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# COLOMBIAN EBA PROJECT REPORT SERIES No. 4



## COLOMBIAN EBA PROJECT: SEARCH FOR THE MAGDALENA TINAMOU



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This project took place with the kind support of:



The purpose of this project was to uncover evidence concerning one of the world's most threatened species, the Magdalena Tinamou *Crypturellus saltuarius*, from a combination of anthropogenic and biological fieldwork. The species had gone unrecorded since 1943. Nothing was known of its ecology and the species was considered perhaps already to be extinct.

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## 2. PARTICIPANTS

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### Research team

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## 3. COLOMBIAN EBA PROJECT

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Colombian EBA Project is the name of an ongoing Anglo-Colombian research and conservation initiative which started in 1997 and has since led to the creation of a new national park in Serranía de los Churumbelos, Cauca; the first ever biological surveys from Serranía de San Lucas, perhaps the greatest 'gap' in our knowledge of South American flora and fauna; the discovery of two new bird species for science, and many other exciting discoveries, publications and conservation outputs.

Colombian EBA Project is known in Colombia as *Proyecto EBA Colombia* and is an investigative programme of Fundación Proaves.

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## 4. EXECUTIVE SUMMARY

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Magdalena Tinamou *Crypturellus saltuarius* is among the most poorly-known and endangered taxa in the world, assigned “Critical” status by *BirdLife International*. It was described from a single specimen collected in the western foothills of Colombia’s East Andes in 1943 and has not been seen since. An old record from 1786 also refers to this species. With no records in almost 60 years, biologists and conservationists crucially lacked any information on *C. saltuarius*’ status, ecology, vocalisations, distribution and threats before this project.

Our objective was to search for the Magdalena Tinamou in remaining forest patches, with a view to initiating protective measures. We set out to achieve this by (i) studying satellite maps of the region to pinpoint areas of the study region where habitat is still extant; (ii) conducting interviews with local people; and (iii) undertaking a rapid biological assessment of the region.

From satellite data and our own observations, we found that the foothill elevations of the western slope of the Cordillera Oriental of the Andes, in which *Crypturellus saltuarius*’ type locality, Ayacucho (200 m), is situated, have largely been deforested and turned over to pasture from 100 to 1000 m elevation, with very few remaining patches of even secondary forest.

We conducted interviews and distributed over 500 posters in the various towns and settlements in our study region, located in the Departments of Cesar, Norte de Santander and Santander in the Magdalena Medio region of northern Colombia. In our interviews, an overwhelming majority of people did not identify *C. saltuarius*. However, in southern Cesar and Norte de Santander, 5 people provided us with good descriptions. Information from these interviews provides strong evidence of the species’ continued existence into the 1980s and early 1990s at least. Reports from interviews suggest that the preferred habitat of the Magdalena Tinamou is forested areas located in the foothills of the west slope of Colombia’s Eastern Cordillera. The species perhaps also inhabits foothill forest on the east slope of Colombia’s Western Andes in the Serranía de San Lucas. The Tinamou’s call, a trisyllabic “soy so-la” was described by several hunters, as was the species’ dawn and dusk activity, typical of the genus.

During biological surveys at six sites located in the Magdalena Valley lowlands and adjacent East Andes, we failed to locate *C. saltuarius*. However, this does not necessarily mean that the species is extinct as our biological surveys were restricted to sub-optimal habitats. Land of suitable elevation in the region from which most recent reports of this species originate, above Ayacucho and Pelaya, has largely been deforested, and the few remaining forest patches are currently considered too dangerous to study due to ongoing conflict between guerrilla and paramilitary groups.

In addition to the new information about *C. saltuarius*, a wealth of new distributional and ecological information about 332 bird species was collected from the Magdalena Medio, a region which has not been surveyed since the 1940s. Important new localities were noted for 12 Threatened and Near-Threatened species including the critically endangered Gorgeted Wood-Quail *Odontophorus strophium*, the endangered Antioquia Bristle-Tyrant *Phylloscartes lanyoni* and the endangered Black Inca *Coeligena prunellei*. Two new bird species for Colombia, Barbary Dove *Streptopelia risoria* and White-tipped Swift *Aeronautes montivagus* were confirmed photographically. A comprehensive entomological collection was also compiled during our fieldwork, containing over 150 butterfly species.

Although we did not rediscover the Magdalena Tinamou, this research project was successful in collating much new information about the ecology of the species and threats to it and in collating much new data relating to the other poorly-known and threatened species from this little-studied region of northern Colombia.

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## 5. SUMARIO EJECUTIVO

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El Tinamú del Magdalena *Crypturellus saltuarius* se encuentra entre las especies de aves más desconocidas y amenazadas del mundo, por lo que está considerada en estado “crítico” por BirdLife International. Esta especie fue descrita de un único espécimen colectado en el piedemonte occidental de la Cordillera Oriental de los Andes colombianos en el año de 1943, la cual desde entonces no ha sido vista. Existe además, un registro más antiguo sobre esta especie del año de 1786. Anterior a la realización de este proyecto, y por casi 60 años, biólogos y conservacionistas carecían de información básica sobre el estatus de *C. saltuarius*, su ecología, vocalizaciones, distribución y amenazas.

Nuestro objetivo principal fue buscar al Tinamú del Magdalena en pequeños parches de bosque, con el propósito de iniciar medidas de protección para la especie. De acuerdo con este objetivo, nuestra metodología consistió en (i) estudiar mapas satelitales para escoger algunas áreas de la región de estudio según los hábitats existentes; (ii) hacer entrevistas con la población local; y (iii) desarrollar una investigación biológica rápida de la región.

Datos satelitales y observaciones propias, muestran que los piedemontes donde se encuentra la localidad del espécimen tipo de *Crypturellus saltuarius* cerca de Ayacucho (200 m), han sido considerablemente deforestados y convertidos a pastizales desde los 100 hasta los 1000 m de elevación, con muy pocos parches de bosques, incluso de bosques secundarios.

Se realizaron entrevistas y se distribuyeron más de 500 afiches en varias poblaciones de la región de estudio, localizada en los Departamentos de Cesar, Norte de Santander y Santander en el Magdalena Medio del norte colombiano. Durante las entrevistas se observó que la mayoría de la gente no identifica a *C. saltuarius*. Sin embargo, en el sur del Cesar y en Norte de Santander, 5 personas de las entrevistadas, hicieron buenas descripciones de la especie. La información obtenida en estas entrevistas muestra una fuerte evidencia de que la especie no fue extinta hasta los años 1980s o primeros de los 1990s. Además, estos sugieren que el hábitat preferido del Tinamú del Magdalena son los bosques localizados en el piedemonte de la vertiente occidental de la Cordillera Oriental de Colombia. Posiblemente, esta especie tal vez se encuentra también en la vertiente oriental de la Cordillera Central en la Serranía de San Lucas (Bolívar). El canto del Tinamú, fue descrito como un trisilábico “soy sola”, y su actividad durante el amanecer y crepúsculo fue descrita por varios cazadores, esta última siendo típica de su género.

Durante investigaciones biológicas realizadas en seis sitios localizados en el valle del Magdalena y la Cordillera Oriental, no encontramos al *C. saltuarius*; esto no significa necesariamente que la especie esté extinta, pues las investigaciones hechas estuvieron restringidas a hábitats poco óptimos para la especie. Muchas de las localidades cercanas a los municipios de Ayacucho y Pelaya, ubicadas en la elevación donde ha sido registrada la especie y son la más conveniente para ella, han sido muy deforestadas y los relictos de bosque aún existentes, representan un grado alto de peligro para ser estudiados, pues allí se encuentran actualmente en conflicto grupos al margen de la ley como guerrilla y paramilitares.

Además de la nueva información obtenida sobre *C. saltuarius*, se consiguieron datos ecológicos y distribucionales sobre 322 especies de aves que fueron encontrados en el Magdalena Medio, el cual no había sido estudiado desde los 1940s. También fueron registradas nuevas localidades para 12 especies de aves considerados como Amenazadas, incluyendo a la perdiz santandereana *Odontophorus strophium* (crítica), al mosquerito antioqueño *Phylloscartes lanyoni* (amenazado) y al Inca Negro *Coeligena prunellei* (amenazado). Dos especies de aves fueron registradas fotográficamente para la primera vez en Colombia: la tórtola de collar *Streptopelia risoria* y el vencejo *Aeronautes montivagus*. Se realizó además, una colección entomológica durante el trabajo de campo, que contiene más de 150 especies de lepidópteros.

Aunque no se consiguió redescubrir al Tinamú del Magdalena, este proyecto fue exitoso pues se colectó una gran cantidad de nueva información sobre la ecología y amenazas de esta especie, y se obtuvo novedosa información sobre otras especies desconocidas y amenazadas de esta región poco estudiada del norte de Colombia.

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## 6. ACKNOWLEDGEMENTS

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### Institutional Support

**Fundación Proaves Colombia** is an institution which supports bird fieldwork and conservation projects in Colombia, and supported the project at all stages. Fundación Proaves provided us with web space for material relating to the project ([www.proaves.org](http://www.proaves.org)). Many thanks are due to Alex Cortés and Paul Salaman.

**Corporación Autónoma Regional para la Defensa de la Meseta de Bucaramanga (CDBM)** (with thanks to Hernando Guevara Pineda), **Corporación Autónoma Regional del Cesar (Corpocesar)**, and **Corporación Autónoma Regional de la Frontera Nororiental (CORPONOR)** (with thanks to Luis Alberto Lopéz and Emilio Ascanio Lobo) are all environmental agencies with jurisdiction over fieldwork permissions in different parts of our study area. Particular thanks are due to CDBM for encouraging Elkin Briceño to work with us in the field and to Corpocesar for providing us with accommodation at their headquarters in Aguachica, and to all for their enthusiasm, assistance and logistical advice. **Corporación Autónoma Regional del Cauca (CRC)**, another regional governmental environmental agency was of great assistance to the project in helping to obtain ornithological field equipment and the support of the other Corporaciones. Much thanks are due to Luis Alfonso Ortega.

The **Royal Geographical Society** is a learned society based in London which supports research, education and training, together with the wider public understanding and enjoyment of Geography. They generously approved and supported the project.

**Conservation International Colombia** is the Colombian branch of Conservation International, a conservation NGO, who provided funding for botanical aspects of the project.

Special thanks are also due to Dr. Mark Mulligan (**Department of Geography, Kings College, London**) who was of great assistance at the planning stage of the expedition and to Prof. Julian Salazar at the **Museo de Historia Natural, Universidad de Manizales** who received and helped identify the entomological collection.

### Sponsors

We were given financial sponsorship by the Royal Geographical Society, the Duke of Edinburgh and Conservation International Colombia, with personal donations by UK expedition members. Much of the fieldwork equipment was inherited from previous Colombian EBA Project fieldwork.

### Individuals

#### Logistical assistance:

We are particularly indebted to the staff of the Alcaldías (Mayoral offices) and UMATAMs (farmers and minors unions) of Pelaya (Cesar) and San Vicente de Chucurí (Santander), for assistance with maps, logistical advice, contacts and other help to the project.

#### Scientific assistance

Methodologies for the project and post-project discussions and conclusions were developed with the assistance of many people, including the following: Prof. F. Gary Stiles (Instituto de Ciencias Naturales, Universidad Nacional, Colombia), Dr. Dan Brooks (Cracid Specialist Group), Julián Salazar (Universidad de Manizales), David Wege (BirdLife International), Andrés Cuervo (University of Puerto Rico), Carlos Daniel Cadena (University of Missouri), Bernabé Lopez-Lanus and many members of the NEOORN-L email list on which an interesting discussion on Tinamou capture was conducted.

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## 7. BACKGROUND

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Magdalena Tinamou *Crypturellus saltuarius* is among the most poorly-known and endangered taxa in the world, assigned “Endangered / Extinct” status by Collar *et al.* (1992), and “Critical” status by BirdLife International (2000), with speculation of its extinction appearing in various websites and popular publications. It was described from a single specimen - probably an immature bird - collected in the western foothills of Colombia’s East Andes or Cordillera Oriental in Ayacucho, southern Dpto. Cesar on 9 June 1943 (Collar *et al.* 1992). A male Tinamid specimen taken during Expedición Botánica on 11 August 1786 by Fray Diego Garcia from Chiminá Feligresia, Mariquita on the eastern slope of the Central Andes in Dpto. Neiva (05°12’N; 74°53’W, 500 m: Renjifo *et al.* 2002) also refers to this species. Although today’s location of the 1786 specimen is unknown, detailed notes on plumage, measurements and sexing taken by Garcia have recently been published (Mantilla and Díaz 1992). With only two records over 150 years apart, and with no records in almost 60 years, biologists and conservationists crucially lacked any information on *C. saltuarius*’ status, ecology, vocalisations, distribution and threats.

The war which has deterred and impaired fieldwork in Colombia started in 1947, just 4 years after the discovery of the Magdalena Tinamou. The period known as “la violencia” was soon followed by over 40 years of guerrilla - government conflict, and, in the last decade, with the rise of paramilitary groups (see further Dávalos, 2001). Throughout this period to the present day, the region of the type locality, the Magdalena Medio, has been regarded as a ‘no-go area’. Despite the complex political situation, the first ornithological surveys in decades took place in the middle Magdalena Valley during the mid 1990s to early 2000s (Stiles *et al.* 1999; Salaman *et al.* 2002). However, the upper Magdalena Valley north of Bucaramanga and the west slope of the Eastern Andes north of the Department of Boyacá had barely been surveyed since the discovery of *C. saltuarius* in the 1940s.

Because it has been considered that very little forest remains in the region in which it was first found, the Magdalena Tinamou has been considered Extinct by various conservation organisations in the past. However, prior to our studies, no field evidence could substantiate or refute these claims. BirdLife International (2000) considered that two major priorities for conservation of the species were (i) to locate any surviving forest patches using aerial photographs and (ii) to search for it in suitable parts of the Ayacucho region.

The objective of this project was therefore to search for the Magdalena Tinamou in remaining forest patches, with a view to initiating protective measures. We set out to achieve this by:

- studying satellite maps of the region to pinpoint areas of the study region where forest is still extant;
- verifying satellite forest cover information with observations from the field;
- conducting interviews with local people to gather information about the species;
- raising awareness of the need to conserve the Magdalena Tinamou amongst local people with posters, leaflets and talks;
- formulating an assessment of the Magdalena Tinamou’s ecological needs; and
- undertaking a botanical assessment of the region.

We also set out to compile valuable ecological and distributional information based on an inventory of other bird, plant and butterfly species present in the study region.



## 8. JUSTIFICATION

The study region of the Magdalena Medio is of international importance to conservation for the following reasons:

**Conservation priority.** The remaining forests of the upper Magdalena Valley comprise some of the most endangered habitats in the world. The Nechí lowlands Endemic Bird Area and Colombian Inter-Andean Slopes Endemic Bird Area, which characterise the region, are both identified by BirdLife International as Critical Priorities.

**Poorly known.** EBA Project fieldworkers recently conducted surveys around Serranía de San Lucas in the middle part of the valley (Salaman *et al.* 2002) and by Universidad Nacional researchers further south in Dpto. Boyacá in the 1990s (Stiles *et al.* 1999). However the upper eastern region of the Magdalena Valley, where the Magdalena Tinamou was considered most likely to occur, had not been surveyed for birds since the discovery of the Tinamou in 1943.

**Threats:** a government-sponsored colonisation programme in the 1960s and 1970s led to most of the Magdalena Valley being deforested (Stiles *et al.* 1999).

**Unprotected:** there are no national parks or nature reserves in the upper Magdalena Valley.

## 9. ITINERARY

**International travel:** Flights from London to Bogotá.

**Internal travel:** Public buses from Bogotá to Bucaramanga and to municipal capitals near study sites. Locally-hired jeeps and mules for access to study sites.



**Accommodation:** Cheap hostels used in towns and tents in the field with several large tarpaulin / plastic sheets to keep the campsite and cooking area dry.



**Food:** Main staples (rice, spaghetti, lentils, beans and tuna), supplemented by local fresh food. An MSR stove powered with gasoline was used for cooking and heating.

**Safety:** BH has a Red Cross diploma in First Aid.

### Part 1: Preliminary assessment to Southern Cesar in January 2002

5 January 2003: team meets in Bogotá

6-7 January 2003: journey Bogotá - Tunja - Bucaramanga by bus.

8 January 2003: Meetings with CDMB in Bucaramanga.

9 January 2003: Interviews in San Martín, Aguachica, La Gloria

10 January 2003: Fieldwork at Corpocesar (a.m.); interviews in Pelaya, Ayacucho, La Mata (p.m.)

11 January 2003: Fieldwork at Corpocesar (a.m.); interviews in Pelaya, San Bernado (p.m.)

11 - 14 January 2003: Fieldwork at La Tapia and Ciénaga Sahaya

15 January 2003: Fieldwork at Corpocesar (a.m.); interviews in La Mata, Besote; to Ocaña (p.m.)

16 January 2003: Interviews in Ocaña, La Playa, Río de Oro, Los Estoraques.

17 - 20 January 2003: Fieldwork in Agua de la Virgen

21-26 January 2003: Various meetings in Bucaramanga and Bogotá.

**Part 2: Fieldwork in Santander in December 2002 - January 2003**

30 December 2002: Team meets in Bogotá, organises logistics

2 January 2003: Internal flight (TD, BH) and buses (JJA) to Bucaramanga.

3 January 2003: Bus to San Vicente de Chucurí, fieldwork at Parque Miraflores (p.m.)

4 January 2003: Fieldwork at Parque Miraflores (a.m.). Interviews in San Vicente (p.m.)

5 - 9 January 2003: Fieldwork at El Talisman

10 January 2003: Interviews in San Vicente de Chucurí

11 - 15 January 2003: Fieldwork in Cerro de la Paz

16 January 2003: Further interviews in San Vicente

17 January 2003: Meetings in Bucaramanga

18 January 2003: Return to Bogotá

19 - 21 January 2003: Various meetings in Bogotá

Below: Map of Study Area (by Paul Salaman)



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## 10. STUDY SITE DESCRIPTIONS

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We undertook fieldwork and interviews in two areas of the Magdalena Medio region. In January 2002, we studied sites in southern Cesar and Norte de Santander departments, in the region of the type locality of *Crypturellus saltuarius* - where the last record of the species was made. In January 2003, we studied sites in the Cerro de la Paz and Serranía de los Yariquíes, Santander, the region which satellite maps revealed to contain most lowland forest in the possible range of *Crypturellus saltuarius*.

### 1. Towns and settlements in which interviews were conducted

We conducted interviews in the following settlements (see Fig. 1): in Dpto. Cesar, Aguachica, Ayacucho, Besote, La Gloria, La Mata, Pelaya, Río de Oro, San Bernado and San Martin; in Dpto. Norte de Santander, Agua de la Virgen, Ocaña and La Playa; in Dpto. Santander in San Vicente de Chucurí, Siberia and Montebello; also in Dpto. Bolívar in the San Pablo and Santa Rosa del Sur region in April 2001.

### 2. Study Sites for Biological Fieldwork

The expedition established a total of six fieldwork study sites at various points within the postulated range of *Crypturellus saltuarius*.

**Cienaga Sahaya and La Tapia** (Municipio Pelaya, Dpto Cesar, c. 08°42'N; 73°47'W, 100 m; 11-14 January 2002). We made observations around Cienaga Sahaya, a huge natural lake formed by the meandering adjacent Río Magdalena, located to the west of the small town of San Bernado. We surveyed small forest regions and aquatic habitats adjacent to the cienaga. La Tapia is a farm bordering Cienaga Sahaya on which we studied a small and heavily degraded forest patch, grazed regularly by a cattle herd. The forest patch was located c. 1 km from the Río Magdalena and c. 800 m from the Cienaga. Despite its small size and heavily disturbed understorey, this site constitutes one of the largest forest patches in the lowlands of south Cesar. Trees rose to c. 20m, and were mostly bare of epiphytes. The forest was characterised by a very sparse understorey and thick canopy, typical of secondary growth of perhaps 30 - 40 years of age at this elevation. Conditions were extremely hot (30°C minimum nightly temperature, rising to 38-40°C by day) with a high abundance of mosquitoes.



Above: Cienaga Sahaya

**Corpocesar, Aguachica** (Municipio Aguachica, Dpto. Cesar, c. 08°19'N; 73°38'W, 350 m, 10 - 11 & 15 January 2002). Corpocesar's southern headquarters are located on the outskirts of Aguachica, 3 km north of the town centre on the Magdalena Troncal. We studied a typically narrow belt of low secondary growth (canopy of 8 m; non-deforested area perhaps 60 m diameter at widest point) which followed a dry stream valley, c. 1 km east of Corpocesar's headquarters.

**Agua de la Virgen** (Municipio Ocaña, Dpto Norte de Santander, c. 08°13'N; 73°24'W, 1600 - 1750 m, 17 - 20 January 2002). At Agua de la Virgen, a patch of primary forest has been preserved since 1711 when a woodcutter discovered a purported image of the Virgin Mary in a tree trunk he was felling. A church (see photo below) was established on the site of the discovery, and, in 1906, the occurrence was declared a miracle by Pope Pius X (Rodríguez 1980: see photos below). Hunting and cutting trees have been prohibited for over two centuries. This primary premontane cloud forest constitutes the best preserved forest in the 2002 study region, although at an unlikely high elevation for *Crypturellus saltuarius*. The forest is characterised by strong lateral winds and regular, though not daily, ground-level ground cover. Bamboo *Carrizo gramineae* and lianas were prevalent. The canopy was broken, with the highest trees perhaps 20 m high. Our camp and study area were located in secondary forest c. 100 m elevation above the church, and situated just below the western / eastern slope ridge of the Cordillera.

Right: Agua de la Virgen church, showing forest behind.



Above: the story of Agua de la Virgen. From left: (i) woodcutter at work; (ii) the discovery of the effigy of the Virgin Mary; (iii) taking the relic to Ocaña; (iv) showing it to the people there; (v) pilgrimages.

**Parque Miraflores** (Municipio San Vicente de Chucurí, Dpto Santander, 06°52'53"N 73°24'51"W, 750 m, 2-3 January 2003). Abutting the east of San Vicente de Chucurí's town centre is a municipal park. In order to assist the local mayoralty with ecotourism plans, due to the potential for establishing a botanical gardens at the site, we produced the first bird and insect inventory of this small woodland, which is largely dominated by exotic ornamental vegetation.



Above: Parque Miraflores

**Montebello, Cuchilla (Serranía) de la Paz** (Above Montebello, Municipio Zapatoca, Dpto. Santander, 6°58'30"N; 73°25'40"W; 1000 m, 12 - 15 January 2003). Montebello is an historic estate established in the 1840s by German commercialist Geo von Lenguerke, whose business interests led to San Vicente de Chucurí first becoming an important economic region. We followed a trail ascending from Montebello (c. 800 m) into the Cuchilla de la Paz, and established a camp site on the eastern slope of the Cuchilla at 1000 m elevation, approximately half way between the settlements of Montebello and Matecacao. The site was dominated by lowland tree species, with many trees over 2.5 m diameter at breast height, and rising to over 25 - 30 m height. The understory was thicker than that at La Tapia, but still reasonably low and sparse. Huge lianas were also prevalent, with some over 0.5 m diameter. Again, our site was located on steep slopes within primary forest. Being good quality lowland forest in the Magdalena Valley, we considered this forest to be of extremely high conservation value, although deforestation pressure for fine woods and coca farming appear to be escalating alarmingly.



Above: Cerro de la Paz study site and an enormous tree typical of those found at this site.

**El Talisman and the Camino de Lenguerke, Serranía (Cuchilla) de los Yariguíes (Cobardes).** (Municipio San Vicente de Chucurí, Dpto Santander, 6°50'57"N; 73°21'51"W, 2000 m, 5 - 9 January 2003). Serranía de los Yariguíes is an isolated spur of Colombia's Eastern Cordillera, rising from the Magdalena Valley to páramo habitat. It extends to 500,000 ha in area, of which 38% remains intact with forest, 26% is farmed for crops (mostly coffee and cocoa) and 35% is pasture (Gutiérrez, 2002). An historic stone trail (see below) traverses the Serranía de los Yariguíes from Montebello, through San Vicente de Chucurí to Zapatoca. The trail was laid by slaves of Geo von Lenguerke in the 1840s, but subsequently fell into disuse and became overgrown. The trail was recently re-opened following a grant by the Colombian tourist board, and is now used for recreational purposes by walkers and hunters. Above a small farm called Siberia (1380 m), the trail ascends rapidly, and at c. 1650 m elevation starts to enter forest. We located a campsite at 2000 m elevation, located immediately below one of the "*Tetas de San Vicente*" along a ridgetop below Finca El Talisman. The forest was cool and humid with frequent ground-level cloud. Due to the steep slopes, the average canopy height was c. 12 m, with emergent trees rising to 15 m. We concentrated our studies on the area west of El Talisman within forest along the Camino de Lenguerke. The site was characterised by extremely steep slopes either side of the trail and was located in primary montane forest, with secondary areas around El Talisman also subject to observations.



Above: The Camino de Lenguerke and Serranía de los Yariguíes.

**Table 1:** Summary of location and field effort information for each study site

Location	Co-ordinates	Altitude	Life Zone	Days at site	Forest type	When studied
La Tapia	08°42'N; 73°47'W	100 m	Magdalena Valley	4	Lowland secondary growth	2002
Corpocesar	08°19'N; 73°38'W	350 m	West slope of E Andes	3	Lowland secondary growth	2002
Agua de la Virgen	08°13'N; 73°24'W	1,500 m	Ridge / east slope of E Andes	4	Upper Premontane humid [cloud] forest	2002
Miraflores	06°52'53" N 73°24'51" W	750 m	West slope of Srra de los Yariguíes; west slope of E Andes	2	Lowland forest of ornamental vegetation	2003
Montebello	06°58'30"N; 73°25'40"W	1,000 m	East slope of Cerro de la Paz, western foothills of E Andes	5	Dry lowland forest	2003
El Talisman	06°50'57"N; 73°21'51"W	2,000 m	West slope of Srra de los Yariguíes; west slope of E Andes	5	Upper montane cloud forest	2003

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## 11. METHODS

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### 11.1 Overview

Our methods involved:

1. Examination of recent **satellite maps** of the region to determine forest extent and potential study areas. High quality land-use satellite maps from 1995 by Instituto Geográfico Agustín Codazzi (IGAC).
2. **Poster campaign.** To raise awareness, we produced and distributed over **500 posters** depicting the Magdalena Tinamou. We gave these out to local people and placed them in important civic centres and notice boards.
3. **Interviews with local people.** Interviews focused on hunters and used our posters together with plates from *Birds of Colombia*.
4. **Fieldwork** in southern Cesar and Norte de Santander. In selected remnant forest patches. Fieldwork at sites pinpointed during interviews.
  - \* **Tinamou surveys:** based largely on transect work, walking trails 1 hour before dawn and dusk, the known peak time for Tinamid vocalisation, using direct field observation, tape-recording and playback to locate the species.
  - \* **Additional bird and butterfly surveys,** in the forms of inventories to collect valuable new distributional and taxonomic data from this poorly-known region.
  - \* **Botanical assessment:** of each site to help understand habitat requirements of the Magdalena Tinamou.

### 11.2 Detailed Methodology

#### 1. Examining satellite maps

High quality land-use satellite maps from 1995 produced by Instituto Geográfico Agustín Codazzi (IGAC) in Bogotá have proved immensely useful in EBA Project work in the past (e.g. on the Serranía de San Lucas project in 1999-2001: see Salaman and Donegan in press). These maps were used, in conjunction with direct observations of habitat and talks with local people, to locate any remaining regions of forest at suitable elevations in the study areas.

Fieldwork and interviews were then concentrated most intensively on regions where vegetation was shown still to be extant, as it was expected that such regions were most likely to contain populations of the Magdalena Tinamou, considering the habitat preferences of the species' closest relatives, such as Red-legged Tinamou *Crypturellus erythropus*.

#### 2. Interviews with local people

Before starting fieldwork, the support of local people is paramount. We made contact with road police, local government leaders (e.g. mayoral staff), farmers' union leaders and the military.

We produced a large number of **posters** and **leaflets** before leaving for the field (see below). These depicted *Crypturellus saltuarius* to raise awareness, provided a description of the bird, explained its rarity, and encouraged people not to hunt it. Posters were placed in public places such as government buildings and the central plaza. We distributed posters to all local people we met, with 500 posters distributed or posted during fieldwork.

During the preliminary assessment, we conducted interviews with as many people as possible to collate information on the Magdalena Tinamou. Questions took an 'open discussion' form, rather than using a questionnaire, in order not to put answers into people's mouths, and such that interviewees could be as relaxed as possible. E.g. "Have you seen any Tinamous in this area?"; "How many different types are there?"; "What do the different types look like?" "Where are they found?"; "How do they call?". This is a preferable approach to the use of 'closed' questions, e.g. "Are there any Tinamous here, about medium sized with red legs?", as the responses are not biased by the questions, and people do not give the answer that the investigator 'wants to hear'. Such talks also

built up a conversation, building up interest and trust. Detailed notes were taken where good information was forthcoming from interviewees.



Above: Interviews with local people. Photo: (c) Paul Salaman / Colombian EBA Project / Fundación Proaves.

Where responses were positive, we asked further questions about the species' habits and behaviour, such as when the interviewee had last seen the species and where, how rare it was, how it called and so on, such that we could locate potential sites for future fieldwork. Where we encountered people knowledgeable about birds and animals, we took additional notes on the presence of other rare species which are a frequent target of hunting, such as *Crax* Curassows and large mammal species.

Below: Proyecto Tinamú poster.

**Proyecto EBA de Colombia: buscando el Tinamú del Magdalena**  
**!Protejamos al Tinamú del Magdalena!**

**¿Cómo es el Tinamú del Magdalena?**

El Tinamú del Magdalena es un ave parecida a una gallineta de tamaño medio. Es de color café encima, blanca por abajo y tiene en su plumaje visos rojos y brillantes.  
 (Observa su fotografía).



**¿Por qué protegerlo?**

Existen varias clases de tinamús o gallinetas en el norte colombiano. Algunas de éstas especies son comunes. Pero el *Tinamú del Magdalena* es probablemente el ave mas amenazada de extinción en suramérica. En el mundo, solamente se encuentra en el Magdalena Medio - una zona con bastante deforestación.



**¿Que se está haciendo para proteger al Tinamú del Magdalena?**

**EBA Colombia** es un proyecto de conservación, investigación y estudio biológico que ha venido realizando en Colombia desde 1997. Somos un grupo de biólogos y conservacionistas voluntarios quienes quieren proteger la naturaleza, no pertenecientes a ningún gobierno ni corporación. En el "*Proyecto EBA de Colombia: buscando el Tinamú del Magdalena*", se quieren observar poblaciones del Tinamú que se cree, aún existen. En el mundo científico, no hay registros del Tinamú del Magdalena desde el año 1943. Queremos investigar si existe o no la especie todavía, y si se encuentra, haremos campañas para evitar su extinción.




Con el visto bueno de Corpocesar, Corponor, CDMB y CRC  
**Equipo de investigadores:** Thomas Donegan, Blanca Huertas, Elkin Briceño y John Jairo Arias **Y el apoyo de** 



### 3. Biological Fieldwork methods

#### (a) Tinamou Surveys

Tinamou surveys were based largely on transect work, walking trails for 2 hours each around dawn and dusk. Other Tinamids show very pronounced daily activity patterns, with a much greater frequency of vocalisation noted at dawn, and most intensively at dusk (Davies, 2002). Identification by call is essential in tropical forests, where many species, particularly Tinamidae, are difficult both to see and to identify visually. A Sharp MD-MT80 Mini-Disc Recorder was used for tape-recording of bird species during transects.

#### (b) General ornithological work

We also conducted surveys of other bird species during the day and night to collect valuable new distributional data from this poorly-known region, and also to search for other threatened species.

Right: processing birds in Cuchilla de la Paz



We took notes of all other bird and large mammal species encountered during transect work. Additionally, we operated 180 m of mist-nets from c. 6 am to c. 5 pm, with nets opened whilst undertaking Tinamou transects, then checked again at the end of Tinamou surveys, and closed an hour earlier than on previous EBA expeditions. It was considered that this would be a worthwhile investment of time which did not adversely impact on Tinamou work. Techniques followed standard mist-netting techniques, supplemented with non-systematic observations with binoculars and sound-recording, using techniques developed on previous EBA Project expeditions:

#### Non-systematic observations:

- Close attention was given to multi-species foraging flocks.
- Fruiting and flowering trees were regularly visited, as they attract large concentrations of frugivores and nectarivores.
- Viewpoints over the forest canopy provided opportunities to see large supra-canopy species.
- Night surveys were undertaken for crepuscular and nocturnal species.



Above: *Todirostrum sylvia*

During observation periods, interesting details of selected species were noted such as: species, age, sex; number of individuals; other species present in association; habitat preferences and forest strata used. Additional notes were taken on rare or poorly known species, such as behaviour, vocalisations, foraging strategies and food. Record photographs were taken of important species encountered in the field.

#### Tape-recording and playback of skulking and nocturnal birds

As for Tinamou surveys, but applied to other bird species. A special effort was made to document the presence of each species encountered as fully as possible: tape recordings therefore concentrated on those species not mist-netted, such as large terrestrial birds, nocturnal species and canopy species.

### Intensive diurnal mist-netting

Consistently, mist-netting has proved reliable and beneficial in the tropics, reducing variability in data and providing considerable insights into the dynamics of avian populations and communities in a relatively short period of time (e.g. Karr 1981). Mist-netting maximises species encounter rates, allowing an inventory to be compiled rapidly and provides for standardised capture data and the photographic documentation of records. The following protocol has been developed from Salaman (1994) and further on EBA Project fieldwork in subsequent years (Donegan and Dávalos 1999; Salaman *et al.* 1999; Salaman *et al.* 2002), but modified in order not to compromise Tinamou work.



Above: mist-nets

A combination of fifteen 12-metre mist-nets were operated. Nets remained open over 5 continuous days at each site from 06:00 until 16:00 - 17:00 hrs to allow for dusk Tinamou surveys.

Nets were checked on a continuous basis (every 45 minutes to 1 hour). The processing of trapped birds was standardised to increase reliability, accuracy and efficiency of data collection, with birds processed in the following order:

- i) identified to species (largely based on Hilty and Brown [1986]);
- ii) metal ringed (most species) or tail feather snipped (Hummingbirds and other species with very small tarsi such as small tyrannulets);
- iii) age and sex determination (plumage, brood patch or cloacal protuberance noted);
- iv) moult examination (body, wing and tail);
- v) biometrics: weight, wing, body, tail, tarsus and culmen length;
- vi) time the bird is caught to nearest 60 minutes.



For re-captured birds, the time, net site and ring number were noted. In order to confirm important records and to aid taxonomical research, photographs of each species from various angles (representative of all plumage-types) were taken and developed in print and electronically. A small number of bird specimens from mist-netting mortality were prepared as flat skins in the field and deposited at Instituto de Ciencias Naturales (ICN) of Universidad Nacional de Colombia, Bogotá and at the Museo de Historia Natural of Universidad Industrial de Santander, Bucaramanga.

**(c) Botanical Assessment**

A botanical assessment was undertaken to complement ornithological and Tinamou work. The following procedure was adopted:

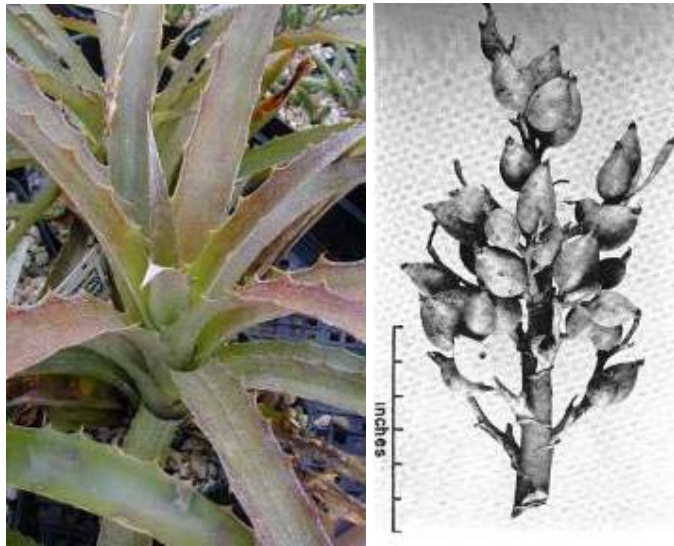
- Observations for general forest characterisation (half a day per transect): records of epiphyte density, principal families of trees, shrubs and herbaceous plants, to produce a forest characterisation and life-zone determination with notes taken on dominant family groups, relative epiphyte density, canopy height etc.
- Herbarium-assisted determination of materials (to genus and species level) using the collections at ICN and UniCauca.
- A special effort was made to record the local names and uses of plants with local people.



Additional funding from Conservation International was specifically provided to obtain information from interviews on an endangered tree species, "Caoba" *Swietenia macrophylla*. This was coordinated in conjunction with Tinamou interview work.

Surveys also focused on the "Piñuela" *Bromelia pinguin*, a plant species considered to be important for the *Crypturellus erythropus* superspecies (Friedman and Smith 1955).

Right: *Bromelia pinguin*. Photos: (c) Philippe Faucon

**(d) Entomological assessment**

Due to BH and JJA's additional knowledge of Lepidoptera and Coleoptera, butterfly nets and canopy nets (for Lepidoptera) and pitfall traps (for Coleoptera) were used at each site to produce an inventory in these groups. Coleoptera and Lepidoptera are considered an important food item for *Crypturellus* (Friedman and Smith 1955). As these groups peak in activity during the brightest sunlight hours when bird activity is very low, and when 2 other team members could valuably check mist-nets and conduct observations, this was considered a valuable use of expedition time.

## Approximate team member time budgeting

Time	Ornithologists / Entomologists	Botanist
00:00	Sleep	
05:00	Tinamou transects.	
06:00	Continue transects (and simultaneously open nets)	Breakfast
07:00	Mist-nets	10 x botanical transects
08:00		Each transect;
09:00		100 x 2 m transects
10:00	mist-nets and observation for rest of morning	
12:00	Lunch and data processing	
13:00	Mist-netting / Observations	non-systematic searches
14:00	Except BH / JJA: Lepidoptera trapping	
15:00	and pitfall traps	
16:00		Identification of specimens
17:00	Close mist-nets; further Tinamou transect work	
18:00		Dinner
19:00	Dinner; collate notes	Preparation of botanical samples
20:00		
21:00		
00:00	Sleep	

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## 12. RESULTS OF *Crypturellus saltuarius* FIELDWORK

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### 1. Satellite data and ground data: status of habitat

The foothill elevations of the eastern slope of the Cordillera Oriental, in which *Crypturellus saltuarius*' type locality, Ayacucho (200 m), is situated, have largely been deforested from 100 to 1000 m elevation in our study region. We estimate that old secondary or primary forest cover is approximately 1-2% at foothill elevations - mostly along river valleys (see photos on page 24) and on some isolated hilltops, with c. 3-4% young secondary and older scrub growth. In the vicinity of the Río Magdalena and Ciénagas (large natural lakes), some forest patches were still in evidence, but mostly mangroves or riverside forest (cover of forest at c. 5% in this region). There is some evidence of more sizeable forest patches on higher elevations of the western slope of the cordillera, although cloud coverage on satellite maps and our distance from the cordillera during surveys made this difficult to assess.

The largest forest patch in the region of to the type locality is a c. 5,600km<sup>2</sup> expanse of c.95% intact forest at 600 – 2400 m elevation in the region of Catatumbo National Park (73°00'–73°25'W; 08°34'–09°00'N). However, most (c. 80-90%) of the Park is located on the eastern slope of the Cordillera where *C. saltuarius* is expected to be replaced by *C. erythropus* in suitable habitat, and much of this land is of too high an elevation (assuming that *saltuarius* has a similar elevational range to other members of the *C. erythropus* superspecies in northern Colombia). CORPONOR staff reported that Catatumbo National Park has been subject to significant recent deforestation for timber and coca farming since our 1995 maps were produced.

We made repeated detailed observations of the state of the forest along a c. 75 km length of the Cordillera from the Magdalena Troncal, a road which runs parallel to the Eastern Cordillera between Aguachica and Pelaya. We also made observations of the Cordillera south to Bucaramanga and into the Cordillera at Ocaña. Throughout the study area, we noted extremely low forest cover levels, with further deforestation since 1995 also evident.

In the Serranía de los Yariguíes, the deforestation situation is much less severe (estimated intact forest is at 38% - Gutiérrez 2002). However, the lowland regions have borne the brunt of deforestation. Lowland dry forest still exists in the region, particularly on the eastern slope of the Cerro de la Paz, in the region of La Putana and on small hillocks in the valley of the Río Chucurí. However, as in Dpto. Cesar, the best surviving forest patches are largely at higher elevations above 1500 m, where *C. saltuarius* is unlikely to occur.

### 2. Results and discussion of interviews: south Cesar

#### *Generally*

We distributed c. 300 posters in the South Cesar region. Of the c. 150 people we spoke to, who included c. 20 interviewees who were recommended to us as old hunters or bird or nature experts and with whom detailed interviews were conducted, only 5 people reliably reported the Magdalena Tinamou, and perhaps only another 20 were aware of “*gallinetas del monte*” in general (i.e. descriptions of Little Tinamou *C. soui* and, rarely, Great Tinamou *Tinamus major*). The lack of awareness was such that many more people identified the farmyard bird Helmeted Guineafowl *Numida meleagris* (photo below) as a *gallineta* than identified a Tinamidae sp. Many more people were aware of even the critically endangered “*Paujil*” Blue-billed Curassow *Crax alberti* than any Tinamou species.



Left: *Numida meleagris* (a *gallineta*, but not a Tinamou)

*Notes and discussions of information from specific interviews*

Although we interviewed several people in Ayacucho, the type locality, only one interviewee recognised the bird on our poster. David Barranco, a 63-year-old former hunter who had lived in Ayacucho for 34 years, knew of three *gallinetas* in the region: one small, one medium-sized and one large species (i.e. *C. soui*, *C. saltuarius* and *Tinamus major*). After providing a good description of *C. saltuarius*, including its red legs, he immediately recognised the bird on our poster. He described *C. saltuarius*' local name as "soy sola" (Translation: "I am alone"). The name is onomatopoeic as the bird sings a trisyllabic refrain. Sr. Barranco used to hear and see the species regularly from c. 0500-0600 and 1600-1800 hrs in the mountains above Pelaya, near Quebrada La Virgen and in the Cerros de Bobalí, although he said that it was not as numerous as the smaller *gallineta* (i.e. *C. soui*). These localities lie on the western slope of the Eastern Cordillera and up to c. 1200 m elevation. Sr. Barranco retired from hunting 25 years ago, and had not seen the species since. He said that it was not as widely hunted as were *Crax alberti* or *Penelope spp*, although it was hunted opportunistically.

The evidence from Sr. Barranco is compelling of the species' continued existence at least into the 1970's. The dawn and dusk calling is behaviour very characteristic of tinamous, and the described call does not resemble either *C. soui*, *T. major* or any of the highland tinamous or other large ground birds (e.g. *Odontophorus*, *Geotrygon*, *Penelope*, *Colinus* or *Crax*) of northern Colombia. The call described is also remarkably similar to other medium-sized red-legged *Crypturellus*. The voice of *C. erythropus* is described as "whooo-hooa" (Hilty and Brown 1986). Interestingly, both Souza (1998) and Davies (2002) transcribe *C. erythropus*' song as "soy so-la". That Sr. Barranco gave the same description for birds fitting the description of *C. saltuarius* in Ayacucho in the 1970s makes this extremely compelling evidence.

In La Mata, another ex-hunter, Martin Suarez, also identified the bird in our poster as the "soy sola" and told us of its song. He said he had seen it in the region of San Calixto until about 12-15 years ago (the late 1980s). Another old hunter from La Mata, who did not provide his name, said that he had seen the bird in the eastern Cordillera and in the lowlands of Serranía de San Lucas. Their information was apparently reliable, though not as detailed, complete or precise as Sr. Barranco's.

In Río de Oro, a man nicknamed "El Curioso" owns a large private zoo which remarkably included a Little Tinamou *C. soui*, a highly unusual species in captivity. He immediately recognised the picture of *C. saltuarius* on our poster with its more red-brown plumage and red legs and claimed to have had one in his collection, until it died 10 years ago at the age of about 8-10 years. This bird had been purchased from a hunter who captured it in the Serranía de San Lucas. It is probable that this bird would have been captured on the eastern flank of San Lucas as the western flank would

not have been accessible at the time the bird was apparently caught (the early 1980s), without a c. 250 km river and road journey via Nechí.

Below: *C. soui* in captivity, Río de Oro



*Reliability of reports from Serranía de San Lucas*

The Serranía de San Lucas is close to a zone where Colombian Tinamou *C. columbianus* may replace *C. saltuarius*. *C. columbianus* is known from the Nechí lowlands to the west of Serranía de San Lucas. However, neither *saltuarius* nor *columbianus* has been recorded on the dryer eastern flank of Serranía de San Lucas where recent interviews and surveys, albeit only in disturbed habitats below 1000 m, failed to locate either taxon (Salaman and Donegan in press). We consider it more likely that *columbianus* and *saltuarius* are (were) separated by the Central Andes with *saltuarius* inhabiting the dryer Magdalena Valley and *columbianus* restricted to the more humid forest of the Nechí lowlands. This view is given some support by the Expedición Botánica *saltuarius* skin which was collected on the eastern slope of the Central Andes. The possibility that the range of *columbianus* extends into the Río Magdalena valley cannot be discounted entirely, although we consider this to be a less plausible analysis.

**3. Results and discussion of interviews: Santander**

We distributed c. 250 posters in the San Vicente de Chucurí region, mainly in schools, offices, public buildings and other public places. However, our work here concentrated more on fieldwork than in towns, as forest patches were accessible, relatively safe and of good quality. Nonetheless, interviews yielded interesting information. Of the c. 60-70 people we spoke to, perhaps 70-80% knew that the bird on the poster was a “*gallineta de monte*” or “*chiriri*”, the latter being a local colloquial name for *C. soui*. Hunting remains extremely popular in the region, despite historical political instability. A “hunters’ club” is particularly popular in San Vicente, and during fieldwork at El Talisman over a bank holiday weekend, a large number of recreational hunters passed by our campsite. We interviewed several of the region’s most active hunters, including people we met in the field. Hunters gave ambiguous but overall negative replies with respect to the Magdalena Tinamou. A vast majority of the active hunters were aware of *C. soui* but most did not recognise the picture of *C. saltuarius* on our poster at all. Five people gave tantalising descriptions of a second Tinamou species, larger than the “*chiriri*”, and at least two felt that three different “*clases*” were involved, suggesting that *C. saltuarius* may be present. However, none of them were able to provide us with a convincing vocalisation description, or with a plumage description detailed enough to exclude either male *C. soui* or *Tinamus major*. This lack of information from active and expert hunters strongly suggests that *C. saltuarius* may be absent from the lowlands adjacent to Serranía de los Yariguíes or that if it is present, it is very rare.

**4. Limitations on interview data and the need for additional data**

The region from where most of the reliable recent reports of *C. saltuarius* originate is the western slope of the Eastern Cordillera in or near Catatumbo National Park. In interviews from settlements in the region of Convención, San Calixto and Teorama and above Pailitas in Dptos. Cesar and Norte de Santander were not possible due to the security situation but would make our assessment of the status of the Magdalena Tinamou more complete. Additional fieldwork in the best quality lowland habitat in the Magdalena Medio - in the San Vicente de Chucurí region - may also shed light on the species’ status.

The security situation in the lowlands of Serranía de San Lucas is also extremely complicated (Salaman and Donegan in press). The highlands were recently subject to bird surveys (Salaman *et al* in press), but further interviews and fieldwork in foothill forest (200 - 1000 m) are urgently needed.

**5. Fieldwork data**

We sound-recorded *C. soui* at Agua de la Virgen and Montebello, Cerro de la Paz, but did not encounter *C. saltuarius* at any of our study sites.

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### 13. CONSERVATION STATUS OF *Crypturellus saltuarius*

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#### Is *Crypturellus saltuarius* Extinct?

Our interviews present good evidence that *C. saltuarius* was still extant in the 1970s and 1980s in the foothills of the Eastern Cordillera, with one individual in captivity until the early 1990s. Although very few sightings were reported by local people, including none for at least 10 years, the lack of recent information does not mean that *C. saltuarius* is now extinct. There are two main reasons for the general lack of good information from local people in south Cesar. Firstly, deforestation in the Cesar region has been so severe and long-established that the forest avifauna (including Tinamidae) has long been expatriated. Secondly, almost no-one in the towns in which we were able to conduct interviews hunts any more. People are deterred from hunting due to (a) the distance of remaining forest patches, (b) a fear of encountering guerrilla groups and (c) prohibitions on the carriage of weapons by both guerrilla and paramilitaries. These factors together mean that the best information relating to the species was obtained from older hunters, who plied their trade when more forest existed and before the paramilitary conflict developed in the region in the early 1990s.

The Magdalena Tinamou is locally extinct in the immediate region of the type locality and the lowland region of the Magdalena Valley from San Martin to Pelaya. However, based on forest cover maps and our talks, we consider it probable that the species is still extant in the few remaining foothill forest patches on the western slope of the Eastern Cordillera, and possibly also in Serranía de las Quinchas, Cerro de la Paz and probably on the eastern slope of Serranía de San Lucas.

Below: ongoing deforestation in Santander.



Unfortunately, the security situation in several of these regions limits possibilities for fieldwork and remaining forests continue to be subject to high levels of deforestation for coca farming, gold mining and subsistence agriculture (see further Salaman and Donegan in press).

BirdLife International (2000) estimated *C. saltuarius*' population to be 50 and decreasing. Based on the little data that exists, this would seem a good a valuation as any. The population would be more amenable to precise determination if and when populations are found and studied.





Above and right: typical deforested habitat in the foothills of the Cordillera Oriental near Aguachica, Cesar.



## Threats

Deforestation is the greatest threat to *C. saltuarius*, both presently and historically. Other members of the *C. erythropus* superspecies do not require a great deal of forest, nor high-quality forest, to subsist (see e.g. Hilty and Brown 1986; Davies 2002). However, in the region of the type locality (as in many other parts of Colombia), 'development' has taken place and continues to take place with little consideration of biodiversity conservation. Where settlements approach forested areas, virtually not a single tree is left standing. Not even *Bromelia pinguin*, a species of secondary areas associated with *Crypturellus* species (Davies, 2002), was encountered in south Cesar. The nature of human settlement in this region, which results in such complete and unsustainable habitat destruction, is such that the Magdalena Tinamou will probably only rarely be found in disturbed or secondary areas, and most likely subsists almost exclusively in undisturbed forest patches - which are rare.

If the species is found further south, in the Cerro de la Paz or the foothills of Serranía de los Yariguíes, the greatest threats for the species include illegal deforestation for coca farming (see further Alvarez, 2002) and fine woods. Hunting in the San Vicente de Chucurí region is also prevalent and may present a threat to the species, though large numbers of other terrestrial bird species (e.g. *Odontophorus strophium*; *Aburria aburri*) were found where suitable habitat exists.

Although hunting may have been a historic threat to the Magdalena Tinamou, it is currently only a very minimal threat in the region of the type locality because of unofficial hunting prohibitions (see above). Such bans can be extremely effective (see e.g. Donegan *et al.* 2001). In the Cerro de la Paz and Serranía de los Yariguíes, hunting is a more important threat.

## Habitat

Collar *et al.* (1992) (quoting Paynter and Traylor 1981) suggest that *C. saltuarius*' habitat is "dry deciduous forest and savannahs". Deforestation has undoubtedly led to increasingly dry conditions in the Magdalena Valley, but references to the species' habitat as "savannah" refer to deforested farmland habitat where the species is not present. Information from our interviews confirm the habitat of *C. saltuarius* to be foothill forest of the western slope of the Eastern Cordillera. Our interviews and the Expedición Botánica skin suggest strongly that it also inhabits foothill forest on the eastern slope of Central Andes including Serranía de San Lucas. Information from our talks with interviewees, fairly regular rainfall during fieldwork, cloud coverage on satellite maps and the nature of the forest in patches which we studied suggest that the 'dry' or 'arid' nature of the habitat of the region is perhaps somewhat overstated in the literature.

## Conservation priorities

1. Conducting ornithological surveys and further interviews in the following regions: (i) San Calixto / Convención region and foothill elevations on the western slope of the East Andes above Pailitas and Pelaya in or near Catatumbo National Park; (ii) the eastern foothills of Serranía de San Lucas; (iii) between Pailitas and La Jagua de Ibirico (to determine the status of the species in Serranía de los Motillones and southern Serranía de Perijá).
2. Recording and analysing vocalisations of *C. columbianus* and *C. idoneus*, which apparently have not been sound-recorded and are also subject to high threat levels, and genetic studies to help determine the taxonomic status of *C. saltuarius* and other closely related taxa; and
3. To take effective practical conservation action, where *C. saltuarius* populations are found.

We are already planning a return to Serranía de los Yariguíes and the Cuchilla de la Paz to study further lowland sites where good quality habitat persists.

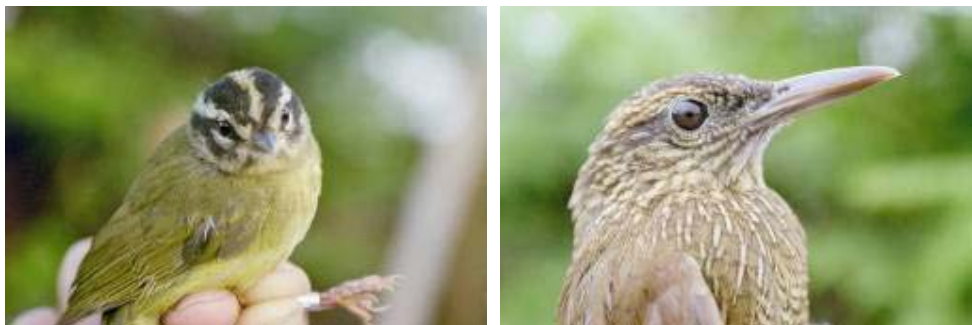
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## 14. GENERAL ORNITHOLOGICAL SURVEYS

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### Introduction

Colombia is of unparalleled ornithological importance. It supports the world's greatest diversity of birds, with about 1,865 species, representing 19% of the World's species in less than 0.8% of the world's land surface (Salaman *et al.* 2001). Surveying and documenting the poorly known avifauna of the tropics in areas such as Colombia can play an important role in assisting biological conservation. Conservation of tropical birds and their habitats 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. As almost no distributional information exists from several of our study regions, conservation efforts in these regions are significantly undermined due to a lack of biological justification.



Above: *Basileuterus tristriatus* subsp. nov and *Dendocolaptes picumnus*, both in Serranía de los Yariquíes.

Before our work, research on the distribution and abundance of birds in certain parts of our study area was considered vital and urgent, particularly around Ayacucho (Collar *et al.* 1992) and Serranía de los Yariquíes (Renjifo *et al.* 2002). 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, and is capable of determination in the field.

### Results

We recorded a total of 332 bird species during our fieldwork in the *Magdalena Medio* using observation, tape recordings and mist-netting. 484 mist-net captures were made of 108 species. The complete inventory and mist-net capture breakdown are provided in Appendix I.

For many species, a great deal of information about ecology and range distribution, biometrics and plumage variations, was collected, and has been presented or is being produced for scientific publication (e.g. Donegan *et al.* in prep; Donegan and Huertas 2002). Various species were sound-recorded, and several previously unknown vocalisations were recorded. Range extensions and noteworthy records are being published elsewhere but include:

- an important new locality for a Critically Endangered species, Gorgeted Wood-Quail *Odontophorus strophium* in Serranía de los Yariquíes.
- new localities for three Endangered species: Saffron-headed Parrot *Pionopsitta pyrilia*, Black Inca *Coeligena prunellei* and Antioquia Bristle-Tyrant *Phylloscartes lanyoni*.

- a new species for Colombia: Barbary Dove *Streptopelia risoria* (right).
- first photographic confirmation of White-tipped Swift *Aeronautes montivagus* for Colombia;
- the first records of 7 species for the Magdalena Valley of Colombia;
- Significant range extensions recorded for over 60 other bird species



Numerous small range extensions, new departmental records and elevational range extensions were also noted. Our new distributional data presents a significant re-evaluation of Colombian bird distributions in the region.

#### Threatened species recorded during fieldwork

The following species are classified as Threatened or Near-Threatened by BirdLife International (2000) or Renjifo *et al.* (2002). As these species are in danger of global or national extinction, it is of the utmost importance that where such species are found, information on ecology should be collected and distributed, and that suitable habitats are protected. The protection of Threatened species also helps protect the forests in which they live, their biological communities and other non-threatened species. A total of 12 endangered bird species (3 Critical, 3 Endangered, 0 Vulnerable, 2 nationally Threatened and 4 Near-Threatened species) were recorded in the study region.

#### **Magdalena Tinamou** *Crypturellus saltuarius*      **Status: Critical**

Information is presented above.

#### **Northern Screamer** *Chauna chavaria*      **Status: Near-Threatened** (Nationally Vulnerable)

This enormous bird species is endemic to aquatic regions of the northern lowlands of Colombia and Venezuela. A pair was present and seen daily at Ciénaga Sahaya in south Cesar (data published in Salaman and Donegan in press). Interestingly, local people in the San Vicente de Chucurí region reliably reported the species at the mouth of the Río Chucurí. We were unable to confirm these reports. However, if confirmed, this would present a small but interesting easterly range extension and new locality for the species.

*C. chavaria* appears to be considerably rarer in south Cesar than in geographically close aquatic habitats on the western side of the Río Magdalena in southern Bolívar (see Salaman and Donegan in press). The species' lower levels of abundance in south Cesar may well be related to the lower quality of forest growth adjacent to aquatic habitats in the region. Salaman and Donegan found that individuals in south Bolívar were most commonly seen in treetops, which are used for nesting and as a vantage point for calling. The relative sparseness of forest growth adjacent to Ciénagas in south Cesar may be why the species is less common there. Based on our talks with local people, unofficial local hunting prohibitions, enforced by paramilitaries seem to be directly and effectively preventing the last surviving pair of *C. chavaria* in Ciénaga Sahaya from being hunted by local people.

**Wattled Guan** *Aburria aburri***Status: Near-Threatened**

Wattled Guan is regarded as a Very High Conservation Priority by the *Cracid Specialist Group* (Brooks and Strahl 2000) and as Near-Threatened (BirdLife International 2000), 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). We sound-recorded this species at El Talisman, where at least 3 males were audible from our campsite at dawn. *A. aburri* was also present in the Cerro de la Paz at 1000 m, an unusually low elevation for the species, though only one male was heard calling along our transect there. We were surprised to find *A. aburri* so common in the region, given that it appears to be widely persecuted by recreational hunting. However, it was notably not as common here as in the Serranía de San Lucas where hunting bans are more rigorously enforced (see Donegan *et al.* 2001).

**Northern Helmeted Curassow** *Pauxi pauxi***Status: Nationally Vulnerable**

*Pauxi pauxi* was reported as present by many local people in San Vicente from the Cerro de la Paz region. We did not confirm these reports, but the number of independent reports in interviews (over 30 different people) and the strength of the descriptions were noteworthy. This species has previously been reported from the San Vicente region (J. I. Hernández-C *in litt* in Franco-Maya & Alvarez 2002).

**Blue-billed Curassow** *Crax alberti***Status: Critical**

This is another of Colombia's rarest endemic species, known now only from a handful of sites in Colombia's northern lowlands. Its global population stronghold is considered to be the lowlands south and west of the Serranía de San Lucas (Cuervo, 2002a). We made no observations of the species. However, perhaps 40 people in south Cesar reliably and independently identified the *Paujil* as present in the western foothills of the Eastern Cordillera. Many of these people drew specific attention to the species' blue bare parts. This data confirms suspicions by Stiles *et al.* (1999) that *C. alberti* ranges further east than was previously thought. This species was also reported as present in the Cerro de la Paz, though further west of our study area in the region of La Putana.

**Gorgeted Wood-Quail** *Odontophorus strophium***Status: Critical**

This terrestrial forest species is one of the rarest birds in the world. Small populations have been observed from just two localities in recent years: Reserva Biológica Cachalú and Alto Río Fonce in Dpto Santander. Over 90% of its historical range has been deforested (Sorria & Alvarez 2002). A skin was taken in oak forest near Betulia, Santander, in 1972 (King 1979) and was considered possibly to be of this species (Hilty and Brown 1986). Betulia is less than 20 km from our study site at El Talisman. The global conservation priority for *O. strophium* was considered to be fieldwork in Serranía de los Yariguíes to establish its status there (BirdLife International 2000; Hernandez-Camacho *in litt.* in Sorria & Alvarez 2002).

We heard this species daily at El Talisman and made sound recordings. Here, at least two calling groups were present. The call is similar in structure and tone to that of other *Odontophorus*, but the refrain consists of a repeated series of 3 notes ("ti-ti-oo"), the first two notes being higher than the last. This three-note refrain is repeated many times in each burst of call: "ti-ti-oo- ti-ti-oo- ti-ti-oo- ti-ti-oo- ti-ti-oo- ti-ti-oo- ti-ti-oo- ti-ti-oo- ti-ti-oo- ti-ti-oo- ti-ti-oo-" etc. The species appeared always to be vocalising from below the transect at lower elevations (mostly at 1800 - 1900 m), but was clearly audible along our transect at 2000 m. We heard the species down to c. 1700 m elevation at the lowest elevations of Serranía de los Yariguíes in suitable forest, some of which appeared to be old secondary forest. At Cerro de la Paz (1000 m), the species was replaced by Marbled Wood-Quail *O. gujanensis*, which we identified by its four-note "cor-co-va-do" refrain. *O. strophium* vocalised most commonly at around 06:30 - 07:30 hrs, and was heard daily. We estimated that at least 4 groups were audible from the Camino de Lenguerke between 1600 and 2000 m elevation.

The presence of populations of *O. strophium* in the Serranía de los Yariguíes makes the site of critical importance for conservation as its global population stronghold. Conservation efforts must be targeted in the premontane elevations of Serranía de los Yariguíes to protect this and other threatened species. ProAves and EBA Project are working together with the Corporación Autónoma Regional de Santander (CAS) and the Alcaldía of San Vicente de Chucurí towards further protective measures in this region. The forest habitats of *O. strophium* in the vicinity of the Camino de Lenguerke are currently relatively well-protected and subject to low deforestation pressure. The region around El Talisman, for example, is subject to a plan of land purchase and reforestation led by the Alcaldía. Worryingly, since the opening of the Camino de Lenguerke, recreational hunting, which according to hunters directly targets *O. strophium*, has become a popular past-time. A species-specific conservation programme for *O. strophium* needs to be developed and implemented in the San Vicente region, which should concentrate on poster campaigns to secure the support of local hunting groups not to target this species, or other globally threatened species such as *Crax alberti* and *Aburria aburri*. The highlands of the Serranía de los Yariguíes deserve national park status, another objective which we, together with Proaves, are pursuing.

**Saffron-headed Parrot** *Pionopsitta pyrilia*

**Status: Endangered**

This distinctive parrot is known from lowland and foothill humid forest in Panama, Colombia and Venezuela. Due to deforestation, it now occupies a much-reduced range. *P. pyrilia* was common in the Cerro de la Paz, where several groups were observed feeding in the canopy and sound recordings were made. This parrot is known only from a handful of sites, thus a new locality is of great importance. Its high abundance at Cerro de la Paz in good quality lowland forest is interesting when considered alongside data by Salaman and Donegan (in press) who note a possible correlation between habitat quality (maturity and level of disturbance of forest) and abundance for this species.



**Black Inca** *Coeligena prunellei*

**Status: Endangered**

This hummingbird is endemic to the western slope of Colombia's eastern Cordillera, known currently from only a handful of localities (BirdLife International 2000; Renjifo *et al.* 2002). This was one of the most common species at El Talisman - we caught 16 individuals with one retrapped, and photographed several individuals.

These records present an important c. 60 km northwards range extension for the species, as well as an important new and strong population. BirdLife International (2000) suggest that the species' population is just 1000-2400. We consider that, were the abundance of the species to be similar in forested regions of suitable elevation across the western slope of the Serranía de los Yariguíes, that its population in Serranía alone would exceed the higher of these figures. *C. prunellei* was frequently observed feeding on the plants of the genera *Cavendishia* (Ericaceae) and *Psitacanthus* (Loranthaceae).

Habitat protection in the Serranía de los Yariguíes (see *Odontophorus strophium* above) is of enormous importance for the protection of this species.

**Beautiful Woodpecker *Melanerpes chrysauchen pulcher* Status: Nationally Vulnerable**

This Woodpecker is endemic to Colombia's northern lowlands. In the Magdalena Valley, its range extends south to San Vicente de Chucurí (J. I. Hernández pers. comm. in Cuervo, 2002b). A pair of this species was observed in the Cerro de la Paz. They were observed feeding on the trunk of a large dead tree in a small forest clearing. During observations here and in Serranía de San Lucas, this species has always been present on dead trees. It seems to prefer forest border habitat and mature secondary growth where such trees are more prevalent.

**Grey-throated Warbler *Basileuterus cinereicollis* Status: Near-Threatened**

This species is regarded as Near-Threatened by BirdLife International (2000) and almost nothing is known of its ecology (Hilty and Brown 1986), thus new records are of great interest. This was one of the most common species at Agua de la Virgen, where 5 were captured and numerous observations were made. The species commonly participated in mixed-species flocks, almost always in close association with Moustached Brush-Finch *Atlapetes albofrenatus*, and also frequently with Chestnut-capped Brush-Finch *Buarremnon brunneinucha*, Golden-crowned Warbler *Basileuterus culicivorus indignus* and migrant warblers. Observations were made at 1700 - 1850 m elevation, mostly within forest but also in forest border habitat. Two of the species' calls, previously unreported, were noted and sound-recorded, one a high pitched "tsip", the other a quite harsh nasal "tnur". Interestingly, one of the individuals mist-netted showed a red / chestnut crown stripe, not a yellow one, and a stronger white eye ring. We will be undertaking a comparison of our photographs against museum skins to investigate whether this feature is due to a mutation, colour morph, or the existence of two taxa.



Left: typical *Basileuterus cinereicollis*. Right: individual showing reddish crown stripe and stronger eye ring.

**Scarlet-rumped Cacique *Cacicus uropygialis* Status: Nationally Near-Threatened**

The montane and lowland forms of this icterid have recently been split (see Jaramillo & Burke 1999). The montane form, *C. uropygialis*, is poorly-known in Colombia. We heard and observed flocks of up to 15 individuals of this species at El Talisman. The most common vocalisation was a disyllabic whistle. This species was previously unknown north of Dpto. Cundinamarca on the western slope of the East Andes. New records represent a c. 200 km northwards range extension, suggesting that the species may be more widely distributed than is currently thought.



### Sooty Ant-Tanager *Habia gutturalis*

**Status: Near-Threatened**

*H. gutturalis* is an endemic of the Nechí Endemic Bird Area of northern Colombia. It was common by voice and seen frequently in the understorey in Cerro de la Paz, where 7 were captured (with one retrap). We concur with Salaman and Donegan (in press) and Stiles *et al.* (1999) in noting that this species was common in disturbed as well as primary forest.

**Large-billed Seed-finch** *Oryzoborus crassirostris*

**Status: Near-Threatened** (Low risk nationally)

*O. crassirostris* is patchily distributed across north and east Colombia and throughout northwestern South America from the Guianas to Peru. We found several individuals in captivity in south Cesar, and photographed one in El Besote, north of Aguachica. We concur with Stiles *et al.* (1999) and Salaman and Donegan (in press) that this species should be downgraded from Near-Threatened status, due its preference for disturbed and secondary growth areas and its large range, which suggest a substantial population in Colombia.





## 15. ENTOMOLOGICAL AND ECOLOGICAL ASPECTS

Due to its frugivorous, granivorous and insectivorous habits (Mantilla & Díaz 1992, Davies, 2002) the Magdalena Tinamou may be a species of fundamental importance to the ecosystem, as its feeding habits are directly related to seed dispersion. The conservation of species of this type is therefore of great importance to maintaining ecological processes on which other species depend (see e.g. Morrinson 1986; Block *et al.* 1987; Landres *et al.* 1988; and Poiani *et al.* 2000).

Seed distribution is linked to the diversity of frugivorous and insectivorous birds, and the diversity and density of vegetation is linked to the existence of ecological niches for birds (Greenwood, 1995). Seed distribution by *Crypturellus saltuarius* probably directly contributes to the complexity of the species' habitat and to maintenance of processes which maintain that habitat.

Tinamous and insects have an important relationship in that insects form an important food resource for Tinamidae: Lepidoptera larvae and Coleoptera, for example, have been found in the stomach contents of *Crypturellus erythropus* (Freedman & Smith 1955). Insects also play an important role as pollinators (Kerr 2001, Cane & Tepedino 2001), as secondary dispersers of seeds (Janzen 1982, Estrada & Coates-Estrada 1991, Primack 1993), as recyclers of nutrients and as agents which reduce populations of parasites (Kempner & Boulton 1976), characters which all influence the production of food resources such as fruits and seeds, upon which the Magdalena Tinamou depends, assuming it to have similar feeding habits to *Crypturellus erythropus*.

A loss of pollinating invertebrates can interrupt the integrity of ecosystems, a situation which is reflected in a decrease of fruits and seeds, which in turn affects other trophic guilds which depend upon these resources (Crane & Tepedino 2001). The loss of a species such as the Magdalena Tinamou, which plays such an important ecological role, would therefore have profound effects on the ecosystem of a region as a whole. It is therefore important to study groups such as insects, with which this species may interact.



### *Methods*

#### **1. Lepidoptera**

Butterflies (Lepidoptera) were collected at each site with an entomological net. Canopy nets were placed at study sites for additional collection to supplement the inventory.

Photos: canopy nets (left) and manual collection (right)

Lepidoptera specimens were kept in Milan paper envelopes, with basic data taken relating to each collection and notes on the organism's habitats. Later, specimens were mounted on pins, extended and labelled. Taxonomic determinations are currently being made at the reference collection of the Museo de Historia Natural, Universidad de Caldas, Manizales and using keys and illustrations found in the most recent taxonomic revisions of the various groups, such as diagnoses by D'Abrera (1981, 1984, 1987a, 1987b, 1988), De Vries (1987, 1996), Smart (1991), Constantino (1995), Vélez & Salazar (1991), Krizek (1991), Austin (1992), Willmott & Hall (1994, 1996), Andrade (1993a), Austin *et al.* (1996), Hall & Willmott (1996), Hall & Austin (1997) and Beccaloni (1997). Specialists including Julián Salazar (Museo de Historia Natural, Universidad de Caldas, Manizales, Colombia) and Keith Willmott (Natural History Museum, UK) are assisting in the identification of some specimens.

## **2. Scarabaeinae**

The Scarabaeinae collection was undertaken using pitfall traps baited with human excrement, and was supplemented with manual capture. 15 pitfall traps were installed at ground level at 25 m intervals at each of the four study sites. Following the methodology of Southwood (1966), these were baited with human excrement every 48 hours and checked every 12 hours. Additionally, manual collection was used to encounter individuals sheltered in vegetation and decomposing organic material. The specimens collected were separated and kept in marked plastic flasks with 70% alcohol. They are currently being mounted and will later be deposited and identified in the reference collection of the Museo de Historia Natural, Universidad de Caldas, Manizales. Determination will be undertaken with the use of keys and illustrations in revisions of various taxonomic groups, such as the diagnoses of Blackwelder (1944); Edmonds (1972, 1994); Halffter & Martínez (1977); Howden & Young (1981); Arnaud (1982); and Jessop (1985).

## **Results**

A preliminary list of 150 morphospecies of the Diurnal Butterflies (Lepidoptera: Rhopalocera) were collected in the region of Serranía de los Yariguíes and Cerro de la Paz (Santander). 75 morphospecies were collected in the region of Ayacucho and Ocaña (Cesar and Norte de Santander), the region where the Magdalena Tinamou was historically reported. There is some overlap between the butterfly species found in these two regions. Both of these species totals relate to a relatively high diversity of pollinating insects, with the species total in Serranía de los Yariguíes and Cerro de la Paz being extraordinarily high for such a short study. The Rhopalocera are a group considered a good indicator of the state of conservation of ecosystems, diversity, endemism and level of intervention of habitat (Coddington *et al.* 1991; Brown 1991; Pearson 1994; Gardiner 1997). Through pollinating, butterflies encourage the production of fruits and seeds (Inouye, 1995), the principal food resources of the Magdalena Tinamou. The highest diversity of Rhopalocera in the study region is in the Serranía de los Yariguíes and Cerro de la Paz, where the best quality forest habitat was encountered.

A more detailed analysis in these groups will need some time to complete and will be published elsewhere.

The scarab beetle collection is still undergoing investigation and identification.

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## **APPENDICES**

### **Appendix I: Systematic inventory of birds**

Taxonomy, nomenclature and sequence largely follows Salaman *et al.* (2001). Please contact the authors for details.

RC | Reported by local people and seen in captivity

## **Appendix 2: Botanical Report on the status of the Caoba tree *Swietenia macrophylla* in South Cesar**

### **Búsqueda del árbol de “Caoba” *Swietenia macrophylla* en el sur del Departamento del Cesar**

Según las encuestas realizadas en la localidad de estudio, se concluyó que SI HAY “Caoba” en el sur-este del Cesar e igualmente se reportan otras posibles localidades para encontrarlo, como la región del Catatumbo en Norte de Santander y el Sur de Bolívar en la Serranía de San Lucas. Otras Unidades (UCC) fueron identificadas como la: 3 del Sur de Bolívar y una nueva a incluir al oeste de Norte de Santander en el Catatumbo. Se rastreó información sobre la existencia del “Caoba” *Swietenia macrophylla* - Meliaceae en la UCC: 7 del sur del Cesar en visita a los municipios de San Martín, Aguachica, La Gloria y Pelaya. Se encuestaron pobladores, madereros, ebanistas, técnicos y profesionales forestales de instituciones públicas y particulares. Los nombres comunes usados en la región son principalmente Caoba, Ceiba roja y Cedro espinoso. Este árbol, se reporta como una especie que se distribuye en zonas de clima caliente y templado, aproximadamente desde 500 hasta 1200 m de elevación. Existen otras especies de árboles extraídos con fines madereros que son vulgarmente conocidos como Cedro negro, Jigua amarillo, Cedro carmín y Toluá. Por lo tanto es altamente crítica la situación de conservación para la población de “Caoba” en el Sur del Cesar.

### **Localidades identificadas**

#### UCC 3: Sur-este del Cesar

Municipio La Gloria, Corregimiento de Ayacucho, Hacienda La Florida, clima caliente.

Municipio Pelaya-La Gloria, Sitio Tronadero, Lugar denominado Maicito y Singarare, clima cálido

Municipio de Pailitas y norte de Pelaya, Vereda La Virgen Cerros de Bobalí, clima cálido.

Corregimiento de Ayacucho, Zona alta de la Vereda El Paraíso, clima cálido.

#### UCC 7: Sur de Bolívar:

Municipios de Simití, San Pablo, El Bagre y Santa Rosa de la Serranía de San Lucas. La vía de movilización de la madera del “Caoba” es: Simití- Sur de Bolívar, Gamarra –Cesar, Aguachica- Cesar, Bucaramanga- Santander, Bogotá.

#### UCC 16: Norte de Santander:

Región del Catatumbo, nor-occidente de Norte de Santander en límites con Cesar.

Zona conocida como Tarra donde están los principales aserraderos.

### **Entidades visitadas**

Se visitaron las alcaldías y UMATAS de los Municipios de Aguachica, La Gloria, Pelaya y San Martín y sus respectivas oficinas de planes de manejo. También fueron visitadas la Corporación Autónoma regional para la defensa de la meseta de Bucaramanga CDMB y Corporación regional del Cesar CORPOCESAR (Regional Aguachica).

### **Perspectivas**

Se espera visitar de nuevo a los municipios del centro y norte del Cesar, Ocaña en Norte de Santander y si es posible, los alrededores de la región del Catatumbo, con el fin de ampliar la información obtenida sobre la especie.

### **Appendix III: Expedition accounts**

Please contact the authors for details.