

## Avian population survey of a Tamaulipan scrub habitat, Tamaulipas, Mexico

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A fines de abril y principios de mayo de 1978 se realizó un censo de las poblaciones de aves de un hábitat de matorral en Tamaulipas, a 90 km al norte de Tampico, Tamaulipas, México. Cinco tipos de hábitat principales fueron identificados en el área de estudio: matorrales litorales, manglares, matorrales espinosos, bosques espinosos y ambientes ribereños. Se registraron en el área un total de 147 especies de aves, 82 nidificantes y 65 de paso. El bosque espinoso (57 y 35) y los ambientes ribereños (43 y 47) mantenían los números más elevados de especies nidificantes y de paso. Solo seis especies nidificaban en todos los hábitats, 11 lo hacían en cuatro, 10 en tres, 23 en dos y 32 en uno solo. De éstas, sólo una especie estaba restringida a los matorrales litorales y otra a los manglares, siete nidificaban exclusivamente en los matorrales espinosos, 14 en los bosques espinosos y nueve en ambientes ribereños. La pérdida de los bosques espinosos, matorrales espinosos y hábitats ribereños, que son los más sensibles a modificaciones, de los ecosistemas de Tamaulipas eliminaría el 30% de la avifauna nidificante.

### Introduction

There have been few avian studies undertaken in north-east Mexico, particularly in the lowlands east of the Sierra Madre Oriental. Martin *et al.*<sup>8</sup>, Selander *et al.*<sup>10</sup>, and Baker & Fleming<sup>4</sup> reported on birds collected and/or observed; Gehlbach *et al.*<sup>5</sup> reported on avian populations along the Río Corona. This report deals with an avian population in a southern Tamaulipan scrub environment located 90 km north of Tampico, Tamaulipas, Mexico. The study area lies between the barrier beach known locally as Barra Vicente and the village of Rancho Nuevo; also see Wauer<sup>11</sup>.

During a two-week period in late April and early May 1978, I was provided with the opportunity to work with Atlantic Ridley turtle *Lepidochelys kempi* biologists and Mexican marines, protecting nesting turtles and gathering eggs for later transportation to Padre Island, Texas. I also censused birds on 800 m avian population transect routes within five distinct habitats, walking each route 1–5 times between 05h30 and 10h30 from 2–10 May. All species and their activities relating to breeding and feeding behaviour were recorded on field sampling sheets.

All birds recorded were later divided into breeding and transient status. Breeding status was determined by actual nests, young, copulation, or obvious territorial behavior. At least one species—Mangrove Cuckoo *Coccyzus minor*—may have been breeding, but since it did not meet any criteria it is listed as transient. Transients are those passing through the area either on migration or only passing from one place to another, and not found to nest along the transects. Species were further divided



Littoral scrub habitat lies between the dunes and thorn scrub zone. (Ro Wauer)

into 12 feeding and six nesting guilds, as determined by direct observations or known behaviour.

### Site descriptions

Native vegetation of the area had been classified by Leopold<sup>7</sup> as "littoral" and "thorn forest" communities. For censusing birds, I divided the littoral zone into littoral scrub and mangrove habitats, and the thorn forest into thorn scrub, thorn forest and riparian habitats.

Littoral scrub habitat was found between the dunes and the thorn scrub zone, varying in width from 20–90 m and broken only by mangrove lagoons. Gonzalez-Medrano<sup>6</sup> described the vegetation of this habitat as a *Suaeda nigra*–*Salicornia ambigua* association with saltwort *Batis maritima*, sea oxeye *Borrhchia frutescens*, leather-stem *Maytenus phyllanthoides*, huisache *Acacia farnesiana*, and bullthorn acacia *A. spadicigera* present in varying abundance.



Thorn scrub habitat contains vegetation never more than 5 m in height. (Ro Wauer)



Thorn forest habitat is consistently more than 5 m in height. (Ro Wauer)



Riparian habitat occurs along freshwater streams. (Ro Wauer)



Mangrove habitat of red and black mangroves line saltwater lagoons. (Ro Wauer)

The mangrove habitat consists of both red *Rhizophora mangle* and black mangroves *Avicennia nitida*, and black olive *Bursera simaruba* that form rather dense thickets along lagoon edges. The lagoons result from cuts made through the dunes by freshwater streams that become partially dammed by the barrier dunes, producing shallow ponds flooded by seawater at high tide.

The thorn scrub habitat is dominant throughout the lowlands of southern Tamaulipas. Common plants include Spanish Bayonet *Yucca terculeana*; hackberry *Celtis pallida*; huisache, bullthorn acacia and blackbrush *Acacia rigidula*; mesquite *Prosopis laevigata*; goatbush *Castela tortuosa*; yaupon *Schaefferia cuneifolia*; *Condalia lycioides* and *C. obovata*; *Karmoniskia humboldtiana*; baretta *Helietta parvifolia*; *Gochnatia hypoleuca*, *Lemaireocereus griseus*, *Acanthocereus pentagonus*, *Forestiera angustifolia*, *Lantana involucrata*, and cenizo *Leucophyllum texanum*. Vegetation may be dense or open in places where grazing occurs, and never more than 5m high.

Thorn forest habitat occurs only in areas spared by wood-cutters. Dominant vegetation includes most of the same species found in the thorn scrub habitat with the addition of a few larger species such as strangler fig *Ficus* and ebony *Pithecellobium flexicaule*. The thorn forest habitat is consistently more than 5 m high.

The riparian habitat cuts through the thorn forest and thorn scrub habitats, and contains most of the same plant species, but appears more luxuriant and dense due to the continuous presence of ground water.

## Results and discussion

A total of 147 bird species was recorded within the five Tamaulipan habitats (Table 1): 82 (56%) nesting and 65 (44%) as transients. Twenty-nine species were recorded on two censuses in the littoral scrub habitat; 36 species were recorded on one census of the mangroves; 66 species were recorded on four censuses in thorn scrub; 92 species were recorded on five censuses in thorn forest; and 90 species were

recorded on three censuses in riparian habitat. The thorn forest and riparian habitats supported the highest number of nesting and transient birds: 57 nesting species in the thorn forest compared to 43 in the riparian, and 35 and 47 transients.

Only six of the 82 breeding birds were found to nest in all five habitats: Red-billed Pigeon *Columba flavirostris*, Groove-billed Ani *Crotophaga sulcirostris*, Ladder-backed Woodpecker *Picoides scalaris*, Couch's Kingbird *Tyrannus couchii*, Olive Sparrow *Arremonops rufivirgatus* and Altamira Oriole *Icterus gularis*. Eleven species nested in four habitats, 10 in three, 23 in two, and 32 in only one habitat.

Of the latter category, only one species—Grey-crowned Yellowthroat *Geothlypis poliocephala*—occurred exclusively within the littoral scrub habitat. Anhinga *Anhinga anhinga* was the only exclusive nester in the mangroves. Seven exclusives occurred in thorn scrub: White-tailed Kite *Elanus leucurus*, Crested Caracara *Polyborus plancus*, Long-billed Thrasher *Toxostoma longirostre*, Loggerhead Shrike *Lanius ludovicianus*, Tropical Parula *Parula pitaiyumi*, Northern Cardinal *Cardinalis cardinalis* and Yellow-faced Grassquit *Tiaris olivacea*. Fourteen exclusives were recorded in thorn forest: Thicket Tinamou *Crypturellus cinnamomeus*, Black Vulture *Coragyps atratus*, Hook-billed Kite *Chondrohierax uncinatus*, Crane Hawk *Geranospiza caerulescens*, Wild Turkey *Meleagris gallapovo*, Squirrel Cuckoo *Piaya cayana*, Mottled Owl *Ciccaba virgata*, Blue-crowned Motmot *Momotus momota*, Smoky-brown Woodpecker *Veniliornis fumigatus*, Ivory-billed Woodcreeper *Xiphorhynchus flavigaster*, Tufted Titmouse *Baerolophus bicolor*, Crimson-collared Grosbeak *Rhodothraupis celaeno*, Melodious Blackbird *Dives dives* and Audubon's Oriole *Icterus graduacauda*. Nine exclusives occurred in riparian habitat: Least Grebe *Tachybaptus dominicus*, Neotropic Cormorant *Phalacrocorax brasilianus*, Bare-throated Tiger-heron *Tigrisoma mexicanum*, Boat-billed Heron *Cochlearius cochlearius*, Olive-throated Parakeet *Aratinga nana*, Green Kingfisher *Chloroceryle americana*, Yellow-green Vireo *Vireo flavoviridis*, Yellow-throated Euphonia *Euphonia hirundinacea* and Brown-headed Cowbird *Molothrus ater* (Table 1). The probable breeding of Loggerhead Shrike in the thorn scrub habitat, based on a pair of birds found in the same location on two of three surveys, is noteworthy; Phillips<sup>9</sup> considered that "No shrikes breed in the Lower Rio Grande Valley or Gulf lowlands in NE or E Mexico."

This group of 32 exclusives suggests a hierarchical ranking of the five habitats. Thorn forest

hosts the greatest number of nesting species as well as the highest number of exclusives, which suggests the greatest ecological integrity. Although species such as Black Vulture, Tufted Titmouse, Loggerhead Shrike, Northern Cardinal and Brown-headed Cowbird seem somewhat out of character in this assemblage of exclusives, most of those recorded in the three key habitats are indeed significant because of their Mexican affinity and, in some cases, their presence represents the northern edge of their range.

Species density values or populations provide a more sensitive comparison of an area's capability to sustain an avifauna. The largest population of breeding birds (441) was recorded in the thorn forest, followed by 321 individuals in thorn scrub, 215 in riparian habitat, 129 in mangroves and 89 individuals in littoral scrub. In the thorn forest, five of the 57 breeding birds (Plain Chachalaca *Ortalis vetula*, 32; Red-billed Pigeon, 37; Spot-breasted *Thryothorus maculipectus* (30) and White-bellied Wrens *Uropsila leucogastra* (26); and Olive Sparrow (39) contributed 32% of that habitat's breeding avifauna. Three species (Tamaulipas Crow *Corvus imparatus*, 26; Olive Sparrow, 38; and Great-tailed Grackle *Quiscalus mexicanus*, 30) made up 21% of the population in the thorn scrub. Only one species (Tamaulipas Crow) displayed similar abundance in the riparian habitat, making up 8% of that population. No species was as abundant in the mangrove and littoral scrub habitats.

Habitat selection usually operates most strongly for birds during the breeding season since that is when habitat requirements, particularly those relating to feeding and nesting, are most essential. Analysis of feeding and nesting guilds (Table 1) for all breeding species provides additional insight into avian community structure and suggests further differences in bird populations of the five habitats censused.

Of the 82 breeding birds recorded, 30 (37%) were primary consumers and 52 (63%) were secondary consumers. The ratio of total individuals, however, was much closer: 577 (48%) primary to 618 (52%) secondary consumers. Foliage-invertebrate (FI) feeders (17) made up the highest number of individuals within the five habitats, 353 or 30% of the combined primary and secondary consumers. Ground-seed (GS) feeders (14) comprised 277 or 23% of the combined totals, closely followed by foliage-fruit (FF) feeders (14) with 268 or 22%; aerial-perching-insect (API) feeders (5) with 65 or 5%; ground-invertebrate (GI) feeders with 58 or 5%; timber-drilling-insect (TDI) feeders (5) with 48 (4%); ground-predator (GP) feeders (10) with 39

Table 1. Actual high counts and breeding bird guilds

Species (147)	LitScb B/T	Mangro B/T	ThnScb B/T	ThnFrt B/T	Riparn B/T	Guilds		Species (147)	LitScb B/T	Mangro B/T	ThnScb B/T	ThnFrt B/T	Riparn B/T	Guilds Nest	Guilds Feed*	
						Nest	Feed*									
Mourning Dove <i>Z. macroura</i>	2/								2/		15/	2/	4/	FP	GS	
Inca Dove <i>Columbina inca</i>											2/		2/	FP	GS	
Least Grebe <i>Tachybaptus dominicus</i>				2/		WF	WP				2/	2/	2/	FP	GS	
Neotropic Cormorant <i>Phalacrocorax brasilianus</i>		1/		1/	6/	FP	WP		2/			8/	6/	FP	FF	
Anhinga <i>Anhinga anhinga</i>		2/				FP	WP						2/	CD	FF	
Magnificent Frigatebird <i>Fregata magnificens</i>	1/										14	2/	3/	CD	FF	
Bare-throated Tiger-heron <i>Tigrisoma mexicanum</i>				1/		FP	WP				13	14/	14/	CD	FF	
Great Blue Heron <i>Ardea herodias</i>	13	1/	1/									1/				
Great Egret <i>Ardea alba</i>	13											6/		FP	FI	
Cattle Egret <i>Bubulcus ibis</i>		1/		15	16											
Green Heron <i>Butorides virescens</i>		3/			1/	FP	WP				2/	2/	6/	2/	CD	GP
Boat-billed Heron <i>Cochlearius cochlearius</i>					1/	FP	WP					4/		FP	GP	
White Ibis <i>Eudocimus albus</i>					13	FP	WP					2/		GN	API	
Roseate Spoonbill <i>Ajaia ajaja</i>	15								1/	1/	12					
Black-bellied Whistling-duck <i>Dendrocygna autumnalis</i>	1/		1/	5/	4/	CD	GS			6/		2/		GN	API	
Black Vulture <i>Coragyps atratus</i>			1/	3/	12	GN	GP		1/				1/			
Turkey Vulture <i>Cathartes aura</i>					1/							1/	4/	1/	FP	FN
Hook-billed Kite <i>Chondrohierax uncinatus</i>			1/			FP	GP					10/	2/	CD	FF	
White-tailed Kite <i>Elanus leucurus</i>	1/		1/			FP	GP					2/		CD	FF	
Crane Hawk <i>Geranospiza caerulescens</i>			1/			FP	GP			2/			1/	CD	WP	
Common Black-hawk <i>Buteogallus anthracinus</i>			2/	2/	2/	FP	GP					1/	4/	CD	WP	
Roadside Hawk <i>Buteo magnirostris</i>			2/	6/	1/	FP	GP				8/	6/	6/	CD	TDI	
Crested Caracara <i>Polyborus plancus</i>			2/		12	FP	GP		4/	6/	6/	2/	3/	CD	TDI	
Plain Chachalaca <i>Ortalis vetula</i>		5/	4/	32/	14/	FP	FF					2/		CD	TDI	
Wild Turkey <i>Meleagris gallopavo</i>			2/			GN	GS					2/	2/	2/	CD	TDI
Northern Bobwhite <i>Colinus virginianus</i>		16/	4/			GN	GS				1/	8/		CD	TDI	
American Coot <i>Fulica americana</i>	5/				3/	WF	WV					10/		CD	TSI	
Black-necked Stilt <i>Himantopus mexicanus</i>					12						8/	4/		FP	FI	
Solitary Sandpiper <i>Tringa solitaria</i>					11							11	1/			
Spotted Sandpiper <i>Actitis macularia</i>	1/			12							1/	12	1/			
Long-billed Curlew <i>Numenius americanus</i>	13	12							1/			1/				
Buff-breasted Sandpiper <i>Tryngites subruficollis</i>					11				1/							
Red-billed Pigeon <i>Columba flavirostris</i>	5/	4/	6/	37/	7/	FP	FF				2/	2/	6/	CD	API	
White-winged Dove <i>Zenaida asiatica</i>	2/	4/	2/	10/		FP	GS				1/	6/	5/	FP	API	
Mourning Dove <i>Z. macroura</i>																
Inca Dove <i>Columbina inca</i>																
Common Ground-dove <i>C. passerina</i>																
White-tipped Dove <i>Leptotila verreauxi</i>																
Olive-throated Parakeet <i>Aratinga nana</i>																
Red-crowned Parrot <i>Amazona viridigenalis</i>																
Yellow-headed Parrot <i>A. oratrix</i>																
Mangrove Cuckoo <i>Coccyzus minor</i>																
Squirrel Cuckoo <i>Piaya cayana</i>																
Groove-billed Ani <i>Crotophaga sulcirostris</i>	5/	4/	16/	4/	4/	FP	FI									
Ferruginous Pygmy-owl <i>Glauclidium brasilianum</i>																
Mottled Owl <i>Ciccaba virgata</i>																
Lesser Nighthawk <i>Chordeiles acutipennis</i>									4/			2/		GN	API	
Common Nighthawk <i>C. minor</i>		1/	1/	12												
Pauraque <i>Nyctidromus albicollis</i>										6/		2/		GN	API	
Chimney Swift <i>Chaetura pelagica</i>									1/				1/			
Buff-bellied Hummingbird <i>Amazilia yucatanensis</i>	12	4/10	1/7	1/4	1/	FP	FN									
Elegant Trogon <i>Trogon elegans</i>												10/	2/	CD	FF	
Blue-crowned Motmot <i>Momotus momota</i>												2/		CD	FF	
Ringed Kingfisher <i>Ceryle torquata</i>			2/										1/	CD	WP	
Green Kingfisher <i>Chloroceryle americana</i>												1/	4/	CD	WP	
Golden-fronted Woodpecker <i>Melanerpes aurifrons</i>			2/	6/	1/	FP	GP				8/	6/	6/	CD	TDI	
Ladder-backed Woodpecker <i>Picoides scalaris</i>	4/	6/	6/	2/	3/	CD	TDI									
Smoky-brown Woodpecker <i>Veniliornis fumigatus</i>												2/		CD	TDI	
Lineated Woodpecker <i>Dryocopus lineatus</i>												2/	2/	2/	CD	TDI
Pale-billed Woodpecker <i>Campephilus guatemalensis</i>											1/	8/		CD	TDI	
Ivory-billed Woodcreeper <i>Xiphorhynchus flavigaster</i>												10/		CD	TSI	
Northern Beardless-tyrannulet <i>Camptostoma imberbe</i>											8/	4/		FP	FI	
Olive-sided Flycatcher <i>Contopus cooperi</i>												11	1/			
Eastern Wood-pewee <i>C. virens</i>												1/	12	1/		
Flycatcher spp. <i>Empidonax spp.</i>		1/							1/			1/				
Ash-throated Flycatcher <i>Myiarchus cinerascens</i>		1/														
Brown-crested Flycatcher <i>M. tyrannulus</i>											2/	2/	6/	CD	API	
Great Kiskadee <i>Pitangus sulphuratus</i>											1/	6/	5/	FP	API	

Species (147)	LitScb	Mangro	ThnScb	ThnFr	Riparn	Guilds		Species (147)	LitScb	Mangro	ThnScb	ThnFr	Riparn	Guilds	
	B/T	B/T	B/T	B/T	B/T	Nest	Feed*		B/T	B/T	B/T	B/T	B/T	Nest	Feed*
Couch's Kingbird <i>Tyrannus couchii</i>	2/	2/	12/	12/	2/	FP	API	Chestnut-sided Warbler <i>D. pensylvanica</i>				12	11		
Eastern Kingbird <i>T. tyrannus</i>				11				Magnolia Warbler <i>D. magna</i>				11			
Scissor-tailed Flycatcher <i>T. forficata</i>			14		13			Blackburnian Warbler <i>D. fusca</i>						11	
Rose-throated Becard <i>Pachyramphus aglaiae</i>				2/	2/	FH	FF	Yellow-throated Warbler <i>D. dominica</i>						12	
Masked Tityra <i>Tityra semifasciata</i>				4/	2/	CD	FI	Bay-breasted Warbler <i>D. castanea</i>		11				13	
Purple Martin <i>Progne subis</i>					11			Black-and-white Warbler <i>Mniotilta varia</i>						13	
Mangrove Swallow <i>Tachycineta albilinea</i>		4/	13			CD	ASI	Ovenbird						11	
Cliff Swallow <i>Petrochelidon pyrrhonota</i>				16	15			Northern Waterthrush <i>S. noveboracensis</i>				11	17		
Barn Swallow <i>Hirundo rustica</i>	135		178	12	111			MacGillivray's Warbler <i>Oporornis tolmiei</i>			11			11	
Green Jay <i>Cyanocorax yncas</i>			2/	4/		FP	FI	Common Yellowthroat <i>Geothlypis trichas</i>	12	17	11	11			
Brown Jay <i>C. morio</i>		2/	8/	21/	12/	FP	FI	Grey-crowned Yellowthroat <i>G. poliocephala</i>	18/					FP	FI
Tamaulipas Crow <i>Corvus imparatus</i>	18	6/	26/	13/	26/	FP	FI	Hooded Warbler <i>Wilsonia citrina</i>				11			
Tufted Titmouse <i>Baerolophus bicolor</i>				2/		CD	FI	Wilson's Warbler <i>W. pusilla</i>				11	11		
Spot-breasted Wren <i>Thryothorus maculipectus</i>		8/	6/	30/	3/	CD	FI	Canada Warbler <i>W. canadensis</i>						15	
White-bellied Wren <i>Uropisila leucogastra</i>		10/	14/	26/	10/	CD	FI	Yellow-breasted Chat <i>Icteria virens</i>						12	
Blue-grey Gnatcatcher <i>Poliopitila caerulea</i>			11	11	11			Yellow-throated Euphonia <i>Euphonia hirundinacea</i>					2/	FP	FF
Swainson's Thrush <i>Catharus ustulatus</i>				11	11			Summer Tanager <i>Piranga rubra</i>						12	
Wood Thrush <i>Hylocichla mustelina</i>					11			Crimson-collared Grosbeak <i>Rhodothraupis celaeno</i>				4/		FP	FI
Grey Catbird <i>Dumetella carolinensis</i>				12	12			Northern Cardinal <i>Cardinalis cardinalis</i>			4/			FP	FI
Northern Mockingbird <i>Mimus polyglottos</i>	6/	2/	8/			FP	GI	Rose-breasted Grosbeak <i>Pheucticus ludovicianus</i>				11			
Long-billed Thrasher <i>Toxostoma longirostre</i>			2/			FP	GI	Blue Bunting <i>Cyanocompsa parellina</i>			2/	14/		FP	FI
Loggerhead Shrike <i>Lanius ludovicianus</i>			2/			FP	GP	Blue Grosbeak <i>Guiraca caerulea</i>				11	11		
White-eyed Vireo <i>Vireo griseus</i>			6/	6/		FP	FI	Indigo Bunting <i>Passerina cyanea</i>				11	11		
Solitary Vireo <i>V. solitarius</i> sp.			12	12	12			Painted Bunting <i>P. ciris</i>			12		11		
Warbling Vireo <i>V. gilvus</i>				11	11			Dickcissel <i>Spiza americana</i>			12	11	14		
Red-eyed Vireo <i>V. olivaceus</i>					12			Olive Sparrow <i>Arremonops rufivirgatus</i>	12/	18/	38/	39/	3/	FP	GS
Yellow-green Vireo <i>V. flavoviridis</i>					11	FP	FI	White-collared Seedeater <i>Sporophila torqueola</i>			4/	2/		FP	GS
Blue-winged Warbler <i>Vermivora pinus</i>				11	11			Yellow-faced Grassquit <i>Tiaris olivacea</i>			6/			FP	GS
Golden-winged Warbler <i>V. chrysoptera</i>				11	11			Botteri's Sparrow <i>Aimophila botterii</i>	19/		6/	2/		GN	GI
Tennessee Warbler <i>V. peregrina</i>				17				Chipping Sparrow <i>Spizella passerina</i>			13	12	11		
Orange-crowned Warbler <i>V. celata</i>				12	12			Clay-colored Sparrow <i>S. pallida</i>			15				
Nashville Warbler <i>V. ruficapilla</i>				12	11			Vesper Sparrow <i>Poocetes gramineus</i>			13				
Tropical Parula <i>Parula pitayumi</i>			10/			FP	FI	Savannah Sparrow <i>Passerculus sandwichensis</i>			11				
Yellow Warbler <i>Dendroica petechia</i>		11	11	16	14			Grasshopper Sparrow <i>Ammodramus savaannarum</i>			11				

Species (147)	LitScb Mangro ThnScb ThnFrt Riparn					Guilds		Estimated no. of birds/40 ha (100 ac)							
	B/T	B/T	B/T	B/T	B/T	Nest	Feed*	Litt. Scrub	Man-grove	Thorn Scrub	Thorn Forest	Riparian	Nest	Feed	
Lincoln's Sparrow <i>Melospiza lincolni</i>			/2	/1	/1										
Red-winged Blackbird <i>Agelaius phoeniceus</i>	9/	4/				FP	GI								
Eastern Meadowlark <i>Sturnella magna</i>	4/		4/	1/		GN	GI								
Melodious Blackbird <i>Dives dives</i>				1/		FP	GS								
Great-tailed Grackle <i>Quiscalus mexicanus</i>	/7	/7	30/	8/	17/	FP	GS								
Bronzed Cowbird <i>Molothrus aeneus</i>		1/	1/	1/	4/		P	GS							
Brown-headed Cowbird <i>M. ater</i>					3/		P	GS							
Orchard Oriole <i>Icterus spurius</i>				1/	15										
Hooded Oriole <i>I. cucullatus</i>		6/	2/	1/		FH	FF								
Altamira Oriole <i>I. gularis</i>	1/	6/	21/	14/	14/	FH	FF								
Audubon's Oriole <i>I. graduacauda</i>					2/	FH	FF								
Baltimore Oriole <i>I. galbula</i>			12	13	17										
Totals:	89/75	129/16	321/126	441/65	215/111										
	64	146	452	506	326										
Species:	13/16	27/9	41/25	57/35	43/47										
	29	36	66	92	90										

Bird names according to AOU<sup>2,3</sup>

\* B = Breeding & T = Transient

Nest: FH = foliage-hanging; FP = foliage-platform/cup; CD = cavity-depression; N = ground; P = parasitic; WF = water floating platform

Feed: API = air-perching-insect; ASI = aerial-soaring-insect; FF = foliage-fruit; FI = foliage-invertebrate; FN = foliage-nectar; GI = ground-invertebrate; GP = ground-predator; GS = ground-seed; TDI = timber-drilling-insect; TSI = timber-searching-invertebrate; WP = water-predator; WV = water-vegetation

Table 2. Breeding bird populations and guilds

Species (78)	Estimated no. of birds/40 ha (100 acres)					Guilds	
	Litt. Scrub	Man-grove	Thorn Scrub	Thorn Forest	Riparian	Nest	Feed
Thicket Tinamou				40		GN	FF
Least Grebe					4	CD	WP
Neotropical Cormorant					8	FN	WP
Green Heron	6				8	FN	WP
Bare-throated Tiger-heron					2	FN	WP
Boat-billed Heron					2	FN	WP
Black-bellied Whistling-duck				6	8	CD	GS
Black Vulture				4		FN	GP
Hook-billed Kite				2		FN	GP
White-tailed Kite			2			FN	GP
Common Black-hawk				2	2	FN	GP
Roadside Hawk			2	6	2	FN	GP
Plain Chachalaca		10	8	29	40	FN	FF
Wild Turkey					2	GN	GS
Northern Bobwhite			22	6		GN	GS
American Coot		12			10	CD	WP
Red-billed Pigeon	10	12	12	44	10	FN	FF
White-winged Dove	8	16	4	14		FN	GS
Mourning Dove	8						
Inca Dove				4			
Common Ground-dove				6			
White-tipped Dove		4			10		
Olive-throated Parakeet							8
Red-crowned Parrot					4		8
Yellow-headed Parrot					12		18
Squirrel Cuckoo					4		4
Groove-billed Ani	18	16	35	8	8		8
Ferruginous Pygmy-owl		4	4		8		6
Mottled Owl							4
Lesser Nighthawk		8			4		GN
Pauraque		10			6		GN
Buff-bellied Hummingbird	8	14	24	14	10		FN
Elegant Trogon				8	6		CD
Blue-crowned Motmot					4		CD
Ringed Kingfisher		2					2
Green Kingfisher					8		CD
Golden-fronted Woodpecker				10	8		14
Ladder-backed Woodpecker	8	10	8	4	6		CD
Smoky-brown Woodpecker				2	2		CD
Lineated Woodpecker				2	4		4
Pale-billed Woodpecker				2	10		CD
Ivory-billed Woodcreeper					14		CD
Northern Beardless-tyrannulet				24	8		FN
Brown-crested Flycatcher				8	4		12
Great Kiskadee					8		10
Couch's Kingbird	8	6	16	14	6		FN
Rose-throated Becard					4		6
Masked Tityra					6		4
Mangrove Swallow		8			6		CD
Green Jay			8	6			FN
Brown Jay		8	18	30	36		FN
Mexican Crow		16	38	16	52		FN
Tufted Titmouse					4		CD
Spot-breasted Wren		16	12	34	8		CD
White-bellied Wren		20	16	28	14		CD
Northern Mockingbird	14	8	8				FN
Long-billed Thrasher				6			FN
Loggerhead Shrike				4			FN
White-eyed Vireo				10	8		FN
Yellow-green Vireo							4
Tropical Parula			20				FN
Grey-crowned Yellowthroat	32						GN
Yellow-throated Euphonia					6		FN
Crimson-collared Grosbeak				6			FN
Northern Cardinal				8			FN
Blue Bunting				4	18		FN
Olive Sparrow	22	36	52	32	4		FN
White-collared Seedeater			8	6			FN
Yellow-faced Grassquit			12				FN
Botter's Sparrow	28		8	4			GN
Red-winged Blackbird	16	8					FN
Eastern Meadowlark	10		8	4			GN
Melodious Blackbird				4	6		FN
Great-tailed Grackle	24	28	45	12	34		FN
Bronzed Cowbird		4	8	2	8		P
Brown-headed Cowbird					34		P
Hooded Oriole		12					FN
Altamira Oriole	4	12	26	20	30		FN
Totals:	218	306	532	535	514		
Species:	15	26	39	55	45		

Abbreviations: FF = foliage-fruit; FS = foliage-seed; GS = ground-seed; FN = foliage-nectar; ASI = air-soaring-insect; API = air-perching-insect; FI = foliage-insect; TSI = timber-searching-insect; TDI = timber-drilling-insect; GI = ground-insect; GP = ground-predator; WI = water-insect; WP = water-predator; and FN = foliage or branch nesting; CD = cavity-depression nesting; GN = ground-nesting; P = parasitic!!

(3%); foliage-nectar (FN) feeders (1) with 27 (2%); water-predators (WP) feeders (8) with 23 (2%); and water-vegetation (WV) feeders (1), aerial-searching-insect (ASI) feeders (1), and timber-searching-invertebrate (TSI) feeders (1), all with less than 1% of the total population.

Of the six nesting guilds (Table 1), 239 individuals (64%) of 44 species (54%) built foliage-platform/cup (FP) nests; 274 individuals (23%) of 21 species (26%) nested in cavities and/or depressions (CD); 91 individuals (8%) of eight species (10%) nested on the ground (GN); 71 individuals (6%) of four species (-1%) built hanging nests on foliage (FH); 10 individuals (-1%) of two species (-1%) were parasitic (P); and 10 individuals (1%) of two species (-1%) used floating platforms (WF).

### Conclusions

The above data assign the greatest importance to the thorn forest that supported the highest number of breeding birds. The thorn scrub habitat supported the second highest number of breeding avifauna as well as the greatest number of transients. These two communities, therefore, are subject to the greatest potential losses. It is paradoxical that these habitats are most susceptible to change. Human activities take the greatest toll on habitats with the tallest trees, the key ingredients of the area's diversity. Environmental integrity is dependent upon the retention of these habitats. The loss of the thorn forest, thorn scrub and riparian habitats from the Tamaulipan ecosystem would eliminate not only approximately a third of the breeding avifauna, but would undoubtedly cause other losses that have not yet been analysed or may never be understood.

### Acknowledgements

I appreciate the opportunity provided by the National Park Service for salary and support, Mexico's Instituto Nacional de Pesca for support on-site, and Steve Howell for reviewing an earlier version of the manuscript and his suggestions.

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