TEXAS TECH UNIVERSITY
Natural Science Research Laboratory

Special Publications

Museum of Texas Tech University

Number 75 17 December 2020

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Front cover: Selected photos of team members conducting field research and birds documented during this study. Photo credits as follows: top row (left to right): I. Engilis, A. Engilis, Jr., I. Engilis; bottom row (left and center) A. Engilis Jr., (right) B. K. Schmidt.

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Layout and Design: Lisa Bradley
Cover Design: Lisa Bradley
Production Editor: Lisa Bradley

This book was set in Times New Roman and printed on acid-free paper that meets the guidelines for permanence and durability of the Committee on Production Guidelines for Book Longevity of the Council on Library Resources.

Printed: 17 December 2020

Library of Congress Cataloging-in-Publication Data

Special Publications of the Museum of Texas Tech University, Number 75
Series Editor: Robert D. Bradley

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ISSN 0149-1768
ISBN 1-929330-43-X
ISBN13 978-1-929330-43-0

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Lubbock, TX 79409-3191 USA
(806)742-2442

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Abstract

The avian diversity of Resaca de las Antonias, Cameron County, Texas is reported herein. The resaca is 3 km northeast of Los Fresnos and is 23 km north of Fort Brown, a historic center for ornithological exploration in the Lower Rio Grande Valley. This is the first systematic, specimen-based survey in the Lower Rio Grande Valley since the mid-1930s and helps establish a benchmark in the 21st century for extant species. Over a span of five years, 444 specimens were collected, representing 82 species of birds, and 182 species of birds were observed across all trips to the resaca. Of the 182 species recorded, 42 were confirmed breeding along the resaca from physiological evidence and observations. The species composition of resident and breeding species was found to be comparable with those recorded from collections prior to 1925. Similarly, with the few notable exceptions of Ringed Kingfisher (*Megaceryle torquata*), Tropical Kingbird (*Tyrannus melancholicus*), and Altamira Oriole (*Icterus gularis*), species of neotropical origins were similar in their breeding occurrence between the two time periods. Changes in avifauna were not directly compared between this survey and those of the 1860s–1930s because these results were restricted to one location in Cameron County and do not reflect broader regional patterns of distribution and species occurrences in the Lower Rio Grande Valley.

Key words: avian survey, birds, Cameron County, Los Fresnos, resaca, specimens, Texas

Introduction

The Lower Rio Grande Valley, in southernmost Texas, is a region in the United States that remains a focal point for ornithological studies and recreational birding. It was aptly called the "Tropical Frontier" by T. Brush (2005), as the region is home to many species of neotropical and subtropical origin. Interest in the region dates well back into the mid-19th century when the United States began exploration along the new boundary between the United States and Mexico. Numerous ornithologists documented birdlife along the Rio Grande, first as a series of specimen-based inventories from primarily 1850–1935 (Baird 1858; Dresser 1865–66; Merrill 1878; Sennett 1878, 1879; De Laubenfels 1924; Friedmann 1925; Griscom and Crosby 1925–1926; Brooks 1933; Van Tyne 1933). The Biological Survey of Texas (Bailey 1905) collected information and specimens bearing on the natural history of Texas. The ecological setting and mammalian diversity was well described in this treatment. The birds collected during the survey became a life-long project for H. C. Oberholser, the results of which were published separately (Oberholser 1974). From that same era, numerous collectors, including Frank B. Armstrong, helped document Texas birdlife (Oberholser 1974). Henry H. Kimball was another important collector documenting birds from the Lower Rio Grande Valley in the 1930s. His collections and history in Texas have been mostly overlooked in the literature. Although Oberholser cited some of Kimball's specimens, most references were removed during the editorial process to produce *The Bird Life of Texas* (Castro 2002).

These foundational surveys helped establish a benchmark for avian diversity when the Texas frontier was opened. They also provided the benchmark for the next phase of Texas ornithology, which was comprised primarily of non-specimen-based distributional, species specific, ecological, and observational studies from the 1960s to present (Oberholser 1974; Brush and Cantu 1998; Benson and Arnold 2001; Arvin 2007; Rappole et al. 2007; Brush 2005, 2008; Ruth et al. 2008).

Modern, observation-based studies are important in understanding avifaunal changes, and a baseline collection of birds from this region in the 21st century will help perpetuate and substantiate the noted changes. Specimens provide an invaluable resource for researchers interested in topics such as biogeography, taxonomy, genomics, population dynamics, ecology, and conservation. There already has been a documented, northward expansion of subtropical species in Texas and there may be additional shifts in patterns of migration, both temporal and spatial (Rappole et al. 2007; Brush 2005, 2008; Lockwood and Freeman 2014; Lafleur et al. 2016). Systematic general collections of birds in the United States are rarely undertaken in the modern ornithological era. Instead, collecting is done to support taxonomic questions, filling gaps in museum holdings, to address species-specific questions, and for many North American museums is limited to preservation of salvaged and donated specimens. State and federal permitting can hamper general collecting, restricting comprehensive surveys (van Remsen 1995; Winker 2005). In addition, there has been a prevailing thought among several researchers that bird diversity in the United States has been sufficiently documented, and therefore many major museums focus their efforts on the survey of avian diversity in parts of the world lacking such data. As we enter into the next phase of the Anthropocene, comprehensive collections of birds in the United States remains an important, but often neglected, part of basic research and datasets needed to measure avian response to changing climate. Collections serve to substantiate avian presence and provide a 21st century benchmark of avian diversity for future scientists.

In collaboration, the University of California, Davis Museum of Wildlife and Fish Biology (MWFB) and the Smithsonian National Museum of Natural History (USNM) completed systematic surveys from 2005 to 2016 along the Rio Grande River to document 21st century avian diversity along the Texas–Mexico border through specimen-based efforts. Sampling occurred in three regions: Lower Rio Grande Valley, South Texas Brush Country, and Trans Pecos. This paper details the findings from Cameron County and represents a third timestamp of specimen-based surveys (late 1800s, 1930s, and early 2000s) documenting the diversity of birdlife in the Lower Rio Grande Valley, Texas. Historic specimens are now being used in many ways that were undreamed of by those who collected them in the past. For example, isotope analysis of feathers from 100-year-old specimens have been used to reconstruct ancient food webs (Rocque and Winker 2005), document changes in distributional ecology through time (Peterson and Navarro-Siguenza 2018), and examine structural adaptations and pigments in extinct species (Webster 2018). Likewise, the specimens collected in this era will have more relevance for researchers 50 to 100 years from now to assess distributional, environmental, evolutionary, and ecological patterns. There is strong evidence that passing samples of biota forward to future researchers is one of the most effective ways to contribute to the accomplishments of future science and conservation biology (Winker 2005).

Because Fort Brown was an import outpost for ornithological exploration of the Lower Rio Grande Valley and was a launching point for the US–Mexico Boundary Survey, selecting a survey area close to the original fort was an important consideration. A group of private landowners allowed the authors to conduct surveys along Resaca de las Antonias, Los Fresnos, Cameron County. Here is where Kimball's collecting was relevant; he lived and collected around Los Fresnos in the 1920s and 30s. Kimball collected nearly 1,400 specimens from the broader area of Los Fresnos from 1927 to 1937. These specimens are housed primarily at the University of Michigan Museum of Zoology (UMMZ). Since Kimball's collections, there has been no systematic specimen-based avian survey undertaken in the Lower Rio Grande Valley.

DESCRIPTION OF THE AREA

Resaca de las Antonias, 3.0 km northeast of Los Fresnos, Texas (26.09478°N, 97.44530°E, at sea level), Cameron County, comprises 238 hectares of privately-owned land of mixed agriculture and native habitats and is a good representation of the landscape currently found in Cameron County. For this study, three families granted access to the bulk of the resaca. A resaca is a local term that is applied to a former channel of the Rio Grande that was naturally cut off from the river; also called an oxbow. In relation to Fort Brown, a historic center for ornithological exploration in the Lower Rio Grande, Resaca de las Antonias is 23 km north by northeast (compass heading 11.56°) (Fig. 1).

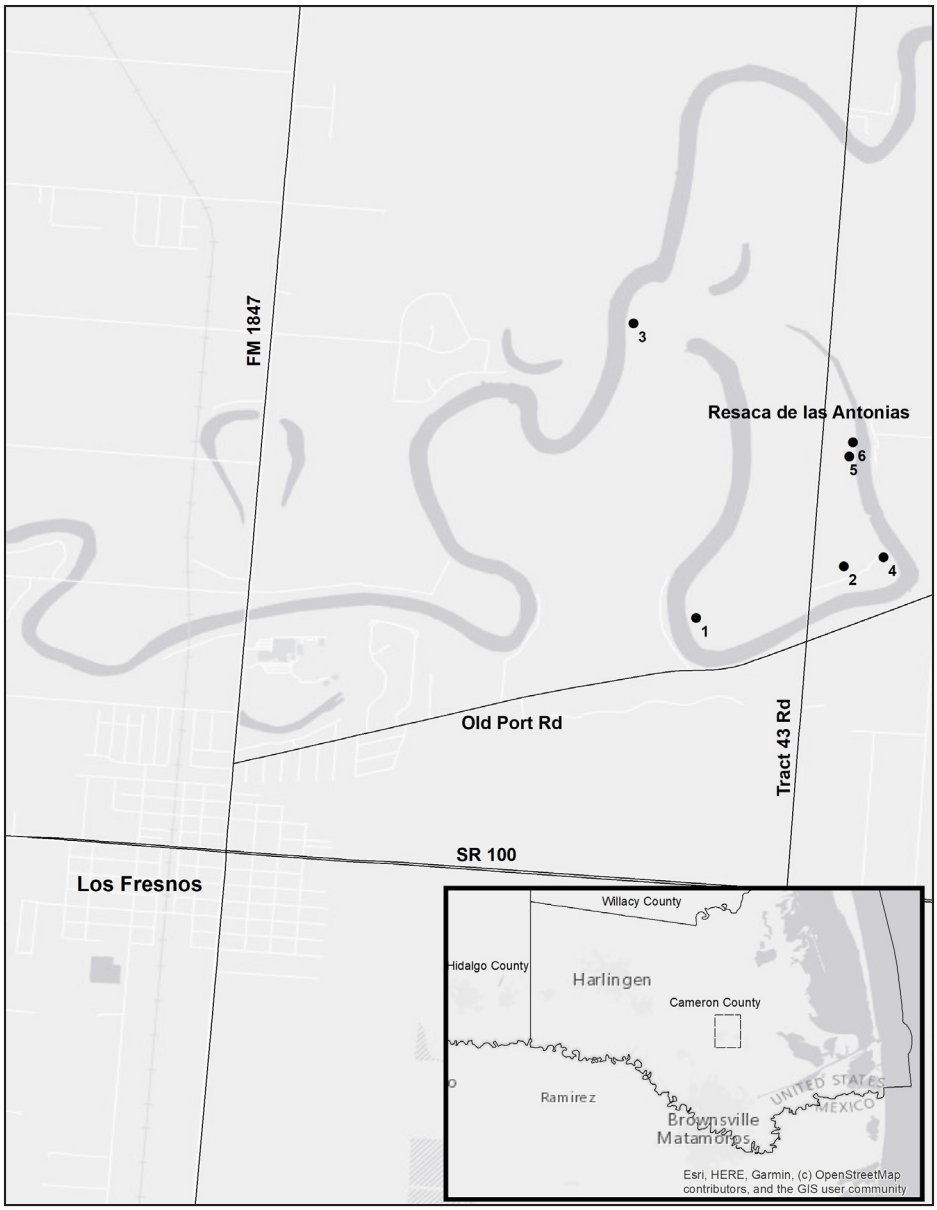

Figure 1. Map of Resaca de las Antonias, Cameron County. Numbers 1–6 correspond to central collecting points referenced in Table 1.

The resaca lies at near sea level in the Mid-Delta Thorn Forest Biotic Community (Jahrsdoerfer and Leslie, Jr. 1988) (Fig 1). This biotic region has been under extreme anthropogenic pressure since the 1930s, resulting in more than 95% of the original forest and brushland cleared for agriculture. Expanding urbanization threatens the remaining habitats and fauna. At the center of the survey area is 100 ha of farmed agricultural lands, most used for cereal grains and row crops or orchards (latter, 11 ha). Resaca de las Antonias is a "u"-shaped oxbow with 45.5 ha of permanent water that fluctuates in depth due to irrigation and water management. The riparian strip along the inner edges of the resaca is mid-delta thorn forest (Jahrsdoerfer and Leslie, Jr. 1988). The largest riparian habitat is located on the southeastern corner of the resaca and accounts for 12.5 ha. It remains among the largest intact riparian tracts in the Los Fresnos area. Two smaller, linear riparian habitats, less than 100 m in width, occur along the inner western arm of the resaca (4.8 ha). The riparian community is a mesquite (*Prosopis glandulosa*) and granjeno (*Celtis pallida*) thorn forest, mixed with Texas ebony (*Pithecellobium flexicaule*), anacua (*Ehretia anacua*), and Brazil (*Condalia hookeri*). This riparian thorn forest is not as complex as the taller Mid-Valley riparian woodland of ash, hackberry, and elm found on the Rio Grande, which supports a different avian community (Jahrsdoerfer and Leslie, Jr. 1988). One landowner restored 9.7 ha of land to native grassland and savanna. Native and exotic grasses formed a continuous buffer along the resaca woodlands. In 2005–2011, a 0.5 ha wetland was restored and managed near the center of the grasslands. The wetland attracted numerous waterbirds. By 2019, that restored wetland was no longer flooded and became overgrown with grasses and shrubs (as assessed from aerial imagery of the site).

Several of the homes along the resaca had beautiful gardens with large trees and flowering plants that attracted migrants and resident birds alike. One parcel (Nonmacher) had a planted line of large chestnuts that served as a migrant trap. The gardens of the Inn at Chachalaca Bend (at that timed owned by the Breedlove family) were large and complex. The Inn also supported one of the larger martin houses and bird feeding stations. Finally, the orchards of the area were primarily grapefruit. General habitat photos are included in Appendix I. The surrounding landscape is comprised primarily of agricultural lands and the town of Los Fresnos (population in 2018, 7,883).

MATERIALS AND METHODS

A. Engilis, Jr. and I. E. (Torres) Engilis conducted the first trip to the resaca in April and May 2004. Small mammal collecting was conducted during this trip, but no birds were collected. A team then returned in 2005, 2008, and in 2011 to conduct avian specimen-based surveys during the peak breeding season for resident species from late April to early May each year. This was also during peak spring migration. Migration fallout (due to storm fronts) was experienced three times during the fieldwork, on 3 May 2005, 28 April 2008, and 3 May 2011. As a result, regularly occurring migrants moving through the resaca were well documented.

Birds were collected throughout the properties but were centered on six primary locations (Table 1, Fig. 1). Standard mist nets and small caliber shotguns were used to collect birds. Birds that were found dead were salvaged when opportunity arose. Bird collecting was primarily during morning hours, but nets were left opened in shaded areas throughout the day, with frequent checks. Afternoons were spent processing specimens. In most cases, specimens were preserved as round skins, various osteological preps, and a few formalin-fixed whole birds. Heart, liver, and breast muscle tissue were sampled and stored in cryovials placed in liquid nitrogen containers. Specimens of birds were collected and salvaged in accordance with state and federal permits, and all welfare and handling methods followed approved Animal Care and Use Authority from the University of California, Davis. All specimens and tissues were deposited at the MWFB (specimen prefix WFB) or Smithsonian (prefix USNM). Taxonomy and nomenclature to the species level follows the AOU Checklist of North American Birds (AOU 1998) and the AOS supplements of Checklist of North and Middle American Birds (Chesser et al. 2019).

Subspecies determinations follow various authorities but is primarily based on Pyle (1997, 2008). Relevant literature was cited where trinomial determinations deviate from Pyle. Table 2 summarizes dates and participants (the authors) for each collecting effort. All specimens were examined in comparison to those in collections at the USNM and MWFB. For brevity in the species accounts, determinations were not discussed if specimens conformed to expected subspecies present in the survey area. Additionally, scientific names with authorities are presented in the species accounts only.

Table 1. List of central collecting localities along Resaca de las Antonias (see Figure 1). Birds were collected at multiple places along the resaca and were referenced to one of these points based on proximity. All localities were recorded in decimal degree using a Garmin, hand-held global positioning unit.

	Verbatim Collecting Locality	Lat long (decimal degree)	Habitat (photos in Appendix I)
1	3.0 km E x NE of Los Fresnos	26.0846°N, 97.4502°W	Resaca edge and agriculture
2	3.9 km NE of Los Fresnos	26.0875°N, 97.4419°W	Wetland and grassland
3	4 km NE of Los Fresnos	26.1010°N, 97.4536°W	Scrubland, fallow agriculture
4	4.1 km E x NE of Los Fresnos	26.0880°N, 97.4397°W	Gardens and resaca forest
5	4.2 km NE of Los Fresnos	26.0936°N, 97.4416°W	Gardens and resaca forest
6	4.3 km NE of Los Fresnos	26.0944°N, 97.4414°W	Resaca forest

Table 2. Dates of collecting trips and participants (by initials), with institutional affiliation (see Appendix I for photos).

Dates	Participants	Species observed	Species collected	Number of specimens
02 May–10 May 2004	AEJr, IET (MWFB)	135	20	43
25 April–05 May 2005	AEJr, IET (MWFB)	141	29	44
27 April–08 May 2008	AEJr, IEE, JAT (MWFB)	157	61	157
02 May–08 May 2011	AEJr, IEE (MWFB), BKS (USNM)	113	69	200

RESULTS AND SPECIES ACCOUNTS

A total of 444 specimens representing 82 species of birds was collected, and 182 species were observed across all trips to Resaca de las Antonias area (Appendix II). Of the 182 species recorded, 42 were confirmed as breeding along the resaca by observation or physiological evidence from specimens. Species composition of resident and breeding species was comparable with those recorded prior to 1925. Similarly, with a few notable exceptions, species of neotropical origins were similar in their breeding occurrence. Although comparisons are drawn to earlier specimen-based efforts in the species accounts, general findings were not compared directly to the surveys of the 1860s–1930s. As tempting as it would be to generalize, based on the finding of this study, as to the change of avian occurrences in the Lower Rio Grande, there were several confounding issues. Early surveys noted "Brownsville" or "Los Fresnos" as a collecting locality, but collectors of that era often roamed for miles to procure specimens; thus there was some level of uncertainty that birds collected were from these specific locations. Bird specimens given these general location names were many times collected south of the US–Mexico border. In addition, the Resaca de las Antonias surveys took place in one location in Cameron County, so the authors determined that extrapolating species occurrences to

the Lower Rio Grande Valley seemed inappropriate. Finally, permit regulations and landowner restrictions prevented collections of several species of observed birds. Earlier collectors did not have such restrictions.

Given that H. H. Kimball did collect in and around the vicinity of Los Fresnos from 1927 to 1937, it is worth noting a bit about his history and the differences in his documented avian specimen composition. Kimball was commissioned in 1930 by Josselyn Van Tyne to initially collect specimens in the Lower Rio Grande for the UMMZ, and Van Tyne published on Kimball's collections (Van Tyne 1933). However, Kimball remained for years in the region, apparently living in Los Fresnos, and collected birds that were purchased by Dr. Max Minor Peet in the 1930s and 40s. Dr. Peet secured Kimball's collection of more than 15,000 specimens after Kimball's death in 1945. It is important to note that many of Kimball's specimens lacked accurate locality data. He instead opted to include general areas (Brownsville, Los Fresnos, Santa Maria, etc.) on his tags. The reality though is that his specimens may have come from other locations in the Valley. Indeed, some of his specimens attributed to Los Fresnos (such as Woodhouse's Scrub-Jay, *Aphelocoma woodhouseii*) seem highly unlikely. Nonetheless, the bulk of his specimens from Los Fresnos does paint a historic picture of the birdlife of the broader area.

Kimball collected 123 species of birds with the locality "Los Fresnos" written on the tag (UMMZ Catalog, VertNet query 01 June 2020, J. Hinshaw pers. comm.). However, based on some of the species collected, it is clear that he ranged east at least 15+ km to coastal habitats. His substantial collection of Botteri's Sparrow (*Peucaea botterii*), Piping Plover (*Charadrius melodus*), and Marsh Wren (*Cistothorius palustris*), were all probably obtained from coastal prairie and flats within biking distance from Los Fresnos (he apparently did not have an automobile). These coastal habitats did not historically occur in Los Fresnos proper. He did document several species associated with mid-Delta thorn forest and scrublands in the Los Fresnos region. Notable species Kimball documented, but we missed, included: Northern Beardless Tyrannulet (*Camptostoma imberbe*), Verdin (*Auriparus flaviceps*), House Wren (*Troglodytes aedon*), Bewick's Wren (*Thryomanes bewickii*), Eastern Bluebird (*Sialia sialia*), Curve-billed Thrasher (*Toxostoma curvirostre*), Field Sparrow (*Spizella pusilla*), Black-throated Sparrow (*Amphispiza bilineata*), Cassin's Sparrow (*Peucacea cassinii*), Audubon's Oriole (*Icterus graduacauda*), Tropical Parula (*Setophaga pitiayumi*),Varied Bunting (*Passerina versicolor*), and Morelet's Seedeater (*Sporophila morelleti*).

Species Kimball documented, that we collected, included: Plain Chachalaca (*Ortalis vetula*), Inca Dove (*Columbina inca*), White-tipped Dove (*Leptoptila verreauxi*), Groove-billed Ani (*Crotophaga sulcirostris*), Common Pauraque (*Nyctidromus albicollis*), Buff-bellied Hummingbird (*Amazilla yucatanensis*), Golden-fronted Woodpecker (*Melanerpes aurifrons*), Brown-crested Flycatcher (*Myiarchus tyrannulus*), Couch's Kingbird (*Tyrannus couchi*), Great Kiskadee (*Pitangus sulpuratus*), Green Jay (*Cyanocorax yncas*), Long-billed Thrasher (*Toxostoma longirostre*), Olive Sparrow (*Arremonops rufivirgatus*), and Bronzed Cowbird (*Molothrus aeneus*). These species also correspond to their early occurrence in the Lower Rio Grande, as summarized by Griscom and Crosby (1925–26). Finally, we documented three species that Kimball did not, nor were these recorded by Griscom and Crosby: Ringed Kingfisher (*Megaceryle torquata*), Tropical Kingbird (*Tyrannus melancholicus*), and Altamira Oriole (*Icterus gularis*).

ORDER ANSERIFORMES
Family Anatidae
***Dendrocygna autumnalis fulgens* Friedmann, 1947**
Black-bellied Whistling-Duck

Specimens examined (3).—Male: WFB 11122; female: USNM 653025, WFB 10867.

Remarks.—Common and nests in boxes along resaca waterways and adjacent open fields and seasonally flooded habitats. Female (WFB 10867) collected on 5 May 2011 had developing ovaries 5mm in diameter. Occurs in large flocks at residences and feeding stations along the resaca.

Diagnosis.—Lacks gray collar and back separating reddish neck from breast of nominate (Pyle 2008).

ORDER GALLIFORMES
Family Cracidae
***Ortalis vetula mccalli* (Baird, 1858)**
Plain Chachalaca

Specimens examined (5).—Male: WFB 1112, 5852, USNM 646371; female: WFB 9761, 8620.

Remarks.—Common in subtropical thorn forest and riparian forest, rarely straying into the open. Female WFB 9761 collected on 28 Apr 2008 had well-developed ova, convoluted and swollen oviduct, and developed brood patch. WFB 8620 collected on 28 Apr 2008 had an egg in its oviduct shell gland, LF = 15mm, and a brood patch. One alcohol prepped specimen, USNM 646370, collected on 4 May 2011 is suspected to be a female based on presence of brood patch (Peterson 2000). This latter bird was not internally examined in order to keep intact as a complete alcohol preserved specimen.

Diagnosis.—Tail coloration and underparts as described for *O. v. mccalli* (Peterson 2000).

ORDER PODICIPEDIFORMES
Family Podicipedidae
***Tachybaptus dominicus dominicus* (Linnaeus, 1766)**
Least Grebe

Specimens examined (1).—WFB 8520.

Remarks.—Observed on only a few occasions, usually on small, flooded ponds along the resaca. The single specimen was collected on 30 April 2008 in a pond surrounded by grasslands. The bird was a female in definitive alternate plumage. Follicles in the ovary were developing; largest follicle was 4 mm in diameter. The stomach had small mammal fur and insect parts along with aquatic vegetation. Mammal parts were not identifiable.

ORDER COLUMBIFORMES
Family Columbidae
***Columbina inca* (Lesson, 1847)**
Inca Dove

Specimens examined (5).—Male: WFB 6179, 8523, 8406, USNM 646281; female: WFB 8524.

Remarks.—Common in subtropical thorn forest with open forest floor. Often observed foraging in open agricultural lands and road edges up to 50 m from cover. All males had developed testes indicating breeding condition.

***Columbina passerina passerina* (Linnaeus, 1758)**
Common Ground Dove

Specimens examined (3).—Male: WFB 11086; female: WFB 8521, 11087.

Remarks.—Uncommon in subtropical thorn forest with open forest floor. Often observed foraging in open agricultural lands and road edges. Observed mostly in pairs from late April to early May indicating pair formation. Females WFB 8521, collected on 27 April 2008, and WFB 11087, collected on 5 May 2011, had developing follicles and convoluted oviduct, but were not yet egg laying.

***Leptoptila verreauxi angelica* Bangs and Penard, 1922**
White-tipped Dove

Specimens examined (7).—Male: WFB 5959, 6178, 8522, 11093; female: WFB 5869, 5882, 11092.

Remarks.—Common in subtropical thorn forest with open forest floor. All males examined had greatly enlarged testes, and females with well-developed follicles, indicating breeding in April and May on the resaca. No nests found in April or May, nor freshly fledged or immature birds in any years sampled, but White-tipped Doves have a prolonged breeding season (Feb–Aug) in Texas (Giese et al. 2018).

***Zenaida asiatica asiatica* (Linnaeus, 1758)**
White-winged Dove

Specimens examined (2).—Male: WFB 8434. USNM 646467.

Remarks.—Common in most habitats along the resaca. Two males were collected, and one saved as a complete skeleton with feathers (USNM 646467) had enlarged testes.

ORDER CUCULIFORMES
Family Cuculidae
***Crotophaga sulcirostris* (Swainson, 1827)**
Grove-billed Ani

Specimens examined (3).—Male: WFB 8616, 8617; female: WFB 8516.

Remarks.—Common in small flocks along resaca in subtropical thorn forest edge. The female, collected on 5 May 2008, possessed a brood patch. Both males had small testes. WFB 8616 was collected from the same flock and had a testes that measured 5 x 3 mm. Female specimen plumage less glossy than male specimens.

***Coccyzus americanus* (Linnaeus, 1758)**
Yellow-billed Cuckoo

Specimens examined (2).—Male: WFB 11090; sex unknown: WFB 11088.

Remarks.—Common in passage in subtropical thorn forest, orchard and gardens, preferring trees closer to existing waterways. Birds collected, WFB 11090 on 7 May 2011 and WFB 11088 on 5 May 2011, were not in breeding condition, and interestingly they did not have large fat loads. Yellow-billed Cuckoo have been documented nesting in the Lower Rio Grande Valley (Lockwood and Freeman 2014), but it was hard to ascertain if the collected birds were transients or birds returning to breed.

Diagnosis.—There has been contention regarding the taxonomic validity of eastern and western subspecies of Yellow-billed Cuckoo (Wetmore 1968; Banks 1988; Franzreb and Layman 1993; Pyle 1997; Farrell 2014). Collected birds were examined and measured along with a series of specimens of Yellow-billed Cuckoos at USNM and the MWFB. The measurements of these two specimens and two others obtained as road kills near Los Fresnos fell within the overlapping range and standard deviation reported for eastern and western subspecies for wing, tail, and bill lengths (Table 3) (Franzreb and Laymon 1993). Plumage traits also were not helpful in assigning subspecies. Assigning subspecies based on range alone was avoided when rendering trinomial diagnosis. Clearly more work is needed to ascertain the validity of the eastern and western subspecies of Yellow-billed Cuckoo.

ORDER CAPRIMULGIFORMES
Family Caprimulgidae
***Chordeiles minor asseriensis* Cherrie, 1896**
Common Nighthawk

Specimens examined (2).—Male: WFB 10830, 10831.

Remarks.—Both birds collected did not show evidence of active breeding. Found foraging over open grasslands and along the resaca waterway.

Diagnosis.—*C. m. asseriensis* is the expected breeding form found in the Lower Rio Grande Valley. Both these specimens were small (wing 181, 183), and both birds lacked markings on inner primary and secondaries – being solid colored. Both specimens were identified as second year males based on primary markings, solid white and both lacked white markings

Table 3. Measurements of *Coccyzus americanus* collected from Los Fresnos; includes two additional specimens found dead along the highways during our surveys.

WFB#	Sex	Wing length	Tail length	Exposed culmen length	Nares bill tip length	Maxilla depth
6635	Male	146	146	23.5	19.2	6.6
11088	?	142	138	24.9	18.9	5.9
11089	Male	146	144	24.6	18.9	5.8
11090	Male	147	141	25.5	19.3	7.4

on outer rectrix (r5) (Pyle 1997). There was uniform wear on rectrices as well. The tail was more similar to that of female birds

***Nyctidromus albicollis merrilli* Sennett, 1888**
Common Pauraque

Specimens examined (4).—Male: USNM 646183, WFB 5873, 10829; female: WFB 109828.

Remarks.—Common breeder in floor of resaca subtropical thorn forest and garden plots with scattered shrubs. Forages in the open forest and adjacent open grasslands. The female (WFB 10928) was on a nest found on 5 May 2011. Nest was on the ground at base of shrub in garden plot adjacent to grasslands. It was essentially a scrape on the ground. Eggs were solid pinkish 29 x 23 mm (eggs were accidently crushed during shipping back to MWFB). All males collected had large testes. Female had large vascularized brood patch. No noticeable cloacal protuberance in males.

Diagnosis.—Large size, wing 171, 173 and tail 170, 171 in WFB males conforms to *N. a. merrilli* (Pyle 1997). Latta and Howell (2015) indicates that *merrilli* is grayer than Central and South American forms. Examination of specimens at the USNM confirmed that only the upperparts are grayer, not the overall bird; there was considerable overlap in the buffy tones of underparts (that cannot be interpreted as gray). Males had worn primaries, female's primaries not as worn.

ORDER APODIFORMES
Family Trochilidae
***Archilochus colubris* (Linnaeus, 1758)**
Ruby-throated Hummingbird

Specimens examined (6).—Male: WFB 8477, 10835, 10833; female: WFB 10834, 10832, USNM 646187.

Remarks.—Common as migrant only, does not breed. In general, birds collected had trace fat loads, the exception being WFB 10833 collected on 6 May 2011 that had heavy migration fat. Most common in gardens.

***Amazilla yucatanensis chalconota* (Oberholser, 1898)**
Buff-bellied Hummingbird

Specimens examined (6).—Male: WFB 5875, 6467, 8430, 11151; female: WFB 6190, 10836.

Remarks.—Common in subtropical thorn forest and around ornamental flowers at homes on resaca. Specimen WFB 11151, collected on 5 May 2011, was a recent arrival in that it still retained a moderate abdominal fat load and was in molt. The body was in general light molt and p10 and r4–6 were all in growth sheaths; bill not corrugated, indicating this was an adult bird in prebasic molt. Prebasic molt is reported primarily from June to October (Chavez-Ramirez and Moreno-Valdez 2015) so this bird may represent one of the earliest molt records for this species in the United States.

Diagnosis.—Adult male with green to bronze-green back and head, little bronze on metallic underparts distinctive for *A. y. chalconota*.

ORDER CHARADRIIFORMES
Family Scolopacidae
***Calidris himantopus* (Bonaparte, 1826)**
Stilt Sandpiper

Specimens examined (2).—Male: WFB 11098; female: WFB 11099.

Remarks.—Uncommon migrant through the area. Observed foraging in shallow flooded mudflats from late April to early May across years. Specimens collected (both on 4 May 2011) were far along in their pre-alternate molts attaining reddish ear patch and barred underparts. Fat loads were moderate to heavy.

***Calidris bairdii* (Coues, 1861)**
Baird's Sandpiper

Specimens examined (1).—Male: WFB 6414.

Remarks.—Uncommon migrant through the area. This bird was found dead on the road during a northern weather front (rain and wind) resulting in a fallout

event in South Texas on 30 April 2005. The bird was in pre-alternate molt. Fat load was light.

***Calidris minutilla* (Vieillot, 1819)**
Least Sandpiper

Specimens examined (3).—Female: WFB 11103, 11104, 11105.

Remarks.—Common migrant through the area. All three were collected on 4 May 2011on mudflat of small grassland pond, in association with Semipalmated and Stilt sandpipers. All three birds were in pre-alternate molt on head, body, and scapulars; WFB 11104 was farthest along in molt with fresh central rectrices and tertials.

***Calidris pusilla* (Linnaeus, 1766)**
Semipalmated Sandpiper

Specimens examined (1).—Male: WFB 11106.

Remarks.—Common migrant through the area. Collected on 4 May 2011 on mudflat of small grassland pond, in association with Least and Stilt sandpipers. Bird was beginning pre-alternate molt showing a few fresh scapulars.

***Limnodromus griseus hendersoni* Rowan, 1932**
Long-billed Dowitcher

Specimens examined (1).—Male: WFB 11097.

Remarks.—Common migrant through the area. Specimen collected on 4 May 2011 on mudflat of small grassland pond. Bird nearly completed with pre-alternate molt, heavily spotted on breast, upper flanks, with barring on rear flanks. Belly rufous with white intermixed.

***Tringa solitaria solitaria* Wilson, 1813**
Solitary Sandpiper

Specimens examined (3).—Male: WFB 11117, 11118; female: WFB 11119.

Remarks.—Common migrant through the area. These specimens were collected on 29 Apr 2008 (WFB 11117) and 4 May 2011 (WFB 11118 and 11119). All three specimens were in worn definitive-basic plumage, no molt detected.

Diagnosis.—All three birds showed solid gray inner vein of primaries (no mottling) and broad white bars on tail. These traits are distinctive for the nominate form (Pyle 2008; Moskoff 2011).

***Tringa flavipes* (Gmelin, 1789)**
Lesser Yellowlegs

Specimens examined (6).—Male: WFB 11111, 11112, 11113, 11114; female: WFB 11115, 11116.

Remarks.—Common migrant through the area. Observed daily in shallow wetlands. All birds collected (between 30 April and 7 May) were in an advanced state of pre-alternate molt with about 50% of the body feathers fresh and replaced. Rectrices were fresh in WFB 11111, 11112, 11115; plumage worn in WFB 11113, 11114. Extensive wear on coverts and tail on WFB 11116 (collected 4 May 2011) indicated bird was in formative plumage in first pre-alternate molt.

ORDER CHARADRIIFORMES
Family Laridae
***Leucophaeus atricilla megalopterus* (Brüch, 1855)**
Laughing Gull

Specimens examined (1).—Male: WFB 11095.

Remarks.—Forages from coastal areas up and down resaca and in agricultural fields, which is where this bird was collected on 5 May 2011. The bird had enlarged testes, and was in definitive alternate plumage.

ORDER PELECANIFORMES
Family Ardeidae
***Butorides virescens virescens* (Linnaeus, 1758)**
Green Heron

Specimens examined (1).—Male: WFB 11120.

Remarks.—Resident along resaca waterways, breeds along resaca, male, collected on 4 May 2011, had enlarged testes (15x6 mm). This bird compared favorably with a specimen of *B. v. virescens* collected

in Brownsville by D. N. Couch pre-1854 (USNM 4154, Fig. 2). WFB 11120 was captured in a mist net along the shore of the resaca.

ORDER PICIFORMES
Family Picidae
***Melanerpes aurifrons aurifrons* (Wagler, 1829)**
Golden-fronted Woodpecker

Specimens examined (7).—Male: WFB 5877, 8480, 8482, 8483, 14374; female: 5877, 8481.

Remarks.—Common and vocal breeding species of subtropical thorn forest and in gardens around homes. WFB 8481 collected on 27 April 2008 had a developed egg in the shell gland (20 x 18 mm), and a developing follicle in the ovary. No fledged birds were observed during surveys, but several pairs were observed provisioning young in nest cavities.

***Dryobates scalaris cactophilus* (Oberholser, 1911)**
Ladder-backed Woodpecker

Specimens examined (3).—Male: USNM 646171; female: WFB 8479, 10837.

Remarks.—Uncommon breeding species in resaca subtropical thorn forest. WFB 10837 had an enlarged brood patch and convoluted oviduct. Male had sarcocystosis, a disease caused by a protozoan parasite. Distinctive white scars were evident in the breast muscles.

ORDER PASSERIFORMES
Family Tyrannidae
***Myiarchus tyrannulus cooperi* (Baird, 1858)**
Brown-crested Flycatcher

Specimens examined (9).—Male: WFB 5857, 6641, 8567, 10848 10849, USNM 646173; female: WFB 5856, 6623, USNM 646181.

Remarks.—Very common and vocal species in resaca subtropical thorn forest and savannah trees. Two females examined possessed well-defined brood patches indicating they were incubating. All males had swollen cloacal protuberances and enlarged testes. One pair was observed provisioning nestlings on 4–6 May 2011. Nest was in tree cavity probably excavated by *Melanerpes aurifrons.* All birds in lightly worn, to worn, definitive alternate plumage. Brightness of pale edging on tertials and secondaries variable based on wear.

Diagnosis.—Identification to species based on rectrix (r)6 pattern, primary (p)10 < p4, contrasting brown crest, large wing and bill. Identified as *M. t. cooperi* (as expected in area) based on bill measurements, wing and tail lengths too small for western *M. t. magister* as described by Pyle (1997) (Table 4).

***Pitangus sulphuratus texanus* (van Rossem, 1940)**
Great Kiskadee

Specimens examined (8).—Male: WFB5854, 6470, 8510, 8549, 8550, 10857; female: WFB 66466, USNM 646172.

Remarks.—Common resident in resaca subtropical thorn forest edge, and grasslands with scattered trees. Birds were becoming reproductive by early May; males had enlarged testes, small brood patch and moderate cloacal protuberances. The two females collected had developing follicles and a brood patch was forming in USNM 646172 collected on 5 May 2011. One active nest was found on 4 May 2008. Both parents were attending and one was incubating on 4 May 2008 in a large tree in yard of one home (Fig. 3). Kimball's eight specimens collected from 1933 and 1934 indicates that the species was an established breeder in Los Fresnos, and represented the earliest documented specimen records for that locale.

***Tyrannus couchii* Baird, 1858**
Couch's Kingbird

Specimens examined (9).—Male: WFB 8511, 8543, 10850, 10853; female: WFB 8548, 10851, 10852, USNM 646179, 646390

Remarks.—Common resident species. Favored resaca subtropical thorn forest edge, grasslands with scattered trees; but also foraged in agricultural fields. Birds collected were in various states of reproductive development. No brood patches found on females, but follicle development starting in early May. One

Figure 2. Upper specimen is *Butorides virescens*, WFB 11120, collected on 4 May 2011; lower specimen of *Butorides virescens*, USNM 4154, was collected from Brownsville in 1865.

Table 4. Measurements of *Myiarchus tyrannus cooperi* collected on Resaca de las Antonias.

WFB #	Sex	Chord	Tail	Bill nares	Bill width at base
5856	Female	97	88	15.5	9.6
5857	Male	104	94	17.0	9.8
6623	Female	97	90	17.2	9.6
6641	Male	102	90	16.5	9.1
8567	Male	100	87	16.0	9.6
8513	Male	98	91	17.1	8.9
10848	Male	100	87	15.4	10.1
10849	Male	99	89	16.0	9.0

Figure 3. Nest of *Pitangus sulphuratus* at Inn at Chachalaca Bend, 6 May 2011.

female, USNM 646390 collected on 6 May 2011, had a convoluted oviduct and enlarged follicle of 6 mm. Most males had enlarged testes, but cloacal protuberance still small. Table 5 shows measurements of kingbirds collected.

Birds were in various degrees of pre-alternate molt. WFB 10852 collected on 5 May 2011 was a second-year bird that had completed its first pre-alternate molt. It exhibited extensive wear on primaries; interpreted as retained juvenile feathers. The tail notch was indistinct when compared to adult birds. Molt limit in secondaries with secondary (s) 1–4 fresher than inner secondaries. Body feathers were fresh. The skull was 70% pneumatized. WFB 10850 collected on 5 May 2008 had full stomach with various insects comprising of one Halictid bee (glossy green), two 17 mm beetles, and other insect parts. WFB 10851 collected on 7 May 2011 had large green seeds and insect parts in its stomach.

***Tyrannus melancholicus satrapa* Cabanis and Heine, 1859**
Tropical Kingbird

Specimens examined (2).—Male: WFB 10854, USNM 646276.

Remarks.—Tropical Kingbird was not recorded on the resaca prior to these specimens collected on 5 May 2011. The two males were squabbling, with their characteristic trilled calls, with an apparent female. We collected all three birds and after further determinations found the two males to be Tropical Kingbirds (by metrics and vocalizations, Table 5). The female (WFB 10855) was a Couch's Kingbird. There are records of hybrids between these two species from southern Mexico (Traylor 1979) but none recorded to date from southern Texas. There was only one confirmed nesting record in Cameron County during the Texas

Table 5. Measurements of *Tyrannus* specimens collected at Resaca de las Antonias.

Museum number	Sex and age	Exposed culmen	Culmen-nares length	Culmen width at nares	Chord	Tail	Long P-P5	Long P-P10	Tail notch depth	Wt (g)
T. couchii										
8511	Male (AHY)	21.8	16.5	10.2	123	99	11	7	5	49
8543	Male (AHY)	23.4	17.1	12.0	124	100	10	8	6	47.9
8548	Female (AHY)	21.7	15.8	12.2	115	90	9	8	4	53.8
10850	Male (AHY)	21.4	16.6	12.1	122	96	10	9	7	50.8
10851	Female (SY)	22.3	17.8	11.9	119	97	n/a	n/a	6	55.3
10852	Female (AHY)	21.3	16.9	11.2	115	96	7	6	4	52.5
10853	Male (AHY)	22.5	17.6	12.3	121	103	11	12	3	47.9
10855	Female (SY)	23.5	18.4	11.5	111	87	8	6	5	48.3
T. melanocholicus										
10854	Male (AHY)	24.3	19.0	11.4	117	98	5	7	12	49.6
646276*	Male (AHY)	20.9	18.6	10.5	--	87	--	--	--	

* USNM 646276 has outer primaries and outer retrices in molt so no measurements were taken.

Breeding Bird Atlas, that near Brownsville (Benson and Arnold 2001). However, Tropical Kingbirds are reported nesting in the Lower Rio Grande, along the river itself and locations away from the river since the mid-1990s (Brush 2005; Lockwood and Freeman 2014). The behavior and reproductive condition of the males indicated they were in breeding condition. The female Couch's Kingbird was a second-year bird and not in condition to breed (ovary was flaccid with undeveloped ova).

***Tyrannus tyrannus* (Linnaeus, 1758)**
Eastern Kingbird

Specimens examined (1).—Female: WFB 10856.

Remarks.—Common migrant in resaca subtropical thorn forest and along pond edges. The specimen collected on 6 May 2011was non-reproductive and had heavy migration fat. On 28 April 2008, there was a migration wave of Eastern Kingbirds during a storm event resulting in a fallout. We observed several dozen Eastern Kingbirds flying north, low over the agricultural fields and in the trees at the edge of the resaca. It was quite amazing to see these birds flying just feet above the ground. Interspersed among them were buntings and orioles.

***Contopus virens* Linnaeus, 1766**
Eastern Wood-Pewee

Specimens examined (7).—Male: WFB 6642, 10586, 10839, 10840, 10843; female: WFB 6648, 10838.

Remarks.—The most common migrant tyrannid in resaca subtropical thorn forest, gardens, orchards, and along pond edges. All specimens were in fresh definitive basic plumage. Birds had variable fat loads and all had non-reproductive gonads.

***Empidonax virescens* (Vieillot, 1810)**
Acadian Flycatcher

Specimens examined (3).—Male: WFB 7473, 10845; unknown sex: WFB 10844.

Remarks.—Uncommon migrant. Both birds in fresh definitive basic plumage, with trace fat and small gonad measurements. Primarily found in subtropical thorn forest.

Diagnosis.—Wing was long, 75 mm (WFB 7473, 10845), 77 mm (WFB 10844), and exhibited long primary projection and large bill. These features confirmed species identification.

***Empidonax traillii traillii* (Audubon, 1828)**
Willow Flycatcher

Specimens examined (2).—Male: WFB 10846, 10847.

Remarks.—Uncommon migrant through resaca subtropical thorn forest, both specimens from first week in May. Both specimens in definitive basic plumage. The primary northward migration of eastern Willow Flycatcher through the Middle Rio Grande occurs from 15 May to 5 June with the main push of all races of Willow Flycatcher occurring during the latter two weeks of May (Yang and Finch 1997).

Diagnosis.—Using wing formula (Pyle 1997), both species fell within the measurements for *E. traillii*. In both specimens, p10 > p5 and both had uniform green head and back, ruling out western Willow Flycatcher subspecies. The crown feathers had large, slightly darker green spots as described for eastern Willow and Alder flycatchers. Both birds lacked an expressive, pale lore marking (present in Alder). The bill length from nares for both specimens, 9.4 mm, is outside the range reported for *E. alnorum* (Pyle 1997). These features supported identification of these specimens as eastern Willow Flycatcher but coloration difference between nominate *E. t. traillii* and *E. t. campestris* are poorly defined (Sedgwick 2000). Some authorities merge *traillii* and *campestris*; further clarification may be needed.

Family Vireonidae
***Vireo griseus micrus* Nelson, 1899**
White-eyed Vireo

Specimens examined (3).—Male: WFB 6496, 10861; female WFB 10858.

Remarks.—Uncommon resident along resaca subtropical thorn forest, preferring denser understory and garden thickets. Female collected on 28 Apr 2008 had developed brood patch both males collected first week of May had large testes and enlarged cloaca protuberance.

Diagnosis.—All three specimens exhibited smaller bill and shorter tail typical of this subspecies (Pyle 1997). The yellow flanks were less intense when compared to northern races. However, but flank color may be the result of feather wear.

***Vireo philadelphicus* (Cassin, 1851)**
Philadelphia Vireo

Specimens examined (6).—Male: WFB 6495, 8431, 8595, 8597, 8598; unknown sex: WFB 10863.

Remarks.—Common migrant in resaca subtropical thorn forest, gardens, and orchards. One of the most common migrant vireos on the resaca. Specimens ranged in date from 28 April to 7 May. Fat loads varied from trace to heavy.

***Vireo olivaceus olivaceus* (Linnaeus, 1766)**
Red-eyed Vireo

Specimens examined (4).—Male: WFB 6627, 10860, 10863; unknown sex: WFB 10859.

Remarks.—Common migrant throughout resaca subtropical thorn forest and gardens.

Family Corvidae
***Cyanocorax yncas glaucescens* Ridgway, 1900**
Green Jay

Specimens examined (12).—Male: WFB 8618, 11124, USNM 646168, 646385, 646469; female: WFB 5865, 8619, 10865, 10866, 11123, USNM 646272, 646470.

Remarks.—Common breeding resident in resaca subtropical thorn forest and frequented gardens. At least five sperate flocks were found in the resaca. These were comprised of 6–10 individuals each. Females col-

lected were in various stages of reproductive activity with some having active brood patches and convoluted oviducts. USNM 646272 collected on 4 May 2011 had three collapsed follicles and developing ovum so was still egg-laying (Table 6). Most males had well-developed gonads and cloacal protuberances. Stomach contents included seeds, insect parts; one coleopteran identified.

Family Alaudidae
***Eremophila alpestris giraudi* (Henshaw, 1884)**
Horned Lark

Specimens examined (1).—Female: WFB 11125.

Remarks.—Rare in open fields. One male heard in territorial song on 28 April 2008. Specimen had a granular ovary measuring 7x4 mm.

Diagnosis.—Assigned to subspecies *E. a. giraudi* based on small size, short wing 87 mm, and upper tail coverts with indistinct streaks along their entire length. This subspecies is resident in southeastern Texas (Oberholser 1974).

Family Hirundinidae
***Stelgidopteryx serripennis serripennis* (Audubon, 1838)**
Northern Rough-winged Swallow

Specimens examined (2).—Male: WFB8566; female: WFB 8565.

Remarks.—Both birds were in non-breeding condition and were probably migrants. Both were collected over a small pond in open grassland.

Table 6. Measurements and reproductive status of *Cyanocorax yncas* collected at Resaca de las Antonias.

Museum #	Date	Sex	Reproductive Measurements	Weight (g)[1]
WFB 5865	02 May 2004	Female	Largest follicle: nearly fully formed 25 mm, oviduct swollen and convoluted	86
WFB 8619	30 Apr 2008	Female	Largest follicle: 4.0 mm, oviduct swollen and convoluted	83.5
WFB 10865	05 May 2011	Female	Ovary: 9 x 7; Largest follicle: 2.0 mm; oviduct thin and straight	75
WFB 10866	04 May 2011	Female	Largest follicle: 3.0 mm, oviduct swollen and convoluted	71.7
WFB 11123	05 May 2011	Female	Largest follicle: 5.0 mm, oviduct swollen and convoluted	72.3
USNM 646272	04 May 2011	Female	Ovary: laying, 3 collapsed follicles, largest follicle 4 mm; Brood patch: edematous; Oviduct: swollen	78
USNM 646470	05 May 2011	Female	Ovary: 11 x 10 mm, largest follicle 2 = 4 mm, 6 = 3 mm; Oviduct: 7 mm, at cloaca, convoluted	68.1
WFB 8618	30 Apr 2008	Male	8x4 mm, fleshy colored, seminal vesicles swollen	80.1
WFB 11124	05 May 2011	Male	Left testis: 10 x 7, seminal vesicles swollen	77.6
USNM 646168	04 May 2011	Male	Left testis: 8 x 5 mm	76.4
USNM 646385	04 May 2011	Male	Left testis: 8 x 5 mm	71.8
USNM 646469	05 May 2011	Male	Left testis: 8 x 5 mm	72.8

[1] All with trace fat loads

Diagnosis.—Both birds were uniformly dark brown above lacking paler crown and rump of *S. s. psammochrous* (Pyle 1997).

***Progne subis subis* (Linnaeus, 1758)**
Purple Martin

Specimens examined (2).—Male: WFB8432; female: WFB 8433.

Remarks.—Common and breeds at site in martin houses erected by landowners. Up to twenty-four pairs present in three martin houses along the resaca. Female had convoluted oviduct, but brood patch waning; feeding young. Both had hymenoptera (large flying ants) parts in stomachs.

Diagnosis.—Female confirms nominate subspecies identification, being dusky below with gray washed forehead contrasting with blue crown.

***Hirundo rustica erythrogaster* Boddaert, 1793**
Barn Swallow

Specimens examined (1).—Male: WFB 10946.

Remarks.—Relatively common as a migrant; hawking insects over open grasslands. A widespread breeding species in Cameron County (Bensen and Arnold 2001). Nesting occurred along the resaca on human-made structures.

Family Paridae
***Baeolophus atricristatus atricristatus* (Cassin, 1850)**
Black-crested Titmouse

Specimens examined (4).—Male: WFB8575, 11126, USNM 646164; female: WFB 8429.

Remarks.—Common resident of resaca subtropical thorn forest. Female collected on 28 April 2008 had well developed brood patch and male specimens had developed testes.

Diagnosis.—These birds were small as described for nominate form (Patten and Smith-Patten 2008; Table 7).

Table 7. Measurements of *Baeolophus atricristatus* specimens collected on Resaca de las Antonias.

Museum #	Sex	Wing	Tail
WFB 8429	Female	69	61
WFB 8575	Male	71	61
WFB 11126	Male	71	61
USNM 646164	Male	72	59

Family Troglodytidae
***Thryothorus ludovicianus lomitensis* Sennett, 1890**
Carolina Wren

Specimens examined (6).—Male: WFB 6638, 11127, USNM 646176, 646180; female: WFB 6643, 11127.

Remarks.—Common in resaca subtropical thorn forest and gardens. All birds collected from 27 April to 7 May were actively breeding. One observed pair was provisioning young in an artificial nest box on 27 April 2008, not collected (Fig. 4). Song similar to nominate, but differed in sounding rushed and raspier (AEJr, pers. obs.).

Diagnosis.—These specimens exhibited paler underparts and less rufous tones on upperparts consistent for *T. l. lomitensis* (Haggerty and Morton 2014). In all specimens, dark barring on tail feathers was more distinct than in nominate form (Fig. 4). WFB 6638 exhibited bolder flank markings than other specimens, and was molting in rectrices and secondaries; seems inconsistent with pre-basic molt, may be adventitious.

Family Turdidae
***Catharus fuscescens* cf. *fuscescens* (Stephens, 1817)**
Veery

Specimens examined (1).—Female: WFB 6926.

Remarks.—Uncommon migrant in subtropical thorn forest and gardens.

Figure 4. Photos comparing *Thryomanes ludovicianus lomitensis* (left specimen in each photo) with nominate *Thryomanes l. ludovicianus* (right specimen in each photo), showing brown-gray tones on upperparts and wings, bolder tail bars, and stronger facial patterning on *lomitensis*.

Diagnosis.—Many features separating subspecies of Veery are clinal and difficult to assess on one specimen. This specimen compared well with USNM specimens of *C. f. fuscescens*. *Catharus f. levyi* could not be ruled out due to poorly defined plumage traits (Pyle 1997). Therefore, it is referred to nominate *C. f. fuscescens*.

***Catharus minimus minimus* (Lafresnaye, 1848)**
Gray-cheeked Thrush

Specimens examined (2).—Female: WFB 11129, 11130.

Remarks.—Uncommon spring migrant through subtropical thorn forest and gardens.

Diagnosis.—When examining a large series at USNM, it was clear that plumage traits used to separate two described subspecies in Whiticare et al. (2018) are largely clinal. Specimens in USNM exhibited subtle variation in dorsal color with western birds tending more olive than eastern birds, which were browner. There was variation of the intensity of the buff wash on the breast west to east, with no real pattern. These specimens compared best with those of nominate *C. m. minimus*, exhibiting browner upperparts, buffy washed breast, and pale lower mandible extending well past nares. Photographed birds showed similar traits to specimens.

***Catharus ustulatus swainsoni* (Tschudi, 1845)**
Swainson's Thrush

Specimens examined (7).—Male: WFB 11132, 11133, 11134, 11678; female: WFB 11136, 11137, USNM 646184.

Remarks.—Common migrant in resaca subtropical thorn forest and gardens. Most birds had trace fat reserves indicating fresh arrivals to the resaca when netted.

Diagnosis.—The series collected compared well with *C. u. swainsoni* in the collections at USNM. Upperparts were dark olive-brown.

***Hylocichla mustelina* (Gmelin, 1789)**
Wood Thrush

Specimens examined (2).—Female: WFB 5790, 6625.

Remarks.—Uncommon migrant in resaca subtropical thorn forest and gardens. Few specimens collected from the Lower Rio Grande (Oberholser 1974). Kimball collected three from 1933 and nine from 1934, all as spring migrants in late April. Our specimens were from 4 May and 1 May 2005, respectively. Both had undeveloped ovaries.

Family Mimidae
***Dumetella carolinensis carolinensis* (Linnaeus, 1766)**
Gray Catbird

Specimens examined (8).—Male: WFB 11140, 11141, 11142, USNM 646277; female: WFB 8558, 10822, 11139, USNM 646278.

Remarks.—Common in subtropical thorn forest and gardens. One of the most abundant migrants at the time surveyed each year. There are no breeding records for Cameron County (Benson and Arnold 2001). All collected birds were migrants based on fat loads and non-reproductive gonads.

Diagnosis.—All specimens possessed dark chestnut-colored crissum typical of nominate *D. c. carolinensis* (Pyle 1997).

***Toxostoma rufum rufum* (Linnaeus, 1758)**
Brown Thrasher

Specimens examined (1).—Female: WFB 11146.

Remarks.—Rare wintering and possible migrant in gardens and subtropical thorn forest. Only one bird was encountered, found on 4 May 2011 in the garden of a residence. That bird was collected on 5 May 2011. It was an adult based on plumage and lacking molt limits. The ovary was non-reproductive.

Diagnosis.—Assigned to nominate subspecies based on wing chord (99 mm) and tail (119 mm); upperpart rufous lacking cinnamon tones (Pyle 1997).

***Toxostoma longirostre sennetti* (Ridgway, 1888)**
Long-billed Thrasher

Specimens examined (9).—WFB 8554, 11147, 11148, 11149, USNM 686386, 686473; female: WFB 5867, 8556, 11150.

Remarks.—Common breeding resident in subtropical thorn forest. Most birds in heightened state of reproduction, males with enlarged testes and swollen cloacal protuberance. Females with enlarged ova, convoluted oviduct, and brood patch. Female WFB 8556 collected on 29 Apr 2008 had two collapsed follicles indicating she was in mid-clutch development. WFB 11148 collected on 29 Apr 2008 was aged as a second-year bird based on narrow and worn rectrices; no molt limits on wings, fresh coverts present. WFB 11148 had dung scarabs in stomach; WFB 11149 collected on 3 May 2008 had a 40 mm cutworm, 9 mm snail, and other insect fragments. Mass by sex poorly documented (Tweit 1997). Fresh weights and fat levels of collected birds are documented in Table 8.

***Mimus polyglottos polyglottos* (Linnaeus, 1758)**
Northern Mockingbird

Specimens examined (8).—Male: WFB 5923, 8557, 11144, USNM 646274; female: WFB 6640, 8555, 11143, 11145.

Remarks.—Common in subtropical thorn forest and gardens. Females collected in late April with well-developed brood patches.

Table 8. Weights and body condition of collected *Toxostoma logirostre* on Resaca de las Antonias.

Museum #	Sex	Mass (g; fresh)	Fat Score
WFB 5867	Female	74.0	Trace – egg laying female
WFB 8554	Male	62.4	Trace
WFB 8556	Female	79.4	Trace – egg laying female
WFB 11147	Male	71.8	Trace
WFB 11148	Male	65.2	Trace – SY male
WFB 11149	Male	71.8	Moderate
WFB 11150	Female	76.4	Trace – egg laying female
USNM 686386	Male	64.0	Trace
USNM 686473	Male	67.4	Moderate

Family Passeridae

***Passer domesticus domesticus* (Linnaeus, 1758)**

House Sparrow

Specimens examined (8).—Male: WFB 5922, 7850, 8599, USNM 646174; female: WFB 5916, 5917, 5918, 8596.

Remarks.—Common breeding resident with localized distribution associated with human dwellings along the resaca. Also occupant of martin boxes. USNM 646174 collected in 5 May 2011 had enlarged testes and swollen seminal vesicles. WFB 8596 collected on 4 May 2008 had a convoluted oviduct, but no brood patch, largest ova was 1.4 mm.

Diagnosis.—Assigned to nominate based on source populations originating from England and Germany (Lowther and Cink 2006). House Sparrow was first reported in the Brownsville area in 1905, with a winter specimen collected (Oberholser 1974). Reported as common in Brownsville by mid 1920s (Griscom and Crosby 1925–26). Kimball did not collect any specimens.

Family Passerellidae

***Arremonops rufivirgatus rufivirgatus* (Lawrence, 1851)**

Olive Sparrow

Specimens examined (7).—Male: WFB 6471, 6509, 11154, 11155, USNM 646178, 646273; female: USNM 646475.

Remarks.—Common breeding resident in resaca subtropical thorn forest and thickets. Most males collected from 27 April to 7 May had enlarged cloacal protuberances and testes indicating peak breeding season. The female, USNM 646475 collected on 4 May 2011 had a convoluted oviduct and largest ovum was 2 mm. Measurements for males presented in Table 9.

Diagnosis.—Tail long, range (n=12) 54–70mm; broad rufous crown stripe of nominate (Pyle 1997).

***Chondestes grammicus grammicus* (Say, 1823)**

Lark Sparrow

Specimens examined (2).—Male: WFB 11158, 11159.

Table 9. Measurements of male *Arremonops rufivirgatus rufivirgatus* collected on Resaca de las Antonias.

WFB #	Tail	Wing	Exposed Culmen	Nares Bill Tip	Tarsus	Wt (g)
6471	58	51	12.6	9.42	23.6	23
6509	62	65	14.2	9.63	25.2	24
6510	57	61	14.8	9.60	23.5	24
8589	70	69	14.1	9.45	24.9	25.5
8590	62	63	14.0	9.56	24.2	24.5
8600	67	67	12	9.00	28	22.9
11152	70	65	14.8	--	24.7	24.9
11154	65	69	12.5	8.69	22.7	23.9
11155	65	66	12.9	8.99	23.6	26.6
11156	54	62	12.5	8.75	24.2	20.7
11157	67	68	13.3	9.22	24.8	24.3
11153	68	65	14.1	--	24.9	25.0

Remarks.—Uncommon in mixed grassland and scrub, gardens. Testes small on WFB 11158 collected on 4 May 2008 and indicates a bird that may been in migration. The testes were enlarged (7 x 6 mm and creamy colored) on WFB 11159 collected on 27 April 2008. This bird was collected while it sang on a small shrub in a grassy clearing; possibly a male on territory. There was no other physiological sign this bird was reproductive. Texas Breeding Bird Atlas recorded Lark Sparrow only as probable breeder in Cameron County (Benson and Arnold 2001). Lark Sparrows were not collected by Friedmann (1925) or DeLaubenfels (1924) during their breeding season surveys and were reported as rare in the Lower Rio Grande by Van Tyne (1933), and Griscom and Crosby (1925–26). However, F. B. Armstrong did collect two nests with eggs in Cameron County in 1905, and R. D. Camp collected three clutches in 1928 (Vertnet Query, 2 June 2020). These early records confirmed nesting at that time.

Diagnosis.—Both birds with worn plumage. Face markings deep chestnut, comparing well at USNM with nominate race.

Family Icteriidae

***Icteria virens virens* (Linnaeus, 1758)**

Yellow-breasted Chat

Specimens examined (1).—Male: WFB 11181.

Remarks.—Uncommon, probably migrant only, in resaca subtropical thorn forest with dense thickets. The single specimen was netted in a thicket on 4 May 2011. The bird had moderate fat and small gonads and was probably a migrant. No territorial singing was noted during survey periods. DeLaubenfels (1924) reported chats as common and breeding in Brownsville. However, the Texas Breeding Bird Atlas did not record the species in Cameron County (Bensen and Arnold 2001). Oberholser (1974) reported that there were no nesting records post-1935 from elevations below 500 feet elevation. Brush (2005) reported a singing and displaying male in Hidalgo County. Chats are recorded breeding on the Rio Grande from San Ygnacio, Zapata County, westward.

Diagnosis.—This bird had facial markings and short tail consistent with nominate subspecies (Pyle 1997; Griscom and Crosby 1925–26).

Family Icteridae
***Sturnella magna hoopesi* Stone, 1897**
Eastern Meadowlark

Specimens examined (1).—Male: WFB 10877.

Remarks.—Uncommon in grassland habitat on the resaca. A reproductive male was collected on 4 May 2011. This specimen had very large gonads (16 x 8 mm) and large cloacal protuberance. Several males were on territory and singing during each survey period in the restored grassland (late April–early May 2008 and 2011.

Diagnosis.—Assigned to *hoopsei* based on comparison with specimens at USNM and features described in Pyle (1997). This bird's plumage was worn, so buff edges on back feathers, a feature that can aid subspecies identification, were noticeable only along lateral edges of the feathers.

***Icterus spurius spurius* (Linnaeus, 1766)**
Orchard Oriole

Specimens examined (8).—Male: WFB8606, 8607, 10887, 10889, 10891; female: WFB 10886, 10888, 10890.

Remarks.—Common spring migrant subtropical thorn forest, gardens and orchards. All specimens were non-reproductive with reduced gonads in both sexes. Two second-year males captured were in light pre-alternate body molt and showed molt limits on wing coverts.

***Icterus cucullatus sennetti* Ridgway, 1901**
Hooded Oriole

Specimens examined (2).—Male: WFB 6629; female: USNM 646380

Remarks.—Local breeding species, but patchy distribution associated with palm tree plantings at residences along the resaca. The male was collected on 29 Apr 2005 from a palm tree with an active nest. It had a swollen cloacal protuberance. The female collected on 5 May 2011 had well developed ovary (largest ova was 2.5 mm). It was collected in the same grove of palms as the male six years earlier.

Diagnosis.—Assigned to *I. c. sennetti* based on range and plumage characteristics. Examination of specimens of nominate *I. c. cucullatus* and *I. c. sennetti* showed overlapping variation among these two described subspecies. Our male specimen had deeper orange on the breast and head than expected for *sennetti*, and could represent a hybrid or a clinal trait. Subspecies limits in the *I. cucullatus/sennetti* group require further study (Pleasants and Albano 2020).

***Icterus galbula* (Linnaeus, 1758)**
Baltimore Oriole

Specimens examined (5).—Male: WFB10894, 10896; female: WFB 10892, 10893, 10895

Remarks.—Common spring migrant through subtropical thorn forest, gardens, and orchards along the resaca. All birds collected were non-reproductive and had moderate to heavy fat loads.

***Agelaius phoeniceus megapotomus* Oberholser, 1919**
Red-winged Blackbird

Specimens examined (17).—Adult male: WFB 5843, 5844, 6624, 6647, 9181, 10819, 10820, 10824; second year male: WFB 10869, 10871, 10872, 10873, 10874; adult female: WFB 10870, 10875, 10882, 14203.

Remarks.—Common breeding and resident species in agricultural and fallow fields, riparian edge, and gardens.

Diagnosis.—All birds compared well to the South Texas subspecies, *A. p. megapotomus,* exhibiting smaller bill and shorter wing on average when compared with Gulf Slope subspecies *A. p. littoralis* (Table 10). Second-year males had shorter bills and chord measurements than adult males. Females were darker, less rufous on the back and with darker belly than *A. p. littoralis*.

Table 10. Measurements of *Agelaius phoeniceus* collected on Resaca de las Antonias, with comparison between male, second-year (SY) male, and female specimens.

WFB #	Sex	Culmen	Culmen nares	Culm depth at nares	Wing chord
5843	Male	23.8	17.8	9.2	115
5844	Male	21.3	14.5	9.1	117
6624	Male	23.0	16.5	9.2	116
6647	Male	21.6	16.5	8.9	118
9181	Male	20.5	17.2	9.0	115
10819	Male	22.3	16.4	8.0	120
10820	Male	21.3	15.1	7.8	114
10824	Male	21.9	16.3	8.5	121
Mean		*22.0*	*16.3*	*8.7*	*117*
10869	Male SY	20.3	14.3	8.1	111
10871	Male SY	22.9	16.4	8.4	110
10872	Male SY	20.3	15.4	8.4	110
10873	Male SY	20.3	15.8	8.5	109
10874	Male SY	21.9	15.6	9.0	109
Mean		*21.1*	*15.5*	*8.5*	*110*
10870	Female	16.4	13.2	7.7	91
10875	Female	17.0	13.1	7.7	96
10882	Female	16.0	12.6	7.5	91
14203	Female	16.9	13.3	7.4	93
Mean		*16.6*	*13.1*	*7.6*	*92.8*

***Molothrus aeneus aeneus* (Wagler, 1829)**
Bronzed Cowbird

Specimens examined (13).—Male: WFB 5954, 5955, 5956, 56468, 6469, 8615, 9059, 10827, 10880, USNM 646279; female: WFB 5957, 10883, 10884.

Remarks.—Common breeding resident in most habitats.

Diagnosis.—Assigned to nominate subspecies based on long wing chord (exceeding 116 mm), and female underparts uniformly dark sooty. All males collected had enlarged gonads and large cloacal protuberances. USNM 646396 was a female with two collapsed follicles indicating egg laying, and three large follicles with developed yolks. The other two females examined also had well developed ova, largest follicles between 10 and 12 mm.

***Molothrus ater ater* (Boddaert, 1783)**
Brown-headed Cowbird

Specimens examined (2).—Male: WFB 10885; female: WFB 8514.

Remarks.—Uncommon during spring survey periods. Both specimens were not reproductive. Brown-

headed Cowbird males were heard and observed in courtship chases of females along the resaca in early May 2008 and 2011.

Diagnosis.—Subspecies determination based on characters detailed by Pyle (1997). These specimens were assigned to nominate *M. a. ater* based on large bill of male (nares to tip 12.2 mm, depth of bill at nares 8.6 mm). The culmen was curved in both sexes. Historic accounts detail two subspecies occurring in the Lower Rio Grande, *M. a. ater* as a wintering and migratory form, departing the valley in May and the breeding subspecies *M. a. obscurus* being common particularly around the forts of the day (Friedmann 1925; Griscom and Crosby 1925–1926). The Texas Breeding Bird Atlas confirmed Brown-headed Cowbirds nesting in Cameron County (Benson and Arnold 2001). Also supporting these specimens as representing migratory *M. a. ater* was that both birds were non-reproductive. This was counter to all other icterids collected on the resaca that were in a heightened reproductive state.

***Quiscalus mexicanus prosopidicola* (Lowery, 1938)**
Great-tailed Grackle

Specimens examined (12).—Male: WFB 5881, 7341, 8630, 8631, 8633, USNM 646165; female: WFB 5848, 8601, 8632, 9733, USNM 646166, 646271.

Remarks.—Abundant resident and breeding species in subtropical thorn forest, gardens, orchards, and crop lands. Reported historically as abundant in the region (Friedmann 1925). Fat loads in males were primarily moderate, females primarily trace. All birds collected were reproductively active. All males collected late April–early May had enlarged testes and swollen cloacal protuberance. All females had developed brood patches, enlarged oviducts, and developed ova.

Family Parulidae
***Seiurus aurocapilla aurocapilla* (Linnaeus, 1766)**
Ovenbird

Specimens examined (3).—Male: WFB 11185, 11186; female: WFB 11184.

Remarks.—Common spring migrant on forest floor of subtropical thorn forest and gardens. Birds had moderate to heavy fat loads and were nonreproductive. All were captured in mist nets.

Diagnosis.—Assigned to nominate based on specimen comparisons; uniformly green-olive on upperparts with contrasting, buffy auricular.

***Parkesia noveboracensis* (Gmelin, 1789)**
Northern Waterthrush

Specimens examined (5).—Male: WFB 6633, 6636, 6637, 8591, 11188.

Remarks.—Common spring migrant in subtropical thorn forest and gardens. Most birds encountered had moderate to heavy fat loads and were non-reproductive. Several were netted and released.

***Mniotilta varia* (Linnaeus, 1766)**
Black-and-white Warbler

Specimens examined (3).—Male: WFB 11189; female: WFB 8588, 11190.

Remarks.—Fairly common spring migrant in subtropical thorn forest and gardens.

***Leiothlypis peregrina* (Wilson, 1811)**
Tennessee Warbler

Specimens examined (7).—Male: WFB 8583, 10818, 11194; female: WFB 11191, 11192, 11193, 11195.

Remarks.—Common spring migrant in various habitats. Birds were in definitive alternate plumage. Most birds had moderate to heavy fat loads and were non-reproductive. Several were netted and released.

***Leiothlypis ruficapilla ruficapilla* (Wilson, 1811)**
Nashville Warbler

Specimens examined (1).—Female: WFB 8576.

Remarks.—This was the only individual encountered. It was netted on 27 April 2008 in subtropical thorn forest. It had trace fat and a granular, non-reproductive ovary.

Diagnosis.—Assigned to nominate form based on drab green back, short tail.

***Geothlypis formosa* (Wilson, 1811)**
Kentucky Warbler

Specimens examined (4).—Male: WFB 8574, 11196; female: WFB 11197, 11198.

Remarks.—Uncommon spring migrant typically on subtropical thorn forest floor with shade understory. WFB 11198 collected on 5 May 2011 was a bright female with black on face reduced but approaching male in intensity. WFB 11197, also collected on 5 May 2011, was a second-year bird with subdued black on face.

***Geothlypis trichas trichas* (Linnaeus, 1766)**
Common Yellowthroat

Specimens examined (2).—Male: WFB 6484, 8587.

Remarks.—This subspecies is a common migrant in the area in thickets and aquatic vegetation lining the resaca. Both males were non-reproductive with small testes and no cloacal protuberance. Several yellowthroats were netted but not collected, permit restricted, due to possibility of occurrence of Brownsville Common Yellowthroat, *G. t. insperata*. One male (WFB 6484) was found dead on road on 29 April 2005; second male (WFB 6484) was a window strike, 4 May 2008. Despite surveys, no yellowthroats were heard singing on territory along the resaca, but there was suitable habitat to support breeding pairs of Rio Grande Yellowthroat. Breeding pairs of Rio Grande Yellowthroat are recorded along the river east and west of Resaca de las Antonias in Cameron and Hidalgo counties (Brush and Conway 2016). It is conceivable that they may breed along this resaca. Nominate subspecies was historically collected and reported as the common subspecies wintering along the Lower Rio Grande (Griscom and Crosby 1925–26).

***Setophaga ruticilla* (Linnaeus, 1758)**
American Redstart

Specimens examined (1).—Male: WFB 11199.

Remarks.—Uncommon migrant in resaca subtropical thorn forest, gardens and orchards. Male collected on 4 May 2011 was in definitive alternate plumage. It had trace fat and was non-reproductive.

***Setophaga magnolia* (Wilson, 1811)**
Magnolia Warbler

Specimens examined (3).—Male: WFB 11200, 11202; female: WFB 1120.

Remarks.—Common spring migrant in subtropical thorn forest, gardens and orchards. Birds captured had moderate to heavy fat loads and were non-reproductive. They were more often seen in the canopy and subcanopy. Birds were in definitive alternate plumage.

***Setophaga castanea* (Wilson, 1810)**
Bay-breasted Warbler

Specimens examined (3).—Male: WFB 6486, 11203; female: WFB 11204.

Remarks.—Uncommon spring migrant in resaca subtropical thorn forest and gardens. Generally high in canopy. Birds had moderate to heavy fat loads and were non-reproductive. Collected birds were in definitive alternate plumage.

***Setophaga fusca* (Müller, 1776)**
Blackburnian Warbler

Specimens examined (3).—Male WFB 6485, 11205, 11206.

Remarks.—Common spring migrant in resaca subtropical thorn forest and gardens. Birds were in definitive alternate plumage. They had moderate to heavy fat loads and were non-reproductive. This species frequented the forest canopy.

***Setophaga petechia aestiva* (Gmelin, 1789)**
Yellow Warbler

Specimens examined (4).—Male: WFB 8578, 11208, 11211, 11212.

Remarks.—Common spring migrant in subtropical thorn forest, gardens and orchards.

Diagnosis.—Brightest subspecies of "Northern" complex. All four specimens well marked with bright yellow crown, reddish wash to crown variable on specimens, and bright yellow-orange underparts with large, heavy red streaking. Identified historically as common spring migrant through Lower Rio Grande (listed as *Dendroica aestiva aestiva* or *D. a. flava* (Griscom and Crosby 1925–26; Oberholser1974) (Fig. 5).

***Setophaga petechia amnicola* Batchelder, 1918**
Yellow Warbler

Specimens examined (3).—Male: 11207, 11209; female: WFB 11210.

Remarks.—Common spring migrant in subtropical thorn forest, gardens and orchards.

Diagnosis.—When compared to *S. p. aestiva*, darker green above, with crown green to bill with slight yellow wash. Underparts lemon yellow (duller than *aestiva*) with finer, less dense red streaks on breast and flanks (Fig. 5). Bill appears shorter in hand when compared to *aestiva*. Female determined based on wing panel darker green, less yellow than *aestiva* on wing and underparts. Another specimen that could not be assigned to subspecies, WFB 8577, was a second-year bird retaining first fall plumage traits.

***Setophaga pensylvanica* (Linnaeus, 1766)**
Chestnut-sided Warbler

Specimens examined (6).—Male: WFB 6494, 8579, 8580, 8581, 11213, 11214.

Remarks.—Common migrant in subtropical thorn forest, gardens and orchards. Specimen WFB 11214 collected on 4 May 2011 was an aberrant specimen (Fig. 6). Its dark cheeks are inconsistent with Chestnut-sided Warbler in any plumage. Images of the specimen were sent to several ornithologists and all agreed that it lacked any real evidence of being a hybrid and is an aberrant individual. Kimball Garrett (LACM, pers

Figure 5. *Setophaga petechia* showing dorsal and ventral differences separating two subspecies collected at Resaca de las Antonias; brighter *S. p. aestiva* (left two) versus duller *S. p. amnicola* (right two). Note intensity of red and yellower head with reddish wash on *aestivia*, compared to more uniform greenish wash to head and back and fine red streaks on lemon yellow underparts of *amnicola*.

Figure 6. Aberrant Chestnut-sided Warbler (top; WFB 11214) collected 4 May 2011along Resaca de las Antonias compared to typical male (bottom). Note the black auricular and face of the aberrant bird.

comm.) suggested, "the blackish cheeks are simply an expression of hypermelanism in those feather tracts". Most birds had moderate to heavy fat loads and were non-reproductive. Several were netted and released.

***Setophaga virens virens* (Gmelin, 1789)**
Black-throated Green Warbler

Specimens examined (1).—Male: WFB 8582.

Remarks.—Rare spring migrant along the resaca in subtropical thorn forest and gardens. The specimen was collected on 28 April 2008, was in definitive alternate plumage, and had moderate fat load.

Family Cardinalidae
***Piranga rubra rubra* (Linnaeus, 1758)**
Summer Tanager

Specimens examined (7).—Male: WFB 6631, 11161; female: WFB 6626, 11160, 11162, 11163, 11164.

Remarks.—Common spring migrant in subtropical thorn forest, gardens and orchards; no evidence of breeding based on reproductive status of birds collected. Nesting was not documented along the resaca. The Texas Breeding Bird Atlas (Benson and Arnold 2001) also failed to confirm nesting in the area; although indicated that a few pairs lingered along the Lower Rio Grande. Lockwood and Freeman (2016) show Summer Tanager as breeding north of the valley. Griscom and Crosby (1925–26) listed the species as a common summer resident. Interestingly, most examined specimens from the Lower Rio Grande were collected from spring and fall, with some winter specimens. One egg set is reported to be from Brownsville, collected 1 May 1910 (no collector) (FMNH 20101). Other papers summarizing breeding birds along the Lower Rio Grande fail to mention the species (Dresser 1865–66; Merrill 1878; Person 1921; DeLaubenfels 1924; Friedmann 1924; Van Tyne 1933). Oberholser (1974) reported Summer Tanager as a rare nesting species in the Lower Valley, and there are only a few nesting records reported in modern era (Brush 2008). In recent decades, Summer

Tanagers have summered on the northern fringes of the Lower Rio Grande Valley, where live oaks occur in sandy soil (Brush 2005). On occasion, wandering, singing males are reported in the Valley during breeding season but are generally absent during that period (T. Brush, unpubl. data).

Diagnosis.—All specimens are of nominate *P. r. rubra*. The female specimens exhibited a great deal of variation in intensity of red in plumage, some having completed their pre-alternate molt south of Texas (Fig. 7).

***Piranga olivacea* (Gmelin, 1811)**
Scarlet Tanager

Specimens examined (3).—Male: WFB 8605, 11165, 11166.

Remarks.—Uncommon spring migrant in subtropical thorn forest, gardens and orchards. There are fewer than 10 specimens of Scarlet Tanager from Cameron County. Interestingly, three specimens collected by H. H. Kimball in 1934 were reported from Los Fresnos. Scarlet Tanager is uncommon away from the coast (Lockwood and Freeman 2016). These birds had moderate to heavy fat loads and two were non-reproductive. However ,WFB11166 had enlarged flesh colored testes (10x10 mm) indicating it was becoming reproductive.

***Cardinalis cardinalis magnirostris* Bangs, 1903**
Northern Cardinal

Specimens examined (7).—Male: WFB 5874, 6646, 11167, USNM 646475; female: WFB 8608, 11168, USNM 646177.

Figure 7. Variation of red in plumage of female Summer Tanagers collected at Resaca de las Antonias.

Remarks.—Common resident and breeding species in subtropical thorn forest, gardens and orchards. Males and females collected were all in reproductive condition, males with enlarged testes and cloaca and females with developed follicles and brood patches. No fledglings observed. Fat loads were trace in all birds.

Diagnosis.—The subspecific characters of Northern Cardinal along the Rio Grande have proven to be confounding among previous authors, and there remains confusion as to the subspecies found in Cameron County (Oberholser 1974; Pyle 1997; Parkes 1997; Halkin and Linville 1999). Exposed culmen measurements for *C. c. magnirostris* and *C. c. canicaudus* were reported to overlap (Oberholser 1974) or to be distinctive above 18 mm (Pyle 1997). Using traits defined by Pyle (1997), these specimens best fit *C. c. magnirostris* (Table 11). Earlier treatments listed birds collected from Cameron County as belonging to *C. c. canicaudus* (Crosby and Griscomb 1926; Oberholser 1974; Parkes 1997). Only Halkin and Linville (1999) listed those of southeast Texas as belonging to *magnirostris*. Both subspecies are deep red in coloration on the underparts and have varying degrees of gray edging to mantle (a subjective trait due to wear), differing from nominate form. Parkes (1997) contended that *canicaudus* from southeast Texas differ from those of western Rio Grande populations but did not elaborate as to which features were defining. For Northern Cardinal, more work is needed to examine the broader cline of traits north and south along the gulf coast as well as east and west along the Rio Grande.

***Pheuticus ludovicianus* (Linnaeus, 1766)**
Rose-breasted Grosbeak

Specimens examined (1).—Male: WFB 11170.

Remarks.—Uncommon spring migrant in subtropical thorn forest, gardens and orchards. Bird was an adult male in definitive alternate plumage. It had a moderate fat load and was non-reproductive.

***Passerina cyanea* (Linnaeus, 1766)**
Indigo Bunting

Specimens examined (8).—Male: WFB 6622, 8586, 11177, 11178; female: WFB 6089, 6632, 11171, 11172.

Remarks.—Common spring migrant in most habitats, sometimes in large flocks. Females varied in intensity of blue on throat and breast. Most birds had moderate to heavy fat loads and were non-reproductive. Several others were netted and released.

***Passerina ciris* (Linnaeus, 1758)**
Painted Bunting

Specimens examined (3).—Male: WFB 8585; female: WFB 8584, 11179.

Remarks.—Most often encountered in grassy scrub and forest edge. Breeding was not confirmed on the resaca, but the species is reported to breed in Cameron County (Oberholder 1974) and as a probable breeder by the Texas Breeding Bird Atlas (Benson and Arnold 2001). These collected birds were migrants as they were non-reproductive and had moderate fat loads. Specimens in collections are from spring and fall migration period, none from breeding months (June–July). One egg set from "Brownsville" collected on 7 June 1891, no other details (FMNH 1420). No other nesting records.

Table 11. Measurements of *Cardinalis cardinalis magnirostris* collected on Resaca de las Antonias.

Museum #	Crest length	Culm exposed	Culmen-nares
WFB 6646	27mm	18.0	13.6
WFB 5874	29mm	18.2	13.1
WFB 11167	27mm	20.0	14.7
USNM 646475	32mm	17.2	13.9

SIGNIFICANT OBSERVATIONS WHERE NO SPECIMEN WAS SECURED

***Cairina moschata* (Linnaeus, 1758)**
Muscovy Duck

Observed at feeders and nest boxes on property along the resaca. Photographed on 28 April 2008 (Appendix I). Observed in 2005 and 2008. Three birds observed and photographed on 25 March 2007 (M. DeAngelo, pers. comm.). Not observed during 2011 survey. The provenance of these birds is probably in doubt, but two of the birds did exhibit plumage and facial characteristics of wild birds. The only known population to have spread naturally into the Lower Rio Grande Valley is from Starr County (Brush 2005). Feral birds are observed regularly in Cameron County at Fort Brown Resaca and University of Texas, Lower Rio Grande Valley campus.

***Anas fulvigula* Ridgway, 1874**
Mottled Duck

A pair was observed on several dates on a restored oxbow in May of 2008 and May of 2009 (Appendix I). No other birds observed. Based on behavior and male guarding, it was likely this species attempted to nest on the small oxbow. There are nesting records for Cameron County (Benson and Arnold 2001).

***Patagioenas flavirostris* (Wagler 1831)**
Red-billed Pigeon

Two birds observed and one photographed on 2 May 2008 flying overhead. Large pigeons with long tail and dark overall coloration, barrel chested look. Seen against bright sky (photo, Appendix I).

***Coccyzus erythropthalmus* (Wilson, 1811)**
Black-billed Cuckoo

One bird observed on 1 May 2008, by AEJr and IEE. This species is rare in passage in the Lower Rio Grande Valley and this inland record might be of interest, regionally. The cuckoo was observed in the garden of one residence on the resaca. H. H. Kimball collected one male reportedly from Los Fresnos on 1 May 1931 (UMMZ 163980).

***Psittacara holochlorus* (Sclater, 1859)**
Green Parakeet

AEJr observed a flock of six birds flying down the resaca on 28 April 2008. According to one landowner, these parrots have become more frequent along the resaca since about 2005.

***Micrathene whitneyi* (J. G. Cooper, 1861)**
Elf Owl

One pair nested in a woodpecker hole, in telephone pole, at the Inn at Chachalaca Bend (AEJr and IEE), 28–30 April 2005. The authors were not permitted to collect this species. The pair was audible in early evenings, but retiring otherwise. None were observed or heard in 2008 and 2011. This species breeds in urban areas of Cameron County (Brush 2005).

***Megaceryle torquata* (Linnaeus, 1766)**
Ringed Kingfisher

A resident along the resaca. One pair was present during each survey period. No evidence of nesting was found, but the presence of the pair indicates that they may breed along the resaca. The pair was particularly wary not allowing close approach.

***Chloroceryle americana* (Gmelin, 1788)**
Green Kingfisher

A resident on the resaca, and breeds; nest area showed to authors by landowner in 2005. They were observed each year during surveys. Although permitted, the landowner requested that no specimens of the Green Kingfisher be collected from the resaca. One male was netted and photographed on 29 April 2005 (Appendix I); the bird was released.

***Turdus assimilis* Cabanis, 1850**
White-throated Thrush

One observed on 25 April 2005. The bird had been present all spring at the Inn at Chachalaca Bend (J. Breedlove, pers. comm.). The thrush visited a water

source set up for birds on the property and frequented the gardens.

***Icterus gularis* (Wagler, 1829)**
Altamira Oriole

Observed daily from 27 April to 1 May 2005 (male sang and foraged in a fruiting tree). The species was not recorded in 2008 or 2011. The resaca has a limited number of emergent trees that can support this large oriole and coupled with the large number of Bronzed Cowbirds may preclude this species' ability to sustain a population along the resaca.

ACKNOWLEDGMENTS

This project would not have been possible without the guidance, support, and friendship of Jesse Breedlove. We spent many nights at the Inn at Chachalaca Bend (then owned by the Breedlove Family) pondering our efforts in Texas. His support helped us realize the surveys along the resaca, which launched the re-survey effort along the Texas border with Mexico for both museums. We also thank landowners Cleve and Rosemary Breedlove for their continued support of our research efforts. They made our stay in the area feel like home. Special thanks also to Leslie (Les) Nonmacher, who passed away on 16 October 2010, and Alter Holland for access to their properties. We missed our afternoon socials and Big Reds and tall tells with Les after he passed. We thank Anne M. Engilis and Alan T. Hitch for their assistance in the field and MWFB students Mary K. Chambers, Angela C. Husing, and Jesse M. Gomez for specimen preparation. We thank collections manager Chris Milensky (Bird Division) for access and use of the Smithsonian National Museum of Natural History ornithological collections for determinations and historical connections. Also, we thank Christina A. Gebhard from the USNM for additional specimen preparation and assistance in the collections. Rachel Alsheikh curated the MWFB specimens and help gather metrics data from specimens. Janet Hinshaw (UMMZ) and Stanley D. Castro (emeritus professor, University of Mary Hardin-Baylor) provided helpful background on H. H. Kimball's specimens. Peter Pyle and Kimball Garrett provided helpful comments on specimens. Our thanks to the permitting branch of the Texas Parks and Wildlife for unwavering support of this project. Funding was obtained from private grants to the Museum of Wildlife and Fish Biology and the Wetmore Endowment at the Smithsonian NMNH. Lastly, our thanks to support staff and museum interns of the Department of Wildlife, Fish, and Conservation Biology. We thank two anonymous reviewers for helpful comments to improve this manuscript.

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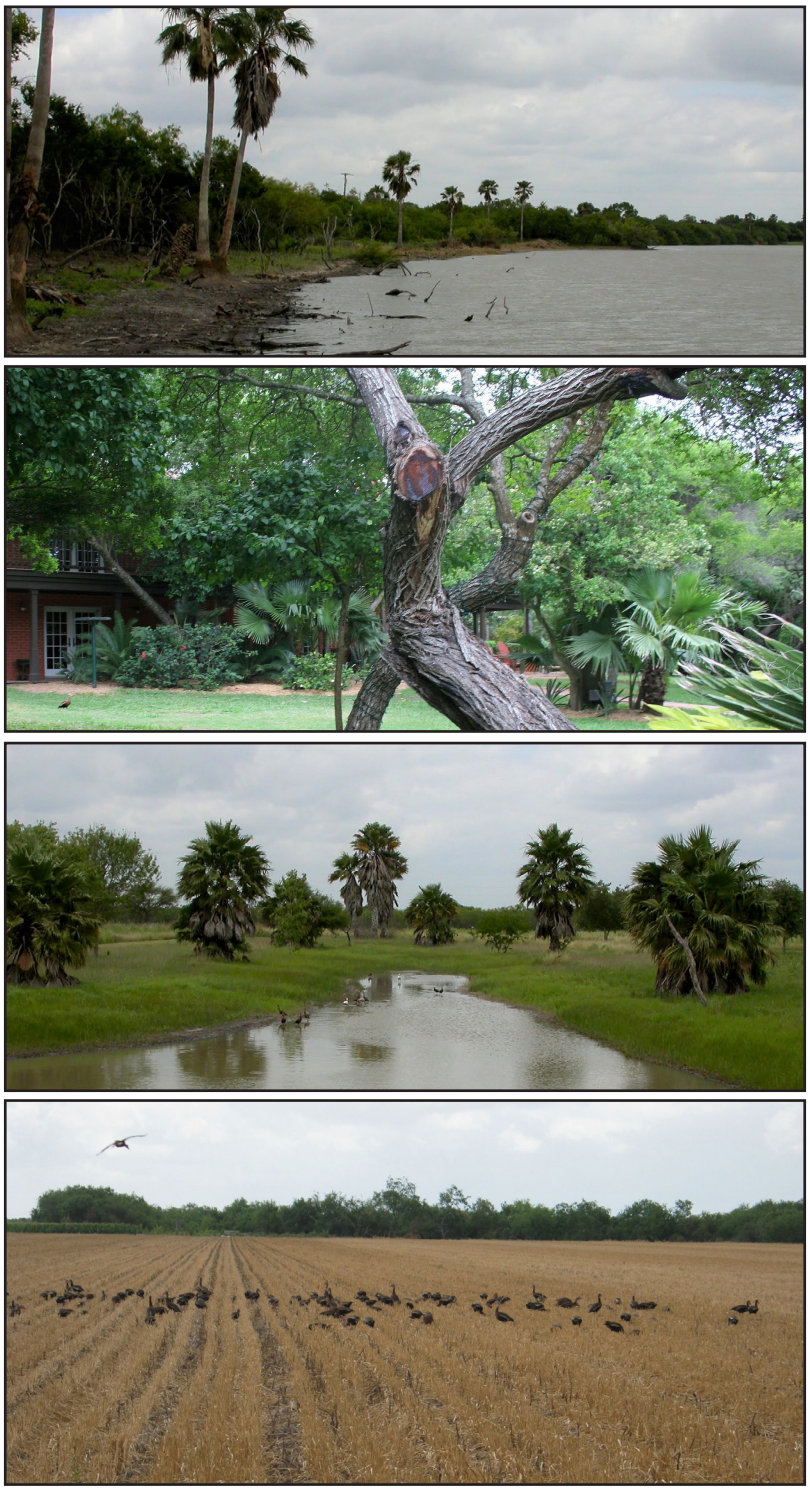
APPENDIX I

Photographs of habitats, participants, and additional species.



Habitats of Resaca de las Antonias. From top to bottom: Resaca forest and edge (2005); gradens (2008), restored oxbow and savanna (2008), and agricultural fields (2011).

Primary participants. Top row, left to right: Andrew Engilis, Jr., (2008), Irene (Torres) Engilis (2008), Brian K. Schmidt (2011; Middle row: John A. Trochet (2008), landowner C. Jesse Breedlove (2011), landowner Leslie L. Nonmacher and Anne M. Engilis (2005)




Top left, Buff-bellied Humminbird. Top right, Mottled Duck. Bottom left, Muscovy Duck. Bottom right, Plain Chachalaca.

Top left, Green Kingfisher. Top right, Long-billed Thrasher. Bottom left, White-tipped Dove. Bottom right, Red-billed pigeon.

APPENDIX II

Complete list of species documented along Resaca de las Antonias, 2004–2011. Species in bold were collected during our efforts.

Species		Confirmed Breeding	2004	2005	2008	2011
ANATIDAE: SWANS, GEESE, AND DUCKS						
Black-bellied Whistling-Duck	***Dendrocygna autumnalis***	**X**	**X**	**X**	**X**	**X**
Fulvous Whistling-Duck	*Dendrocygna bicolor*		X			
Muscovy Duck	*Cairina moschata*	X		X	X	
Blue-winged Teal	*Spatula discors*		X	X	X	X
Mottled Duck	*Anas fulvigula*			X	X	X
CRACIDAE: GUANS						
Plain Chachalaca	***Ortalis vetula***	**X**	**X**	**X**	**X**	**X**
ORDER ODONTOPHORIDAE: QUAIL						
Northern Bobwhite	*Colinus virginianus*	X	X	X	X	X
PODICIPEDIDAE: GREBES						
Least Grebe	***Tachybaptus dominicus***	**X**		**X**	**X**	
Pied-billed Grebe	*Podilymbus podiceps*		X	X	X	X
COLUMBIDAE: PIGEONS AND DOVES						
Rock Pigeon (I)	*Columba livia*		X	X	X	
Red-billed Pigeon	*Patagioenas flavirostris*				X	
Inca Dove	***Columbina inca***	**X**	**X**	**X**	**X**	**X**
Common Ground Dove	***Columbina passerina***	**X**	**X**	**X**	**X**	**X**
White-tipped Dove	***Leptotila verreauxi***	**X**	**X**	**X**	**X**	**X**
White-winged Dove	***Zenaida asiatica***	**X**	**X**	**X**	**X**	**X**
Mourning Dove	*Zenaida macroura*	X	X	X	X	X
CUCULIDAE: CUCKOOS AND ANIS						
Groove-billed Ani	***Crotophaga sulcirostris***	**X**	**X**	**X**	**X**	**X**
Yellow-billed Cuckoo	***Coccyzus americanus***		**X**	**X**	**X**	**X**
Black-billed Cuckoo	*Coccyzus erythrophthalmus*				X	
CAPRIMULGIDAE: GOATSUCKERS						
Lesser Nighthawk	*Chordeiles acutipennis*		X		X	
Common Nighthawk	***Chordeiles minor***			**X**	**X**	**X**
Common Pauraque	***Nyctidromus albicollis***	**X**	**X**	**X**	**X**	**X**

Species		Confirmed Breeding	2004	2005	2008	2011
Chuck-will's-widow	*Antrostomus carolinensis*		X	X	X	X
Whip-poor-will	*Antrostomus vociferus*			X	X	
APODIDAE: SWIFTS						
Chimney Swift	*Chaetura pelagica*		X	X		
TROCHILIDAE: HUMMINGBIRDS						
Ruby-throated Hummingbird	***Archilochus colubris***		**X**	**X**	**X**	**X**
Buff-bellied Hummingbird	***Amazilia yucatanensis***	**X**	**X**	**X**	**X**	**X**
RALLIDAE: RAILS, GALLINULES, AND COOTS						
Sora	*Porzana carolina*		X			
Common Gallinule	*Gallinula galeata*		X	X	X	
RECURVIROSTRIDAE: STILTS AND AVOCETS						
Black-necked Stilt	*Himantopus mexicanus*		X	X	X	X
CHARADRIIDAE: PLOVERS						
Black-bellied Plover	*Pluvialis squatarola*		X		X	
Killdeer	*Charadrius vociferus*		X	X		
Semipalmated Plover	*Charadrius semipalmatus*		X	X		
SCOLOPACIDAE: SHOREBIRDS AND ALLIES						
Stilt Sandpiper	***Calidris himantopus***			**X**	**X**	**X**
Dunlin	*Calidris alpina*			X	X	
Baird's Sandpiper	***Calidris bairdii***		**X**		**X**	
Least Sandpiper	***Calidris minutilla***		**X**	**X**	**X**	**X**
White-rumped Sandpiper	*Calidris fuscicollis*		X	X	X	
Semipalmated Sandpiper	***Calidris pusilla***		**X**	**X**	**X**	**X**
Short-billed Dowitcher	**Limnodromus griseus**		**X**	**X**		
Long-billed Dowitcher	*Limnodromus scolopaceus*		X		X	X
Wilson's Snipe	*Gallinago delicata*		X	X		
Solitary Sandpiper	***Tringa solitaria***		**X**	**X**	**X**	**X**
Lesser Yellowlegs	***Tringa flavipes***		**X**	**X**	**X**	**X**
Greater Yellowlegs	*Tringa melanoleuca*		X	X	X	X
LARIDAE: GULLS, TERNS AND SKIMMERS						
Laughing Gull	***Leucophaeus atricilla***		**X**	**X**	**X**	**X**
Gull-billed Tern	*Gelochelidon nilotica*		X		X	

Species		Confirmed Breeding	2004	2005	2008	2011
Caspian Tern	*Hydroprogne caspia*		X		X	
Black Tern	*Chlidonias niger*		X			X
Forster's Tern	*Sterna forsteri*		X		X	X
Black Skimmer	*Rynchops niger*			X	X	
PHALACROCORACIDAE: CORMORANTS						
Neotropic Cormorant	*Phalacrocorax brasilianus*		X	X	X	X
Double-crested Cormorant	*Phalacrocorax auritus*		X			
ANHINGIDAE: DARTERS						
Anhinga	*Anhinga anhinga*		X		X	
PELECANIDAE: PELICANS						
American White Pelican	*Pelecanus erythrorhynchos*			X		X
ARDEIDAE: BITTERNS AND HERONS						
Great Blue Heron	*Ardea herodias*		X	X	X	X
Great Egret	*Ardea alba*		X	X	X	X
Snowy Egret	*Egretta thula*		X	X	X	X
Little Blue Heron	*Egretta caerulea*		X	X	X	X
Tricolored Heron	*Egretta tricolor*		X	X	X	X
Green Heron	***Butorides virescens***	**X**	**X**	**X**	**X**	**X**
Black-crowned Night-Heron	*Nycticorax nycticorax*		X	X	X	X
Yellow-crowned Night-Heron	*Nyctanassa violacea*		X		X	
THRESKIORNITHIDAE: IBISES AND SPOONBILLS						
White Ibis	*Eudocimus albus*		X	X		X
Glossy Ibis	*Plegadis falcinellus*		X			
White-faced Ibis	*Plegadis chihi*		X			
Roseate Spoonbill	*Platalea ajaja*		X	X	X	X
CATHARTIDAE: AMERICAN VULTURES						
Black Vulture	*Coragyps atratus*		X	X	X	X
Turkey Vulture	*Cathartes aura*		X	X	X	X
PANDIONIDAE: OSPREY						
Osprey	*Pandion haliaetus*		X	X	X	X
ACCIPITRIDAE: KITES, HAWKS, EAGLES						
White-tailed Kite	*Elanus leucurus*		X	X		X

Species		Confirmed Breeding	2004	2005	2008	2011
Northern Harrier	*Circus hudsonius*			X	X	
Sharp-shinned Hawk	*Accipiter striatus*				X	X
Cooper's Hawk	*Accipiter cooperii*		X		X	X
Harris's Hawk	*Parabuteo unicinctus*			X		
White-tailed Hawk	*Geranoaetus albicaudatus*		X	X	X	X
Red-shouldered Hawk	*Buteo lineatus*		X		X	
Broad-winged Hawk	*Buteo platypterus*			X	X	X
Swainson's Hawk	*Buteo swainsoni*			X	X	
Red-tailed Hawk	*Buteo jamaicensis*		X		X	
TYTONIDAE: BARN OWLS						
Barn Owl	*Tyto alba*		X	X	X	X
STRIGIDAE: TYPICAL OWLS						
Eastern Screech-Owl	*Megascops asio*	X	X		X	
Ferruginous Pygmy-Owl	*Glaucidium brasilianum*				X	
Elf Owl	*Micrathene whitneyi*	X		X	X	
ACEDINIDAE: KINGFISHERS						
Ringed Kingfisher	*Megaceryle torquatus*		X	X	X	X
Belted Kingfisher	*Megaceryle alcyon*	X	X	X	X	X
Green Kingfisher	*Chloroceryle chloris*	X	X	X	X	X
PICIDAE: WOODPECKERS						
Golden-fronted Woodpecker	***Melanerpes aurifrons***	**X**	**X**	**X**	**X**	**X**
Ladder-backed Woodpecker	***Dryobates scalaris***	**X**	**X**	**X**	**X**	**X**
FALCONIDAE: CARACARAS AND FALCONS						
Crested Caracara	*Caracara cheriway*		X	X	X	X
American Kestrel	*Falco sparverius*				X	
Merlin	*Falco columbarius*		X	X		
PSITTACIFORMES: PARAKEETS AND PARROTS						
Green Parakeet	*Psittacara holochlorus*				X	
TYRANNIDAE: TYRANT FLYCATCHERS						
Great Crested Flycatcher	*Myiarchus crinitus*			X	X	
Brown-crested Flycatcher	***Myiarchus tyrannulus***	**X**	**X**	**X**	**X**	**X**
Great Kiskadee	***Pitangus sulphuratus***	**X**	**X**	**X**	**X**	**X**

Species		Confirmed Breeding	2004	2005	2008	2011
Tropical Kingbird	***Tyrannus melancholicus***					**X**
Couch's Kingbird	***Tyrannus couchii***	**X**	**X**	**X**	**X**	**X**
Eastern Kingbird	***Tyrannus tyrannus***		**X**	**X**	**X**	**X**
Scissor-tailed Flycatcher	*Tyrannus forficatus*		X	X	X	X
Eastern Wood-Pewee	***Contopus virens***		**X**	**X**	**X**	**X**
Yellow-bellied Flycatcher	*Empidonax flaviventris*		X		X	X
Acadian Flycatcher	***Empidonax virescens***				**X**	**X**
Alder Flycatcher	*Empidonax alnorum*				X	X
Willow Flycatcher	***Empidonax traillii***					**X**
Least Flycatcher	*Empidonax minimus*		X	X	X	X
Eastern Phoebe	*Sayornis phoebe*		X			
Vermilion Flycatcher	*Pyrocephalus rubinus*		X		X	
LANIIDAE: SHRIKES						
Loggerhead Shrike	*Lanius ludovicianus*		X		X	
VIREONIDAE: VIREOS						
White-eyed Vireo	***Vireo griseus***	**X**	**X**	**X**	**X**	**X**
Yellow-throated Vireo	*Vireo flavifrons*		X	X	X	X
Blue-headed Vireo	*Vireo solitarius*		X		X	X
Philadelphia Vireo	***Vireo philadelphicus***			**X**	**X**	**X**
Warbling Vireo	*Vireo gilvus*				X	X
Red-eyed Vireo	***Vireo olivaceus***		**X**	**X**	**X**	**X**
CORVIDAE: JAYS, MAGPIES, AND CROWS						
Green Jay	***Cyanocorax yncas***	**X**	**X**	**X**	**X**	**X**
ALAUDIDAE: LARKS						
Horned Lark	***Eremophila alpestris***	**X**			**X**	**X**
HIRUNDINIDAE: SWALLOWS						
Bank Swallow	*Riparia riparia*		X	X	X	X
Tree Swallow	*Tachycineta bicolor*		X	X	X	X
No. Rough-winged Swallow	***Stelgidopteryx serripennis***		**X**	**X**	**X**	**X**
Purple Martin	***Progne subis***	**X**	**X**	**X**	**X**	**X**
Barn Swallow	***Hirundo rustica***	**X**	**X**	**X**	**X**	**X**

Species		Confirmed Breeding	2004	2005	2008	2011
PARIDAE: TITMICE AND CHICKADEES						
Black-crested Titmouse	***Baeolophus atricristatus***	**X**	**X**	**X**	**X**	**X**
TROGLODYTIDAE: WRENS						
Carolina Wren	***Thryothorus ludovicianus***	**X**	**X**	**X**	**X**	**X**
POLIOPTILIDAE: GNATCATCHERS						
Blue-gray Gnatcatcher	*Polioptila caerulea*		X	X	X	X
TURDIDAE: SOLITAIRES & THRUSHES						
Veery	***Catharus fuscescens***		**X**		**X**	**X**
Gray-cheeked Thrush	***Catharus minimus***		**X**		**X**	**X**
Swainson's Thrush	***Catharus ustulatus***		**X**		**X**	**X**
Wood Thrush	***Hylocichla mustelina***		**X**	**X**	**X**	**X**
White-throated Thrush	*Turdus assimilis*				X	
MIMIDAE: MOCKINGBIRDS &THRASHERS						
Gray Catbird	***Dumetella carolinensis***		**X**	**X**	**X**	**X**
Brown Thrasher	***Toxostoma rufum***				**X**	
Long-billed Thrasher	***Toxostoma longirostre***	**X**	**X**	**X**	**X**	**X**
Northern Mockingbird	***Mimus polyglottos***	**X**	**X**	**X**	**X**	**X**
STURNIDAE: STARLINGS						
European Starling (I)	*Sturnus vulgaris*		X		X	
PASSERIDAE: OLD WORLD SPARROWS						
House Sparrow (I)	***Passer domesticus***	**X**	**X**	**X**	**X**	**X**
FRINGILLIDAE: FINCHES AND ALLIES						
American Goldfinch	*Spinus tristis*			X	X	
PASSERELLIDAE: NEW WORLD SPARROWS						
Olive Sparrow	***Arremonops rufivirgatus***	**X**	**X**	**X**	**X**	**X**
Lark Sparrow	***Chondestes grammacus***		**X**	**X**	**X**	**X**
Lark Bunting	*Calamospiza melanocorys*			X		
Chipping Sparrow	*Spizella passerina*				X	
Lincoln's Sparrow	*Melospiza lincolnii*		X			
ICTERIIDAE: YELLOW-BREASTED CHATS						
Yellow-breasted Chat	***Icteria virens***		**X**		**X**	**X**

Species		Confirmed Breeding	2004	2005	2008	2011
ICTERIDAE: BLACKBIRDS AND ORIOLES						
Eastern Meadowlark	***Sturnella magna***	**X**	**X**	**X**	**X**	**X**
Orchard Oriole	***Icterus spurius***		**X**	**X**	**X**	**X**
Hooded Oriole	***Icterus cucullatus***	**X**	**X**	**X**	**X**	**X**
Altamira Oriole	*Icterus gularis*	X		X	X	
Baltimore Oriole	***Icterus galbula***		**X**	**X**	**X**	**X**
Red-winged Blackbird	***Agelaius phoeniceus***	**X**	**X**	**X**	**X**	**X**
Bronzed Cowbird	***Molothrus aeneus***	**X**	**X**	**X**	**X**	**X**
Brown-headed Cowbird	***Molothrus ater***	**X**	**X**	**X**	**X**	**X**
Great-tailed Grackle	***Quiscalus mexicanus***	**X**	**X**	**X**	**X**	**X**
PARULIDAE: WOOD WARBLERS						
Ovenbird	***Seiurus aurocapilla***		**X**	**X**	**X**	**X**
Northern Waterthrush	***Parkesia noveboracensis***		**X**	**X**	**X**	**X**
Golden-winged Warbler	*Vermivora chrysoptera*				X	X
Black-and-white Warbler	***Mniotilta varia***		**X**	**X**	**X**	**X**
Prothonotary Warbler	*Protonotaria citrea*			X		
Tennessee Warbler	***Leiothlypis peregrina***		**X**	**X**	**X**	**X**
Nashville Warbler	***Leiothlypis ruficapilla***				**X**	
Kentucky Warbler	***Geothlypis formosa***				**X**	**X**
Common Yellowthroat	***Geothlypis trichas***		**X**	**X**	**X**	**X**
Hooded Warbler	*Setophaga citrina*		X	X	X	X
American Redstart	***Setophaga ruticilla***				**X**	**X**
Northern Parula	*Setophaga americana*		X	X	X	X
Magnolia Warbler	***Setophaga magnolia***		**X**	**X**	**X**	**X**
Bay-breasted Warbler	***Setophaga castanea***		**X**	**X**	**X**	**X**
Blackburnian Warbler	***Setophaga fusca***		**X**	**X**	**X**	**X**
Yellow Warbler	***Setophaga petechia***		**X**	**X**	**X**	**X**
Chestnut-sided Warbler	***Setophaga pensylvanica***		**X**	**X**	**X**	**X**
Yellow-rumped Warbler	*Setophaga coronata*				X	X
Black-throated Green Warbler	***Setophaga virens***		**X**		**X**	**X**
Canada Warbler	*Cardellina canadensis*			X		
Wilson's Warbler	*Cardellina pusilla*				X	

Species		Confirmed Breeding	2004	2005	2008	2011
CARDINALIDAE: CARDINALIDS						
Summer Tanager	***Piranga rubra***		**X**	**X**	**X**	**X**
Scarlet Tanager	***Piranga olivacea***			**X**	**X**	**X**
Northern Cardinal	***Cardinalis cardinalis***	**X**	**X**	**X**	**X**	**X**
Pyrrhuloxia	*Cardinalis sinuatus*			X		
Rose-breasted Grosbeak	***Pheucticus ludovicianus***		**X**	**X**	**X**	**X**
Blue Grosbeak	*Passerina caerulea*			X	X	X
Indigo Bunting	***Passerina cyanea***		**X**	**X**	**X**	**X**
Painted Bunting	***Passerina ciris***		**X**	**X**	**X**	**X**
Dickcissel	*Spiza americana*		X	X		
Total Species		42	137	131	157	126