

Table 3 Comparisons of Arthropods at Sites in Different Preserves (Jan-Feb 1991, Costa Rica).

Preserve	Site	#. of Orders	Total #of Ind.	#. of ind. in each order	#. of herbivores
Palo Verde 1-12-91	Road, (R) Toledo trail(T)	No significant difference	No significant difference	No significant difference	No significant difference
Corcovado 1-25-91	Airstrip (A) Pavo Trail(P) Beach (B)	No significant difference	No significant difference	Ortho:P>A>B (p<.05) Hemi:A>P>B (p<.05) Homo:A,P>B (p<.05) Cole:P>A>B (p<.05) Dip:P>B>A (p<.05) Hym:P,A>B (p<.05) Lep:No sig. difference	P>B(P<0.1 test does not allow lower p)
Monteverde 2-2-91	Bullpen (BP) Edge of Pen(E)	No significant difference	E>BP(p<.05)	Orth:BP>E (p<.05) Homo:PB>E (p<.05) others: No sig. difference	BE>E (p<.05)
La Selva 2-9-91	1° Forest (1°) 2°Forest (2°)	1°>2° (p<.05)	1°>2° (p<.05)	Hemi:1°>2° (p<.05) Homo:1°>2° (p<.05) Cole:1°>2° (p<.05) Lepid:1°>2° (p<.05) Others: No sign. difference	1°>2°(p<.05)

COMPARATIVE BIRD PROJECT 1991

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Abstract (E.G.)

Climate, vegetative structure and latitude can affect the number of species and abundances of birds in a habitat. By mist netting birds in a dry deciduous forest, Palo Verde, and two evergreen wet forests, La Selva in the North and Corcovado in the South, we attempted to determine if such differences do exist. Species diversity and abundances were greater in the wet forests than the dry. Migrants were only found at the northern latitude sites of La Selva and Palo Verde.

Introduction (Shan Burson)

Climate and vegetative structure directly affect the food and spatial resources available to birds. Latitude and rainfall regimes also are known to affect the diversity, distribution and size of bird populations. Because Costa Rica contains many diverse habitat types it would be expected that species diversity and abundance may differ greatly between these habitats. To measure the influences of latitude, climate and vegetative structure on bird species and abundance, birds were sampled using mist nets in three locations within Costa Rican preserves. A comparison among two wet evergreen and one dry deciduous site enabled us to measure the possible influences of habitat on the native avian populations.

Methods (T.Y., G.G., A.M.)

Sites sampled were Palo Verde, Corcovado National Park and La Selva Biological Preserve in Costa Rica. 8 to 12 mist nets were set up in both primary and secondary forest at Corcovado and La Selva, while only in second growth forest at Palo Verde. We placed all nets in well shaded areas to reduce visibility of the nets to the birds. After recording the species and various morphological measurements for each netted bird, the bird was released. One tail feather was clipped to determine when a bird we netted had been captured previously. Samples at all sites were taken between 0700 and 1200.

Results (A.B.)

We captured a greater number of birds at wet forest sites than at the dry forest site, with the greatest number captured at Corcovado (Table 1). In the wet forests a greater number of species were also captured (Table 1). A greater percentage of migrant birds were caught at Palo Verde, the dry forest site, than at any other site; no migrants were caught at Corcovado (Table 1).

At Corcovado, a larger percentage of individual birds, bird species, and both oscines and suboscines were captured by mist nets located in primary growth forest. At La Selva, greater percentages of all examined birds were caught in secondary growth forest (Table 2).

Refer to Figures 1, 2, and 3 for net placements and surrounding habitat in each site. Refer to Tables 3, 4, and 5 for Families, orders and species of birds netted at each site. Refer to Appendix A for forest descriptions and Appendices B,C, and D for site descriptions. Refer to Appendices E,F, and G for raw data.

Discussion (A.M., E.G., G.G.)

Our comparative study has revealed that differences exist in species composition and abundances of avifauna among our study sites. We attribute these differences to differences in vegetation types and climate. We found that birds are more abundant in the wet forest sites than the dry forest site. Plants annual productivity is greater in the wet forest and we suspect that this creates a greater food base (Hartshorn & Janzen, 1983). The greater amount of rainfall in the wet forests may increase insect populations which is another addition to the food base. In addition, there was greater species diversity in our wet forest samples than the dry. Species diversity decreases as climates become harsher and more variable. The physiological stresses caused by harsh and variable conditions exclude many species found in more moderate climates (Sanders & Krebs, 1985). Our data follow this trend. Another possible contributing factor to the species diversity differences is that we only sampled secondary growth in Palo Verde, whereas we sampled greater habitat diversity in the wet forest by netting in both primary and secondary growth. Greater habitat diversity allows for greater bird species diversity.

Migrants were not found at the southern latitude, Corcovado. This finding may be attributed to longer travel distances to reach reserves in southern Costa Rica; a longer travel distance requires a greater amount of energy expenditure and mortality risk. Previous empirical data has also indicated that migrants are more likely to be found in secondary forests than primary forest; our data concur.

Our sampling methods left much room for error. At La Selva, our nets were placed

in secondary forest when the canopy was no more than five meters high. Our primary forest nets were in considerably taller forests. Thus, our nets covered a much greater proportion of vertical forest space and the birds therein in the secondary forest. Consequently, we caught many more birds in the secondary growth. We only netted birds on one day and for a maximum of four hours in each site. Only a quarter of our nets in Corcovado were in secondary growth, therefore we can not conclude that the primary forest has more birds.

Because of limited sample sizes, we have most likely not given an adequate representation of the populations in these habitats. Nevertheless, there do appear to be differences in species composition and abundances between our sample sites.

On a separate note, a further study of bill morphology could help identify various food habitats and food abundance, which would also help explain species distribution and abundance.

Table 1 Site Comparisons

	Palo Verde	Corcovado	La Selva
Nets opened	0730-1030	0700-1105	0715-1115
Total # nets	8	12	10
Total # net hours	24	50	40
Total # birds	9	51	31
# Birds/net hour	0.375	1.000	0.78
Total biomass of netted birds	150.5g	1,086g	819.5g
x Biomass	16.7g	21.3g	26.4g
Orders	1	3	3
Families	5	10	11
Species	8	21	15
# Migrants	5	0	1
# Residents	4	51	30
(indiv.) Oscines	5	6	7
Suboscines	4	37	18

Table 2 Growth-type comparisons (primary/secondary)

	Corcovado Primary	Corcovado Secondary	La Selva Primary	La Selva Secondary
individuals	67% (0.90) ⁺	33% (1.42)	13% (0.20)	87%(0.74)
oscines (of all)	67% (0.11)	33% (0.17)	0% (0)	100% (0.35)
suboscines (of all)	70% (0.68)	30% (0.92)	22% (0.20)	78% (0.70)
oscines (of all birds caught in growth type)	12%	77%	0%	26%
# species	17 (0.45)	12 (1.0)	3 (0.15)	14 (0.70)

+Numbers in parentheses indicate numbers of individuals caught per net hour.

Table 3 Orders and families of birds netted at Palo Verde On 11 Jan., 1991, between 0730 and 1030.

ORDER: Passeriformes

Pipridae

Chiroxiphia linearis - 2 (Long-tailed Manakin)

Tyrannidae

Myiarchus crinitus (Great-crested Flycatcher)

Empidonax flaviventris (Yellow-bellied Flycatcher)

Platyrinchus cancrominus (Stub-tailed Spadebill)

Turdidae

Catharus ustulatus (Swainson's Thrush)

Parulidae

Seiurus aurocapillus (Ovenbird)

Basileuterus rufifrons (Rufous-capped Warbler)

Emberizidae

Passerina ciris (Painted Bunting)

Total # OSCINES: 5

Total # SUBOSCINES: 4

SITE DESCRIPTION:

8 mist nets set up on or near the Toledo Trail. Dry forest area; sunny and 80-85°F.

Nets mostly covered by secondary growth low canopy trees.

4 Residents, 5 Migrants

Table 4 Orders and Families of birds netted at Corcovado on 25 Jan., 1991 from 0700-1105.

Orders and Families of Birds Netted

Individuals

I. Columbiformes

1) Columbidae

Ruddy quail dove

1

II. Apodiformes

1) Trochilidae

Blue throated goldentail

1

White necked Jacobin

1

Long tailed hermit

3

Bronzy hermit

1

Crowned wood nymph

1

III. Passiformes

1) Dendrocolaptidae

tawny winged woodcreeper

3

buff throated woodcreeper

2

2) Formicariidae

bi-colored outbird

1

chestnut backed outbird

1

russit outshrike

1

3) Pipridae

thrush-like manakin

2

blue-crowned manakin

5

red capped manakin

2

4) Tyrannidae

golden crowned spadebill

5

ochre bellied flycatcher

11

sulphur rumped flycatcher

1

5) Turdidae

white throated robin

1

6) Parulidae

buff rumped warbler

1

7) Thraupidae

gray headed tanager

3

8) Emberizidae

orange-billed sparrow

1

Orders - 3

Families - 10

Species - 21

Individuals - 51

51 residents suboscines: 37

0 migrants oscines: 6

Suboscines - 29% in secondary forest
71% in primary forest

Oscines - 33% in primary forest
67% in secondary forest

Table 5 Orders and Families of birds netted at La Selva on 8 February, 1991 between 0715 and 1115. La Selva - Orders & Families of birds netted 2/8/91.

Orders and Families of Birds Netted	# Individuals
I. Columbiformes	
1) Columbidae	
Gray crested dove	
II. Apodiformes	
1) Trochilidae	
Long tailed hermit	2
Red footed plumeleteer	3
III. Passeriformes	
1) Dendrocolaptidae	
Wedge billed wood creeper	2
Buff throated woodcreeper	2
2) Formicariidae	
Spotted antbird	
3) Pipridae	
White collared manakin	7
Red capped manakin	2
4) Tyrannidae	
Ochre bellied flycatcher	4
5) Troglodytidae	
Black throated wren	
6) Turdidae	
Clay colored robin	
7) Parulidae	
Northern waterthrush	
8) Thraupidae	
Scarlet rumped tanager	
9) Emberizidae	
Orange billed sparrow	2
Blue black grossbeak	
Totals -	
Orders - 3	
Families - 11	
Species - 15	
Individuals - 31	

Appendix A Forest descriptions for each site, canopy height, percent canopy cover, for primary and secondary forest at each site.

Corcovado

secondary: % cover

x=85 range 80-95

canopy height

x=11.3m range 4m-15m

primary: % cover

x=96.1% 90-100

canopy height

x=37.2m 30-50m

Palo Verde

all secondary

% cover 54.38% range 25-100

canopy height 10m range 7-25m

La Selva

(estimates)

secondary: % cover

95% range 90-100

canopy height

4m range 3-5m

primary: % cover

95% range 90-100

canopy height

35.0m range 30-40

Literature Cited

Janzen, Daniel H., 1983. Costa Rican Natural History, Chicago University Press: Chicago, Illinois.

Krebs, J.B., 1985, Behavioral Ecology.

Figure 1 Palo Verde mist net map. All nets are in secondary growth forest. Sampling occurred on January 11, 1991.

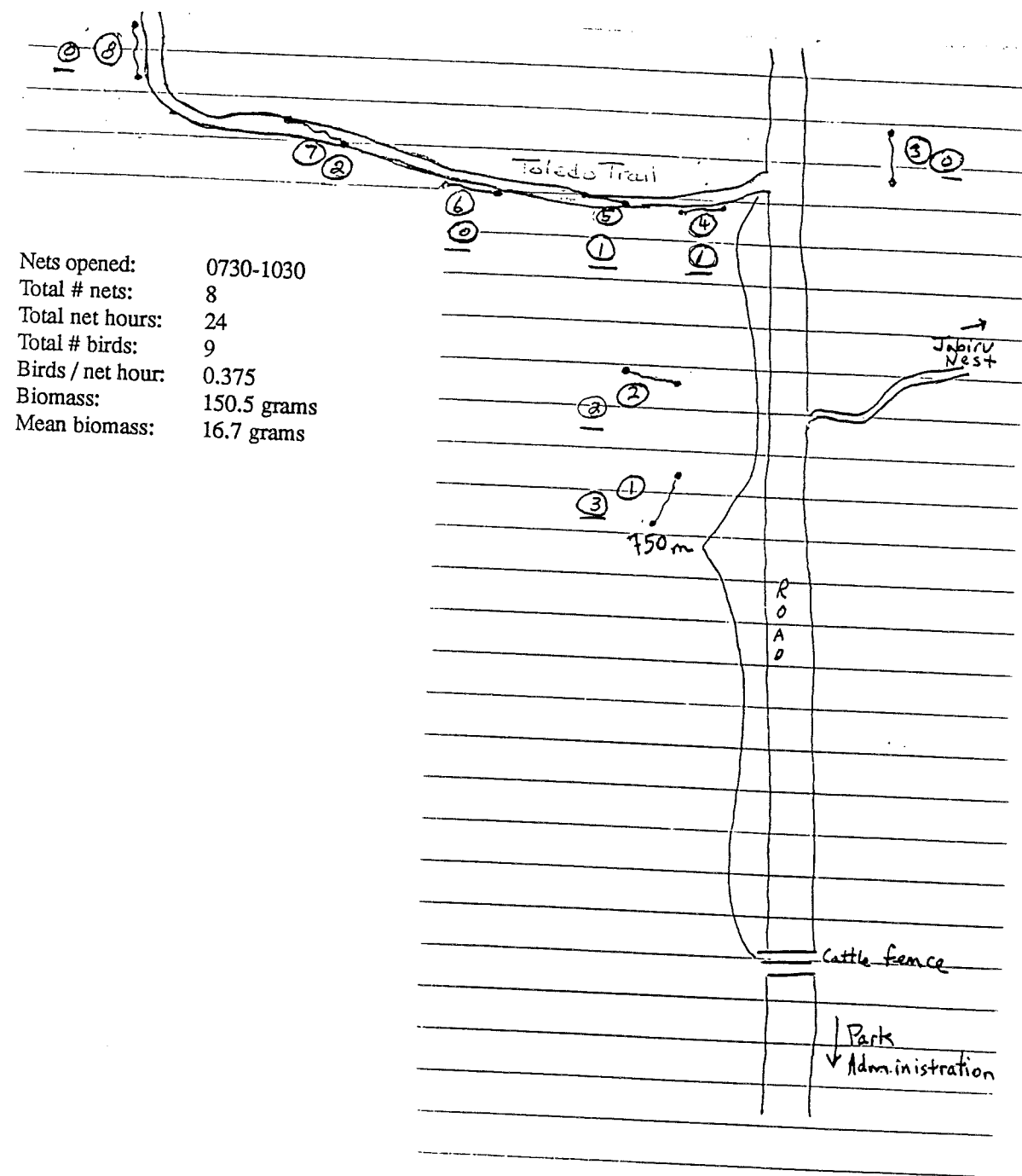


Figure 2 Corcovado mist net map. Sampling occurred on January 25, 1991.

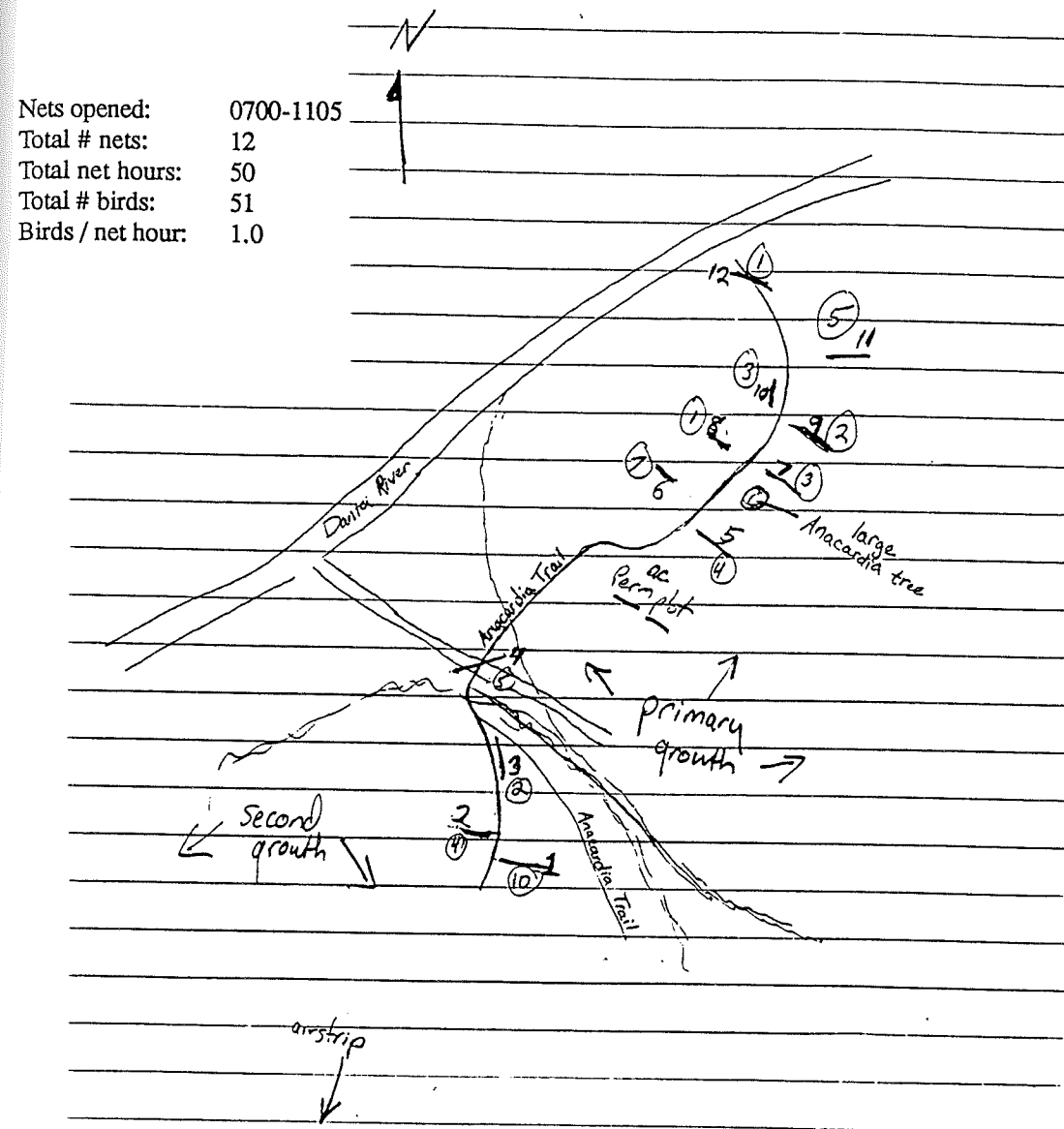


Figure 3 La Selva mist net map.

Nets opened: 0715-1115
 Total # nets: 10
 Total net hours: 40
 Total # birds: 31
 Birds / net hour: 0.78

