

**NEW DISTRIBUTIONAL RECORDS AND CONSERVATION IMPORTANCE OF
THE SAN SALVADOR VALLEY, SIERRA NEVADA DE SANTA MARTA,
NORTHERN COLOMBIA**

**Nuevos registros de distribución e importancia para la conservación del valle de San Salvador,
Sierra Nevada de Santa Marta, Colombia**

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RESUMEN

En este trabajo se presentan nuevas observaciones sobre la avifauna en bosques húmedos tropicales y bosques húmedos premontanos en la cuenca del río San Salvador de la vertiente norte del macizo de la Sierra Nevada de Santa Marta, departamento de La Guajira, Colombia. Se registraron en total 374 especies de aves en el área de estudio, incluyendo registros nuevos para la región y ampliaciones de rangos altitudinales. Se colectaron datos importantes para la conservación de especies endémicas y con rangos restringidos y de diez especies amenazadas así como información sobre la distribución vertical, preferencias de hábitats y amenazas para las poblaciones. Este estudio demostró la importancia de los ecosistemas naturales y de los cultivos de café bajo sombra de la vertiente norte de la Sierra Nevada de Santa Marta para 59 especies de migratorios boreales. Basado en los resultados se identificaron prioridades de conservación, se diseñó un corredor de conservación y se desarrolló una estrategia de conservación de hábitats para la cuenca del río San Salvador.

Palabras clave: avifauna, Colombia, conservación, cuenca San Salvador, Sierra Nevada de Santa Marta.

ABSTRACT

This study presents new observations on the avifauna of humid tropical forest and humid premontane forest within the San Salvador valley on the northern slope of the Sierra Nevada de Santa Marta massif, La Guajira Department, northern Colombia. A total of 374 bird species were recorded within the study area, including new records for the region and extensions of altitudinal ranges. Important data were collected for the conservation of endemic and range-restricted bird species and for ten threatened bird species, as well as information on vertical distribution, habitat preferences and threats for bird populations. The study shows the importance of natural ecosystems and shade-grown coffee plantations on the northern slope of the Sierra Nevada de Santa Marta for 59 boreal migratory bird species. Based on the results, conservation priorities have been identified, a conservation corridor has been designed, and a habitat conservation strategy within the San Salvador valley was developed.

Key words: Bird survey, Colombia, conservation, Sierra Nevada de Santa Marta, San Salvador valley.

INTRODUCTION

The Sierra Nevada de Santa Marta is the world's highest coastal massif, reaching an altitude of 5775 m just 46 km from the Caribbean coast in north-east Colombia close to the border with Venezuela. Because of its altitudinal variation as well as its location, the region contains a mosaic of globally significant biomes (nearly all those to be found in tropical America) from mangroves, semi-deserts, tropical dry forests and tropical wet forests, to montane forests and Paramus; the region is unique

for its small size (about 11 000 km²) combined with its large variety of habitats. However, only 15 % of the original forest cover remains, and despite substantial protected-area status on paper, the massif continues to sustain high rates of habitat loss to human colonization and degradation.

The Sierra Nevada represents the world's single most important continental avian endemism center with 18 endemic species and 55 endemic subspecies wholly dependent upon this massif. The Sierra Nevada Endemic Bird Area (EBA 036) also holds

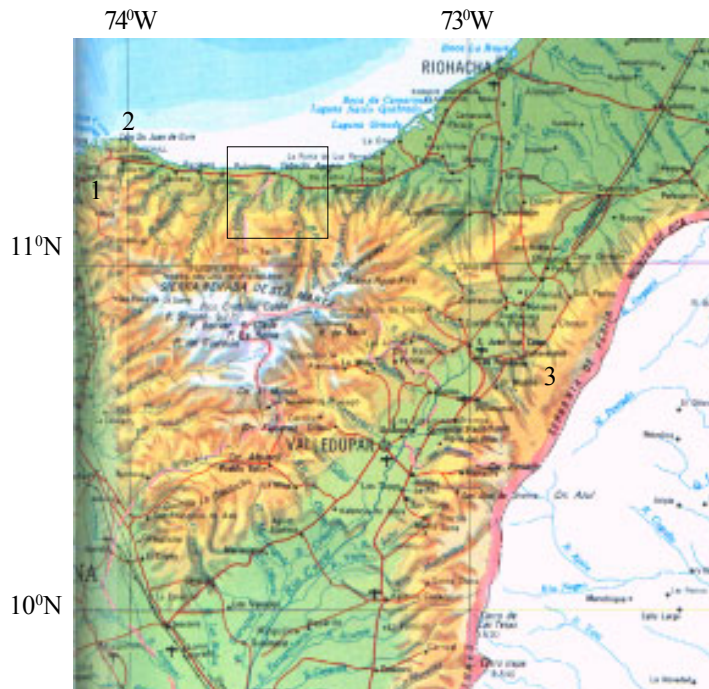


Figura 1. La Sierra Nevada de Santa Marta en el norte de Colombia, con la ubicación del área de estudio (recuadro; ver la figura 2) y otras localidades mencionadas en el texto: 1) Cuchilla de San Lorenzo 2) Parque Nacional Natural Tayrona 3) Serranía del Perijá.

populations of 27 restricted-range species, of which nine are distributed within additional EBAs. Eight bird species of the eco-region are restricted to the EBA Caribbean Colombia and Venezuela (EBA 035) (Stattersfield et al. 1998). Although the Sierra Nevada de Santa Marta justifiably receives wide international recognition for its importance as a unique and highly threatened enclave for native and migrant avifauna, little attention or effort has been taken within the last 50 years towards conducting research to aid the implementation of effective conservation measures and adequate management strategies for this highly sensitive faunal group.

This paper presents data from the first ornithological survey of the San Salvador valley on the northern slope of the massif. The closest areas to San Salvador where birds have been surveyed are the upper río Ancho valley (11°57'N, 72°05'W) to the east and the río Don Diego valley further west (11°27'N, 78°01'W). These ornithological collections by Todd and Carriker (1922) comprised a period of several years and at different sites and elevations within the Sierra Nevada area. After this study no other bird surveys have been made, and information on the avifauna of the Sierra Nevada principally was collected along the San Lorenzo Ridge (11°45'N, 78°58'W) in the vicinity of Santa Marta City.

Data were collected during fieldwork within the project "Habitat conservation of migratory and resident bird species

in the Sierra Nevada de Santa Marta", conducted in 2000-2001 (Salazar & Strewe unpubl.).

SITES AND METHODS

San Salvador valley is located on the northern slope of the Sierra Nevada de Santa Marta within the Municipio Dibulla, department of La Guajira, in north-eastern Colombia (between 11°05'N and 11°16'N; 73°35'W and 73°32'W; see Fig. 2). The valley had been identified as a priority area for conservation within the Rapid Ecological Assessment carried out by Fundación Pro-Sierra Nevada de Santa Marta (FPSNSM) in 1996. According to this assessment, San Salvador valley holds the last populations of Tapir *Tapirus terrestris colombianus* and Jaguar *Panthera onca* within the Caribbean region.

The San Salvador valley still includes areas of primary habitats along an altitudinal gradient that has been mainly lost in other regions of the Sierra Nevada. Besides the ecological significance, social and operational considerations have been reasons for the selection of this area. The study area covers 8400 ha and is limited to the north by the Caribbean Sea, to the south by the main mountain ridge at 2300 m, where the San Salvador river has its origin; to the west by the watershed of the Palomino river and in the east by that of the Ancho river, which both originate in the glaciers of the snow peaks

cooperi, Grey-cheeked Thrush *Catharus minimus*, Veery *C. fuscescens*, Wood Thrush, Baltimore Oriole *Icterus galbula*, Blackburnian Warbler *Dendroica fusca*, Bay-breasted Warbler *Dendroica castanea*, Chestnut-sided Warbler, Black-and-white Warbler *Mniotilta varia*, American Redstart *Setophaga ruticilla* and Golden-winged Warbler *Vermivora chrysoptera*.

The survey also contributed new information on 15 species with limited ranges within the Sierra Nevada Endemic Bird Area (EBA 036). Six are range-restricted species of the Sierra Nevada EBA 036 with additional distribution in other EBAs (Coastal Central Mountains - Venezuela 032; Andes Merida 033; Caribbean Colombia and Venezuela 035; Nechi lowlands 037; Colombian Oriental Andes 038; Inter-Andean Colombian valleys 040). In total, 38 Sierra Nevada endemic subspecies were recorded within the study area (Appendix 1). The lower altitudinal limits of 17 species were extended, including several frugivore and nectarivore species (Strewe in prep.)

Threatened species

Nine species currently considered globally threatened by BirdLife International (2000) (one critically endangered, three vulnerable and five near-threatened) are listed below, with all known recent records from the area. Ten species are included in the National Colombian Red List (Renjifo et al. 2002), where the Wattled Guan *Aburria aburri* is not classified as near-threatened (Appendix 1). The Solitary Eagle *Harpyhaliaetus solitarius* and Black-and-chestnut Eagle *Oroaetus isidori* are included as endangered in Colombia, but are not on the Globally Threatened list. Data on distribution, ecological requirements and current status of threatened and poorly known bird species recorded for the study area are listed below.

Black-fronted Wood-Quail *Odontophorus atrifrons*: Recent records of this vulnerable species in the Sierra Nevada de Santa Marta existed mainly from the San Lorenzo ridge (BirdLife 2000). Within the study area the species was found to be uncommon in primary forest above 1600 m, where small groups were observed and more frequently heard calling at dusk at (c.18:00).

Blue-billed Curassow *Crax alberti*: Historically the endemic, critical endangered *C. alberti* inhabited humid forests up to 1200 m in northern Colombia from the Magdalena valley to the Sinú valley and the Sierra Nevada de Santa Marta. Recent records came from Antioquia (BirdLife 2000, Cuervo 2002). The species was recorded by Todd and Carriker (1922) as not uncommon within the lower parts of the Don Diego valley on the northern slope of the Sierra Nevada in primary forest. Small populations within the Tayrona National Park, have been recently confirmed, in the río Frío valley on the west slope of the massif (department of Magdalena) (Strewe in press), and within the private reserve Los Besotes on the southern slope

near Valledupar, Cesar Department. Within the study area, all historical and recent records have been collected and analyzed. Habitat destruction and especially high hunting pressure has driven the species close to extinction in the San Salvador valley. The endangered species was recorded from reports of several local people during the last three years at four different localities at elevations between 350 to 600 m within the valley. Observations included single birds and one pair in 1999. Within its limited range in the valley, the species is suffering heavily from habitat destruction and hunting pressure, which also is the reason for its absence in different parts of the valley.

Wattled Guan *Aburria aburri*: Within its range from Venezuela to southern Peru the species is recorded at elevations of 500-2500 m, where habitat destruction and hunting pressure decrease its population size. Formerly this near-threatened species was known within the Caribbean region only from the mountain ridge Los Baños east of the main Sierra Nevada de Santa Marta massif, La Guajira Department (Hilty & Brown 1986). The first population known from the massif was found above 450 m on the main slope of the San Salvador valley. Up to two eight males were heard calling at dusk and dawn within the Buena Vista reserve boundaries. Additionally, two nests with eggs and young were found in primary premontane forest. Two other localities with healthy populations were identified west and east of the reserve on the same slope at elevations between 400 to 700 m.

Semicollared Hawk *Accipiter collaris*: This little-known, near-threatened raptor is distributed very locally from south-west Venezuela through Colombia and Ecuador to south Peru at elevations between 600 to 1950 m. It was recorded regularly within the Buena Vista nature reserve with individuals or pairs hunting over primary forest canopy or at forest borders at elevations between 500 and 1500 m.

Solitary Eagle *Harpyhaliaetus solitarius*: This endangered species is distributed very locally in Colombia, and in the Sierra Nevada de Santa Marta is only known from the northern slope at Pueblito in Tayrona National Park and the San Lorenzo Ridge (Hilty & Brown 1986, Márquez 2002). A resident pair was observed frequently at altitudes from 400 to 1200 m soaring low over primary premontane forest or perching in tall emergent trees. The existence of three breeding territories is suspected on the ridge between the Palomino and Ancho rivers.

Black-and-chestnut Hawk-Eagle *Oroaetus isidori*: This powerful, endangered montane eagle had been recorded fairly regularly from the San Lorenzo Ridge on the northern slope of the Sierra Nevada de Santa Marta above 2200 m (Hilty & Brown 1986, Strewe pers. obs.). A breeding territory of this species was studied in the upper San Salvador valley at 900-2200 m within primary forest. On several occasions during

the study period, a pair was observed hunting over or within the primary forest canopy. In March 2001, an immature was recorded soaring at midday over the middle San Salvador valley at 500 m.

Military Macaw *Ara militaris*: Beyond the Sierra Nevada, this species is known in Colombia from the Serranía de Perijá and the Serranía de San Lucas and locally on the eastern slope of the Eastern Andes, the Pacific slope in Chocó, the Cauca valley, the head of the Magdalena valley and in the Sierra de la Macarena (BirdLife 2000, Rodríguez-Mahecha & Hernández-Camacho 2002). Within the San Salvador valley the species is only present from December to July during the breeding season, when three nests were found in 2001 in primary forest at 1400-1600 m within palm stands. During the rest of the year the species was absent while groups of up to 25 birds were observed within lowland forests within Tayrona National Park. Breeding pairs were observed migrating daily from the premontane forest to lowland forest patches at elevations 300-500 m and to sea level. These migrations demonstrate the need to conserve habitats and food resources of this vulnerable species along the altitudinal gradient from sea level to 2000 m. The main threat for *A. militaris* is habitat loss, but domestic trade still has a major impact for populations in the region.

Blossomcrown *Anthocephala floriceps*: This Colombian endemic has a disjoint range in the Central Andes in departments Quindío, Tolima and Huila and on the north and southeast slopes of the Sierra Nevada. It is classified as vulnerable, because of its small range, and the loss and degradation of its habitat. Within the Sierra Nevada the species is found in premontane evergreen forest and secondary growth at 600-1700 m from several sites on the northern and western slopes, especially along the San Lorenzo ridge. The most eastern records for the massif come from San Salvador at elevations between 400 to 1200 m. The species was found feeding low at forest borders during the period from June to August, when two common *Psychotria* species (*Rubiaceae*) were flowering. Outside this period the species was only recorded above 800 m.

Rusty-headed Spinetail *Synallaxis fusciorufa*: This globally near-threatened and nationally vulnerable Sierra Nevada endemic is principally recorded at 2000-3000 m, but occasionally down to 900 m in humid shrubby forest borders, overgrown clearings and forest undergrowth (BirdLife 2000, Renjifo et al. 2002). Observations and first records for the eastern part of the northern slope come from the upper San Salvador slope at 1600 m, where several individuals were observed in midlevel and canopy of primary forest and at forest borders. Different individuals have been tape-recorded steadily calling while foraging with mixed-species flocks.

Santa Marta Antpitta *Grallaria bangsi*: This globally near-threatened and nationally vulnerable Sierra Nevada endemic

inhabits humid montane forest and mature secondary woodland at 1200 to 2400 m (BirdLife 2000, Kattan & Renjifo 2002). Within San Salvador valley, individuals were observed and tape-recorded within primary forest above 1600 m.

White-lored Warbler *Basileuterus conspicillatus*: This globally near-threatened and nationally endangered species is found in humid premontane and montane forest, and forest borders and well developed secondary growth at 750-2200 m (BirdLife 2000, López-Lanus & Renjifo 2002). The species is quite common within different habitat types from forest borders, older second growth to primary forest at San Salvador, where it was found down to 450 m, an altitudinal range extension of 300 m for this species (photos and tape-recording). The species is known from all slopes of the massif and is one of the most common endemic species at San Lorenzo ridge. White-lored Warblers tolerate some degree of habitat degradation and were common within the study area. Its classification as threatened seems appropriate since the species occurs within a limited altitudinal range in the Sierra Nevada massif, and its habitats are under heavy deforestation pressure. However, if this species is classified as endangered several other Sierra Nevada endemic species also must be categorized as vulnerable or endangered.

Other noteworthy records

Fasciated Tiger-Heron *Tigrisoma fasciatum*: This species is scarce and local within the San Salvador valley; one or two individuals were recorded along the San Salvador river and larger streams at 250-600 m. It is sympatric with the Rufescent Tiger-Heron *Tigrisoma lineatum* at lower elevations and within the same habitat type.

Band-tailed Guan *Penelope argyrotis*: This restricted-range species is uncommon in the foothills and slopes of the Sierra Nevada de Santa Marta. It is also known in Colombia from the Serranía de Perijá and the northern east slope of the east Andes (Fjeldsa & Krabbe 1990, Hilty & Brown 1986, Todd & Carriker 1922). A healthy population exists on the upper slope of the San Salvador valley within the reserve boundaries above 550 m (range extension from 900 m). Individuals were heard at dawn and individuals or small groups were observed at forest borders and within primary premontane forest. In March 2001, adults were observed with two juveniles in primary forest at 800-1100 m.

Black-and-white Hawk-Eagle *Spizastur melanoleucos*: The first record of this species for the Sierra Nevada de Santa Marta comes from the San Salvador valley within the Buena Vista Nature Reserve. Adults were observed several times perching in emergent trees or soaring during midday along the ridge at 500-1500 m. The species was known from the western slope of the Serranía de Perijá, but it is unlikely that it still persists there because of intensive forest destruction within the region (Strewe pers. obs).

Violaceous Quail-Dove *Geotrygon violacea*: This species is rare or very uncommon and known from very few localities in Colombia. It was recorded on the lower slopes of the San Salvador valley within primary forest at 200-500 m. The species is very uncommon within the study area and sympatric with the Ruddy Quail-Dove *Geotrygon montana* and the Lined Quail-Dove *Geotrygon linearis* towards its upper altitudinal limit.

White-tailed Starfrontlet *Coeligena phalerata*: This Sierra Nevada endemic was formerly known from six sites on the northern slope including the San Lorenzo ridge at elevations between 1600 to 2400 m. The first records from the San Salvador valley come from primary premontane forest at 1500-1700 m, where males and females were caught within primary premontane forest in May and June 2001 when abundant Bromeliaceae epiphytes were flowering. The species is probably an altitudinal migrant confirmed by seasonal observations at elevations below 1800 m (Hilty & Brown 1986). Bird species with strong seasonal movements are at even higher risk from habitat degradation as they may depend on intact habitats at various elevations (Strewe 1999). In the case of *C. phalerata* the montane habitats are nominally protected within the Sierra Nevada National Park, but the primary habitats at the lower end of its altitudinal migrations are unprotected and under heavy deforestation pressure.

Santa Marta Woodstar *Chaetocercus astreans*: This endemic, little-known species has been recorded from shade-grown coffee plantations in the premontane zone on the San Lorenzo ridge. The first record for the northern slope comes from the San Salvador valley, where a female was encountered at 580 m in the open canopy of primary forest along a ridge in May 2000 (photo documentation and tape recording). In June 2001 the species was found at the identical site within the same trees, with one female and an immature male singing several days from an exposed branch of a dead tree. An female feeding at low-midlevel flowers of *Psychotria* (Rubiaceae) entered a mist net but escaped.

Ruddy Woodcreeper *Dendrocincla homochroa*: This species is poorly known in Colombia including records from La Cueva and Los Gorros from the foothills of the east slope of the Sierra Nevada de Santa Marta. Within the San Salvador valley individuals were caught at four different sites within primary forest between elevations of 300 and 650 m. The species does not tolerate habitat degradation and depends on primary forest. It was not collected by Carriker, who worked intensively on the northern slope (Todd & Carriker 1922).

Streak-capped Spinetail *Cranioleuca hellmayri*: The first records of this species for the east part of the northern slope come from the upper San Salvador slope at 1600 m, where several individuals were observed in midlevel and canopy of primary forest and at forest borders. Different individuals have

been tape-recorded steadily calling while foraging with mixed-species flocks.

Rusty-breasted Antpitta *Grallaricula ferrugineipectus*: This species is apparently rare and locally distributed in Colombia. It was first recorded on the northern slope of the massif at 680 m within the San Salvador valley, where an adult was caught in primary premontane forest in August 2000. Further records occurred along the same mountain ridge, where four more individuals were caught and different individuals tape-recorded.

Santa Marta Tapaculo *Scytalopus sanctaemartae*: This endemic species is little known and recorded principally from the San Lorenzo ridge between elevations of 1000 to 1800 m. At San Salvador the species was observed and tape-recorded within primary premontane forest from 650 to 1700 m.

Three other Sierra Nevada endemics were recorded within the study area: Yellow-crowned Whitestart *Myioborus flavivertex* (above 1200 m), Santa Marta Mountain-Tanager *Anisognathus melanogenys* (above 1500 m) and Santa Marta Brush-Finch *Atlapetes melanocephalus* (above 900 m). All three were found within primary forest and at forest borders frequently accompanying mixed species flocks. The species are known from different sites within the massif, seem to tolerate habitat degradation and do not depend on undisturbed forest habitats. For this reason they are not classified as threatened or near threatened.

Some other noteworthy records are Black-banded Owl *Strix nigrolineata* at 600 m, Rufous-necked Wood-rail *Aramides axillaris* within primary forest at 450 m, a breeding colony of Oilbird *Steatornis caripensis* at 500 m and observations of Great Potoo *Nyctibius grandis* in the lower valley. A range extension resulting from the destruction of the forest ecosystems within the region is probably responsible for the capture of several individuals of Sooty Grassquits *Tiaris fuliginosa* at a forest border at 480 m at San Salvador field station. An individual of Black-faced Grassquit *Tiaris bicolor* caught in February 2001 at Buena Vista (500 m) was probably a transient. The nearest record for this species comes from the semi-desert within the Guajira peninsula.

Todd and Carriker (1922) recorded only two swift species within the Sierra Nevada, Band-rumped Swift *Chaetura spinicauda* and White-collared Swift *Streptoprocne zonaris*. Additionally, we recorded Chestnut-collared Swift *Streptoprocne rutila*, Gray-rumped Swift *Chaetura cinereiventris* and Lesser Swallow-tailed Swift (four nests at forest borders or within natural clearings at elevations between 400-700 m) within the study area. Healthy populations of Toucans also thrive within the upper valley, including Keel-billed Toucan *Ramphastos sulfuratus* (groups of 16 birds in October), Collared Araçari *Pteroglossus torquatus*, Yellow-

billed Toucanet *Aulacorhynchus calorhynchus* and Emerald Toucanet *A. prasinus*. Between September and January, groups of the four toucan species foraged in the canopies of *Schefflera* sp. (Araliaceae), an abundant species at 400 to 600 m.

The altitudinal migration of several species was recorded at San Salvador during the study period. The hummingbirds *Coeligena phalerata*, *Chaetocercus astreans*, Sparkling Violetear *Colibri coruscans*, Green Violetear *Colibri thalassinus*, Brown Violetear *Colibri delphinae*, *Campylopterus falcatus*, and Tyrian Metaltail *Metallura tyrianthina districta* were found only from the end of May to the end of July at elevations between 450 to 800 m; outside this period they were never recorded at these elevations. The species were found mostly feeding on *Psychotria* flowers, which were very abundant during this period. The highly seasonal occurrence of these species suggests migrations between different habitats and elevations (Strewe 1999). The records of frugivores like Band-tailed Pigeon *Columba fasciata*, *Ara militaris*, Yellow-legged Thrush *Platycichla flavipes*, Black-hooded Thrush *Turdus olivater*, Black-capped Tanager *Tangara heinei* and Blue-capped Tanager *Thraupis cyanocephala* also indicate migrations along the altitudinal gradient. These species used fruit resources at elevations between 450 to 800 m, where they were not present during the breeding season.

DISCUSSION

The results of the avian monitoring demonstrate with new distributional records of range-restricted and Red Data book species the conservation importance of the San Salvador valley on the northern slope of the Sierra Nevada. The presence of healthy populations of six species of Cracidae (including *Aburria aburri*, Crested Guan *Penelope purpurascens*, *Penelope argyrotis* and Sickie-winged Guan *Chaemepetes goudotii* and a small population of *Crax alberti*) is a good indicator of intact forest habitat and the absence of heavy hunting pressure in the upper valley. The raptor community is impressive with 34 species (25 Accipitridae, 9 Falconidae) within the study area, and there are few sites in the Neotropics where *Spizastur melanoleucos*, *Harpyhaliaetus solitarius* and *Oroaetus isdori* can be observed from the same spot. Other noteworthy species are *Accipiter collaris*, Ornate Hawk-Eagle *Spizaetus ornatus* and Black Hawk-Eagle *Spizaetus tyrannus*. The diversity of the raptor community is an indicator of the still extensive premontane forests on the slope of the Sierra Nevada of this region.

The results of this study indicate that the Sierra Nevada is a highly strategically staging post for Neotropical migrant bird species traveling through the Caribbean to South America. The Sierra's humid forests are an oasis in the 1300 km wide densely populated and long-ago deforested Caribbean coastal plains (less than 5 % of the natural vegetation are existing)

and the South America "gateway" to the Andes. The data shown here confirm the diversity and abundance of migrants that pass through and winter in the massif. Fifty-nine neotropical migrant species inhabit the lowlands to lower montane forests on the northern face of the Sierra Nevada as a migration staging post, whilst ca. 30 species winter here. Nineteen migratory species of conservation concern were found in good numbers in the San Salvador valley. The study produced critically needed data on the elevational distribution of migrant avifauna, of key habitats and of priority areas for conservation of migratory bird species. As primary vegetation of most types within the Sierra Nevada is disappearing rapidly the migrant bird species have lost extensive areas of suitable habitats. The remaining premontane forests on the northern face of the Sierra Nevada are of critical importance for boreal migrants in South America.

The main threats to biodiversity conservation in the valley are the expansion of the agricultural frontier, particularly by small farmers in the middle altitude areas, associated with unsustainable production systems such as extensive livestock and cultivation on steep slopes, and extractive activities such as hunting and harvesting wood, which all exert pressures on the remaining natural habitats. The upper San Salvador valley with its special topography is still covered by tracts of primary forest, but with the extension of the agricultural frontier the access to the area will be much easier and a new road will be the invasion route for settlers, speeding up the deforestation. During the study period (2000-2001) striking changes in the forest cover of the middle San Salvador valley were seen, with expanding of coca cultivation and burning of large areas during the dry period. The headwaters of the valley are protected by the Sierra Nevada de Santa Marta National Park since 1977.

Nevertheless, despite this protection the continuing loss of forests demonstrates that formal designation is inadequate. The foothill and lowland forests below 600 m remain nearly totally unprotected on the northern slope of the massif, leaving an important portion exposed to further degradation. In 1986, the Foundation Pro-Sierra Nevada de Santa Marta (FPSNSM) began its conservation work in the eco-region Sierra Nevada. The analysis of the vegetation types and actual forest cover in the region using the extensive information and GIS capabilities of the FPSNSM, acquainted the distribution and isolation degree of forest islands. The data were used for the development of a habitat management strategy for the San Salvador valley (8400 ha), addressing the identified threats to migratory and resident bird species. The principal objective was the design of a conservation corridor along the San Salvador river connecting the forest ecosystems of the headwaters with the mosaic of natural habitats and agro ecosystems in the lower valley.

The establishment of the private nature reserve Buena Vista in close cooperation with the local organization Grupo

Ecologico Defensores de la Naturaleza - Campesinos de Palomino was the first step to conserve the foothill forest ecosystems. Within the study area FPSNSM established and maintains a permanent monitoring station, located strategically at Buena Vista nature reserve. FPSNSM is realizing sustainable development projects in cooperation with local communities, National Park units and Coffee-grower committees in the region, including educational campaigns to limit hunting. Habitat management takes place on private lands in the lowlands and foothills of the San Salvador valley to reduce the pressure on the remaining natural forest habitats, including a reforestation program with native tree species. Within 18 farms forest reserves were established as part of a network of private nature reserves in the valley.

Habitat conservation of migratory and resident birds also benefit from conservation activities in more intensive agricultural areas within the valley. FPSNSM is guiding a project of ecological coffee and cacao cultivation in buffer areas of the Sierra Nevada National Park. Information from the avian monitoring was integrated into the productive sector and used for habitat management within coffee and cacao plantations (shade management to maximize biological diversity, secondary plant diversity, buffer zones of unmanaged native shrubs and trees, bird-friendly coffee certification). The San Salvador valley was recently designated an Important Bird Area (IBA or AICA – Area importante para la Conservación de las Aves), under a joint program of Bird Life International and the Alexander von Humboldt Institute (Bogotá).

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Appendix 1.

Birds recorded from the San Salvador Valley.

Taxonomy and order follows seventh edition of American Ornithologists' Union list (AOU 2003) and Hilty (2002). Bold type species names refers to EBA birds.

Codes in brackets:

CR = Critical,

EN = Endangered,

VU = Vulnerable,

NT = Near threatened (according to Colombian Red Data Book (Renjifo et al. 2002);

Nm = Nearctic migrant, +Nm = resident and Nearctic migrant populations;

EBA (Endemic Bird areas)

Coastal Central Mountains -

Venezuela = 032;

Andes Merida = 033;

Caribbean Colombia and Venezuela = 035;

Santa Marta Mountains = 036;

Nechí lowlands = 037;

Colombian Eastern Andes = 038;

Colombian Inter-Andean valleys = 040.

TINAMIDAE (2)

Crypturellus soui Little Tinamou

Tinamus major Great Tinamou

PHALACROCORACIDAE (1)

Phalacrocorax brasilianus Neotropic Cormorant

ARDEIDAE (11)

Ardea herodias Great Blue Heron (Nm)

Ardea cocoi Cocoi Heron

Ardea alba Great Egret

Egretta thula Snowy Egret

Egretta caerulea Little Blue Heron

Butorides virescens Green Heron (Nm)

Butorides striatus Striated Heron

Bubulcus ibis Cattle Egret

Pilherodius pileatus Capped Heron

Tigrisoma lineatum Rufescent Tiger-Heron

Tigrisoma fasciatum Fasciated Tiger-Heron

ANATIDAE (1)

Anas discors Blue-winged Teal (Nm)

CARTHARTIDAE (3)

Cathartes aura Turkey Vulture (+Nm)

Coragyps atratus Black Vulture

Sarcoramphus papa King Vulture

PANDIONIDAE (1)

Pandion haliaetus Osprey (Nm)

ACCIPITRIDAE (26)

Leptodon cayanensis Grey-headed Kite

Chondrohierax uncinatus Hook-billed Kite

Elanoides forficatus Swallow-tailed Kite

Gampsonyx swainsonii Pearl Kite

Elanus leucurus White-tailed Kite

Rostrhamus sociabilis Snail Kite

Harpagus bidentatus Double-toothed Kite

Ictinia plumbea Plumbeous Kite

Ictinia mississippiensis Mississippi Kite (Nm)

Accipiter collaris Semicollared Hawk (NT)

Accipiter superciliosus Tiny Hawk

Accipiter bicolor Bicolored Hawk

Accipiter cooperi Cooper's Hawk (Nm)

Buteogallus anthracinus Common Black-Hawk

Harpohaliaetus solitarius Solitary Eagle (EN)

Busarellus nigricollis Black-collared Hawk

Asturina nitida Grey-lined Hawk

Buteo magnirostris Roadside Hawk

Buteo leucorrhous White-rumped Hawk

Buteo platypterus Broad-winged Hawk (Nm)

Buteo brachyurus Short-tailed Hawk

Buteo albonotatus Zone-tailed Hawk

Spizastur melanoleucus Black-and-White Hawk-Eagle

Spizaetus tyrannus Black Hawk-Eagle

Spizaetus ornatus Ornate Hawk-Eagle

Oroaetus isidori Black-and-Chestnut Eagle (EN)

FALCONIDAE (9)

Caracara plancus Southern Crested Caracara

Milvago chimachima Yellow-headed Caracara

Herpetotheres cachinnans Laughing Falcon

Micrastur ruficollis Barred Forest-Falcon

Micrastur semitorquatus Collared Forest-Falcon

Falco sparverius American Kestrel

Falco columbarius Merlin (Nm)

Falco ruficularis Bat Falcon

Falco peregrinus Peregrine Falcon (Nm)

CRACIDAE (6)

Ortalis garrula Chestnut-winged Chachalaca

Penelope argyrotis Band-tailed Guan

Penelope purpurascens Crested Guan

Aburria aburri Wattled Guan

Chamaepetes goudotii Sickle-winged Guan
Crax alberti Blue-knobbed Curassow (CR) (EBA 36, 37)

ODONTOPHORIDAE (2)

Colinus cristatus Crested Bobwhite
Odontophorus atrifrons Black-fronted Wood-Quail (VU)
 (EBA 36, 38)

ARAMIDAE (1)

Aramus guarauna Limpkin

RALLIDAE (3)

Laterallus albigularis White-throated Crake
Aramides cajanea Grey-necked Wood-Rail
Aramides axillaris Rufous-necked Wood-Rail

JACANIDAE (1)

Jacana jacana Wattled Jacana

CHARADRIIDAE (1)

Vanellus chilensis Southern Lapwing

SCOLOPACIDAE (3)

Tringa solitaria Solitary Sandpiper (Nm)
Tringa melanoleuca Greater Yellowlegs (Nm)
Actitis macularia Spotted Sandpiper (Nm)

COLUMBIDAE (11)

Columba fasciata Band-tailed Pigeon
Columba speciosa Scaled Pigeon
Columba corensis Bare-eyed Pigeons
Columba cayennensis Pale-vented Pigeon
Columbina passerina Common Ground-Dove
Columbina talpacoti Ruddy Ground-Dove
Claravis pretiosa Blue Ground-Dove
Leptotila verreauxi White-tipped Dove
Geotrygon montana Ruddy Quail-Dove
Geotrygon violacea Violaceous Quail-Dove
Geotrygon linearis Lined Quail-Dove

PSITTACIDAE (8)

Ara militaris Military Macaw (VU)
Aratinga wagleri Scarlet-fronted Parakeet
Aratinga pertinax Brown-throated Parakeet
Forpus passerinus Green-rumped Parrotlet
Brotogeris jugularis Orange-chinned Parakeet
Touit batavica Lilac-tailed Parrotlet
Pionus menstruus Blue-headed Parrot
Pionus sordidus Red-billed Parrot

CUCULIDAE (6)

Coccyzus americanus Yellow-billed Cuckoo (Nm)
Piaya cayana Squirrel Cuckoo
Crotophaga ani Smooth-billed Ani
Crotophaga sulcirostris Groove-billed Ani

Crotophaga major Greater Ani
Tapera naevia Striped Cuckoo

STRIGIDAE (5)

Otus choliba Tropical Screech-Owl
Pulsatrix perspicillata Spectacled Owl
Glaucidium brasilianum Ferruginous Pygmy-Owl
Strix nigrolineata Black-and-White Owl
Strix virgata Mottled Owl

STEATORNITHIDAE (1)

Steatornis caripensis Oilbird

NYCTIBIIDAE (2)

Nyctibius griseus Common Potoo
Nyctibius grandis Great Potoo

CAPRIMULGIDAE (4)

Lurocalis semitorquatus Short-tailed Nighthawk
Chordeiles acutipennis Lesser Nighthawk +Nm
Chordeiles minor Common Nighthawk (Nm)
Nyctidromus albicollis Pauraque

APODIDAE (8)

Streptoprocne zonaris White-collared Swift
Streptoprocne rutila Chestnut-collared Swift
Chaetura pelagica Chimney Swift (Nm)
Chaetura cinereiventris Grey-rumped Swift
Chaetura spinicauda Band-rumped Swift
Chaetura brachyura Short-tailed Swift
Aeronautes montivagus White-tipped Swift
Panyptila cayennensis Lesser Swallow-tailed Swift

TROCHILIDAE (27)

Glaucis hirsuta Hairy Hermit
Threnetes ruckeri Band-tailed Barbthroat
Phaethornis longirostris Western Long-tailed Hermit
Phaethornis anthophilus Pale-bellied Hermit
Phaethornis augusti Sooty-capped Hermit
Phaethornis striigularis Stripe-throated Hermit
Campylopterus falcatus Lazuline Sabrewing
Florisuga mellivora White-necked Jacobin
Colibri delphinae Brown Violetear
Colibri thalassinus Green Violetear
Colibri coruscans Sparkling Violetear
Anthracothorax nigricollis Black-throated Mango
Chrysolampis mosquitus Ruby Topaz
Chlorostilbon gibsoni Red-billed Emerald
Chlorostilbon russatus Coppery Emerald (EBA 36, 38)
Thalurania colombica Purple-crowned Wood-Nymph
Lepidopyga goudoti Shinning-green Hummingbird
Hylocharis cyanus White-chinned Sapphire
Amazilia saucerrottei Steely-vented Hummingbird
Amazilia tzacatl Rufous-tailed Hummingbird
Chalybura buffonii White-vented Plumeleteer

Anthocephala floriceps Blossomcrown (VU) (EBA 36, 40)
Lafresnaya lafresnayi Mountain Velvetbreast
Coeligena phalerata White-tailed Starfrontlet (EBA 36)
Metallura tyrianthina Tyrian Metaltail
Heliomaster longirostris Long-billed Starthroat
Chaetocercus astreans Santa Marta Woodstar (EBA 36)

TROGONIDAE (3)

Pharomachrus fulgidus White-tipped Quetzal (EBA 32, 33, 36)
Trogon personatus Masked Trogon
Trogon violaceus Inter-Andean Violaceous Trogon

ALCEDINIDAE (4)

Ceryle torquata Ringed Kingfisher
Chloroceryle amazona Amazon Kingfisher
Chloroceryle americana Green Kingfisher
Chloroceryle aenea American Pygmy Kingfisher

MOMOTIDAE (1)

Momotus momota Blue-crowned Motmot

GALBULIDAE (1)

Galbula ruficauda Rufous-tailed Jacamar

BUCCONIDAE (4)

Notharchus macrorhynchus White-necked Puffbird
Notharchus tectus Pied Puffbird
Hypnelus ruficollis Russet-throated Puffbird
Malacoptila mystacalis Moustached Puffbird

RAMPHASTIDAE (4)

Aulacorhynchus calorhynchus Yellow-billed Toucanet (EBA 32, 33, 36)
Aulacorhynchus prasinus Emerald Toucanet
Pteroglossus torquatus Collared Aracari
Ramphastos sulfuratus Keel-billed Toucan

PICIDAE (7)

Piculus rubiginosus Golden-olive Woodpecker
Piculus chrysochlorus Golden-green Woodpecker
Dryocopus lineatus Lineated Woodpecker
Melanerpes rubricapillus Red-crowned Woodpecker
Veniliornis fumigatus Smoky-brown Woodpecker
Veniliornis kirkii Red-rumped Woodpecker
Campephilus melanoleucos Crimson-crested Woodpecker

DENDROCOLAPTIDAE (6)

Dendrocincla fuliginosa Plain-brown Woodcreeper
Dendrocincla homochroa Ruddy Woodcreeper
Dendropletes picus Straight-billed Woodcreeper
Xiphorhynchus susurrans Cocoa Woodcreeper
Lepidocolaptes souleyetii Streak-headed Woodcreeper
Lepidocolaptes lacrymiger Spot-crowned Woodcreeper

FURNARIIDAE (10)

Furnarius leucopus Pale-legged Hornero
Synallaxis albescens Pale-breasted Spinetail
Synallaxis fusciorufa Rusty-headed Spinetail (NT) (EBA 36)
Cranioleuca hellmayri Streak-capped Spinetail (EBA 36)
Premnoplex brunnescens Spotted Barbtail
Anabacerthia striaticollis Montane Foliage-gleaner
Automolus rubiginosus Ruddy Foliage-gleaner
Xenops rutilans Streaked Xenops
Xenops minutus Plain Xenops
Sclerurus albigularis Grey-throated Leafscraper

THAMNOPHILIDAE (6)

Thamnophilus doliatus Barred Antshrike
Thamnophilus atrinucha Western Slaty Antshrike
Formicivora grisea White-fringed Antwren
Cercomacra nigricans Jet Antbird
Myrmeciza longipes White-bellied Antbird
Myrmotherula schisticolor Slaty Antwren

FORMICARIIDAE (3)

Grallaria bangsi Santa Marta Antpitta (VU) (EBA 36)
Grallaria guatemalensis Scaled Antpitta
Grallaricula ferruginepectus Rusty-breasted Antpitta

RHINOCRYPTIDAE (1)

Scytalopus sanctaemartae Santa Marta Tapaculo (EBA 36)

PIPRIDAE (3)

Pipra erythrocephala Golden-headed Manakin
Chiroxiphia lanceolata Lance-tailed Manakin
Manacus manacus White-bearded Manakin

COTINGIDAE (6)

Pipreola aureopecta Golden-breasted Fruiteater
Schiffornis turdinus Thrushlike Schiffornis
Pachyramphus rufus Cinereous Becard
Pachyramphus albogriseus Black-and-white Becard
Pachyramphus homochrous One-colored Becard
Tityra semifasciata Masked Tityra

TYRANNIDAE (58)

Phyllomyias griseiceps Sooty-capped Tyrannulet
Phyllomyias nigrocapillus Black-capped Tyrannulet
Zimmerius improbus Paltry Tyrannulet
Zimmerius chrysops Golden-faced Tyrannulet
Ornithion brunneicapillus Brown-capped Tyrannulet
Camptostoma obsoletum Southern Beardless Tyrannulet
Phaeomyias murina Mouse-coloured Tyrannulet
Sublegatus arenarum Northern Scrub-Flycatcher
Tyrannulus elatus Yellow-crowned Tyrannulet
Myiopagis gaimardii Forest Elaenia
Myiopagis viridicata Greenish Elaenia
Elaenia flavogaster Yellow-bellied Elaenia
Elaenia parvirostris Small-billed Elaenia (Am)

Elaenia chiriquensis Lesser Elaenia
Elaenia frantzii Mountain Elaenia
Inezia tenuirostris Slender-billed Inezia (EBA 35)
Inezia caudata Pale-tipped Inezia
Mionectes olivaceus Olive-striped Flycatcher
Mionectes oleagineus Ochre-bellied Flycatcher
Leptopogon amaurocephalus Sepia-capped Flycatcher
Capsiempis flaveolus Yellow Tyrannulet
Lophotriccus pilaris Pale-eyed Pygmy-Tyrant
Oncostoma olivaceum Southern Bentbill
Todirostrum nigriceps Black-headed Tody-Flycatcher
Todirostrum cinereum Common Tody-Flycatcher
Rhynchocyclus olivaceus Olivaceous Flatbill
Tolmomyias sulphurescens Yellow-olive Flycatcher
Platyrinchus mystaceus White-throated Spadebill
Onychorhynchus mexicanus Northern Royal Flycatcher
Terenotriccus erythrurus Ruddy-tailed Flycatcher
Myiophobus fasciatus Bran-colored Flycatcher
Pyrrhomyias cinnamomea Cinnamon Flycatcher
Contopus cooperi Olive-sided Flycatcher (Nm)
Contopus virens Eastern Wood Pewee (Nm)
Contopus sordidulus Western Wood Pewee (Nm)
Contopus cinereus Tropical Pewee
Empidonax virescens Acadian Flycatcher (Nm)
Empidonax traillii Willow Flycatcher (Nm)
Empidonax alnorum Alder Flycatcher (Nm)
Sayornis nigricans Black Phoebe
Pyrocephalus rubinus Vermilion Flycatcher
Machetornis rixosus Cattle Tyrant
Attila spadiceus Bright-rumped Attila
Myiarchus venezuelensis Venezuelan Flycatcher
Myiarchus panamensis Panama Flycatcher
Myiarchus tyrannulus Brown-crested Flycatcher
Myiarchus crinitus Great-crested Flycatcher (Nm)
Myiarchus tuberculifer Dusky-capped Flycatcher
Pitangus sulphuratus Great Kiskadee
Megarhynchus pitangua Boat-billed Flycatcher
Myiozetetes similis Social Flycatcher
Myiodynastes maculatus Streaked Flycatcher
Myiodynastes chrysocephalus Golden-crowned Flycatcher
Legatus leucophaeus Piratic Flycatcher
Tyrannus savana Fork-tailed Flycatcher (+Nm)
Tyrannus tyrannus Eastern Kingbird (Nm)
Tyrannus melancholicus Tropical Kingbird
Tyrannus dominicensis Grey Kingbird (Nm)

HIRUNDINIDAE (8)

Progne tapera Brown-chested Martin
Progne subis Purple Martin (Nm)
Progne chalybea Grey-breasted Martin
Stelgidopteryx ruficollis Southern Rough-winged Swallow
Riparia riparia Bank Swallow (Nm)
Hirundo rustica Barn Swallow (Nm)
Petrochelidon pyrrhonota Cliff Swallow (Nm)
Tachycineta bicolor Tree Swallow (Nm)

CORVIDAE (1)

Cyanocorax affinis Black-chested Jay

TROGLODYTIDAE (7)

Campylorhynchus griseus Bicolored Wren
Thryothorus rutilus Rufous-breasted Wren
Thryothorus rufalbus Rufous-and-white Wren
Thryothorus leucotis Buff-breasted Wren
Troglodytes aedon House Wren
Henicorhina leucophrys Grey-breasted Wood-Wren
Microcerculus marginatus Southern Nightingale-Wren

MIMIDAE (1)

Mimus gilvus Tropical Mockingbird

TURDIDAE (10)

Catharus fuscater Slaty-backed Nightingale-Thrush
Catharus fuscescens Veery (Nm)
Catharus minimus Grey-cheeked Thrush (Nm)
Catharus ustulatus Swainson's Thrush (Nm)
Catharus mustelina Wood Thrush (Nm)
Platycichla flavipes Yellow-legged Thrush
Turdus olivater Black-hooded Thrush
Turdus leucomelas Pale-breasted Thrush
Turdus grayi Clay-colored Thrush
Turdus albicollis White-necked Thrush

POLIOPTILIDAE (1)

Ramphocaenus melanurus Long-billed Gnatwren

VIREONIDAE (6)

Vireolanius eximius Yellow-browed Shrike-Vireo
Vireo altiloquus Black-whiskered Vireo (Nm)
Vireo olivaceus Red-eyed Vireo (Nm)
Vireo flavoviridis Yellow-green Vireo (Nm)
Vireo leucophrys Brown-capped Vireo
Hylophilus aurantiifrons Golden-fronted Greenlet

ICTERIDAE (12)

Molothrus bonariensis Shiny Cowbird
Scaphidura oryzivora Giant Cowbird
Psarocolius decumanus Crested Oropendola
Cacicus cela Yellow-rumped Cacique
Amblycercus holosericeus Yellow-billed Cacique
Quiscalus mexicanus Great-tailed Grackle
Icterus auricapillus Orange-crowned Oriole
Icterus nigrogularis Yellow Oriole
Icterus galbula Baltimore Oriole (Nm)
Icterus chrysater Yellow-backed Oriole
Icterus mesomelas Yellow-tailed Oriole
Sturnella militaris Red-breasted Blackbird

PARULIDAE (25)

Mniotilta varia Black-and-white Warbler (Nm)
Vermivora chrysoptera Golden-winged Warbler (Nm)

Vermivora peregrina Tennessee Warbler (Nm)
Parula pitiayumi Tropical Parula
Dendroica aestiva Northern Yellow Warbler (Nm)
Dendroica petechia Mangrove Warbler
Dendroica pensylvanica Chestnut-sided Warbler (Nm)
Dendroica caerulescens Black-throated Blue Warbler (Nm)
Dendroica fusca Blackburnian Warbler (Nm)
Dendroica striata Blackpoll Warbler (Nm)
Dendroica castanea Bay-breasted Warbler (Nm)
Setophaga ruticilla American Redstart (Nm)
Seiurus aurocapillus Ovenbird (Nm)
Seiurus noveboracensis Northern Waterthrush (Nm)
Seiurus motacilla Louisiana Waterthrush (Nm)
Protonotaria citrea Prothonotary Warbler (Nm)
Geothlypis trichas Common Yellowthroat (Nm)
Wilsonia citrina Hooded Warbler (Nm)
Oporornis formosus Kentucky Warbler (Nm)
Oporornis philadelphia Mourning Warbler (Nm)
Myioborus miniatus Slate-throated Whitestart
Myioborus flavivertex Yellow-crowned Whitestart (EBA 36)
Basileuterus culicivorus Golden-crowned Warbler
Basileuterus conspicillatus White-lored Warbler (EN)
 (EBA 36)
Basileuterus rufifrons Rufous-capped Warbler

COEREBIDAE (1)

Coereba flaveola Bananaquit

THRAUPIDAE (22)

Diglossa albilatera White-sided Flower-piercer
Cyanerpes caeruleus Purple Honeycreeper
Cyanerpes cyaneus Red-legged Honeycreeper
Dacnis cayana Blue Dacnis
Tersina viridis Swallow-Tanager
Chlorophonia cyanea Blue-naped Chlorophonia
Euphonia trinitatis Trinidad Euphonia
Euphonia lanirostris Thick-billed Euphonia
Tangara gyrola Bay-headed Tanager
Tangara heinei Black-capped Tanager
Tangara cyanoptera Black-headed Tanager

Anisognathus melanogenys Santa Marta Mountain-Tanager
 (EBA 36)
Thraupis episcopus Blue-grey Tanager
Thraupis glaucocolpa Glaucous Tanager
Thraupis palmarum Palm Tanager
Thraupis cyanocephala Blue-capped Tanager
Ramphocelus dimidiatus Crimson-backed Tanager
Piranga flava Hepatic Tanager
Piranga rubra Summer Tanager (Nm)
Piranga olivacea Scarlet Tanager (Nm)
Tachyphonus rufus White-lined Tanager
Eucometis penicillata Grey-headed Tanager

CARDINALIDAE (5)

Saltator maximus Buff-throated Saltator
Saltator coerulescens Greyish Saltator
Saltator striatipectus Streaked Saltator
Pheucticus ludovicianus Rose-breasted Grosbeak (Nm)
Cyanocopsa cyanooides Blue-back Grosbeak

EMBERIZIDAE (15)

Volatinia jacarina Blue-back Grassquit
Tiaris fuliginosa Sooty Grassquit
Tiaris bicolor Black-faced Grassquit
Tiaris obscura Dull-colored Grassquit
Oryzoborus funereus Thick-billed Seed-Finch
Oryzoborus crassirostris Large-billed Seed-Finch
Sporophila intermedia Grey Seedeater
Sporophila plumbea Plumbeous Seedeater
Sporophila bouvronides Lesson's Seedeater
Sporophila nigricollis Yellow-bellied Seedeater
Sporophila minuta Ruddy-breasted Seedeater
Atlapetes melanocephalus Santa Marta Brush-Finch (EBA 36)
Buarremon torquatus Stripe-headed Brush-Finch
Arremonops conirostris Black-striped Sparrow
Arremon schlegeli Golden-winged Sparrow

FRINGILLIDAE (1)

Carduelis psaltria Lesser Goldfinch

Total species: 374

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