

A COMPARISON OF THE PRIMARY FOREST UNDERSTORY AVIFAUNAL COMMUNITIES OF FOUR COSTA RICAN FORESTS

Mark E. Berry, Hannah M. Fouts, Diane J. Gardella, Pamela L. Kunz, D. Meegan Larsen and Aviva E. Liebert

ABSTRACT (AEL)

We compared the primary forest bird communities using mist nets in the understory of four Costa Rican forests: Palo Verde National Wildlife Refuge, Cerro Cacao, Corcovado National Park and the biological station at Finca la Selva. The fewest number of individuals and species were found in the dry forest (Palo Verde) and the greatest number in lowland wet forest (Corcovado). Oscines were predominant in dry forest while, suboscines were predominant in lowland wet forests. Similar numbers of both groups were found in the high altitude site. Finally, nectivores were most abundant in lowland wet forest while other foraging guilds were more evenly distributed.

Key Words: avian community structure, understory bird communities, mist net capture

INTRODUCTION (DML)

Climate and forest structure affect bird community composition by influencing food and spatial resource availability. Different habitats should therefore contain different bird communities. Proportions of birds in different foraging guilds may vary between communities depending on food availability. Oscines, of North American evolutionary origin, and suboscines, of South American origin, may make up different proportions of communities in different habitats. Tropical bird communities may also vary in the relative numbers of migrants. This study looked for differences in understory bird communities residing in the among primary forests of three different tropical habitats: lowland dry forest, montane cloud forest and lowland wet forest. We also compared bird communities found in primary versus secondary forest at one lowland rainforest site.

METHODS (HMF)

During the dry season months of January and February, we used 12 x 2.5m mist nets to capture understory avifauna in four Costa Rican forests: a dry tropical forest (Palo Verde) a premontane cloud forest (Cerro Cacao), a Pacific lowland tropical wet forest (La Sirena, Corcovado), and an Atlantic lowland tropical wet forest (La Selva). All nets were opened during morning hours, two to five meters from trails. At Palo Verde, eight nets were set up north of the Mirador in the mesic habitat along Sendero Cerros Calizos. At Cerro Cacao, nine nets were set up east of the station along the pipeline trail. At Corcovado, nine nets were set up on Sendero Espaveles. At La Selva, seven nets were set up in primary forest and three in secondary growth, all on Sendero Holdridge (see Table 1 for schedules of opening and closing). The nets were checked at half-hour intervals at which time all birds were removed, identified to species, and

then released. Tail feathers were clipped to prevent re-counting in the event of a recapture.

RESULTS (DJG)

Species richness of understory birds was lowest in tropical dry forest and highest in lowland wet forest (3 vs. 9 and 6; Table 2). Birds captured per net hour was lowest in Palo Verde and was at least twice as high at the other three sites (0.14 vs. 0.38, 0.40, 0.32; Table 2).

Suboscines were more abundant than oscines in the two wet lowland sites (10 and 8 vs. 0 and 0; Table 2), equally abundant in the montane forest (7 vs. 5), and less abundant in dry forest (1 vs. 3; Table 2). Migrant birds were captured only in the montane sites.

A comparison of guilds at the four sites indicated that insectivores were more common at Cerro Cacao and Corcovado than at the other two sites (7 and 8 vs. 3 and 1; Table 3). Frugivores were common in all sites except Palo Verde. Nectivores were only represented in the lowland wet forest sites.

Secondary growth habitat at La Selva had a species richness similar to the primary growth habitat (7 vs. 6; Table 2). However, captures per net hour were over three times as great in secondary growth than in primary growth (1.17 vs. 0.32; Table 2). An equal number of suboscines were captured between the two habitats yet oscines and migrants were more common in secondary growth than in primary growth (5 and 3 vs. 0 and 0; Table 2). Similar numbers of insectivores, frugivores, and nectivores were captured in both habitats (Table 2).

DISCUSSION (PLK)

Capture rates, species richness, taxonomic representation, and foraging guilds of understory birds are directly affected by habitat differences such as forest composition and insect abundance. In addition to the results presented here, parallel studies at the same sites examined forest composition (Broughton et al., this volume) and insect abundance (Zug et al., this volume). Data for these comparative studies was collected in primary growth forests except in Corcovado, where the forest data was collected in secondary growth and in La Selva where the weather prevented insect sampling.

At Cerro Cacao and La Selva the relative density of trees per unit area was at least 35% greater than at Palo Verde (Broughton et al., this volume). This may explain the high bird abundance and species richness as the dense forest structure provides more foraging substrates. These forests at Cerro Cacao and La Selva also had at least twice as much basal area ($m^2/100m^2$) than did Palo Verde perhaps indicating that the abundance of birds is linked to forest productivity. At Corcovado and Cerro Cacao the insect diversity was at least twice that at Palo Verde (Zug et al., this volume), and may support a more diverse bird community because it allows for a greater degree of dietary specialization.

The distributions of suboscines and oscines were also affected by habitat type. Based on their biogeographic evolution affinities, we predicted that oscines (North American origin) would be more abundant in cool, high altitude

Table 1. Mist net sampling times.

	Palo Verde	Cerro Cacao	Corcovado	La Selva (1°growth)	La Selva (2°growth)
Date	1/14/94	1/22/94	1/29/94	2/12/94	2/12/94
# nets	8	9	9	7	3
nets open	07:00	07:10	06:30	06:50	07:00
nets closed	11:20	11:00	11:10	11:20	11:20
net hours	29.25	31.67	39.75	30.90	12.80

Table 2. Site comparisons.

	Palo Verde	Cerro Cacao	Corcovado	La Selva (1°growth)	La Selva (2°growth)
#birds caught	4	12	16	10	15
# species caught	3	8	9	6	7
captures/net hour	0.14	0.38	0.40	0.32	1.17
#oscines	3	5	1	0	5
#suboscines	1	7	10	8	8
#migrants	0	3	0	0	3

habitats, and that suboscines (South American origin) would be more abundant in wet tropical rain forests.

These predictions were largely upheld, in that oscines were more abundant in the dry forest of Palo Verde than in the rain forests of Corcovado and La Selva, suboscines made up a large component of the avifauna at Corcovado and La Selva than elsewhere, and more oscines

were captured at Cerro Cacao than any other primary forest. However, oscines were as abundant in the secondary forest at La Selva as they were at Cerro Cacao.

Foraging guilds were also examined as a function habitat type. Insectivores were more abundant at Cerro Cacao and Corcovado than at Palo Verde and La Selva, perhaps because the insect communities were at least twice as diverse at Cerro Cacao and Corcovado.

Table 3. A comparison of foraging guilds in four Costa Rican Sites (Numbers represent number of individuals captured per site in particular guild).

	Palo Verde	Cerro Cacao	Corcovado	La Selva (1°growth)	La Selva(2°growth)
insectivores	3	7	8	1	3
frugivores	1	5	5	7	10
nectivores	0	0	2	2	2

Frugivores and nectivores were quite abundant at Cerro Cacao, Corcovado and La Selva. This may be attributable to the lack of a pronounced dry season in these regions, which allows for a stable supply of fruits and flowers throughout the year.

A related study at La Selva (Berry et al., this volume) compared avifauna in the primary forest and early secondary growth. The higher capture rates in the successional growth may be due to the very dense undergrowth which provides understory birds with a more complex environment and more foraging substrate than in the primary forest. Successional growth also lacks chemical defenses, and therefore herbivorous insects were more abundant in this habitat (Berry et al 1994). Perhaps this abundance

of insects attracts more birds.

LITERATURE CITED

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