA fieldworkers in 1999.

Serranía de San Lucas had, until recently, largely avoided the catastrophic human impact that other regions have suffered. Forest cover maps of Colombia revealed *ca.*500,000 ha of forest over San Lucas: one of the largest fragments of pristine humid lowland to montane forests remaining in the Northern Andes. However, colonisation from the densely populated lowland plain of northern Colombia is accelerating habitat modification in a region lacking any protected status. From our surveys in 1999 and 2001, we estimate that as much as 60% of the forest intact in 1995 has now been cleared or heavily degraded. However, considering that Andean forests presently compose only *ca.*10% of its previous natural coverage in Colombia, Serranía de San Lucas, containing a sizeable fragment of such forest, is of immense conservation value. Remaining forest fragments warrant urgent official protection.

### ii) Gold-mining.

In late 1996, multi-million ounce high-grade gold deposits were discovered throughout Serranía de San Lucas, and were made public. The Colombian Ministry of Mines (MINMINAS-DNP) rated the San Lucas area as “the most promising zone for commercial gold discoveries in the highly prospective Andino system” (Canada NewsWire, Sept. 1996 *in litt.*). Large samples taken over an extended area held gold yields of up to 2.9 ounces per ton, and averaging 0.6 opt. (22.1 grams/ton) - a discovery of enormous economic potential (gold trading at \$280/oz [Dec. 1997]). Also in late 1996, the BMR Gold Corporation entered into agreements with Colombian subsidiaries such as San Lucas Mining Inc. and Compañía Minera San Lucas Ltda, to form the “San Lucas Project”; to explore and develop the region. A property of 70 km<sup>2</sup> was obtained west of Simití, in the heart of the Serranía de San Lucas, and BMR was obliged to commit US\$500,000 over 18 months (9 January 1997, Canadian NewsWire *in litt.*). However, after a kidnapping it appears that the company’s operations no longer persist in Serranía de San Lucas.



The highlands of Serranía de San Lucas are one of the most gold-rich areas in the world, which attract a large population of workers. An estimated 40,000 people work in small gold mine operations in the highlands above Santa Rosa in a cluster of mining towns called San Pedro Frío.



The gold-mining process is in desperate need of ecological advice, which will not only improve water systems but increase the efficiency of production. However, any outsider who takes an interest in gold-mining is immediately regarded as suspicious. Previously, representatives of gold-mining companies have been attracted to San Lucas, prospecting for gold under the guise of conducting geological surveys. The environmental effects of rapid economic growth with natural resource exploitation have received insufficient attention in the region.

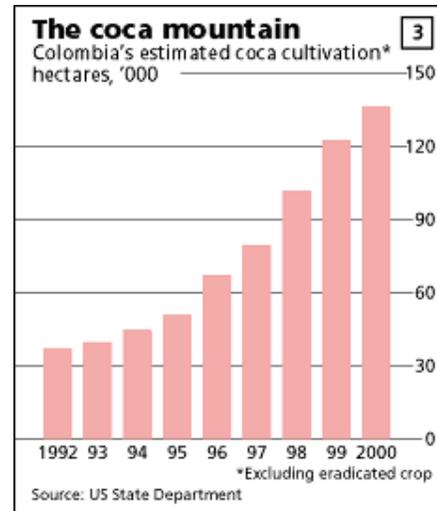
### iii) *Coca Erythroxylon* spp. production.

The lowlands surrounding Serranía de San Lucas very ideal for the crop and rapidly became important to the rural population. The lowlands of San Lucas presently constitute one of the worlds most profitable and extensive cocaine-producing regions. Coca is rarely encountered above 1,000 m elevation, where climatic conditions make it difficult to grow the crop, so the crop coca does not greatly threaten highland forests.

A farmer with one acre of coca can be harvested leaves at least 3 times a year with each harvest yielding *ca.* 10 kilos of coca paste, which is retailed at *ca.* US\$70. Therefore, in one year a small field that requires just herbicide spray and basic chemicals for refining to a paste can generate US\$20,000 (after further refined = US\$3 million street value). Having extensive areas of coca is unproductive as it attracts the unwanted interests of the government and other groups for taxing. Considering the enormous net return on coca it is unsurprising that farmers prefer the minimal effort of a few acres of coca to the intensive effort and low return on logging and other crops, such

as yuca and platano, over a large area. Whilst it is hard to disentangle the social effects of coca, at the production end, well-managed **coca cultivation could potentially be of benefit to biodiversity conservation** and partially improves the living standards of rural populations.

However, as part of a US\$1.6 billion emergency aid package called 'Plan Colombia' by the USA, Colombia is obliged to undertake a massive programme of **fumigation** of illicit coca plants using the herbicide glyphosate and *Fusarium* fungi. As part of the US-sponsored 'War against Drugs', military fumigation planes constantly patrolled the San Lucas lowlands and highlands whilst we were conducting fieldwork.



#### The effects of fumigations:

- 1) **Human health costs:** rural communities in the lowlands of San Lucas report that indiscriminate fumigation has caused illnesses, poisoned livestock and contaminated water supplies, which is similar to numerous reports from Putumayo and other regions, including Guaviare, Meta and Caquetá. In the United States, the Environmental Protection Agency's own study on the herbicide published in 1993 noted that in California, a state that is required to report pesticide poisonings, glyphosate was ranked third out of the 25 leading causes of illness or injury due to pesticides. Labels on glyphosate products in the United States advise users to avoid applying it to any body of water.
- 2) **Agricultural costs:** Glyphosate is a non-specific herbicide that destroys *all* vegetation and renders the land infertile for over five years. The effects are profound. Rural communities in San Lucas reported that fumigation, which is largely conducted at night to avoid hostile fire, is undertaken



indiscriminately. We verified these reports, witnessing large tracts of dead licit crops, such as yuca, platano, and other vital food crops (see photo). Shortly after our fieldwork, the representatives of San Lucas municipalities demanded the central government to stop fumigation and replace it with manually eradication, because rural watersheds and large crops of oranges and maize were damaged.

- 3) **Biodiversity costs:** The effects of spraying glyphosate are not dissimilar from the notorious 'Agent Orange' used during the US war with Vietnam. Large areas of forest adjacent to coca cultivations are contaminated and die, causing a biodiversity hemorrhage, as habitats are lost and forests are increasingly fragmented. Furthermore, the effects on biodiversity are greatly amplified by fumigation; as farmland is sterilized by fumigation the rural communities are faced with impoverishment and starvation and have no choice but to slash and burn the few remaining forest patches and try to start growing crops again. A vicious circle of fumigation followed by forest clearance ensues.
- 4) **Alternatives:** The alien African oil palm is touted as the alternative crop to coca, yet is far more damaging to the environment, being grown in vast monoculture fields devoid of wildlife.

Although framed as a strong-arm tactic against drugs, the US-backed fumigation scheme is having a catastrophic effect on the human population. Following claims that fumigation had destroyed legal crops, the government announced compensation payments to farmers in San Pablo, where people whose livelihoods had been destroyed queued weekly in the town for government handouts and food relief. From our observations of affected areas, fumigation largely appeared to be military tactic to clear hideouts, cause impoverishment and reduce popular support for rebel groups.



#### v) Political insecurity

The government has *de facto* control of the main municipal towns bordering the San Lucas mountains. San Pablo, Simití, Santa Rosa, Puerto Wilches and Cantagallo all have a large and highly visible military and police presence. However, government control is tentative.



Political instability

In 1998, right-wing groups crossed the Río Magdalena into the lowlands surrounding the San Lucas massif. They now hold most of the lowlands and are encircling the various guerrilla fronts (divisions) in the highlands from both the western and eastern flanks of the mountain range. This conflict has resulted in thousands of casualties and tens of thousands of displaced people fleeing from the war zone. Displaced people have fled either deeper into the mountains or into large refugee camps in Puerto Wilches.

In the highlands, **La Teta** – an *ca.* 1000 ha montane forest - has no national government protected area status but is currently effectively protected; being enforced by land mines.

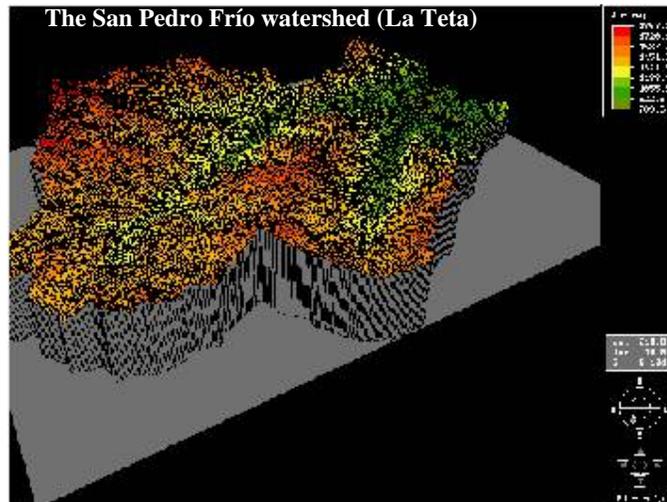
**Land-mines:** Large sections of the mountain range and surrounding lowlands are infested with anti-personnel land-mines. These mines are cheap to make and install and are used widely by various groups to entrench their positions and to keep the enemy visible. Almost every major road and mule trail in the region is land-mined on both sides to deter people from entering cover. Landmines continue to be laid at an alarming rate. This will have terrible future human and social effects.

From the EBA project perspective, it made our work difficult as groups, such as plants, require forest access to conduct searches. Widespread land-mining is making bleak the prospect of conducting future fieldwork in the zone. However, from a conservation perspective, mines ensure that forests are perfectly preserved in the immediately future, with no hunting, firewood collection or clearance.

### Conservation feasibility

Despite the highly complicated problems of political instability in San Lucas, we have demonstrated that conservation work here *is* possible. Local people and municipal government and union leaders showed an exceptional enthusiasm to improve their lot. Conservation and other work in the area needs weeks of preparation and information to determine safe zones where *operativos* are not taking place. In addition to our EBA Project expedition, teams from the *Médecins sans Frontières* are presently working in the region. Also, peace talks until April regarding a demilitarised zone in the municipalities of San Pablo and Cantagallo took place.

There is some hope for the conservation of hunted species, such as large mammals and birds in the region. For several years the groups that control the San Lucas highlands have restricted all hunting. Hunting now results in heavy fines (equivalent to the cost of a live cow). Forests are also protected from hunting and deforestation by land-mining, a tactic with dire human consequences, but one which is producing beneficial effects to threatened species as hunters and colonists are deterred from entering many areas. For the short term, important populations of large mammals and birds (typically the most threatened species) are well protected. However, the long-term situation is less clear due to political instability and recent crop fumigations forcing a 'slash and burn' culture in local agriculture practices. The situation for conservation in the region is therefore very complicated.



## Conservation Strategy for Serranía de San Lucas

*There is a critical need for conservation action in Serranía de San Lucas.*

Given the complicated and multi-faceted problems of the Serranía, it would be a gross understatement to say that a straightforward and simple conservation strategy will serve to protect the unique biodiversity of the Serranía de San Lucas. It truly faces a critical situation and no imminent or obvious 'quick fix' solution can be formulated in this report. However, to alleviate the immediate crisis, we tentatively suggest the following 5-point strategy:



### 1. STOP fumigation

Fumigation is directly and indirectly destroying the region's forests at an alarming rate. Stopping fumigation and encouraging other alternatives and tactics against coca production must be investigated and implemented as a matter of urgency. Although we don't have knowledge of anti-drug strategies, we suggest that more effective and less damaging tactics would include: (i) concentrating efforts at the market end of cocaine, e.g. on drug traffickers and mafia rather than poor farmers; and (ii) improving drug awareness and education and alleviating social problems in consumer societies.

### 2. Community environmental education

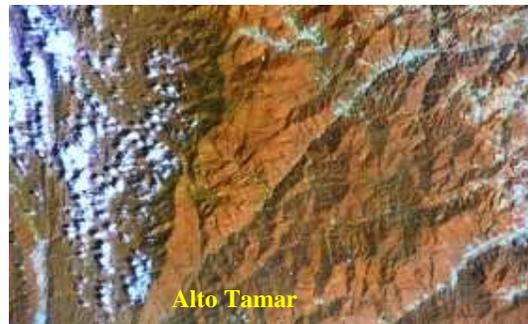
A campaign to educate local communities in the Serranía is highly recommended, focussing on the following issues:

- 1) **gold-mining activities;** seeking alternatives and safeguards to improve production methods and reduce the effects on humans and run-off into the environment.
- 2) **youth education;** provide education and awareness of environmental issues to school teachers and directly to children. Assistance with basic facilities for the schools in the San Lucas highlands.
- 3) **improving health care and living standards;** education and materials from international NGOs for simple and effective ways to improve the people's life style.
- 4) **prohibition of hunting and forest fires;** posters illustrating protected species, consequences of fires on the ecosystem;
- 5) **agricultural improvements;** encouraging international NGOs to assist with agronomic information and technical support to assist in environmentally-friendly self-sufficiency in harmony with nature.

### 3. Protective measures I: conservation of the southern Serranía de San Lucas.

The largest remaining expanse of forest in the Serranía de San Lucas range is on the southern and southwestern slope in the Municipalities of Segovia, Remedios, Zaragoza, and El Bagre. During aerial surveys in July 2000, we found the forest in the southern half of Serranía de San Lucas to be continuous and expansive, although with an increasing number of recent incursions by colonists (compared to satellite maps from 1995 - right), including a small village near Alto Tamar (the highest southern peak at ca.2,000 m). Also we mapped large tracts of lowland forest to the southwest of the Serranía, continuous with forest studied in SS4. Despite the increased encroachment, this region appears the most promising location in which to concentrate efforts in saving the threatened Blue-billed Curassow *Crax alberti* from imminent extinction. An outline strategy to protect the southern region is as follows:

- i) CORANTIOQUIA y Corpo Sur de Bolivar to collaborate and formally designate a "Bi-Departmental Natural Reserve" of primary forested area of Alto Tamar & Alto Santo Domingo (ca.20,000 ha) from 200-2,200 m elevation,
- ii) Design a protective strategy working with local communities and cooperating with political bodies, including environmental education,
- iii) Encourage small community-based projects, e.g. *Proyecto Crax alberti* already underway in this region by CORANTIOQUIA and with EBA team support.



A poster campaign for *Crax alberti* protection is important in raising awareness amongst the community and local authorities.

#### 4. Protective measures II: official conservation of La Teta

As part of a future peace processes (there are currently [suspended] dialogues called the ‘National Convention’ with various groups, “friendly countries”, NGO’s and the civil society), politicians representing all groups should formulate plans for official declaration of the La Teta as a protected area. Such an area could be politically “neutral” although supported by Corpo Sur de Bolivar. La Teta mountain peak of San Lucas is an imposing and striking bosom-shaped mountain that is ideal as a figurehead for the region’s conservation and is of enormous pride to the people of the region.

#### 5. Further rapid base-line biological surveys are urgently necessary

These recommendations lack the added weight of detailed biodiversity studies in the Serranía. Additional rapid biodiversity studies, integrated with geographical data through the full spectrum of forest ecosystems are an essential prerequisite for a comprehensive assessment, particularly in the following areas:

- (i) the upper western slope which has perpetual clouds indicating cloud forest - potentially ecologically distinct from the drier eastern slope;
- (ii) the southern part of the Serranía (Alto Tamar and Alto Santo Domingo) which contains the most intact forests,
- (iii) La Teta de San Lucas, especially above 1,400 m, which is the highest region of the mountain range and contains elfin forest on the ridges and peaks and an extensive area of lower montane cloud forest.

Furthermore, a much-needed detailed human impact assessment would be invaluable in putting ecological studies to practical use for wildlife conservation, as well as people. Assessments of ecological requirements of threatened species will provide the basic information on which conservation organisations and governments can base conservation action such as education of local people and protecting remnant forest patches. EBA team members are currently planning this next stage of investigation in the region to:

1. identify and map areas of outstanding biodiversity, endemism, vulnerability, and conservation viability,
2. evaluate each ecosystem to produce a strong long-term conservation strategy,
3. facilitate the production of action plans and conservation strategies for threatened species
4. prioritise and map recommended zones and areas in urgent need of protection or further attention.
5. facilitate the rapid and effective designation of protected areas
6. produce a preliminary management strategy for the region and for protected areas.
7. promote local environmental awareness and conservation of the forests with local communities.

We shall continue to achieve these goals in liaison with the local communities of Serranía de San Lucas.



## References

- Biodiversity Support Program, CI, TNC, WCS, WRI, WWF** (1995) *A regional analysis of geographical priorities for biodiversity conservation in Latin America and the Caribbean*. Biodiversity Support Program, Washington, D.C., USA.
- Braun G.** (1997) The use of digital methods in assessing forest patterns in an Andean environment: the Polylepis example. *Mountain Research and Development*. 17: 253-262
- Buckley, P. A., Foster, M. S., Morton, E. S., Ridgely, R. S., and Buckley, F. G., eds.** (1985) *Neotropical ornithology*. Washington, D.C.: American Ornithologists' Union (Orn. Monogr. No. 36).
- Casas, G., Ramirez, A. and Valenzuela, G.** (1991) Como hacer una colección de anfibios y reptiles. *Cuadernos del Instituto de Biología 10*. Instituto de Biología de la Universidad Nacional Autónoma de México. México.
- Cavalier, J. and A. Etter.** (1995). Deforestation of montane forest in Colombia as a result of illegal plantations of opium (*Papaver somniferum*) in: Churchill, S. P., H. B. Balsev, E. Forero & H. B. Luteyn (eds.). Biodiversity and conservation of neotropical montane forests. New York Botanical Garden. NY.
- Chapman, F. M.** (1917) The distribution of bird-life in Colombia: a contribution to a biological survey of South America. *Bulletin of the American Museum of Natural History* 36, New York.
- CNPPA** (1982) IUCN Commission on National Parks and Protected Areas (1982) *IUCN Directory of Neotropical protected areas*. Dublin: Tycooly International Publishing Limited.
- Coad, B.** (1995) *Expedition field techniques: fishes*. Expedition Advisory Centre. London, U.K.
- Collar, N. J., Crosby, M. J., and Stattersfield, A. J.** (1994) *Birds to Watch 2: The World List of Threatened Birds*. BirdLife Conservation Series. Cambridge UK.: BirdLife International.
- Collar, N. J., Gonzaga, L. P., Krabbe, N., Madroño-Nieto, A., Naranjo, L. G., Parker III, T. A. and Wege, D. C.** (1992) *Threatened birds of the Americas: The ICBP/IUCN Red Data Book*. 3rd edition (part 2). Cambridge U.K.: ICBP.
- Cracraft, J.** (1985) Historical biogeography and patterns of differentiation within the South America avifauna: areas of endemism. Pp. 49-84 in P.A. Buckley *et al.*, *op. cit.*
- Cuervo, A.M., Ochoa, J.M., Delgado, C. and Palacio, J.A.** (1999) Evaluación de la avifauna y de la mastofauna del proyecto de reserva regional La Forzosa, Municipio de Anorí, Departamento de Antioquia. Informe final. Corporación Autónoma Regional del Centro de Antioquia CORANTIOQUIA
- DaRos D. and M. Borga** (1997) Use of digital elevation model data for the derivation of the geomorphological instantaneous unit hydrograph, *Hydrological Processes*, Vol.11, No.1, pp.13-33
- Diamond, A. W. and Lovejoy, T. E., eds.** (1982) *Conservation of Tropical Forest Birds*. Cambridge, U.K.: ICBP (Techn. Publ. 4).
- Díaz-Rincon, W.** (1997) *Un Diagnostico*. Santa Fe de Bogotá. Unpublished report on Santa Rosa del Sur.
- Donegan, T. M. and Dávalos, L. M.** (1999) Ornithological observations from Reserva Natural Tambito, Cauca, south-west Colombia. *Cotinga* 12 (1999): 48-55
- Eisenberg, J. F.** (1989) *Mammals of the Neotropics. The northern neotropics. Volumen I. Panamá, Colombia, Venezuela, Guyana, Suriname, French Guiana*. The University of Chicago Press, Chicago and London.
- Emmons, L. H. and Feer, F.** (1990) *Neotropical Rainforest Mammals: a field guide*. Chicago: University of Chicago Press.
- Fjeldså, J. and Krabbe, N.** (1990) *Birds of the high Andes*. Copenhagen: University of Copenhagen Zoological Museum.
- Gentry, A. H.** (1993) *A field guide to the families and genera of Woody Plants of Northwest South America*. Washington, D.C.; Conservation International.
- Golley, F. B. and E. Medina** eds. (1975) *Tropical ecological systems*. Springer Verlag. New York.
- Graves G. R.,** (1988) A new species of Bristle-tyrant (Tyrannidae) from the lower Cauca Valley of Colombia. *Wilson Bull.* 100:529-534.
- Graves, G. R.** (1986) Geogrpahic variation in the White-mantled Barbet (*Capito hypoleucus*) of Colombia (Aves: Capitonidae). *Proc. Biol. Soc. Washington* 99:61-61.
- Haffer, J.** (1959) Notas sobre las aves de la región de Urabá. Lozania. *Acta Zoológica Colombiana* 12:1-49 Bogotá.
- Haffer, J.** (1967) Speciation in Colombian forest birds west of the Andes. American Museum Novitates 2294. New York.
- Hamilton, L.** (1997) *Document GFIS - Global Forest Information Service*. Prototype September 1997. URL: <http://www.wcmc.org.uk/forest/gfis/col/cloud/intro.htm>
- Harcourt, C. S. and J. A. Sayer** eds. (1996) *The Conservation Atlas of Tropical Forests: The Americas*. Simon and Schuster.
- Hernández Camacho, J., R. O. Quijano, T. Walschburger and A. H. Guerra** (1997) Estado de la Biodiversidad en Colombia. In *Biodiversidad de América Latina.*, G. Halfpeter, ed. URL: <http://dell.ieco.conacyt.mx/index1.html>
- Hershkovitz, P.** (1947) Mammals of Northern Colombia. Preliminary Report No. 1 Squirrels (Sciuridae). *Proc. Of the United States Nat. Mus.* 97 No. 3208.
- Hilty, S. L. and Brown, W. L.** (1986) *A Guide to the Birds of Colombia* Princeton, New Jersey: Princeton University Press.
- Holdridge, L. R.** (1967) *Life zone ecology*. San José, Costa Rica: Tropical Science Center.
- ICBP** (1992) *Putting Biodiversity on the Map: Priority Areas for Global Conservation*. Cambridge, U.K.: ICBP.
- IGAC** (1988) *Suelos y bosques de Colombia*. Bogotá D.C.: Subdirección Agrologica, IGAC.
- IGAC** (1989) *Atlas básico de Colombia*. Bogotá: División de difusión geográfica, IGAC.
- IGAC, INDERENA, and CONIF** (1984) *Bosques de Colombia*. Bogotá D.C.
- INDERENA**, (1984). Colombia: Parques Nacionales. Bogotá, Colombia.
- IUCN** (1996) *1996 IUCN Red List of Threatened Animals*. Cambridge: IUCN.
- IVH** (1997) [Biodiversity priorities in Colombia]. *BioConservación*. Instituto Von Humboldt, October 1997.
- Kapila, S. and Lyon, F.** (1994) *Expedition field techniques: people oriented research*. Expedition Advisory Centre. London.

- Lazaroff, L.** (1994) Colombia opening the door to foreign investment. *Institutional Investor* 1: 1-12
- O'Shea, M.** (1992) *Expedition field techniques: reptiles and amphibians*. Expedition Advisory Centre. London, U.K.
- Oldroyd, H.** (1970) *Collecting, preserving and studying insects*. Hutchinson and Co. London, U.K.
- Ridgely, R. S. and Tudor, G.** (1989) *The birds of South America: Vol. 1, the Oscine Passerines*. Oxford: OUP.
- Ridgely, R. S. and Tudor, G.** (1994) *The birds of South America: Vol. 2, the Suboscine Passerines*. Oxford: OUP.
- Salaman, P. G. W., ed.** (1994) Surveys and conservation of biodiversity in the Chocó, south-west Colombia. Cambridge, U.K.: *BirdLife International Study Report* 61.
- Salaman, P., Cuadros, T., Jaramillo, J.G. and Weber, W. H.** (2001) *Checklist of the Birds of Colombia*. Sociedad Antioqueña de Ornitología, Medellín, Colombia.
- Schelenberg, T. S. and Awbrey, K. eds.** (1997) *RAP working papers 8: A rapid assessment of humid forests of Central Chuquisaca, Bolivia*. Conservation International. Washington, USA
- Serna, D.** (1980) *Catálogo de aves, Museo de Historia Natural*. Medellín, Colombia: Museo de Historia Natural del Colegio de San José de Medellín.
- Stattersfield, A. J., Crosby, M. J., Long, A. J. and Wege, D. C.** (1997) *Endemic Bird Areas of the World: Priorities for Biodiversity Conservation*. BirdLife Conservation Series. Cambridge, U.K.: BirdLife International.
- Stiles, F. G.** (1990) Un encuentro con el Mosquerito Antioqueño, *Phylloscartes lanyoni*. *Bol. SAO* 1: 12-13.
- Strahl, S. D.** (1989) WPA/ICBP International Cracidae Specialist Group Conservation Strategy and Action Plan: 1990-1995.
- Strahl, S. D. and J. L. Silva.** (1997) Census methods for Cracid populations. Pp. 26-33 *In*: S. D. Strahl, S. Beaujon, D. M. Brooks, A. Begazo, G. Sedaghatkish, and F. Olmos, eds. *The Cracidae: their Biology and Conservation*. Hancock House Publishers, WA.
- Sugden, A. M.** (1982). The ecological, geographical and taxonomic relationships of an isolated Colombian cloud forest, with some implications for island biogeography. *Journal of the Arnold Arboretum* 63: 31-61.
- Sutherland, W. J.** (1996) *Ecological census techniques: a handbook*. Cambridge University Press.
- Terborgh, J. and Winter, B.** (1983) A method for siting parks and reserves with special reference to Colombia and Ecuador. *Biological Conservation* 27: 45-58.
- Thornback, J. and M. Jenkins** (1982) IUCN Mammal Red Data Book: part 1. IUCN
- Van Velzen, H. P.** (1991) *Priorities for conservation of biodiversity in the Colombian Andes*. Unpublished.
- Vuilleumier, F.** (1970) Insular biogeography in continental regions. 1. The northern Andes of South America. *Amer. Naturalist* 104: 373-388.
- Webster, G. L.** (1995). The Panorama of Neotropical Cloud Forests. Pp.53-77 in S. P. Churchill *et al.* eds. *Biodiversity and Conservation of Neotropical Montane Forests*. New York Botanical Garden.
- Wege, D. C. and Long, A. J.** (1995) *Key Areas for threatened birds in the Neotropics*. BirdLife Conservation Series No. 5. Cambridge, U.K.: BirdLife International.

## Appendix 1: Bird species inventory for Serranía de San Lucas.

The compilation of all bird species observed on the west slope (1999) and eastern slopes (2001) of Serranía de San Lucas, Dept. Antioquia and Bolívar, Colombia.

### Key:

**1 = SS1: San Pablo** (50-250 m). Aquatic habitats (cienagas and Río Magdalena) and lowland secondary growth forest.

**2 = SS2: La Punta** (1,000-1,400 m). Secondary growth, open country and heavily disturbed remnant forest.

u = upper slope (1,250-1,400 m); observation and mist-net captures; 17-20 March 2001.

w = lower slope (1,000-1,250); observation; 15-17 March 2001

**3 = SS3: La Teta Resort** (1,300 m) east slope. Secondary growth and forest border

**4 = SS4: Apollo 13** (300 m west slope).

x = primary forest.

a = open country, secondary growth and forest border.

x = field observations (no captures) at each site or areas within each (codes above for “u” and “w” [see above]).

2 (or other digits) = 2 individuals captured at this site

P = reported by local people (at least 2 people independently identifying species)

blank = not present

Species	1	2	3	4	Species	1	2	3	4
Great Tinamou <i>Tinamus major</i>	x	x		x	Black-and-white Hawk Eagle <i>Spizastur melanoleuc</i>				x
Little Tinamou <i>Crypturellus soui</i>	x	x	x	x	Black Hawk-Eagle <i>Spizaetus tyrannus</i>		u	x	x
Neotropical Cormorant <i>Phalacrocorax brasilianus</i>	x			a	Red-throated Caracara <i>Daptrius americanus</i>		u	x	x
Anhinga <i>Anhinga anhinga</i>	x			a	Crested Caracara <i>Polyborus plancus</i>	x			
Great Blue Heron <i>Ardea herodias</i>	x				Yellow-headed Caracara <i>Milvago chimachima</i>	x			x
Cocoi Heron <i>Ardea cocoi</i>	x			a	Laughing Falcon <i>Herpetotheres cachinnans</i>		u	x	x
Great White Egret <i>Casmerodius albus</i>	x			a	Barred Forest-Falcon <i>Micrastur ruficollis</i>			x	x
Snowy Egret <i>Egretta thula</i>	x			a	American Kestrel <i>Falco sparverius</i>	x	x	x	a
Little Blue Heron <i>Florida caerulea</i>	x				Bat Falcon <i>Falco rufigularis</i>	x	u	x	x
Striated Heron <i>Butorides striatus</i>	x			a	Alpomado Falcon <i>Falco femoralis</i>	x		x	
Cattle Egret <i>Bubulcus ibis</i>	x			a	Chestnut-winged Chachalaca <i>Ortalis garula</i>	x			a
Capped Heron <i>Pilherodius pileatus</i>	x			a	Colombian Chachalaca <i>Ortalis columbiana</i>		P	P	
Rufescent Tiger-Heron <i>Tigrisoma rufescens</i>	x				Crested Guan <i>Penelope purpurascens</i>				x
Fasciated Tiger-Heron <i>Tigrisoma fasciatum</i>				a	Wattled Guan <i>Aburria aburri</i>		x	x	
Wood Stork <i>Mycteria americana</i>	x			a	Blue-knobbed Curassow <i>Crax alberti</i>		P		x
Green Ibis <i>Mesembrinibis cayennensis</i>	x				Crested Bobwhite <i>Colinus cristatus</i>	x			a
Whispering Ibis <i>Phimosus infuscatus</i>	x				Marbled Wood-Quail <i>Odontophorus gujanensis</i>	x	x	x	x
Roseate Spoonbill <i>Ajaia ajaja</i>	x			a	Rufous-fronted Wood-Quail <i>O. erythrops</i>		u	x	
Northern Screamer <i>Chauna chavaria</i>	x			a	Limpkin <i>Aramus guarauna</i>	x			
White-faced Whistling-Duck <i>Dendrocygna viduata</i>	x				Grey-necked Wood-Rail <i>Aramides cajanea</i>	x			
Blue-winged Teal <i>Anas discors</i>	x				Purple Gallinule <i>Porphyrio martinica</i>	x			a
Turkey Vulture <i>Cathartes aura</i>	x	x	x	x	White-throated Crake <i>Laterallus albigularis</i>	x		x	
Lesser Yellow-headed Vulture <i>C. burrovianus</i>	x			a	Sungrebe <i>Heliornis fulica</i>		P		
Black Vulture <i>Coragyps atratus</i>	x	x	x	x	Sunbittern <i>Eurypyga helias</i>				x
King Vulture <i>Sarcoramphus papa</i>				x	Wattled Jacana <i>Jacana jacana</i>	x			a
Osprey <i>Pandion haliaetus</i>	x			a	Southern Lapwing <i>Vanellus chilensis</i>	x			a
Swallow-tailed Kite <i>Elanoides forficatus</i>		u	x	x	Collared Plover <i>Charadrius collaris</i>				a
White-tailed Kite <i>Elanus (caeruleus) leucurus</i>				a	Solitary Sandpiper <i>Tringa solitaria</i>	x			
Pearl Kite <i>Gampsonyx swainsonii</i>	x				Lesser Yellowlegs <i>Tringa flaviceps</i>	x			
Plumbeous Kite <i>Ictinia plumbea</i>	x			a	Greater Yellowlegs <i>Tringa melanoleuca</i>	x			
Double-toothed Kite <i>Harpagus bidentatus</i>				x	Spotted Sandpiper <i>Actitis macularia</i>	x			
Crane Hawk <i>Geranoospiza caerulescens</i>	x				Least Sandpiper <i>Calidris minutilla</i>	x			
Plumbeous Hawk <i>Leucopternis plumbea</i>				x	Large-billed Tern <i>Phaetusa simplex</i>	x			
White Hawk <i>Leucopternis albicollis</i>				x	Yellow-billed Tern <i>Sterna superciljaris</i>	x			
Gray-lined Hawk <i>Asturina nitida</i>				x	Black Skimmer <i>Rynchops nigra</i>	x			
Common Black Hawk <i>Buteogallus anthracinus</i>	x				Scaled Pigeon <i>Columba speciosa</i>		u	x	x
Great Black Hawk <i>Buteogallus urubitinga</i>	x				Pale-vented Pigeon <i>Columba cayennensis</i>	x	u		a
Savannah Hawk <i>Heterospizas meridionalis</i>	x			a	Feral Pigeon <i>Columba livia</i>	x			a
Black-collared Hawk <i>Busarellus nigricollis</i>	x				Eared Dove <i>Zenaida auriculata</i>	x		x	a
Roadside Hawk <i>Buteo magnirostris</i>	x			x	Ruddy Ground-Dove <i>Columbina talpacoti</i>	x	x	4	x

Species	1	2	3	4	Species	1	2	3	4
Common Ground-Dove <i>Columbina passerina</i>				a	Amazon Kingfisher <i>Chloroceryle amazona</i>				a
Plain-breasted Ground-Dove <i>Columbina minuta</i>				a	Rufous Motmot <i>Baryphthengus martii</i>				x
Blue Ground-Dove <i>Clavis pretiosa</i>			1		Barred Puffbird <i>Nystalus radiatus</i>		w	1	
White-tipped Dove <i>Leptoptila verreauxi</i>	x	x	4	x	Russet-throated Puffbird <i>Hypnelus ruficollis</i>	x			
Ruddy Quail-Dove <i>Geotrygon montana</i>				x	White-fronted Nunbird <i>Monasa morphoeus</i>			1	x
Violaceous Quail-Dove <i>Geotrygon violacea</i>				x	White-necked Puffbird <i>Notharchus macrorhynchus</i>				x
Olive-backed Quail-Dove <i>Geotrygon veraguensis</i>				x	Black-breasted Puffbird <i>Notharchus pectoralis</i>				x
Blue-and-yellow Macaw <i>Ara ararauna</i>	P				White-whiskered Puffbird <i>Malacoptila panamensis</i>				x
Scarlet Macaw <i>Ara macao</i>	P				White-mantled Barbet <i>Capito hypoleucus</i>			2	x
Chestnut-fronted Macaw <i>Ara severa</i>	x				Spot-crowned Barbet <i>Capito maculicoronatus</i>				x
Brown-throated Parakeet <i>Aratinga pertinax</i>	x			x	Red-headed Barbet <i>Eubucco bourcierii</i>			u	
Orange-chinned Parakeet <i>Brotogeris jugularis</i>	x			x	Crimson-rumped Toucanet <i>Aulacorhynchus haematopygus</i>			x	1
Saffron-headed Parrot <i>Pionopsitta pyrrhila</i>		u		x	Collared Aracari <i>Pteroglossus torquatus</i>	x	u	x	x
Blue-headed Parrot <i>Pionus menstruus</i>	x	x	x		Chestnut-mandibled Toucan <i>Ramphastos swainsonii</i>	x	x	x	x
Yellow-crowned Parrot <i>Amazona ochrocephala</i>	x			a	Citron-throated Toucan <i>Ramphastos citreolaemus</i>	P			x
Mealy Parrot <i>Amazona farinosa</i>	x			x	Olivaceous Piculet <i>Picumnus olivaceus</i>		w	4	
Red-lored Parrot <i>Amazona autumnalis</i>				x	Cinnamon Woodpecker <i>Celeus loricatus</i>				x
Orange-winged Parrot <i>Amazona amazonica</i>				x	Spot-breasted Woodpecker <i>Chrysomitris punctigula</i>	x			x
Squirrel Cuckoo <i>Piaya cayana</i>	x	x	x		Golden-oilve Woodpecker <i>Piculus rubiginosus</i>			u	
Greater Ani <i>Crotophaga major</i>	x				Golden-green Woodpecker <i>Piculus chrysochloros</i>				x
Smooth-billed Ani <i>Crotophaga ani</i>	x	x	x	x	White-throated Woodpecker <i>Piculus leucolaemus</i>				x
Groove-billed Ani <i>Crotophaga sulcirostris</i>				a	Lineated Woodpecker <i>Dryocopus lineatus</i>	x	u	x	
Striped Cuckoo <i>Tapera naevia</i>	x	x	x	a	Red-crowned Woodpecker <i>Melanerpes rubricapillus</i>	x		x	x
Barn Owl <i>Tyto alba</i>	P				Beautiful Woodpecker <i>Melanerpes pulcher</i>			x	x
Tropical Screech-Owl <i>Otus choliba</i>			x	x	Red-rumped Woodpecker <i>Veniliornis kirkii</i>	x		x	x
Mottled Owl <i>Ciccaba virgata</i>				x	Crimson-crested Woodpecker <i>Campephilus melanoleucos</i>			u	x
Spectacled Owl <i>Pulsatrix perspicillata</i>				x	Crimson-bellied Woodpecker <i>C. haematogaster</i>				x
Common Nighthawk <i>Chordeiles minor</i>	x				Strong-billed Woodcreeper <i>Xiphocolaptes promeropirhynchus</i>				x
Pauraque <i>Nyctidromus albicollis</i>			1	x	Plain-brown Woodcreeper <i>Dendrocincla fuliginosa</i>		1	3	x
White-collared Swift <i>Streptoprocne zonaris</i>	x	2	x	x	Long-tailed Woodcreeper <i>Deconychura longicauda</i>		w		
Chapman's Swift <i>Chaetura chapmani</i>				x	Olivaceous Woodcreeper <i>Sittasomus griseicapillus</i>		3	1	
Grey-rumped Swift <i>Chaetura cinereiventris</i>	x			x	Wedge-billed Woodcreeper <i>Glyphorhynchus spirurus</i>			1	x
Band-rumped Swift <i>Chaetura spinicauda</i>		x	x		Barred Woodcreeper <i>Dendrocolaptes certhia</i>				x
Ashy-tailed Swift <i>Chaetura andrei</i>				x	Straight-billed Woodcreeper <i>Xiphorhynchus picus</i>	x			x
Short-tailed Swift <i>Chaetura brachyura</i>	x	x	x		Black-striped Woodcreeper <i>Xiphorhynchus lachrymosus</i>			2	x
Lesser Swallow-tailed Swift <i>Panyptila cayennensis</i>			x		Red-billed Scythebill <i>Campylorhamphus trochilirostris</i>				1
Rufous-breasted Hermit <i>Glaucis hirsuta</i>				x	Streaked-headed Woodcreeper <i>Lepidocolaptes souleyetii</i>				x
Band-tailed Barbthroat <i>Threnetes ruckeri</i>				x	Pale-legged Hornero <i>Furnarius leucops</i>		x		
Green Hermit <i>Phaethornis guy</i>			7	6	Pale-breasted Spinetail <i>Synallaxis albescens</i>	x	1	3	a
Long-tailed Hermit <i>Phaethornis longirostris</i>	x	u		x	White-whiskered Spinetail <i>Synallaxis c. atrigularis</i>	x			
Pale-bellied Hermit <i>Phaethornis anthophilus</i>				x	Yellow-chinned Spinetail <i>Certhiaxis cinnamomea</i>	x			
Little Hermit <i>Phaethornis longuemareus</i>	x		2	x	Lineated Foliage-Gleaner <i>Syndactyla subalaris</i>			1	
White-necked Jacobin <i>Florisuga mellivora</i>				2	Slaty-winged Foliage-Gleaner <i>Philydor erythronotus</i>			3	1
Black-throated Mango <i>Anthracothorax nigricollis</i>	x	x		a	Ruddy Foliage-Gleaner <i>Automolus rubiginosus</i>			1	
Rufous-crested Coquette <i>Lophornis delattrei</i>			x	x	Buff-throated Foliage-Gleaner <i>Automolus ochrolaemus</i>			1	1
Green Thorntail <i>Popelaria conversii</i>			x		Streaked Xenops <i>Xenops rutilans</i>				x
Blue-tailed Emerald <i>Chlorostilbon mellisugus</i>	x	2	6	x	Plain Xenops <i>Xenops minutus</i>				x
Red-billed Emerald <i>Chlorostilbon gibsoni</i>				x	Tawny-throated Leaf-tosser <i>Sclerurus mexicanus</i>				x
Green-crowned Woodnymph <i>Thalurania fannyi</i>		5	12		Scaly-throated Leaf-tosser <i>Sclerurus guatemalensis</i>				x
Blue-chested Hummingbird <i>Amazilia amabilis</i>				x	Fasciated Antshrike <i>Cymbilaimus lineatus</i>			u	
Andean Emerald <i>Amizilia franciae</i>			2	x	Black-crested Antshrike <i>Sakesphorus canadensis</i>	x			
Rufous-tailed Hummingbird <i>Amizilia tzactl</i>	x		x	x	Antshrike <i>Thamnophilus sp</i>			u	x
Green-crowned Brilliant <i>Heliodoxa jacula</i>			1	4	Bar-crested Antshrike <i>Thamnophilus multistriatus</i>				x
Purple-crowned Fairy <i>Heliothryx barroti</i>			u	x	Western Slaty Antshrike <i>Thamnophilus atrinucha</i>				x
Long-billed Starthroat <i>Helioaster longirostris</i>			u	3	Checker-throated Antwren <i>Myrmotherula fulviventis</i>				x
Bronze-tailed Plumeteer <i>Chalybura urochrysis</i>				x					
Collared Trogon <i>Trogon collaris</i>				1					
Black-throated Trogon <i>Trogon rufus</i>			u	x					
Violaceous Trogon <i>Trogon violaceus</i>				x					
White-tailed Trogon <i>Trogon viridis</i>				x					
Ringed Kingfisher <i>Ceryle torquata</i>	x			x					
Green Kingfisher <i>Chloroceryle americana</i>	x			x					

Species	1	2	3	4	Species	1	2	3	4
White-flanked Antwren <i>Myrmotherula axillaris</i>				x	Rufous Mourner <i>Rhytipterna holerythra</i>		1	1	
Rufous-winged Antwren <i>Herpsilochmus rufimarginatus</i>				x	Dusky-capped Flycatcher <i>Myiarchus tuberculifer</i>	x		2	x
Dot-winged Antwren <i>Microrhophias quixensis</i>				x	Great Kiskadee <i>Pitangus sulphuratus</i>	x			a
White-fringed Antwren <i>Formicivora grisea</i>				x	Boat-billed Flycatcher <i>Megarhynchus pitangua</i>	x			
Plain Antwren <i>Dysithamnus mentalis</i>		2			Rusty-margined Flycatcher <i>Myiozetetes cayanensis</i>	1	x	1	x
White-fringed Antwren <i>Formicivora grisea</i>	x				Social Flycatcher <i>Myiozetetes similis</i>	x	x	x	
Parker's Antbird <i>Cercomacera parkeri</i>		u	x		Streaked Flycatcher <i>Myiodynastes maculatus</i>	x	x	x	x
Dusky Antbird <i>Cercomacra tyrannina</i>				x	Golden-crowned Flycatcher <i>M. chrysocephalus</i>		x		
Immaculate Antbird <i>Myrmeciza immaculata</i>		5	x		Piratic Flycatcher <i>Legatus leucophaeus</i>	x	w		a
Bare-crowned Antbird <i>Gymnocichla nudiceps</i>	x				Fork-tailed Flycatcher <i>Tyrannus savana</i>		x		
Chestnut-backed Antbird <i>Myrmeciza exsul</i>				x	Tropical Kingbird <i>Tyrannus melancholicus</i>	x	x	x	x
Bicolored Antbird <i>Gymnophithys bicolor</i>				x	Cinereous Becard <i>Pachyramphus rufus</i>		x	1	x
Spotted Antbird <i>Hylophylax naevioides</i>				x	Cinnamon Becard <i>Pachyramphus cinnamomeus</i>	x	w		x
Black-faced Antthrush <i>Formicarius analis</i>				x	White-winged Becard <i>P. polychopterus</i>	x			
Chestnut-crowned Gnatcatcher <i>Conopophaga castaneiceps</i>		1			Masked Tityra <i>Tityra semifasciata</i>		w	x	x
Rufous-vented Tapaculo <i>Scytalopus femoralis sp</i>				x	Black-crowned Tityra <i>Tityra inquisitor</i>				x
Golden-headed Manakin <i>Pipra erythrocephala</i>			1	x	White-winged Swallow <i>Tachycineta albiventer</i>	x			a
White-crowned Manakin <i>Pipra pipra</i>	x	4	x		Purple Martin <i>Progne subis</i>	x			
White-bearded Manakin <i>Manacus manacus</i>	6	1		x	Grey-breasted Martin <i>Progne chalybea</i>		w		
Striped Manakin <i>Machaopterus regulus</i>		5	x		Brown-chested Martin <i>Progne tapera</i>				a
Velvety Manakin <i>Pipra velutina</i>				x	Blue-and-white Swallow <i>Notiochelidon cyanoleuca</i>				a
Thrush-like Mourner <i>Schiffornis turdinus</i>				x	Southern Rough-winged Swallow <i>Stelgidopteryx ruficollis</i>	x	4	1	x
Blue Cotinga <i>Cotinga nattererii</i>		u	x		Barn Swallow <i>Hirunda rustica</i>	x	w		
Purple-throated Fruitcrow <i>Querula purpurata</i>		x		x	Cliff Swallow <i>Petrochelidon pyrrhonota</i>				x
Rufous Piha <i>Lipaugus unirufus</i>				x	Black-chested Jay <i>Cyanocorax affinis</i>				x
Sharpbill <i>Oxyruncus cristatus</i>			1		Black-capped Donacobius <i>Donacobius atricapillus</i>		x		
Golden-faced Tyrannulet <i>Zimmerius viridiflavus</i>		x	5		Bicoloured Wren <i>Campylorhynchus griseus</i>	x	w		x
Southern Beardless Tyrannulet <i>Camptosoma obsoletum</i>	x	x	x		Band-backed Wren <i>Campylorhynchus zonatus</i>		w		x
Brown-capped Tyrannulet <i>Ornithion brunneicapillum</i>				x	Stripe-backed Wren <i>Campylorhynchus nuchalis</i>	x			
Yellow-crowned Tyrannulet <i>Tyrannulus elatus</i>				x	Sooty-headed Wren <i>Thryothorus spadix</i>		3	6	
Yellow-bellied Elaenia <i>Elaenia flavogaster</i>	x	x	1	a	Buff-breasted Wren <i>Thryothorus leucotis</i>	x			
Lesser Elaenia <i>Elaenia chiriquensis</i>			x	1	Black-bellied Wren <i>Thryothorus fasciatoventris</i>				x
Olive-striped Flycatcher <i>Mionectes olivaceus</i>		3	5	x	Bay Wren <i>Thryothorus nigricapillus</i>				x
Ochre-bellied Flycatcher <i>Mionectes oleagina</i>			4	x	House Wren <i>Troglodytes aedon</i>	x	x	1	
Slaty-capped Flycatcher <i>Leptopogon superciliaris</i>		2	1		White-breasted Wood-wren <i>Henicorhina leucosticta</i>	x	1	x	x
Marble-faced Bristle-Tyrant <i>Pogonotriccus ophthalmicus</i>			1		Southern Nightingale-Wren <i>Microcerculus marginatus</i>			1	x
Yellow Tyrannulet <i>Capsiempis flaveola</i>			1		Song Wren <i>Cyphorhinus phaeocephalus</i>				x
Black-capped Pygmy-Tyrant <i>Myiornis atricapillus</i>				x	Tropical Mockingbird <i>Mimus gilvus</i>	x	x	5	
Scale-crested Pygmy-Tyrant <i>Lophotriccus pileatus</i>		4	x		Spotted Nightingale-Thrush <i>Catharus dryas</i>			1	
Common Tody-Flycatcher <i>Todirostrum cinereum</i>	x	x	1	a	Grey-cheeked Thrush <i>Catharus minimus</i>				1
Black-headed Tody-Flycatcher <i>T. nigriceps</i>				x	Swainson's Thrush <i>Catharus ustulatus</i>			9	6
Slate-headed Tody-Flycatcher <i>Todirostrum sylvia</i>	x			a	Pale-vented Thrush <i>Turdus obsoletus</i>				1
Olivaceous Flatbill <i>Rhynchocyclus olivaceus</i>				x	Long-billed Gnatwren <i>Ramphocaenus melanurus</i>		w		x
Ruddy-tailed Flycatcher <i>Terenotriccus erythrus</i>				x	Slate-throated Gnatcatcher <i>Poliopitila schistaceigula</i>				x
Yellow-margined Flycatcher <i>Tolomyias assimilis?</i>			x		Tawny-faced Gnatwren <i>Microbates cinereiventris</i>				x
Bran-coloured Flycatcher <i>Myiophobus fasciatus</i>	x	1			Rufous-browed Peppershrike <i>Cyclarhis gujanensis</i>				x
Black-tailed Flycatcher <i>Myiobius atricaudus</i>				x	Yellow-browed Shrike-Vireo <i>Vireolanius eximus</i>		w		
Olive-sided Flycatcher <i>Contopus borealis</i>		x	x		Yellow-throated Vireo <i>Vireo flavifrons</i>			u	x
Eastern Wood-Pewee <i>Contopus virens</i>	x	x	x		Red-eyed Vireo <i>Vireo olivaceus</i>			x	3
Tropical Pewee <i>Contopus cinereus</i>		u	4		Rufous-naped Greenlet <i>Hylophilus semibrunneus</i>		u	x	
Acadian Flycatcher <i>Empidonax virescens</i>		1			Shiny Cowbird <i>Molothrus bonariensis</i>	x			a
Black Phoebe <i>Sayornis nigricans</i>		x			Giant Cowbird <i>Scaphidura oryzivora</i>	x	w		
Vermillion Flycatcher <i>Pyrocephalus rubinus</i>	x				Crested Oropendola <i>Psarocolius decumanus</i>	x	w	x	a
Pied Water-Tyrant <i>Fluvicola pica</i>	x				Chestnut-headed Oropendola <i>Zarhynchus wagleri</i>		w	x	
White-headed Marsh-Tyrant <i>Arundinicola leucocephala</i>	x				Yellow-rumped Cacique <i>Cacicus cela</i>	x			a
Long-tailed Tyrant <i>Colonia colonus</i>	x			x	Yellow-hooded Blackbird <i>Agelaius icterocephalus</i>	x			
Cattle Tyrant <i>Machetornis rixosus</i>	x			a	Orange-crowned Oriole <i>Icterus auricapillus</i>		w	1	x
Bright-rumped Attila <i>Attila spadiceus</i>	x		1	x	Yellow Oriole <i>Icterus nigrogularis</i>	x	w		
					Baltimore Oriole <i>Icterus galbula</i>	x			
					Red-breasted Blackbird <i>Leistes militaris</i>	x			
					Black-and-white Warbler <i>Mniotilta varia</i>		1		

Species	1	2	3	4	Species	1	2	3	4
Golden-winged Warbler <i>Vermivora chrysoptera</i>		u	x		Lemon-rumped Tanager <i>Ramphocelus icteronotus</i>		w	x	a
Tennessee Warbler <i>Vermivora peregrina</i>	1	1	6		Summer Tanager <i>Piranga rubra</i>	x	x	3	
Tropical Parula <i>Parula pitiayumi</i>		u			Scarlet Tanager <i>Piranga olivacea</i>			x	
Yellow Warbler <i>Dendroica petechia</i>		x			Sooty Ant-Tanager <i>Habia gutturalis</i>		4		x
Blackburnian Warbler <i>Denroica fusca</i>			x	2	White-lined Tanager <i>Tachyphonus rufus</i>	x	1	3	a
Blackpoll Warbler <i>Dendroica striata</i>			u		White-shouldered Tanager <i>Tachyphonus luctuosus</i>		x	x	
Bay-breasted Warbler <i>Dendroica castanea</i>		x	x		Tawny-crested Tanager <i>Tachyphonus delatrii</i>				x
American Redstart <i>Setophaga ruticilla</i>		1	1		Scarlet-browed Tanager <i>Heterospingus xanthopygi</i>				x
Northern Waterthrush <i>Seiurus noveboracensis</i>		x			Dusky-faced Tanager <i>Mitrospingus cassinii</i>				x
Prothonotary Warbler <i>Protonotaria citrea</i>		4			Hooded Tanager <i>Nemosia pileata</i>	x			
Mourning Warbler <i>Opornis philadelphia</i>			x	7	Black-faced Tanager <i>Schistochlamys melanopsis</i>				x
Canada Warbler <i>Wilsonia canadensis</i>		1			Blue-black Grosbeak <i>Cyanocompsa cyanoides</i>		1	3	x
Slate-throated Whitestart <i>Myioborus miniatus</i>		5	1		Buff-throated Saltator <i>Saltator maximus</i>		x	3	x
Rufous-capped Warbler <i>Basileuterus rufifrons</i>		1	3		Black-winged Saltator <i>Saltator atripennis</i>			x	2
Three-striped Warbler <i>B. tristriatus subsp</i>		4	x		Greyish Saltator <i>Saltator coerulescens</i>	x	w	x	x
Buff-rumped Warbler <i>Basileuterus fulvicauda</i>		x	w	x a	Streaked Saltator <i>Saltator albicollis</i>			3	11
Bananaquit <i>Coereba flaveola</i>				a	Slaty Grosbeak <i>Pitylus grossus</i>		w		2
Purple Honeycreeper <i>Cyanerpes caeruleus</i>			w	x x	Rose-breasted Grosbeak <i>Pheucticus ludovicianus</i>		x		1
Green Honeycreeper <i>Chlorophanes spiza</i>			x	6 x	Black-headed Brush-Finch <i>Atlapetes atricapillus</i>		w		
Blue-hooded Euphonia <i>Euphonia musica</i>				x	Chestnut-capped Brush-Finch <i>A brunneinucha</i>			5	x
Orange-bellied Euphonia <i>Euphonia xanthogaster</i>			1		Black-striped Sparrow <i>Arremon conirostris</i>		u	x	a
Thick-billed Euphonia <i>Euphonia laniirostris</i>		x	x	6 x	Dull-coloured Grassquit <i>Tiaris obscura</i>			x	16
Speckled Tanager <i>Tangara guttata</i>				x 5	Lesser Seedfinch <i>Oryzoborus angolensis</i>		x		x
Blue-necked Tanager <i>Tangara cyanicollis</i>				x 2	Large-billed Seedfinch <i>Oryzoborus crassirostris</i>			1	21
Golden-hooded Tanager <i>Tangara larvata</i>		x	x	x x	Slate-coloured Seedeater <i>Sporophila schistacea</i>		x		x
Bay-headed Tanager <i>Tangara lavinia</i>				x 2	Yellow-bellied Seedeater <i>Sporophila nigricollis</i>			11	58 x
Blue-grey Tanager <i>Thraupis episcopus</i>		x	x	5 x	Ruddy-breasted Seedeater <i>Sporophila minuta</i>		x		a
Palm Tanager <i>Thraupis palmarum</i>		x	x	6 x	Blue-black Grassquit <i>Volatina jacarina</i>		x	14	13 x
Crimson-backed Tanager <i>Ramphocelus dimidiatus</i>		4	2	14 x	Saffron Finch <i>Sicalis flaveola</i>		x		

## Appendix 2: Work in Tambito Nature Reserve; 23 – 26 July 2000

(extract from an article in press to appear in Neotropical Notebook, Cotinga 16).

### Recent records from Tambito Nature Reserve and Munchique National Park, southwest Colombia.

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The authors, researching as part of Colombian EBA Project, spent a total of four days (24-27 July 2000) investigating sites at Tambito Nature Reserve and southern border of Munchique National Park (c.02°30'N 77°00'W; 2,200-2,800 m) on both slopes of the Western Cordillera, Dpto. Cauca, Colombia. Observations complement data collected from 1500 - 2200 m elevation in 1997 and 1998, with some additions to Donegan and Dávalos (1999) noted below.

#### Brown-bellied Swallow *Notiochelidon murina*

Previously known from the Western Cordillera only from the northern tip in Dpto. Antioquia (Hilty and Brown 1986), c. 530 km north of Munchique. A pair were observed near the Inderena Cabin (2200 m on 6 July 1997 by TD), and a flock of 100+ observed at Cerro Munchique (c. 3000 m on 24 July 2000 by all authors). *N. murina* may have colonised the area recently as surveys by S. Hilty and others in the 1980s apparently did not locate the species.

#### Grey-headed Dove *Leptoptila plumbeiceps*

In Colombia, known only from the Río Cauca and Dagua valleys, mostly at 1000-1800 m elevation, although once in the Central Andes to 2400 m (Hilty and Brown 1986). In dry mature secondary forest below Cerro Munchique (2400 m), TD and JCL observed an individual on the El Tambo road, presenting a local elevation extension.

#### Other new records for the reserve

The following species were also observed in Tambito, which did not appear on the reserve's checklist in Cotinga 12: Greater Scythebill *Campylorhamphus pucheranii*; Green Jay *Cyanocorax yncas*; Sepia-brown Wren *Cimycerthia peruana*; Red-hooded Tanager *Piranga rubriceps*; Golden-crowned Tanager *Iridosornis porphyrocephala*; and Black-capped Hemispingus *Hemispingus atropileus*. A total of 319 species have now been recorded in the reserve.

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## Appendix 4: Accounts of Colombian EBA Project 2000-2001

<b>Income</b>	
AS Butler CT	100
Percy Sladen Memorial Fund	500
Lindeth CT	200
Duke of Edinburgh	500
World Pheasant Association	200
Kilverstone Wildlife Trust	2000
Albert Reckitt CT	750
Personal Contributions	1500
Anonymous Donation	2000
Compensation for Barclays Bank mistake	50
British Airways / World Pheasant Association (Free Flight)	
Interest on Bank account	10
<b>TOTAL</b>	<b>7810</b>

### less EXPENDITURE in July – August 2000

Air flight (1 x 600 + 50 tax)	650*
Equipment	200
<b>Fieldwork in Churumbelos</b>	
Photographic	100
Food in Field (3 persons, 7 days)	150
Internal transport (Medellín – Mocoa and back)	250
Local transport	100
<b>Fieldwork in Tambito / Munchique</b>	
Insurance	100
Internal Transport	250
Local transport	200
Food in field (5 persons, 6 days)	250
Extra equipment	150
Accommodation	50
<b>Total</b>	<b>2450</b>

### **HELD FOR 2001 EXPEDITION FIELDWORK 5360**

### less EXPENDITURE in February – April 2001

Air flights (2.5 x 400 + 50 tax)	1125**
Equipment	480
Insurance	100
Photographic	370
Food in Field (30 days)	850
Pre-expedition reconnaissance trip (transport +food)	900
Internal transport (Medellin – Santa Rosa and back)	215
Local transport (hire of jeeps for 6 days)	950
Post-expedition expenses (work in museums etc)	220
Production of reports	150
<b>Total</b>	<b>5360</b>

### **BALANCE 0**

\* In 2000, British Airways paid for a free flight for Thomas Donegan

\*\* In 2001, the expedition paid for flights for Thomas Donegan and Javier Bustos. Proyecto *Ognorhynchus* paid for 50% the cost of Paul Salaman's ticket as he conducted work on that project before and after the expedition. Thomas Donegan, 20/4/2001