

SPECIES COMPOSITION AND ABUNDANCE OF BIRD FAUNA IN A DISTURBED FOREST IN THE CENTRAL ANDES OF COLOMBIA

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ABSTRACT.—This paper is based on bird censuses conducted regularly along a 1000 m trail in a disturbed natural forest east of the city of Medellín, Colombia, over a period of 13 months. Forty species belonging to 19 families were found at the study site and 23 additional species in the surrounding area. The most abundant species were the Blue-and-black Tanager, Common Bush-Tanager, Sparkling Violetear and Tyrian Metaltail. Interspecies flocks occurred frequently in the area, usually with the Blue-and-black Tanager as nucleus species. The only regular migrant species was the Blackburnian Warbler, which constituted 6.2 o/o of all individuals censused during its presence from September to March. *Aceptado el 30 de marzo de 1986.*

RESUMEN.— Composición y abundancia de especies de aves en un bosque modificado en los Andes Centrales de Colombia. Este estudio está basado en censos de aves hechos regularmente a lo largo de un camino de mil metros, en un bosque semi-natural al este de la ciudad Medellín, Colombia, durante un período de 13 meses. Cuarenta especies de 19 familias fueron encontradas en el sitio de estudio y además 23 especies en el área adyacente. Las especies más frecuentes fueron *Tangara vassorii*, *Chlorospingus ophthalmicus*, *Colibri coruscans* y *Metallura tyrianthina*. Bandadas de aves de diferentes especies ocurrieron frecuentemente en el área, normalmente con *Tangara vassorii* como la especie núcleo de las bandadas. La única especie migratoria regular fue *Dendroica fusca*, que constituyó el 6,2 o/o de todos los individuos registrados durante su presencia desde septiembre hasta marzo.

In many parts of the Andes of South America land use has become intensive, with severe impact on the natural vegetation, especially at altitudes where coffee and crops for subsistence can be grown. In order to observe some of the impact of these changes on a local avifauna we conducted regular censuses along a short trail in a small disturbed natural forest in the vicinity of the Medellín, northwestern Colombia. In this way, we tried to get some basic knowledge of the composition and relative abundance of the local bird community to be used as a comparison between similar studies carried out in other parts in the Andes of Colombia, for monitoring possible changes in the future, and also to some extent, to see if the avifauna differed in the past.

Much of the area is covered by plantations of pines (*Pinus patula*) and cypresses (*Cyprinus lusitanicus*), which were introduced about 40 years ago in order to reduce erosion, as well as for commercial exploitation. In some parts of the area, where gold mining has occurred, the heavily weathered granite bedrock remains exposed. In other parts the land is used for subsistence farming and cattle ranching. Between these areas are patches of more or less disturbed natural forests, mostly along ravines and streams. The study site is situated in such a ravine, surrounded by a stand of 3-5 m tall pines on one side, and by a stand of at least 15 m tall cypresses on the other.

The vegetation in the ravine consists mainly of dense scrub and trees; the most frequent tree species is the oak (*Quercus humboldtiana*). Many of the shrubs and trees belong to the families Melastomaceae, Ericaceae and Guttiferae (Espinal 1964).

Climatic data were obtained from a small weather station named Mazo a few km from the study site. From September 1979 to August 1980 the total precipitation was 1473 mm and days of precipitation were 179. Over a period of 33 years the annual mean temperature was 15°C and the mean annual precipitation was 1722 mm (Espinal 1964).

STUDY AREA AND METHODS

The study area is situated in the northern part of the Cordillera Central of the Andes, near the village of Piedras Blancas, about 10 km east of the city of Medellín, Antioquia, Colombia (06° 18'N-75° 30'W). It is 2350 m above sea level and is classified as lower montane wet forest in the system of Holdridge (Espinal 1964). The terrain is gently undulating and intersected by small streams.

This area was chosen primarily for convenience as a small forest station run by the Universidad Nacional is located there, but also because older collections of birds have been reported from nearby Santa Elena (named Santa Helena in Meyer de Schauensee 1948-52).

From 1 September 1979 to 25 September 1980, a bird census was taken about once every two weeks along an approximately 1000 m long circular trail covering the two banks of a small stream. The censuses were conducted in the mornings after 7 a.m. and lasted about 1.5 h. No observations were made when it was raining, although it was often overcast. We walked slowly and stopped when birds could be spotted and identified or if bird sounds were heard. Only clearly identified birds and/or bird sounds were noted.

Before and after the censuses supplementary observations were made of birds in the surrounding habitats.

Because of an insufficient number of mist-nets we could not confirm more than a few species by netting, but the use of a tape-recorder permitted us to record and identify most of the typical bird songs and calls in the area.

Until 11 February the observations were made by the two of us; after that they were made by S. J. Alone, but no significant difference in mean number of birds counted during each census can be demonstrated whether one or two observers were involved (32.3 and 33.3 birds per census, respectively). This may be because slightly longer census periods or better familiarity with the bird fauna in the latter part of the study compensated for the loss of one observer.

RESULTS AND DISCUSSION

SPECIES COMPOSITION

Forty species of birds belonging to 19 different families were noted in the ravine during the study. Twentythree additional species were noted in the surrounding area (Table 1).

There are many open areas with pastures and cultivated fields around the ravine, offering different habitats for other species of birds such as the Smooth-billed Ani (*Crotophaga ani*), which is typical of pastures in the area. Birds such as vultures and swallows, which often circled high above the study site, are not residents in the ravine.

According to older published data (Meyer de Schauensee 1948-52), 172 species of birds belonging to 33 families have been collected by different ornithologists over a period of nearly one century at the nearby areas of Santa Elena and Barro Blanco. Since many of these birds, at least nowadays, normally occur at lower, tropical, levels in the

TABLE 1. Bird species observed at the study site at Piedras Blancas (marked *) and its surroundings only (unmarked).

CATHARTIDAE	TYRANNIDAE
<i>Coragyps atratus</i>	<i>Myiotheretes striaticollis</i>
<i>Cathartes aura</i>	<i>Ochthoeca fumicolor</i>
ACCIPITRIDAE	* <i>Knipolegus poecilurus</i> V
<i>Elanus leucurus</i>	* <i>Myiarchus cephalotes</i> R
<i>Buteo albicaudatus</i>	<i>Nuttallornis borealis</i>
* <i>Buteo magnirostris</i> S	<i>Platyrinchus coronatus</i>
<i>Pandion haliaetus</i>	* <i>Elaenia obscura</i> U
FALCONIDAE	HIRUNDINIDAE
<i>Falco sparverius</i>	<i>Notiochelidon cyanoleuca</i>
COLUMBIDAE	CORVIDAE
* <i>Columba fasciata</i> V	* <i>Cyanocorax yncas</i> S
<i>Zenaida auriculata</i>	TROGLODYTIDAE
* <i>Leptotila verreauxi</i> S	* <i>Henicorhina leucophrys</i> R
CUCULIDAE	TURDIDAE
* <i>Piaya cayana</i> U	* <i>Myadestes ralloides</i> R
<i>Crotophaga ani</i>	<i>Catharus ustulatus</i>
STRIGIDAE	* <i>Turdus fuscater</i> U
* <i>Otus choliba</i> V	VIREONIDAE
CAPRIMULGIDAE	* <i>Cyclarhis gujanensis</i> R
* <i>Caprimulgus longirostris</i> V	* <i>Vireo gilvus</i> U
APODIDAE	PARULIDAE
<i>Streptoprocne zonaris</i>	* <i>Mniotilta varia</i> S
TROCHILIDAE	* <i>Vermivora peregrina</i> S
* <i>Colibri coruscans</i> C	* <i>Dendroica fusca</i> R
* <i>Lafresnaya lafresnayi</i> V	* <i>Myioborus miniatus</i> R
* <i>Coeligena torquata</i> S	* <i>Myioborus ornatus</i> R
* <i>Haplophaedia aureliae</i> R	* <i>Basileuterus coronatus</i> R
* <i>Metallura tyrianthina</i> C	THRAUPIDAE
MOMOTIDAE - PICIDAE	* <i>Diglossa albilatera</i> R
* <i>Momotus momota</i> R	* <i>Diglossa cyanea</i> R
* <i>Piculus rubiginosus</i> S	* <i>Tangara vassorii</i> C
<i>Melanerpes formicivorus</i>	* <i>Tangara heinei</i> U
* <i>Veniliornis fumigatus</i> V	<i>Anisognathus flavinucha</i>
FURNARIIDAE	* <i>Thraupis cyanocephala</i> S
* <i>Synallaxis azarae</i> R	* <i>Chlorospingus ophthalmicus</i> C
FORMICARIIDAE	FRINGILLIDAE
<i>Drymophila caudata</i>	<i>Pheucticus ludovicianus</i>
* <i>Grallaria ruficapilla</i> U	<i>Tiaris olivacea</i>
RHINOCRYPTIDAE	* <i>Atlapetes gutturalis</i> S
* <i>Scytalopus unicolor</i> R	* <i>Atlapetes rufinucha</i> U
COTINGIDAE	<i>Zonotrichia capensis</i>
<i>Ampelion rubrocristatus</i>	<i>Carduelis psaltria</i>

The relative abundance for each species in the study site is indicated by the following letters: C = Common, R = Regular, U = Uncommon, S = Scarce, V = Vagrant. See text for definitions. Names according to Meyer de Schauensee (1966) and Meyer de Schauensee & Phelps (1978).

region and probably have been collected over areas of several km², any comparison with the findings from our small site would be irrelevant. However, it is evident that species of the families Trogonidae, Dendrocolaptidae and Icteridae no longer exist in the area, species which require larger and/or less disturbed natural forests to survive.

In a more intensive study at a reserve at similar elevation about 480 km to the south in the Central Andes, Ridgely and Gaulin (1980) reveal a richer community of birds which might resemble an earlier stage of community in our study area, although many species may not range over the distance between the two areas. Along two 1-km trails in an evidently less disturbed forest and forest edge, where up to 40 m high trees still remain, these authors recorded 132 species during seven months of study. Thirtythree species on their list are found on ours.

According to Ridgely and Gaulin, Carriker (unpubl.) obtained a further 34 species in the area during three collecting trips in the early 50 s when the region was much wilder than today. The pressure on natural resources in the region of our study site certainly has been greater, in that it is situated close to the second largest city in the country. This might partly explain our comparably short species list, although a more intensive study in our small and uniform study site might have revealed a few more uncommon species. It is probable that the species noted in our study are the ones most resistant to human interference.

In another intensive study in Cundinamarca near Bogotá, Munves (1975) recorded 82 species of birds in his 9-month long study at a ranch of 25 ha, where 80 o/o of the land was in pasture and the rest in coffee plantations and fruit trees as well as stands of natural forest. Many of the species recorded in his study, notably Tanagers, are also typical of lower subtropical levels in the region around Medellín where coffee plantations are abundant, but are not found at our site. The species composition in nearby Cordillera Subia, Cundinamarca, at an elevation of 2200 m, seems to be more consistent with our records. Twenty out of 67 species noted there by Munves appear in our study site as well. But in spite of the rather varied habitat and the appearance of species more typical of tropical zones, it is probable that the reduction in species diversity has been about as great as in our area due to extensive land disturbance.

ABUNDANCE OF BIRD SPECIES IN THE RAVINE

The species recorded along the trail in the ravine during the 13 months of study were classified as to abundance as follows (Table 1):

1. Common: Noted in more than 80 o/o of the censuses, and at least once with seven or more individuals. Marked "C".
2. Regular: Noted in more than 50 o/o of the censuses, and at least once with two or more individuals. Marked "R".
3. Uncommon: Noted in 20 o/o to 50 o/o of the censuses. Marked "U".
4. Scarce: Noted in less than 20 o/o of the censuses, but at least twice. Marked "S".
5. Vagrant: Only observed once in the ravine. Marked "V".

Four species have been classified as common: two hummingbirds and two tanagers.

The hummingbirds favor numerous species of plants which flower frequently throughout the year (e.g. *Clusia* sp., *Befaria glauca*, *Tibouchina lepidota*). Flowers were especially numerous during the wettest period at the end of the year, when many hummingbirds defended territories around stands of flowering plants. A few nests of the Greenish Puffleg (*Haplophadia aureliae*) and Tyrian Metaltail (*Metallura tyrianthina*) were also found during this period. Males of the Sparkling Violetear (*Colibri coruscans*)

marked their territories during most of the year by emitting harsh sounds while perched high up in the vegetation. Hence, they were more easily detected than many of the other birds in the area.

The two tanagers classified as common were the Blue-and-black Tanager (*Tangara vassorii*) and the Common Bush-Tanager (*Chlorospingus ophthalmicus*). The former foraged mostly in groups in the canopies of the trees or slightly lower, while the latter foraged alone or in small groups in the lower parts of the vegetation.

Four species of wood warblers were classified as regular. The relative abundance of the three migrant species in this family, Blackburnian Warbler (*Dendroica fusca*), Black-and-white Warbler (*Mniotilta varia*), and Tennessee Warbler (*Vermivora peregrina*), are calculated on the 13 months of censuses, although they were only present in the area during a part of the year.

INTERSPECIFIC FLOCKING

A great many of the observations were made when flocks of various species moved through different layers of the vegetation. No systematic data about these flocks were gathered during this study, but the most important species in these flocks is the Blue-and-black Tanager, because of its gregariousness, its high, twittering calls, rapid movements, and its rank as a common species. Around groups of this nucleus species were often gathered individuals of the following "regular attendant species" (Short 1961): Blackburnian Warbler, Slate-throated Redstart (*Myioborus miniatus*), Golden-fronted Redstart (*Myioborus ornatus*), Russet-crowned Warbler (*Basileuterus coronatus*), Black-capped Tanager (*Tangara heinei*), and Common Bush-Tanager. Other less frequently observed species, e.g. Black-and-white Warbler, Tennessee Warbler, Rufous-naped Brush-Finch (*Atlapetes rufinucha*), and Yellow-throated Brush-Finch (*Atlapetes gutturalis*) occasionally appeared near these flocks.

This composition resembles that of the "montane bush flocks" in western Panama (Moynihan 1962), of which three species are identical, namely Common Bush-Tanager, Yellow-throated Brush-Finch and Slate-throated Redstart. The Common Bush-Tanager, described as noisy and gregarious, was regarded as the only nucleus species in these flocks.

Buskirk, et al (1972), studied interspecies flocks formed around three bands of Common Bush-Tanagers in the area where Moynihan (1962) did his fieldwork, and classified six species as long-term followers, four as joiners, and six species as short-term followers. Only two of these attendant species were seen in our interspecies flocks, namely Black-and-white Warbler (joiner) and Slate-throated Redstart (short-term follower).

Chipley (1976) studied the flocking phenomenon in a habitat very similar to that of this study, at oak woods near Popayán about 450 km south of our study area. However, the composition of species in the flocks differs considerably between the two study areas; only three of a total of 13 species are the same, namely Slate-throated Redstart, Blackburnian Warbler, and Black-and-white Warbler. Chipley could not distinguish any of the 13 species as the nucleus species in flock formation, although the Slate-throated Redstart was a strong candidate.

MIGRANT BIRDS FROM NORTH AMERICA

Only three species of North American migrants were observed in the study site: Blackburnian Warbler, Black-and-white Warbler, and Tennessee Warbler. Four additional

migrant species were observed occasionally in the surrounding area: Swainsons Thrush (*Catharus ustulatus*), Olive-sided Flycatcher (*Nuttallornis borealis*), Rose-breasted Grosbeak (*Pheucticus ludovicianus*), and an Osprey (*Pandion haliaetus*) heading southward in September 1980.

The only regular migrant species in the study area was the Blackburnian Warbler, which constituted 6.2 o/o of all individuals during its presence from September to March. The two other species were noted only during a short period from the end of September to November, when the Blackburnian Warbler also was most common.

This is consistent with studies in Panama, where September, October and November also are peak months for migrants (Karr 1976). This evidently means that transients predominate during that period, heading further southward. Only the Blackburnian Warbler could be classified as a true winter visitor in our study area.

The Blackburnian Warbler is also the most common migrant species in the mountains further south in Colombia (Chipley 1976, Miller 1963, Ridgely & Gaulin 1980). Chipley reports 19 migrant species at his locality, making up 46.4 o/o of all individuals between October and April. The Blackburnian Warbler accounted for 57.2 o/o of all migrants during that period. Miller noted 13 migrant species in his study, and estimated that they accounted for 15 o/o of all birds during the winter. But Ridgely & Gaulin observed only 7 migrant species in their area at 2300 m elevation, also with the Blackburnian Warbler as the most abundant, followed by the Canada Warbler (*Wilsonia canadensis*). The Blackburnian Warbler was also a common migrant species out of the 10 recorded at 1700 m altitude near Bogotá in central Colombia (Munves 1975).

At 1900 m elevation on the Pacific slope in western Colombia the Blackburnian Warbler and the Canada Warbler were the most common of 10 migrant species, but they were less abundant than the resident species (Hilty 1980). Hilty worked mainly at an elevation of 1000 m where migrant species constituted 8.8 o/o of the community from October to March, with no typical peak month. In the Santa Marta highlands in northeastern Colombia, the Blackburnian Warbler was also the most common of 25 migrant species, but was most frequent in March-April (Johnson 1980).

However, one has to keep in mind that these studies have been conducted using different methods and at localities of different sizes, our site probably being the smallest. But it is obvious that elevation and habitat are of decisive importance for migrants in the neotropics (Leck 1972, Karr 1976). For instance, many migrants such as the Summer Tanager (*Piranga rubra*) were occasionally common in the nearby Medellín Valley at 1500 m elevation, but were never seen at the study area.

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