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Avifaunas of Two Dry Forest Sites in Northern Oaxaca, Mexico

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A b s t r a c t
Two sites in northern Oaxaca, in the La Cañada region of the Valle de Tehuacán, were surveyed avifaunistically. A total of 142 species was detected, with about 100 species found at each site. A surprising number (37) of species was found to represent isolated interior populations of species otherwise restricted to one or the other coastal plain, of which about even proportions were exclusively from one coastal plain or the other, creating an avifauna at these sites that is an odd mixture of birds from the Interior, the Pacific coastal plain, and the Atlantic coastal plain.
Keywords: Check-list, Oaxaca, Tehuacán valley, avifaunas.

R e s u m e n
Avifaunas de dos bosques secos del norte de Oaxaca, México
Se realizaron inventarios avifaunísticos en el norte de Oaxaca, en dos sitios de la región de la Cañada del Valle de Tehuacán. Se observaron 142 especies de aves, encontrándose cerca de 100 especies en cada sitio. Se encontró un número sorprendente de especies (37) que representan poblaciones aisladas del interior restringidas por una u otra vertiente costera. Además, proporciones similares de especies fueron exclusivamente de una vertiente costera o la otra, creando una extraña mezcla en la avifauna de estos sitios que incluye aves del interior, de la vertiente costera del Pacífico y de la vertiente costera del Atlántico.
Palabras clave: Inventario, Oaxaca, La Cañada, Valle de Tehuacán, avifaunas.

R é s u m é
Oiseaux de deux emplacements secs de forêt dans Oaxaca, Mexique
Au cours d'inventaires ornithologiques réalisés en deux sites distincts de la Cañada (Vallée de Tehuacan), au Nord de l'état d'Oaxaca, 142 espéces d'oiseaux furent dénombrées, avec environ 100 especes par site. Un nombre surprenant d'espece (37) ont éte recensé. Elles représentent des populations isolées dans l'intérieur de cet état, normalement limitées a un des versants maritimes. De plus, une proporcion égale d'espéces sont exclusivement d'un versant maritime (pacifique) o de l'autre (atlantique), creant un mélange qui inclut especes de la cote pacifique, de la cote atlantique et de l'intérieur.
Mots cléts: Inventaire ornithologique, Oaxaca, La Cañada, Vallée de Tehuacan.

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The habitats that have seen least attention from ornithologists in Mexico are the arid tropical forests and scrubs typical of the interior valleys and Pacific coastal slopes. Very few detailed studies have focused on the birds of these habitats (Navarro-Sigüenza 1992). Present authors included, ornithologists appear to have passed these habitats by in their haste to arrive at the 'more interesting' habitats, such as tropical evergreen forest and cloud forest. Nevertheless, these habitats hold surprisingly rich avifaunas (Escalante-Pliego et al. 1993), including many forms that are endemic and that are of great importance to conservation efforts (Peterson et al. 1993, Navarro-Siguenza and Peterson 2000), e.g., the microendemic coquette hummingbird *Lophornis brachylopha*, the rare flycatcher *Xenotriccus mexicanus*, the poorly-known vireos *Vireo nelsoni* and *V. brevipennis*, and the scarce poor-will *Nyctiphrynus mcleodii*.

Table 1. Summary of species observed at two sites in La Cañada, in northern Oaxaca.

Site	Number of species	Isolated populations in interior	Eastern slope	Western slope
Santiago Quiotepec	103 (95 riparian forest, 52 cactus forest)	18 isolated in La Cañada, 17 in La Cañada and central Oaxaca	7	8
Río Tomellín	98 (72 dry scrub, 51 oak scrub)	6 isolated in La Cañada, 6 in La Cañada and central Oaxaca	1	6
Total	142	20 isolated in La Cañada, 17 in La Cañada and central Oaxaca	7	9

As part of efforts to evaluate the importance of the Valle de Tehuacán, in northern Oaxaca, for conservation action, we set out to fill a small part of this knowledge gap via detailed inventories at a series of dry forest localities. We worked throughout the Valle de Tehuacán, also known as La Cañada, which is the arid basin holding San Juan Bautista Cuicatlán. Herein, we describe the ornithological results of inventories at two sites (the two most complete in the series), and discuss the avifaunal composition at each

Methods

Work reported herein was carried out at two sites in La Cañada (Fig. 1) in January 1994. The first site was 3 km SE Santiago Quiotepec, Distrito de Cuicatlán, Oaxaca, México, 470 m, 96° 58' 54" N, 17° 53' 55" W, surveyed 18-23 January 1994. This site held two main habitat types: well-developed riparian forest extending 10-100 m on both sides of the courses of the Río Grande and the Río Sabino (97° 0' 23" N, 17° 52' 11" W, at the intersection); and columnar cactus forest, which was extensive in the uplands away from the rivers.

The second site was the vicinity of El Venado, Distrito de Cuicatlán, Oaxaca (Fig. 1), México, up to 2000 m, 97° 00' 32" N, 17° 53' 55" W, surveyed 24-27 January 1994. This site also held two principal habitat types: dry deciduous forest, which was concentrated in the valleys and lower slopes of the surrounding mountains; and dry oak scrub, which was found on the higher slopes of the surrounding mountains. This site is an abandoned railroad stop, accessible only via the train that runs from Mexico City to Oaxaca City, with stops by previous arrangement.

At each site, occurrence records were accumulated via three means. (1) Experienced observers fanned out along all available trails, detecting species by eye and by voice, and identifying them with the help of the usual birding aids (binoculars, field guides, etc.). (2) We used shotguns and mist nets (10-15 per day per site) to collect voucher specimens of as many species as was feasible, permitting confirmation of most identifications, as well as further systematic study. Finally, (3) we conducted nightly auditory surveys 100+ m from our campsites in efforts to detect nocturnal species present.

Taxonomy used herein follows the most recent Check-list of North American Birds (AOU 1998), except in the specification of particularly distinct forms whenever possible (e.g., *Dendroica* [*coronata*] *auduboni* vs. *D.* [*c.*] *coronata*). Range extensions, interior vs. coastal records,

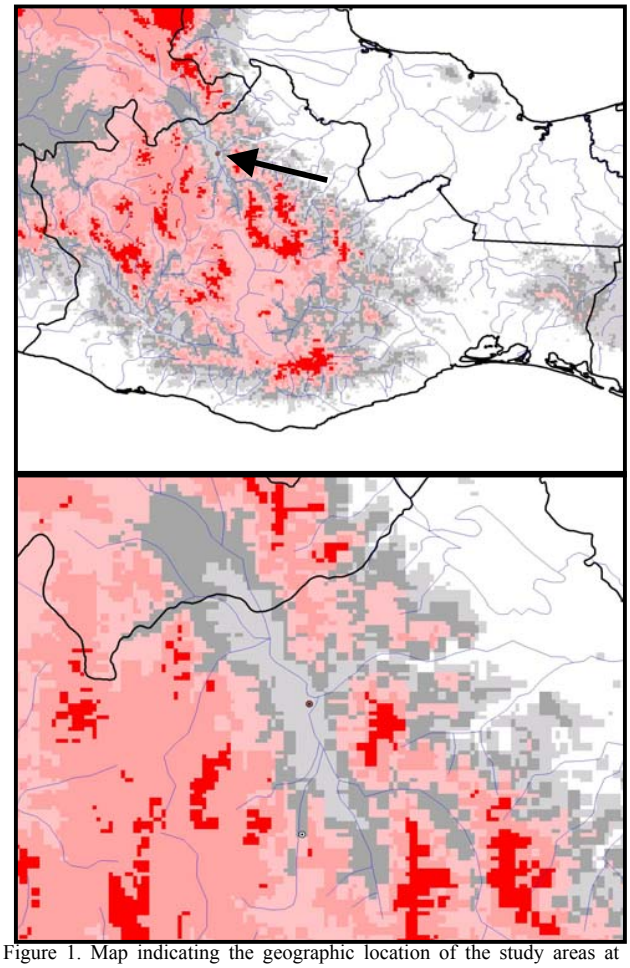

Figure 1. Map indicating the geographic location of the study areas at Santiago Quiotepec and Valle del Tomellín in northern Oaxaca. Sites are plotted on a map of elevation, in which successively darker shades of gray and red indicate 500 m elevation intervals. Top panel is a view of Oaxaca (study area indicated by black arrow); bottom panel is a close-up of the La Cañada region of northern Oaxaca (Santiago Quiotepec site is indicated by a dotted red circle, and Río Tomellín site is indicated by a dotted white circle. On both maps, rivers are plotted in blue.

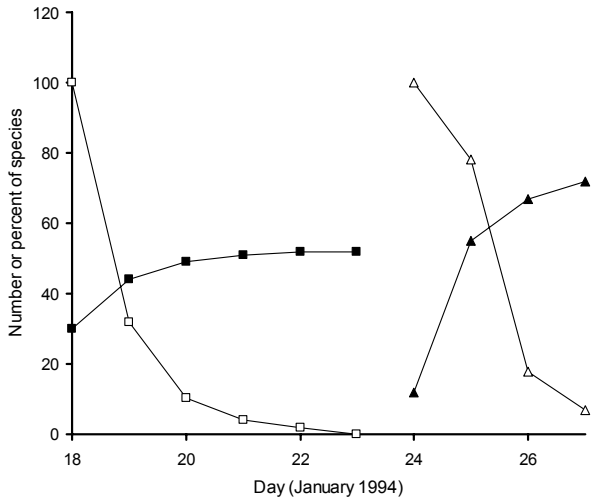

Figure 2. Accumulation of species (closed symbols) and percent of species new to the site list (open symbols) for Santiago Quiotepec (squares) and Valle del Tomellín (triangles).

and east vs. west coast distributions were summarized subjectively based on a recent state summary (Binford 1989) and more recent published information for central Oaxaca (Forcey 2002a, b, c). To some degree, we also took into account information from a recent field guide presenting small-scale range maps for each species (Howell and Webb 1995); however, the lack of precision of these maps makes their interpretation complex. Because our work was carried out in January only (dry season, non-breeding), we were unable to use specimen information towards establishing seasonal or reproductive status of species.

Results

A total of 142 species was found at the two sites (Appendix). Of those, 103 were found at Santiago Quiotepec, and 98 at Río Tomellín. Species accumulation curve was asymptotic for Santiago Quiotepec, and that for Río Tomellín was probably close to its asymptote (Fig. 2). Within each site, species detected were distributed unevenly among habitats (Santiago Quiotepec: 95 in riparian forest and 52 in cactus forest; Río Tomellín: 72 in dry tropical scrub and 51 in oak scrub), reflecting a combination of differences in species richness and uneven sampling effort.

A surprising number of species detected represented isolated populations in the Interior of the state of Oaxaca, of species that are otherwise restricted to one or the other coastal plain (Table 1), particularly at Santiago Quiotepec. In all, for 35 species, Santiago Quiotepec represents an isolated interior population, although about half have also been found in the Oaxaca Valley. At Río Tomellín, in contrast, only 12 species represent isolated interior populations (of which half have been found in the Oaxaca Valley). In all, 35 of 37 species representing isolated or somewhat isolated populations in the Interior are present at Santiago Quiotepec, whereas only 12 of 37 are present at Río Tomellín.

Interestingly, species for which these two sites represent isolated Interior populations are derived from populations both to the east and to the west (Table 1), in spite of the close proximity to the Atlantic coastal plain (Fig. 1). In all, 9 species represent isolated Interior populations of species otherwise found on the Pacific coastal plain, and 7 species represent isolated Interior populations of species otherwise found on the Atlantic coastal plain. It should be pointed out, though, that decisions about 'eastern' vs. 'western' affinities were complex throughout, as a continuum of restriction to the coastal slopes exists. Regardless, the lowland tropical component of the La Cañada avifauna represents a mix of eastern and western faunistic elements.

Discussion

We present the results of brief—and probably somewhat incomplete—inventory efforts at two sites in northern Oaxaca, Mexico, to complement other recent studies in the La Cañada region (Cisneros-Palacios and Bonilla-Ruz 1993, DRBT-C 2001) and the state (Aguilar-Rodríguez 2000, Forcey 2001, Grosselet 2001, Forcey 2002a, b, c, Grosselet and Forcey 2002). Although the species accumulation curve for Santiago Quiotepec was asymptotic, and that for Río Tomellín was probably close to its asymptote, the occurrence of additional species at these sites is likely given the short duration of our visits. In particular, work in other seasons would reveal additional species more detectable because of increased singing activity.

Interestingly, though, the avifauna of both sites, and particularly that of Santiago Quiotepec, included lowland tropical elements not expected in the Interior of the state (Binford 1989). This intermixture of bird species characteristic of the dry tropical habitats of Interior Mexico (e.g., *Amazilia violiceps*, *Melanerpes hypopolius*) with species usually considered characteristic of the Pacific coastal plain (e.g., *Ortalis poliocephala*, *Ara militaris*, *Caprimulgus ridgwayi*) or of the Atlantic coastal plain (e.g., *Euphonia hirundinacea*, *Tiaris olivacea*) creates a unique avian community in the area. Interestingly, whereas species characteristic of the Pacific coastal plain were found in numbers at both sites, Santiago Quiotepec had many more species from the Atlantic coastal plain than Río Tomellín (7 vs. 1). This difference is perhaps to be expected, as Santiago Quiotepec is closer to the Sierra Madre Oriental (Figure 1), and holds a riparian forest habitat that appears to run continuously along the Río Santo Domingo out to the Atlantic coastal plain.

The results of this study illustrate the continuing need for inventory efforts focused on Mexican birds. Even in areas that are apparently well-known, such as the interior valleys of Oaxaca (Binford 1989), and in spite of recent general distributional summaries (Howell and Webb 1995), many details remain to be discovered and documented.

Acknowledgments

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Appendix. Summary of species recorded at two sites in northern Oaxaca: Santiago Quiotepec (SQ) and Río del Tomellín (RT). "East slope" and "west slope" indicate species for which the La Cañada and nearby populations are isolated interior populations restricted to the eastern (Atlantic) slopes or western (Pacific) slopes of Mexico, respectively. C = found in La Cañada and central Oaxaca as well (Forcey 2002a, b, c), including records of vagrants.

Species	Isolated interior population	East slope	West slope	SQ-riparian	SQ-cactus	RT-oak scrub	RT-deciduous scrub
Phalacrocorax brasilianus	C			1			
Ardea herodias	C			1			
Ardea alba	C			1			
Egretta caerulea				1			
Coragyps atratus				1	1		1
Cathartes aura				1	1	1	1
Cairina moschata	1			1			
Accipiter striatus				1		1	
Buteogallus anthracinus	1			1			
Parabuteo unicinctus				1			
Buteo albonotatus	C		1		1		
Buteo jamaicensis				1	1	1	1
Spizaetus ornatus?	1	1		1			
Falco sparverius				1	1		1
Ortalis poliocephala	1		1	1	1		1
Quail sp.						1	
*Rallus elegans**	1	1		1			
Actitis macularia				1			1
Columba fasciata						1	
Zenaida asiatica				1	1	1	1
Columbina inca				1	1		1
Columbina passerina				1	1		
Leptotila verreauxi				1	1	1	1
Ara militaris			1	1	1		
Piaya cayana	1			1			1
Geococcyx velox				1		1	1
Crotophaga sulcirostris				1	1		
Bubo virginianus				1	1		
Glaucidium brasilianum	1			1	1		1
Micrathene whitneyi					1		
Ciccaba virgata							1
Caprimulgus ridgwayi	C		1		1		1
Aeronautes saxatalis						1	
Cynanthus sordidus					1		1
*Cynanthus latirostris**				1	1		1
*Amazilia violiceps**				1	1		1
Trogon elegans				1	1		1
Momotus mexicanus				1	1		1
Ceryle torquata	1			1			
Ceryle alcyon	C			1			
Chloroceryle americana				1	1		
Melanerpes formicivorus						1	
Melanerpes hypopolius				1	1		1
Colaptes [*auratus*] *cafer*				1	1	1	

Species	Isolated interior population	East slope	West slope	SQ-riparian	SQ-cactus	RT-oak scrub	RT-deciduous scrub
Dryocopus lineatus	1					1	
Lepidocolaptes affinis						1	1
Camptostoma imberbe				1	1		
Contopus pertinax						1	1
Contopus sp.						1	
Empidonax albigularis				1	1	1	1
Empidonax difficilis?				1	1		1
Sayornis nigricans				1	1		1
Pyrocephalus rubinus							1
Attila spadiceus	1				1		
Myiarchus tuberculifer				1	1	1	1
Myiarchus cinerascens				1	1		1
Myiarchus nuttingi				1	1		
Pitangus sulphuratus	C			1			
Megarynchus pitangua	1			1			
Myiozetetes similis	C			1		1	
Tyrannus melancholicus				1			1
Tyrannus crassirostris				1	1	1	1
Pachyramphus aglaiae	C			1			
Vireo griseus	C	1		1			
Vireo solitarius				1		1	1
Vireo hypochryseus	C			1	1		
Vireo gilvus				1			1
Aphelocoma californica						1	
Corvus corax				1	1	1	1
Progne chalybea?	1			1			
Tachycineta albilinea	1			1			
Tachycineta thalassina				1			
Stelgidopteryx serripennis				1			1
Baeolophus wollweberi						1	
Psaltriparus minimus						1	
Campylorhynchus jocosus							1
Catherpes mexicanus				1	1		1
Thryothorus pleurostictus	1		1				1
Thryothorus felix	C		1	1			1
Thryomanes bewickii						1	
Troglodytes [*aedon*] *aedon*				1		1	
Regulus calendula						1	
Polioptila caerulea				1	1	1	1
Polioptila albiloris	1		1	1	1	1	1
Myadestes occidentalis						1	1
Catharus aurantiirostris							1
Catharus guttatus						1	1
Turdus grayi	C	1		1	1		1
Turdus assimilis							1
Turdus rufopalliatus	C		1	1			1
Turdus migratorius				1			
Mimus polyglottos				1			
Toxostoma ocellatum						1	
Toxostoma curvirostre				1	1	1	1

Species	Isolated interior population	East slope	West slope	SQ-riparian	SQ-cactus	RT-oak scrub	RT-deciduous scrub
Melanotis caerulescens						1	
Ptilogonys cinereus						1	
Vermivora celata				1		1	
Vermivora ruficapilla				1	1		1
Vermivora virginiae				1	1		1
Vermivora luciae	1		1	1			
Parula pitiayumi	1			1	1		
Parula superciliosa						1	
Dendroica magnolia	C			1	1		
Dendroica [*coronata*] *coronata*						1	1
Dendroica [*coronata*] *auduboni*						1	1
Dendroica nigrescens				1			1
Dendroica townsendi							1
Dendroica occidentalis						1	
Dendroica virens	C			1		1	
Mniotilta varia				1		1	1
Seiurus motacilla	C				1		
Oporornis tolmiei				1			1
Geothlypis trichas				1			
Wilsonia citrina	1	1			1		
Wilsonia pusilla				1	1		1
Wilsonia canadensis				1			
Basileuterus rufifrons				1			1
Piranga flava				1	1		1
Piranga rubra				1			
Euphonia hirundinacea	1	1		1			
Volatinia jacarina				1			
Tiaris olivacea	1	1		1			
Arremonops rufivirgatus?						1	
Melozone kieneri				1		1	1
Pipilo erythrophthalmus						1	
Pipilo albicollis						1	1
Aimophila mystacalis				1	1	1	1
Spizella passerina						1	
Spizella pallida							1
Melospiza lincolnii						1	
Pheucticus chrysopeplus				1	1		1
Pheucticus melanocephalus				1			1
Guiraca caerulea				1			1
Passerina amoena							1
Passerina cyanea							1
Passerina versicolor				1	1		1
Passerina ciris				1			
Icterus wagleri							1
Icterus pustulatus				1	1	1	1
Carpodacus mexicanus				1			1
Carduelis psaltria						1	1
Passer domesticus				1			

*: Moderate range extensions within the state of Oaxaca. ?: indicate doubt in species-level determination