

The avifauna of Serranía de Tobatí, Departamento Cordillera, Paraguay

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ABSTRACT

The Serranía de Tobatí (25°17' S, 57°05' W) comprises a series of precipitous sandstone bluffs along the Cordillera de los Altos of Departamento Cordillera, Paraguay. Thus far 131 species representing 38 families of birds have been recorded from Serranía de Tobatí and adjacent lowlands, based on 34 days of intermittent field work by myself and others from 1978–2016. Data are provided on the breeding and migratory status and the abundance of each species. Two species typical of cerrado vegetation to the northeast, the Rusty-backed Antwren (*Formicivora rufa*) and Black-throated Saltator (*Saltatricula atricollis*), occur near the southwestern limit of their distribution. Despite several anthropogenic threats, only a small portion of Serranía de Tobatí has been protected; the remaining area should be preserved as well.

KEY-WORDS: abundance, birds, specimens, status, threats

RESUMEN

La Serranía de Tobatí (25°17' S, 57°05' W) comprende una serie de acantilados de piedra arenisca a lo largo de la Cordillera de los Altos del Departamento de la Cordillera, Paraguay. Hasta la fecha se han registrado 131 especies representando 38 familias de aves en la Serranía de Tobatí y las tierras bajas adyacentes, sobre la base de 34 días de trabajo de campo intermitente por mí y otros desde 1978–2016. Se proporcionan datos sobre el estado de reproducción y migración y la abundancia relativa de cada especie. Dos especies típicas de la vegetación de cerrado al noreste, el Batará Colorado (*Formicivora rufa*) y el Pepitiro de Corbata (*Saltatricula atricollis*), se encuentran cerca del límite suroeste de su distribución. A pesar de varias amenazas antropogénicas, sólo una pequeña parte de Serranía de Tobatí ha sido protegida; el área restante también debe ser preservada.

PALABRAS CLAVES: abundancia, amenazas, aves, especímenes, estado

INTRODUCTION

Despite its proximity to Asunción (just 55 km), ease of access beside a well established road (Ruta Caacupé-Tobatí), and scenic landscapes, very little has been published on the avifauna in the vicinity of Tobatí, a small town in Departamento Cordillera, Paraguay. In 1978, Robert Storer and Philip Myers collected 78 specimens of 42 species for the University of Michigan Museum of Zoology (UMMZ) during 11 days of field work (2–4 June, 8–9 and 12–14 July, 31 August, and 1 September; data from unpublished specimen catalogs); the data for four species were published by Storer (1981, 1989). On 3 August 1986, Nancy López de Kochalka collected two specimens of one species for the Museo Nacional de Historia Natural del Paraguay (MNHNP); the data for both specimens were published by Storer (1989). An additional four specimens of four species were collected for the MNHNP by Felicita Areco de Medina and Floyd Hayes on 24 February 1987; the locality for three species was published by Amarilla and Etcheverry (1996) and the sighting of a Nearctic migrant was reported by Hayes (1990). Hayes (1995a) reported sightings for four species, of which two represented the southernmost records and one the westernmost record for the species in Paraguay. All of these observations and specimen records were in the vicinity of Serranía de Tobatí and adjacent lowlands, located just

south of Tobatí. In this paper I summarize data on the avifauna of Serranía de Tobatí and adjacent lowlands, based on specimen data, personal field observations, and reports by other observers to eBird (ebird.org).

Study area

Serranía de Tobatí (25°17' S, 57°05' W) comprises a series of precipitous sandstone bluffs along the Cordillera de los Altos of Departamento Cordillera in the Central Paraguay biogeographical region (Hayes 1995a) of eastern Paraguay (Fig. 1). The elevation ranges from about 105 m along Arroyo Tobatí, a stream flowing from south to north in the valley between sandstone bluffs, to about 237 m at the summit of Cerro Kavajú (data from Google Earth; www.google.com/earth). The white saccharoidal sandstone and clay, which form cliffs up to 25 m high (Bibee 2012), belong to the Tobatí Formation of the Caacupé Group, and are thought to have been deposited in shallow seas during the Silurian (Eckle 1959, Fúlfaro 1996). The vegetation, which includes at least 741 species of plants, was described by Degen et al. (2004). Savannas occur in the open spaces between the bluffs and marshes occur in areas with impeded drainage. Scattered patches of seasonal dry forest (Oakley

and Prado 2011), with trees up to 20 m tall, occur along the base of the sandstone bluffs and in ravines (Fig. 2). Shorter trees and shrubs occur at higher elevations, especially along the banks of small streams and pools. Scattered patches of grasses, spiny palms (*Acrocomia totai*), and shrubs with elements of cerrado vegetation occur on the summit plateaus of the bluffs (Figs. 3–4). Several species of plants, including lianas, cling to the vertical rock faces. The cerrado vegetation in this area approaches its southernmost limit (Mereles 2013).

METHODS

In addition to reviewing the published literature and unpublished catalogs of museum specimens (see Introduction above), I spent 18 days observing birds at Serranía de Tobatí and adjacent lowlands on the following dates: 24–25 February, 28 June, and 9 August 1987; 17 July 1988; 7 August 1994; 9 August 1995; 9, 12, and 29 September, 6–7, 17, and 29 October, 11 November, and 9 December 2012; and 22–23 November 2014. Mist nets were set up during 24–25 February 1988; captured birds were prepared as specimens by Felicita Areco de Medina and deposited in the MNHNP. I also reviewed reports of birds in the area submitted to eBird, including: observer Werner

Nezadal in the vicinity of Rancho Granja Paraíso, on the southeastern fringe of Serranía de Tobatí, on 8 August 1995; observer Philip Aspergen along Arroyo Tobatí on 15 September 2016 (Philip Myers and Robert Storer collected marsh birds for the UMMZ in the same area in 1978, as described in the Introduction above); and observer Rebeca Irala Melgarejo at Cerro Kavajú, on the southwestern fringe of Serranía de Tobatí, on 10 August 2016. My field work combined with that of previous field workers (see Introduction) and observers submitting reports to eBird represent a total effort of 34 days.

Birds were identified by consulting Naumosky and Yzurieta (1987, 1989, 2006). I compiled a list of bird species and placed each species into one of six status categories and one of three abundance categories. The taxonomy and sequence of species is based on Remsen et al. (2017).

Terms for status (Hayes 1995a, b, del Castillo and Clay 2004) include: (1) breeding permanent resident (breeds in the region and potentially breeds in the area); (2) breeding resident but northern austral migrant (less abundant or absent during austral winter, when resident birds migrate northward toward the tropics); (3) breeding resident but southern austral migrant (less abundant during austral summer, when wintering birds migrate southward to breed); (4) introduced breeding resident (non-native); (5) Nearctic migrant (breeds in North America, but migrating or wintering birds present during austral spring, summer, and fall); (6) austral migrant (breeds south of Paraguay, but wintering birds present during austral fall, winter, and spring).

Terms for abundance (Hayes 1995a) include: common (usually recorded daily in appropriate habitat); uncommon (recorded every 2–10 days in appropriate habitat); and rare (recorded at intervals of 11 or more days).



Fig. 1. Map of Serranía de Tobatí, Departamento Cordillera, Paraguay. The author's study area is indicated by a dashed line. Other portions of the serranía occur to the northwest, west, southwest, and across the valley to the east. A = area where Philip Myers and Robert Storer collected marsh birds in 1978 and Philip Aspergen observed birds on 15 September 2016; B = area where Werner Nezadal observed birds on 8 August 1995; C = area where Rebeca Irala Melgarejo observed birds on 10 August 2016 (data in eBird; see Methods section). Satellite photo from Google Earth (www.google.com/earth).



Fig. 2. Savanna and dry forest at the base of sandstone bluffs at Serranía de Tobatí, Departamento Cordillera, Paraguay. Photo by Floyd E. Hayes.



Fig. 3. Savanna and spiny palms (*Acrocomia totai*) on the top of the sandstone bluffs at Serranía de Tobatí, Departamento Cordillera, Paraguay. Photo by Floyd E. Hayes.

RESULTS AND DISCUSSION

Thus far 131 species representing 38 families of birds have been recorded from Serranía de Tobatí. Of these, 43 species have been documented by collected specimens; the remaining species are known from sight or vocalization records (Table 1). The avifauna comprises 119 breeding permanent residents, seven breeding residents but northern austral migrants, one breeding resident but southern austral migrant, two Nearctic migrants, one austral migrant, and one introduced breeding resident (Table 1). The avifauna represents a mixture of species typical of dry forest, humid forest, savanna, and marshes.

Two species, the Rusty-backed Antwren (*Formicivora rufa*) and Black-throated Saltator (*Saltatricula atricollis*), are characteristic of cerrado vegetation to the northeast (Hayes 1995, del Castillo and Clay 2004, 2005). Serranía de Tobatí represented the southwestern limit of the distribution of both species in 1995 (Hayes 1995a), but in recent years both have been recorded farther south, the former at Villa Flores in Departamento Paraguari (20 February 2005; Guyra Paraguay *in* eBird), and the latter at Parque Nacional Ybycuí, Paraguari (23 May 2006; Jay Keller *in* eBird).

The environment of Serranía de Tobatí is gravely threatened by human activities. The sandstone and clay bluffs are excavated in several places to manufacture bricks and ceramics, small-scale deforestation occurs, the savannas are grazed by livestock, and urbanization has encroached upon the perimeter of the bluffs. Despite several anthropogenic threats, only a small portion of Serranía de Tobatí has been preserved. In December 2014, a small area (110 ha) in the southwestern part of Serranía de Tobatí, Cerro Kavajú, was declared a protected area (ley 5.377). The steep cliffs, a few small waterfalls, and a small cave in the northern part of Serranía de Tobatí attract a growing number of ecotourists who enjoy hiking, caving, rock climbing, and rappelling. Given the importance of the area for both biodiversity and ecotourism, much more of the area should be preserved to protect the area's aesthetic scenery as well as its flora, fauna, and ecological processes.



Fig. 4. Scattered grasses and shrubs on the top of the sandstone bluffs at Serranía de Tobatí, Departamento Cordillera, Paraguay. Photo by Floyd E. Hayes.

Table 1. Status and relative abundance of birds at Serranía de Tobatí, Departamento Cordillera, Paraguay. Taxonomy is based on Remsen et al. (2017). * = specimen(s) at UMMZ; ** = specimen(s) at MNHNP (plus an unidentified female *Sporophila* sp.). Status: AM = austral migrant; BR = breeding permanent resident; BS = breeding resident but southern austral migrant; BN = breeding resident but northern austral migrant; IB = introduced breeding resident; NM = Nearctic migrant (see Methods for more detailed descriptions). Abundance: C = common; R = rare; U = uncommon (see Methods for more detailed descriptions).

Family / Species	Status	Abundance
TINAMIDAE		
Small-billed Tinamou (<i>Crypturellus parvirostris</i>)*	BR	R
Red-winged Tinamou (<i>Rhynchotus rufescens</i>)	BR	R
Spotted Nothura (<i>Nothura maculosa</i>)	BR	R
ANATIDAE		
Brazilian Teal (<i>Amazonetta brasiliensis</i>)	BR	R
COLUMBIDAE		
Picazuro Pigeon (<i>Patagioenas picazuro</i>)	BR	R
White-tipped Dove (<i>Leptotila verreauxi</i>)*	BR	U
Ruddy Ground Dove (<i>Columbina talpacoti</i>)	BR	U
Scaled Dove (<i>Columbina squammata</i>)	BR	R
Picui Ground Dove (<i>Columbina picui</i>)	BR	C
CUCULIDAE		
Guira Cuckoo (<i>Guira guira</i>)*	BR	C
Smooth-billed Ani (<i>Crotophaga ani</i>)	BR	C
Striped Cuckoo (<i>Tapera naevia</i>)	BR	U
Pheasant Cuckoo (<i>Dromococcyx phasianellus</i>)	BR	R
Squirrel Cuckoo (<i>Piaya cayana</i>)	BR	R
Dark-billed Cuckoo (<i>Coccyzus melacoryphus</i>)	BN	R
NYCTIBIIDAE		
Common Potoo (<i>Nyctibius griseus</i>)	BR	R
CAPRIMULGIDAE		
Nacunda Nighthawk (<i>Chordeiles nacunda</i>)	BR	R
Common Pauraque (<i>Nyctidromus albicollis</i>)	BR	R
Scissor-tailed Nightjar (<i>Hydropsalis torquata</i>)*	BR	R
TROCHILIDAE		
Planalto Hermit (<i>Phaethornis pretrei</i>)*	BR	U
Glittering-bellied Emerald (<i>Chlorostilbon lucidus</i>)	BR	U
Gilded Hummingbird (<i>Hylocharis chrysura</i>)*	BR	U
RALLIDAE		
Giant Wood-Rail (<i>Aramides ypecaha</i>)	BR	R
Red-and-white Crake (<i>Laterallus leucopyrrhus</i>)*	BR	R
Ash-throated Crake (<i>Mustelirallus albicollis</i>)*	BR	R
CHARADRIIDAE		
Southern Lapwing (<i>Vanellus chilensis</i>)*	BR	C
SCOLOPACIDAE		
Giant Snipe (<i>Gallinago undulata</i>)	BR	R
South American Snipe (<i>Gallinago paraguaiiae</i>)*	BR	R
Solitary Sandpiper (<i>Tringa solitaria</i>)	NM	R
JACANIDAE		
Wattled Jacana (<i>Jacana jacana</i>)	BR	U
ARDEIDAE		
Whistling Heron (<i>Syrigma sibilatrix</i>)	BR	U
THRESKIORNITHIDAE		
Bare-faced Ibis (<i>Phimosus infuscatus</i>)	BR	R
CATHARTIDAE		
Turkey Vulture (<i>Cathartes aura</i>)	BR	R
Black Vulture (<i>Coragyps atratus</i>)	BR	C
ACCIPITRIDAE		
Snail Kite (<i>Rostrhamus sociabilis</i>)	BS	U
Long-winged Harrier (<i>Circus buffoni</i>)	BR	U
Roadside Hawk (<i>Rupornis magnirostris</i>)	BR	U

Family / Species	Status	Abundance
STRIGIDAE		
Tropical Screech-Owl (<i>Megascops choliba</i>)*	BR	C
Burrowing Owl (<i>Athene cunicularia</i>)	BR	U
TROGONIDAE		
Blue-crowned Trogon (<i>Trogon curucui</i>)	BR	R
ALCEDINIDAE		
Ringed Kingfisher (<i>Megaceryle torquata</i>)	BR	U
Green Kingfisher (<i>Chloroceryle americana</i>)	BR	R
PICIDAE		
White-barred Piculet (<i>Picumnus cirratus</i>)*	BR	U
White Woodpecker (<i>Melanerpes candidus</i>)	BR	U
Little Woodpecker (<i>Veniliornis passerinus</i>)*,**	BR	U
Green-barred Woodpecker (<i>Colaptes melanochloros</i>)	BR	R
Campo Flicker (<i>Colaptes campestris</i>)	BR	C
Blond-crested Woodpecker (<i>Ceelus flavescens</i>)*	BR	R
FALCONIDAE		
Southern Caracara (<i>Caracara plancus</i>)	BR	U
Yellow-headed Caracara (<i>Milvago chimachima</i>)	BR	C
Chimango Caracara (<i>Milvago chimango</i>)	BR	U
American Kestrel (<i>Falco sparverius</i>)	BR	U
PSITTACIDAE		
Monk Parakeet (<i>Myiopsitta monachus</i>)	BR	R
Yellow-chevroned Parakeet (<i>Brotogeris chiriri</i>)	BR	C
Blue-winged Parrotlet (<i>Forpus xanthopterygius</i>)*	BR	U
White-eyed Parakeet (<i>Psittacara leucophthalmus</i>)	BR	R
THAMNOPHILIDAE		
Great Antshrike (<i>Taraba major</i>)*	BR	U
Barred Antshrike (<i>Thamnophilus doliatus</i>)*	BR	C
Variable Antshrike (<i>Thamnophilus caerulescens</i>)	BR	R
Rusty-backed Antwren (<i>Formicivora rufa</i>)	BR	U
FURNARIIDAE		
Narrow-billed Woodcreeper (<i>Lepidocolaptes angustirostris</i>)*	BR	U
Rufous Hornero (<i>Furnarius rufus</i>)*	BR	C
Pale-breasted Spinetail (<i>Synallaxis albescens</i>)	BR	U
Sooty-fronted Spinetail (<i>Synallaxis frontalis</i>)	BR	U
Greater Thornbird (<i>Phacellodomus ruber</i>)*	BR	U
Firewood-gatherer (<i>Anumbius annumbi</i>)	BR	R
TYRANNIDAE		
Yellow-bellied Elaenia (<i>Elaenia flavogaster</i>)*	BR	U
Large Elaenia (<i>Elaenia spectabilis</i>)	BN	R
Tawny-crowned Pygmy-Tyrant (<i>Euscarthmus meloryphus</i>)	BR	R
Sepia-capped Flycatcher (<i>Leptopogon amaurocephalus</i>)*	BR	U
Eared Pygmy-Tyrant (<i>Myiornis auricularis</i>)	BR	R
Pearly-vented Tody-Tyrant (<i>Hemitriccus margaritaceiventer</i>)**	BR	C
Yellow-olive Flycatcher (<i>Tolmomyias sulphureus</i>)	BR	R
Cliff Flycatcher (<i>Hirundinea ferruginea</i>)*,**	BR	C
Vermilion Flycatcher (<i>Pyrocephalus rubinus</i>)	BR	R
Yellow-browed Tyrant (<i>Satrapa icterophrys</i>)	BR	U
White Monjita (<i>Xolmis irupero</i>)	BR	U
Streamer-tailed Tyrant (<i>Gubernetes yetapa</i>)	BR	C
Cattle Tyrant (<i>Machetornis rixosa</i>)	BR	C
Great Kiskadee (<i>Pitangus sulphuratus</i>)*	BR	C
Streaked Flycatcher (<i>Myiodynastes maculatus</i>)	BN	R
Boat-billed Flycatcher (<i>Megarynchus pitangua</i>)	BR	R
Tropical Kingbird (<i>Tyrannus melancholicus</i>)	BN	U
Fork-tailed Flycatcher (<i>Tyrannus savana</i>)	BN	U
Short-crested Flycatcher (<i>Myiarchus ferox</i>)*	BR	R
Brown-crested Flycatcher (<i>Myiarchus tyrannulus</i>)	BR	U
PIPRIDAE		
Band-tailed Manakin* (<i>Pipra fasciicauda</i>)	BR	R

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Family / Species	Status	Abundance	
VIREONIDAE			
Rufous-browed Peppershrike (<i>Cyclarhis gujanensis</i>)	BR	C	Hayes, F. E. 1995a. Status, distribution and biogeography of the birds of Paraguay. Monographs in Field Ornithology 1:1-231. Colorado Springs: American Birding Association.
CORVIDAE			
Purplish Jay (<i>Cyanocorax cyanomelas</i>)*	BR	U	
Plush-crested Jay (<i>Cyanocorax chrysops</i>)	BR	U	Hayes, F. E. 1995b. Definitions for migrant birds: what is a Neotropical migrant? Auk 112(2):521-523.
HIRUNDINIDAE			
Brown-chested Martin (<i>Progne tapera</i>)	BN	U	
Gray-breasted Martin (<i>Progne chalybea</i>)	BN	R	
Barn Swallow (<i>Hirundo rustica</i>)	NM	C	Mereles, M. F. 2013. Acerca de las extensiones de cerrados y cerradones en el Paraguay. Paraquaria Natural 1(1):35-38.
TROGLODYTIDAE			
House Wren (<i>Troglodytes aedon</i>)*	BR	U	
TURDIDAE			
Pale-breasted Thrush (<i>Turdus leucomelas</i>)*,**	BR	U	
Rufous-bellied Thrush (<i>Turdus rufiventris</i>)*	BR	R	Narosky, T., and D. Yzurieta. 1987. Guía para la identificación de las aves de Argentina y Uruguay. Asociación Ornitológica del Plata, Buenos Aires. 345 pp.
Creamy-bellied Thrush (<i>Turdus amaurochalinus</i>)*	BR	U	
MIMIDAE			
Chalk-browed Mockingbird (<i>Mimus saturninus</i>)	BR	C	Narosky, T., and D. Yzurieta. 1989. Birds of Argentina & Uruguay. A field guide. Asociación Ornitológica del Plata, Buenos Aires. 337 pp.
THRAUPIDAE			
Hooded Tanager (<i>Nemosia pileata</i>)	BR	R	
Saffron Finch (<i>Sicalis flaveola</i>)	BR	U	
Blue-black Grassquit (<i>Volatinia jacarina</i>)	BR	U	
Ruby-crowned Tanager (<i>Tachyphonus coronatus</i>)*	BR	R	
White-lined Tanager (<i>Tachyphonus rufus</i>)	BR	R	
Black-goggled Tanager (<i>Trichothraupis melanops</i>)*	BR	R	
Red-crested Finch (<i>Coryphospingus cucullatus</i>)*	BR	U	Narosky, T., and D. Yzurieta. 2006. Guía para la identificación de las aves de Paraguay. Vazquez Mazzini Editores, Buenos Aires. 239 pp.
White-bellied Seedeater (<i>Sporophila leucoptera</i>)*	BR	U	
Dark-throated Seedeater (<i>Sporophila ruficollis</i>)	BR	R	
Chestnut-bellied Seed-Finch (<i>Sporophila angolensis</i>)	BR	U	
Double-collared Seedeater (<i>Sporophila caerulescens</i>)	BR	U	
Rusty-collared Seedeater (<i>Sporophila collaris</i>)	BR	U	
Black-throated Saltator (<i>Saltatricula atricollis</i>)	BR	C	
Grayish Saltator (<i>Saltator caerulescens</i>)*	BR	U	Oakley, L. J., and D. E. Prado. 2011. El dominio de los bosques secos estacionales neotropicales y la presencia del Arco Pleistocénico en la República del Paraguay. Rojasiana 10(1):55-75.
Great Pampa-Finch (<i>Embernagra platensis</i>)	BR	U	
Long-tailed Reed Finch (<i>Donacospiza albifrons</i>)*	BR	R	
Red-crested Cardinal (<i>Paroaria coronata</i>)	BR	C	
Sayaca Tanager (<i>Thraupis sayaca</i>)*	BR	C	
EMBERIZIDAE			
Grassland Sparrow (<i>Ammodramus humeralis</i>)	BR	U	
Rufous-collared Sparrow (<i>Zonotrichia capensis</i>)	BR	C	Remsen, J. V., Jr., J. I. Areta, C. D. Cadena, S. Claramunt, A. Jaramillo, J. F. Pacheco, J. Pérez-Emán, M. B. Robbins, F. G. Stiles, D. F. Stotz, and K. J. Zimmer. 2017. A classification of the bird species of South America. American Ornithologists' Union. www.museum.lsu.edu/~Remsen/SACCBaseline.htm [accessed 15 May 2017]
CARDINALIDAE			
Glaucous-blue Grosbeak (<i>Cyanoloxia glaucocaeerulea</i>)	AM	R	
Ultramarine Grosbeak (<i>Cyanoloxia brissonii</i>)	BR	R	
PARULIDAE			
Masked Yellowthroat (<i>Geothlypis aequinoctialis</i>)*	BR	U	
Tropical Parula (<i>Setophaga pitayumi</i>)*	BR	R	
Golden-crowned Warbler (<i>Basileuterus culicivorus</i>)*	BR	R	
ICTERIDAE			
Red-rumped Cacique (<i>Cacicus haemorrhous</i>)*	BR	R	Storer, R. W. 1981. The Rufous-necked Craque (<i>Laterallus xenopterus</i>) and its Paraguayan congeners. Wilson Bulletin 93(2):137-144.
Variable Oriole (<i>Icterus pyrrhopterus</i>)	BR	U	
Chopi Blackbird (<i>Gnorimopsar chopi</i>)	BR	U	
Yellow-rumped Marshbird (<i>Pseudoleistes guirahuro</i>)	BR	U	
Shiny Cowbird (<i>Molothrus bonariensis</i>)	BR	U	
White-browed Meadowlark (<i>Sturnella superciliaris</i>)	BR	R	
FRINGILLIDAE			
Hooded Siskin (<i>Spinus magellanicus</i>)	BR	U	Storer, R. W. 1989. Notes on Paraguayan birds. Occasional Papers of the Museum of Zoology, University of Michigan 719:1-21.
PASSERIDAE			
House Sparrow (<i>Passer domesticus</i>)	IB	U	