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Cover photo Purple Sandpiper (*Calidris maritime*).
Photographer Fernando Cerra

BULLETIN OF THE

TEXAS ORNITHOLOGICAL SOCIETY

SPECIAL COASTAL BIRDS SECTION

2009 WINTER TEXAS GULF COAST AERIAL SHOREBIRD SURVEY

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ABSTRACT.—As part of a cooperative effort of southeastern states, we conducted an aerial survey from 9–17 February 2009 to determine major concentration areas for wintering shorebirds along the Texas Gulf Coast. Shorebirds were surveyed from a Partenavia P-68 based out of Victoria with two observers viewing on either side of the airplane while flying at an altitude of 30 m (100 ft.) and flight speed of 185 km/h (100 knots). Shorebirds were placed into size categories when counted because of difficulty of identifying birds to species under the conditions of the survey but were tallied to species where possible. All likely high shorebird concentrations within tidal zones were searched between the Sabine and Rio Grande rivers. Approximately one-third of the major tidal marsh areas were surveyed due to limitation of available air time. Only freshwater wetlands adjacent to tidal marshes were surveyed. Five airplane hours were used surveying Sabine Lake to High Island, 7 h Galveston and Matagorda Bays, 6 h San Antonio Bay and Matagorda and San Jose Islands, 3 h Nueces and Corpus Christi Bays, and Mustang Island, and 9 h Baffin Bay and Laguna Madre. Five thousand shorebirds were found between the Sabine River and High Island, 45,000 in the Galveston Bay complex with 16,000 at Bolivar Flats, 11,000 in marshes west of Texas City and 7,000 at the mouth of the Trinity River, 38,000 near Matagorda Bay with 11,000 at the mouth of the Colorado River, 46,000 on Matagorda and San Jose Islands and San Antonio Bay with 16,000 on Matagorda Island, 2,500 on Nueces and Corpus Christi Bays and Mustang Island, and 89,000 on the Laguna Madre system with 60,000 concentrated in the "9-mile Hole" and 11,000 along Baffin Bay on the Upper Laguna Madre and Baffin Bay. The Lower Laguna Madre had 95,000 with 68,000 using tidal areas between Port Mansfield and the Arroyo Colorado. The 330,000 shorebirds were comprised of 257,000 small size, 33,000 medium size, and 1,000 large size. There also were 14,000 American Avocets (*Recurvirosta americana*), 4,000 Willet (*Catoptrophorus semipalmatus*), and 1,200 Marbled Godwit (*Limosa fedoa*). Ground surveys conducted during the same time indicated the bulk of small shorebirds were Western Sandpiper (*Calidris mauri*) and Dunlin (*Calidris alpina*), and medium shorebirds comprised of mostly dowitchers (*Limnodromus* spp). Density and distribution of wintering shorebirds found during this survey assist conservation planners in focusing their efforts on habitat conservation.

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INTRODUCTION

Texas has 229,000 ha (566,570 acres) of estuarine emergent wetlands, 83,000 ha (205,972 acres) of unvegetated estuarine wetlands (wind tidal flats, beaches, etc.), 627,600 ha (1,550,073 acres) of subtidal wetlands and 600 km (372 miles) of beaches along the Gulf Coast (Moulton et al. 1997). This large amount of habitat has the potential to be highly significant for shorebirds. However, shorebirds as a group are one of the most highly threatened groups of declining species of birds in the United States (Brown et al. 2001), but they receive little research and monitoring attention within the Central Flyway of the United States. Incidental reports of shorebird winter numbers in Texas vary from modest numbers to substantial depending on location. Christmas Bird Counts provide some numbers on density and distribution during winter, but volunteer birders as a rule do not survey wetlands very well. The Texas Christmas Bird Counts reported 92,000 shorebirds along the Coast during 2005–06 (http://www.audubon.org/bird/cbc/). Ted Eubanks (pers. comm.) mobilized birders to survey shorebirds on the Texas Coast during January–February 2006, and birders reported about 50,000 birds from sites accessable by automobiles. Yet, Texas Parks and Wildlife Department (TPWD) staff observed almost 500,000 shorebirds by visiting seven sites between Matagorda Bay and upper Laguna Madre during the same period by airboat (Fig. 1). National conservation plans have been developed for American Oystercatcher (*Haematopus palliates*), Long-billed Curlew (*Numenius americanus*), Marbled Godwit (*Limosa fedoa*), Red Knot (*Calidris canutus*) and Western Sandpiper (*Calidris mauri*) with only crude estimates of densities in Texas (http://www.whsrn.org/conservation-plans). Texas has the potential to be a very significant site for wintering shorebirds but lacks survey efforts to document its coastal populations. This aerial survey was designed to locate significant winter concentrations of shorebirds along the Texas Gulf Coast bays during a period when there is maximum bay bottom exposure. Exposed bay bottoms will attract many shorebirds that might otherwise be foraging on nearby wetlands and agriculture fields.

METHODS

Shorebirds were surveyed from a Partenavia P-68 based out of Victoria with two observers viewing on either side of the airplane from 9–17 February 2009 while flying at an altitude of 30 m (100 ft) and flight speed of 185 km/h (100 knots). A total of 30 airplane hours were used to survey the Texas Coast (Table 1). Four hundred-km (253 miles) of the 600-km (372 miles) of Texas beaches were surveyed for shorebirds. The stretches of beach from

Figure 1. Large shorebird concentration on Laguna Madre, TX, during January 2006.

Figure 2. Chenier Plain segment. White polygon = areas surveyed. Yellow place-markers show general locations of highest concentrations and numbers counted.

Sabine River to High Island, and south of the Mansfield Cut were not surveyed because of air time logistics. Shorebirds were placed into size categories when counted because of difficulty of identifying birds to species under the conditions of the survey but were tallied to species where possible. All likely high shorebird concentration within tidal zones were searched between the Sabine and Rio Grande rivers. Approximately one-third of the major tidal marsh areas were surveyed due to limitation of available air time. Only freshwater wetlands adjacent to tidal marshes were surveyed (Figs. 2–8).

RESULTS

A strong weather system developed during the week scheduled for flight. Mudflats normally exposed during this time were under at least 0.3 m (1 ft) of water due to strong southerly winds and solar effects.

Five thousand shorebirds were found between the Sabine River and High Island, 45,000 in the Galveston Bay complex with 16,000 at Bolivar Flats, 11,000 in marshes west of Texas City and 7,000 at the mouth of the Trinity River (Table 2, Figs. 1–7). Thirty-eight thousand were found near Matagorda Bay with 11,000 at the mouth of the Colorado River. Forty-six thousand were counted on Matagorda and San Jose Islands and San Antonio Bay with 16,000 on Matagorda Island. The Nueces and Corpus Christi Bays and Mustang Island only had 2,500 during the survey. The Laguna Madre system had the vast majority of birds with 89,000 on the Upper Laguna Madre and Baffin Bay with 60,000 being concentrated in the 9-mile Hole and 11,000 along Baffin Bay. The Lower Laguna Madre had 95,000 with 68,000 using tidal areas between Port Mansfield and the Arroyo Colorado. The 330,000 shorebirds were comprised of 257,000 small size, 51,000 medium size, and 25,000 large size. We identified 14,000 American Avocets (*Recurvirosta americana*), 4,000 Willet (*Catoptrophorus semipalmatus*), and 1,200 Marbled Godwit within the large shorebird size group. Ground surveys conducted during the same time indicated the bulk of small shorebirds were Western Sandpiper and Dunlin (*Calidris alpina*), and the medium shorebirds comprised of mostly dowitchers (*Limnodromus* spp.).

DISCUSSION

Shorebird numbers during previous studies generally reported substantially fewer birds than

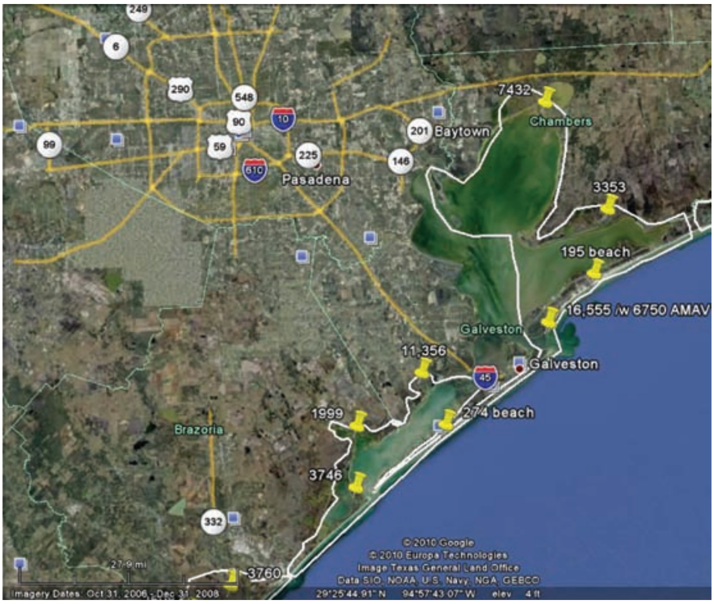

Figure 3. Galveston Bay segment. White polygon = areas surveyed. Yellow place-markers show general locations of highest concentrations and numbers counted. Beach refers to total on beach and AMAV = American Avocet.

during our survey. We suspect this was a result of the difficulty of surveying the entire coast and timing of surveys. Skagen et al. (1999) reported a general compilation of published and unpublished reports on density/location patterns of en route shorebirds migrants for 37 species. They reported <100,000 shorebirds on the Gulf Coast between 25–30° latitude north in Louisiana and Texas during February. The bulk of small sandpipers were in Galveston and Matagorda bay systems and Laguna Madre.

Rick Speer, Bill Howe and Jim Bredy (pers. comm.) conducted shorebird aerial surveys of major conservation lands along the Texas Coast from 19–21 April 1997, and 8–10 April 1998. They reported 42,000 shorebirds in 1997 and 96,000 in

Figure 4. Matagorda Bay segment. White polygon = areas surveyed. Yellow place-markers show general locations of highest concentrations and numbers counted. Beach refers to total on beach.

Figure 5. Matagorda Island segment. White polygon = areas surveyed. Yellow place-markers show general locations of highest concentrations and numbers counted. Beach refers to total on beach and MAGO = Marbled Godwit.

Figure 6. Coastal Bend segment. White polygon = areas surveyed. Yellow place-markers show general locations of highest concentrations and numbers counted. Beach refers to total on beach.

Figure 7. Upper Laguna Madre segment. White polygon = areas surveyed. Yellow place-markers show general locations of highest concentrations and numbers counted. Beach refers to total on beach, and yellow = Yellowlegs spp.

1998. Sites with >10% of birds in 1997 were Laguna Atascosa National Wildlife Refuge (NWR) 8,876, Matagorda Island NWR (4,977), San Bernard NWR (5,690), Brazoria NWR (7,949), and in 1998 Padre Island Laguna Side (12,226), Laguna Atascosa NWR (11,545), San Bernard NWR (10,083), Brazoria NWR (12,052), and Bolivar Flats (15,587).

Morrison et al. (1993) conducted an aerial survey of shorebirds along 6,800 km (4,225 miles) of the Gulf of Mexico and Caribbean coastlines of Mexico during January 1993. They reported 125,000 shorebirds with the vast majority (80,000) located in the Laguna Madre of Mexico with half of shorebirds being small.

Although this aerial survey showed fewer birds than the 500,000 reported by TPWD staff from airboats during February 2006, it was at least twice as large as all other formal surveys of the Texas Gulf Coast and demonstrates significant numbers of shorebirds during winter. The Texas Christmas Bird Counts conducted one month earlier only reported 87,000 shorebirds state-wide (http://www.audubon.org/bird/cbc/).

In general, we found it difficult to locate small flocks of shorebirds, shorebirds that did not flush, and shorebirds in vegetation. We did not observe many shorebirds in vegetated habitats from the air where previous experience on the ground would indicate shorebirds were common in this setting. This was problematic on northern sections of the coast because many tidal areas were vegetated. Shorebirds on bare, exposed mudflats were noticeable if they were in flocks large and if they

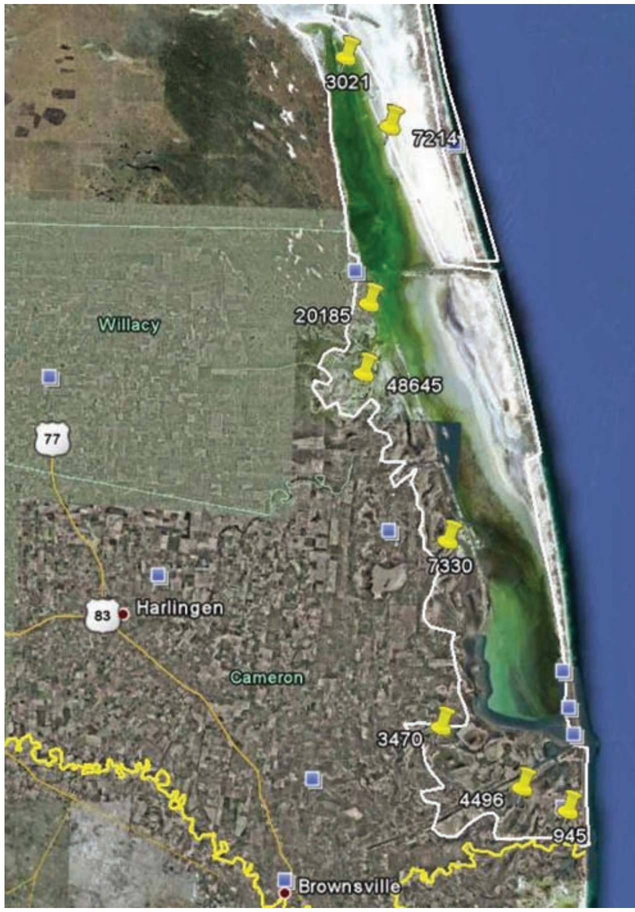

Fig. 8. Lower Laguna Madre segment. White polygon = areas surveyed. Yellow place-markers show general locations of highest concentrations and numbers counted.

flushed. We counted very few scattered shorebirds which were not flying. Even though many shorebirds were likely over-looked, we located major concentrations along the Texas Coast during the week of our survey.

Key Concentrations. About half of reported shorebirds occurred within the Laguna Madre wetland complex. The largest concentration was 68,000 birds on wind tidal flats and tidal sloughs bordering the western bank between Port Mansfield and Arroyo Colorado. We located 67,000 shorebirds on wind tidal flats on the lower end of Upper Laguna Madre. This is the same vicinity we reported 350,000 shorebirds from an airboat during

Table 1. Date, location, tide level, weather and aircraft time for Texas coastal shorebird survey, February 2009. (1 mph = 1.61 kph)

Date	Zone	Tide	Wind	Time
2/9	San Antonio Bay, Matagorda & San Jose Islands	high	25–35 mph S	6 h
2/10	Nueces & Corpus Christi Bays, & Mustang Island	high	35–45 mph S	3 h
2/11	Laguna Madre	all	15–25 mph N	9 h
2/12	Matagorda & Galveston Bays	all	15–25 mph S	7 h
2/17	High Island to Port Arthur	high	25–35 mph S	5 h

Table 2. Different size shorebirds and waterbirds counted by section of the Texas Gulf Coast 9-17 February 2009.

	Fig. 2	Fig. 3	Fig. 4	Fig. 5	Fig. 6	Fig. 7	Fig. 8	
Species	Chenier Plain	Galveston Bay	Matagorda Bay	Matagorda Island	Coastal Bend	Upper Laguna Madre	Lower Laguna Madre	TOTAL
SMALL	1,970	32,180	21,780	15,530	11,692	88,254	86,135	257,541
MEDIUM	1,269	1,691	10,209	9,461	2,882	4,878	2,645	33,035
Identified Medium								
Killdeer	238	56	51	8	13	0	2	368
Ruddy Turnstone	0	4	0	8	0	0	0	12
Red Knot	0	0	9	0	0	0	3	12
Dowitcher spp.	1,265	3,240	5,636	4,530	1,335	0	1,730	17,736
TOTAL MEDIUM	2,772	4,991	15,905	14,007	4,230	4,878	4,380	51,163
LARGE	24	100	705	140	52	148	149	1,318
Identified Large								
Black-bellied Plover	0	239	230	337	140	133	85	1,164
Am. Oystercatcher	0	10	38	20	25	2	0	95
Black-necked Stilt	30	0	40	0	30	18	30	148
Am. Avocet	0	7,356	1,146	1,060	400	700	3,480	14,142
Yellowlegs spp.	62	294	221	163	65	855	677	2,337
Willet	428	613	1,052	497	475	139	1,521	4,725
Long-billed Curlew	0	15	11	23	21	10	62	142
Marbled Godwit	0	160	41	420	275	5	305	1,206
TOTAL LARGE	544	8,777	3,446	2,640	1,458	2,008	6,309	25,182
GRAND TOTAL	5,286	45,948	41,131	32,177	17,380	95,140	96,824	333,886
Reddish Egret	0	6	18	35	101	166	504	830
Black Skimmer	0	600	555	1,240	290	475	125	3,285

2006. We located 18,000 shorebirds on wetlands associated with Baffin Bay. Many of these wetlands were exposed tidal mudflats and drying natural ponds bordering the bay.

We counted no shorebirds on many miles of shallow wind tidal flats with algal mats. We are concerned they may have contained significant concentrations but were not noticed because small shorebirds possibly were not flying at the time of the survey. Withers (1994) reported wind tidal flats covering about 15,800 ha (39,000 acres) of the coast have great potential for shorebirds. We don't know if shorebird use is characterized by high densities in small areas with massive areas with few shorebirds, or the aerial survey is not appropriate because these birds are cryptic with an algal mat background (which is fairly common on wind tidal flats) and are difficult to observe unless in flight.

The second most significant areas for shorebirds were river deltas. Most river deltas have mudflats which become exposed and useable by shorebirds during low tides. We did not notice a delta on the Sabine River largely because the mouth was framed by jetties. The Trinity River had expansive mudflats and we observed 7,000 shorebirds. The Colorado River delta was much smaller, but it contained more birds (11,000). The Lavaca River delta had 3,000 and the Guadalupe River delta had 10,000. The Nueces River delta had <1,000. This was surprising since there were expansive mudflats during the survey. However, it was the windiest day of the survey, and we had difficulty getting down low between major power lines while we were over this river system.

Other impressive shorebird concentrations were noted in tidal marshes on the north side of West

Galveston Bay. The marshes looked like they were breaking up from salt water intrusion and contained 11,000 shorebirds. Marshes of Matagorda Island and San Jose Islands were too large to survey entirely, so we flew transects covering about one-third of the habitat. We noted 8,000 on the backside of each of these islands.

Beaches. A total of 6,613 shorebirds were tallied, and most were Sanderling (*Calidris alba*) and Black-bellied Plover (*Pluvialis squatarola*) based on identification on the ground before and after the aerial survey and their appearances from the air.

The undisturbed beaches of Matagorda and San Jose Islands had the highest densities of beach birds, 45 and 32 per km (73 and 51 per mile), respectively. The third highest density was 24 per km (38 per mile) on the eastern Matagorda Peninsula which has light vehicle access, but the western Matagorda Peninsula, which has very limited vehicle access, only had 1 shorebird per km. Mustang Island, which had considerable public visitation during the survey, had 16 birds per km (25 per mile), while North Padre Island, which had considerably lighter human use, had 10 birds per km (16 per mile). Hurricane ravaged Galveston Island and Bolivar Peninsula along with its reconstruction activities had 6 and 5 birds per km (9 and 8 per mile), respectively. Disturbance probably had some effects on density, especially when looking at beaches under reconstruction, but it was not the only factor causing different densities.

Individuals Species. Long-billed Curlew is a species of high state and national conservation concern (Fellows and Jones 2009). Our survey method resulted in very poor counts of this species. We only identified 142 from the air in areas which should have had many birds. We typically found this species as scattered individuals along tidal shorelines when we conducted surveys from boats, but we did not observe many unless they were in flight.

The American Oystercatcher is a species of state and national conservation concern (Schulte et al. 2007). Brown et al. (2005) searching just for this species counted 315 in Texas during 2003 from an aerial survey in January during a period of very low tides.

We only observed 95 during a period of very high tides. We specifically looked for this species at all exposed oyster reefs near our flight path, but did not go out of our way to search isolated oyster reefs.

With the large difference in numbers, it is possible oystercatchers were concealed in the vegetation and did not fly during our survey making their detection very difficult.

The Red Knot has experienced major population declines during recent decades and is a species of state and national concern (Niles et al. 2007). We made specific efforts to search for this species on Texas beaches and suitable exposed mudflats in bays. We only identified 12 during the survey. As scattered individuals, this species would be difficult to identify from the air. Land surveys conducted near Padre and Mustang Islands during the same time did not detect Red Knots (D. Newstead pers. comm.).

The Marbled Godwit is a species of conservation concern in Texas and the Untied States (Melcher et al. 2006). We located 1,200 during the survey with the highest concentration (400) in tidal marshes of Matagorda Island. This large species was located because it tended to occur in dense flocks.

We also counted two waterbird species, Reddish Egret (*Egretta rufescens*) (http://www.tpwd.state.tx.us/huntwild/wild/species/reddishegret/) and Black Skimmer (*Rynchops niger*) (Gochfeld and Burger 1994) of state and national conservation concern. They were generally conspicuous so we tallied them as we surveyed for shorebirds.

Reddish Egrets were located in greatest concentrations along the southern part of the coast. We counted 830 and had difficulty separating white-phase phase Reddish Egrets from white egrets thus, we likely undercounted the white phase of this species.

Black Skimmers were typically located near tidal passes, and we observed 3,285 with one-third located near Matagorda Island. This number is very similar to estimates of adults tallied during nesting season surveys.

CONCLUSION

This survey was designed to locate shorebirds during a period of maximum bay bottom exposure. However, we conducted this survey during 4 days of strong southerly winds and 1 day of strong northerly winds associated with a major cold front (Table 1). Solunar influences negated lowering of tides during the cold front passage. TPWD staff and airplane commitments did not allow for a change in schedule. Despite very high tides, over 330,000 shorebirds were counted. The density and distribution of wintering shorebirds found during this survey contributes greatly to the knowledge of conservation planners to assist in focusing their efforts on habitat conservation.

ACKNOWLEDGMENT

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OBSERVATIONS OF SEASIDE SPARROW (*AMMODRAMUS MARITIMUS*) ON TEXAS GULF COAST

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ABSTRACT.—I summarize observations on postures and displays used by juvenile and adult Seaside Sparrows (*Ammodramus maritimus*). Some displays, like carrying material, were only known to be practiced by adults during territorial disputes. I collected photographic documentation showing juveniles carrying material (debris, stems and feathers) during aggressive encounters. I also collected data on juvenile Seaside Sparrows manipulating natural and artificial objects and agonistic encounters. I describe a behavior in which juveniles carry materials such as debris or feathers, one of which was 16 cm long. I describe food items consumed by Seaside Sparrows during late summer/fall.These included a large quantity of halophyte plant parts, leaves and fruits of *Suaeda linearis* and leaf tips of *Batis maritima*. Comfort movements are also described including the only documented record of Seaside Sparrow sunbathing. I present photographic material showing in detail how Seasides Sparrows collect uropygial gland secretion. Two leucistic individuals are described.

INTRODUCTION

The Seaside Sparrow (*Ammodramus maritimus*) is a North American emberizid that breeds in salt marshes on the Atlantic and Gulf coasts from southern Maine to southern Texas. Occurring in relatively small, localized populations, even within suitable habitats, it is not easily found. Because it spends a significant proportion of its time on the ground in dense vegetation, often in the shallow water, observations of Seaside Sparrows are difficult. Under optimal conditions, Seaside Sparrows may occur at high population densities, a reflection of the high productivity of salt marshes. Because this species is a good potential “indicator” of the continued ecological integrity of certain types of coastal marshes, its biology and ecology were intensively studied (Post and Greenlaw 1994). Many studies of the “animal mind” depend, at least partially, on access to a large number of observations opportunistically collected by researchers during studies unrelated to their main subject. It seems that, at least at this stage, even single reports of animal innovation, play, etc., can have important value to workers in this field and can be used for comparison in further studies.

STUDY AREA

During 2006–2009, I studied Seaside Sparrow biology, ecology and behavior along the Texas upper coast between Bolivar Peninsula and Freeport. Perhaps, the most valuable observations from 25 August through October 2007 were behaviors of juvenile and adult Seaside Sparrows in a breeding population in salt marshes along edges of Salt Lake in Brazoria County, Texas. I also collected data about Seaside Sparrow foraging methods and diet in dense vegetation and open patches of mudflats with tidal creeks near the canal running across the marsh and entering Salt Lake.

METHODS

I followed Post and Greenlaw (1975) descriptions and illustrations as a basis to identify observed displays and postures. My data are based on field notes and observations documented by photographs. I did not collect statistically valid data. The purpose of my data is material for comparison with further observations of this species.

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To document my observations, I used Canon cameras 20D and 40D usually with 500 mm lens coupled with 1.4X teleconverter.

Many of my analyses of observations were based on a collection of photographs taken during the last few years. Photographs illustrating many Seaside Sparrow behaviors can be found at <www.pbase.com/mbb/sesp>. This folder includes subfolders with extensive photo-material illustrating all behaviors described in this paper.

I started my observations on 25 August 2006, a few days after tropical storm Erin made landfall (19 August). High water and high tide forced Seaside Sparrows to move to higher ground. Large parts of marshes, normally available as feeding grounds, were flooded, and only small patches of mudflats were exposed above water level. These limited foraging areas forced Seaside Sparrows to congregate. Seaside Sparrows may form dense flocks in high vegetation during storm tides (Beaton 2003). Visits during September and October yielded more observations even though the water level was much lower. Seaside Sparrows congregated on mudflats on 1–2 September while feeding throughout the day. After 5 September only a few Seaside Sparrows were seen during early morning. None congregated in large numbers. Most foraged alone in dense vegetation, often moving between different feeding sites.

RESULTS

JUVENILE SEASIDE SPARROWS DISPLAYS

Wing raise, Bobbing, Head Forward Threat and Gaping.—I observed juvenile Seaside Sparrows using a combination of different postures during disputes on feeding grounds. During fast action movements Seaside Sparrows kept changing displays shown to the opponent. Most confrontations were very short and did not last more than 10–20 sec. In many situations it was not clear which juvenile was dominant as they often changed reactions and postures. In some cases an aggressive sparrow changed posture and left. I observed juveniles gaping (Fig. 1c and d) quite often near a potential adversary. Pecking at the opponent occurred only sporadically, usually as a single attempt. The head forward threat display (Fig. 1d and e) was used often. When presented by an adult toward a juvenile, it almost always ended with the juvenile quickly fleeing. The most aggressive confrontations, jab the opponent, occurred when the aggressor had its wing raised and gape. (Fig. 1a and b).

Raising forehead and crown feathers.—Seaside Sparrows occasionally raised their forehead and crown feathers during aggressive encounters (e.g., during the head forward threat – Fig. 1e) or in a semi-erected posture when checking surroundings.

Carrying-materials.—Juveniles used this display when confronting other individuals. Most commonly used materials were short pieces of dry or green stems (Fig. 2a), feathers (Fig. 2b and c), and other debris (e.g., fragments of dead crab). I measured the 3 largest feathers carried by juveniles (10.8, 12.5, and 16.0 cm). Juveniles reused these feathers (also on different days) and dropped them after the confrontation was over. The juvenile carrying material would not always stand up to an opponent. In a few cases, the bird dropped the object and retreated when another juvenile attacked. A seemingly dominant juvenile often kept the material for a longer time or remained near the object dropped on the ground. A displaying bird was also seen retrieving a dropped object. In a few cases, one juvenile chased another into the vegetation while carrying materials in its bill (Fig. 2c).

Wing-tail flicking.—I observed this display several times on the feeding ground, but most often when both adults and juveniles foraged on the ground, walking and gleaning food items from mud or vegetation. When birds were wing-tail flicking while foraging, they kept their head low (Fig. 3b), but held the neck and head erect when approaching another Seaside Sparrow (Fig. 3a).

Erect posture.—I observed Seaside Sparrows on the ground or on branches with their bodies fully erect seemingly checking the surrounding area or watching potential opponents from a distance (Fig. 4a and b). Juveniles often assumed erected postures after carrying material (Fig. 4c and d). In one case a Seaside Sparrow erected the body to the maximum by standing on the tips of raised digits (Fig. 4a).

Sham-preening and Sham feeding.—Juveniles occasionally engaged in sham-preening by nibbling on chest feathers, scratching the neck and head

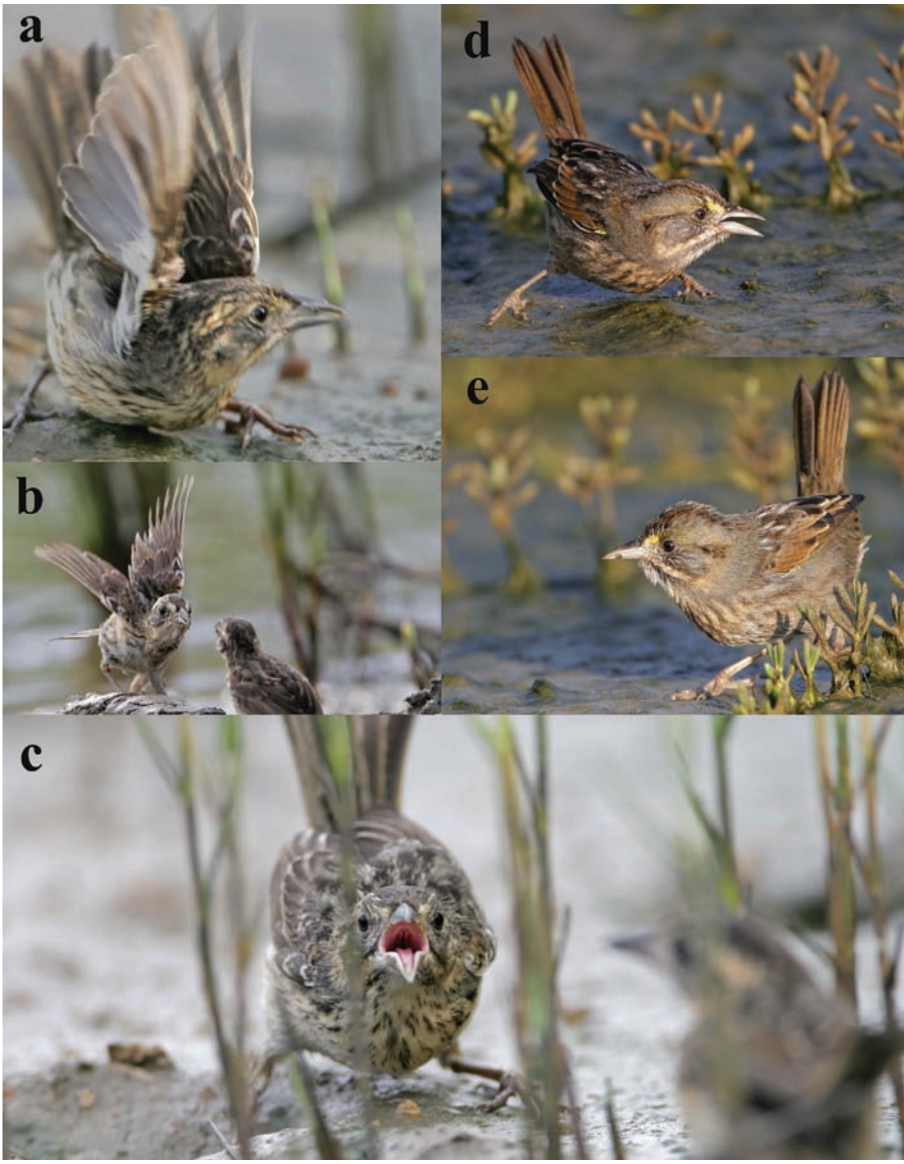

Figure 1. Composite photographs illustrating Seaside Sparrow aggressive postures and displays used during disputes on feeding grounds.

(Fig. 5a) or shaking the plumage during confrontation. These displays usually lasted <10 sec. During-sham preening or scratching Seaside Sparrows remained immobile; in most cases an attack was initiated by the watching bird. Sham-feeding (Fig. 5b) also occurred often and could last for up to 1 min ending when one Seaside Sparrow stopped feeding and chased another.

Bill wiping.—I did not observe this behavior during aggressive confrontations between juveniles. Seaside Sparrow beaks are often covered with mud, small pieces of plant material etc., which stick to the beak during mud probing and gleaning food from a wet surface or vegetation. From time to time, adults and juveniles wiped their beaks against grass stems or branches to clean them. During

Figure 2. Composite photographs illustrating juvenile Seaside Sparrow carrying material used in display during disputes on feeding grounds.

foraging the beak stayed covered with mud and other particles.

Wing trailing, Hunch down.—These two displays differed slightly from those described by Post and Greenlaw (1975). I observed juveniles and adults approaching opponents in postures similar to wing trailing with the wings extended slightly downward and tail at a downward angle but no spread of the remiges. When an opponent was still far away (a few meters or more), Seaside Sparrows assumed postures similar to Hunch down (the head pulled into the

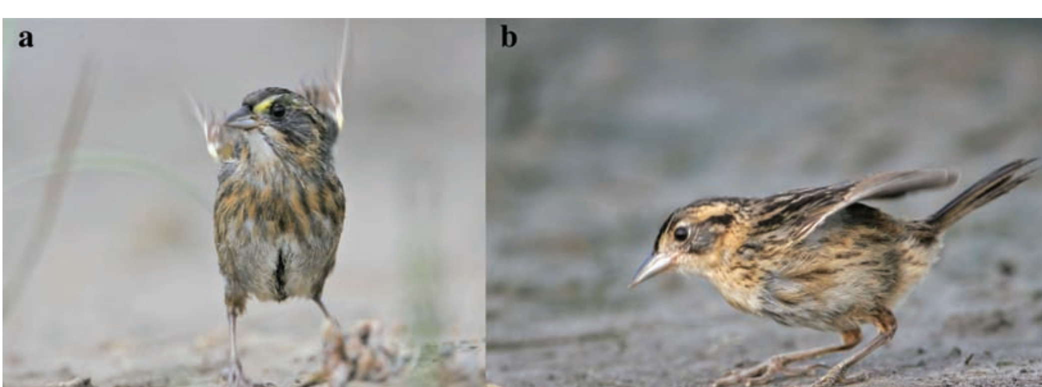

Figure 3. Composite photograph illustrating Seaside Sparrow wing and tail flicking display. (a) Adult approaching another Seaside Sparrow. (b) Juvenile during foraging.

Figure 4. Composite photographs illustrating juvenile Seaside Sparrows erect posture. (a) On the ground: observing the surrounding area and checking for a threat – note that foot could be raised above the ground by standing on digit tips. (b) On shrub branch. (c and d) During carrying material display.

body, body feathers ruffed), but they did not raise the tail and fled when the other bird walked or flew toward them.

Continuous chases.—Dominant Seaside Sparrows persisted in the chase after opponents took flight. The aggressor followed the flying opponent to a new location and continued to chase every time the opponent flew.

Physical fight between juveniles.—Breast-to-breast fights occurred several times. These fights occurred between birds perching on barbed wire; I did not observe this interaction on the ground. The attacking bird flew first and attempted to claw the opponent. The attacked bird either flew and escaped the attack or waited with beak pointed toward the attacker, often gaping. None of these fights lasted more than a few seconds.

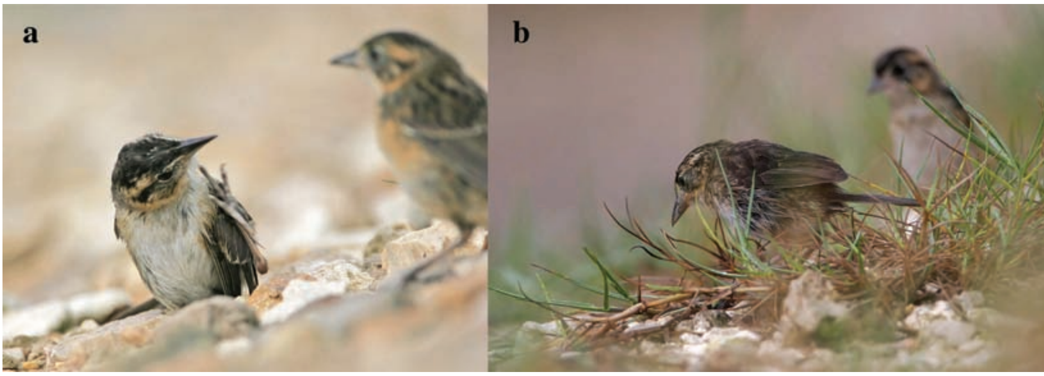

Figure 5. Composite photographs illustrating juvenile Seaside Sparrow sham scratching (a) and sham feeding (b) displays.

INTERACTIONS WITH OTHER SPECIES

I observed many interactions between Seaside Sparrows and other birds. I observed three reactions: fleeing, neutral and aggression. Fleeing was a quick dive and disappearance inside shrub or grassy vegetation upon an early sign of any raptor flying over (e.g., Northern Harrier *Circus cyaneus*, White-tailed Kite *Elanus leucurus* or a Boat-tailed Grackle *Quiscalus major* or Great-tailed Grackle *Quiscalus mexicanus* flying or landing nearby). Neutral was continuation of normal activities when large shorebirds (e.g., Willet *Catoptrophorus semipalmatus*, Snowy Egret *Egretta thula*, Great Egret *Ardea alba*, Tricolored Heron *Egretta tricolor*, White Ibis *Eudocimus albus* and Clapper Rail *Rallus Longirostris*) were feeding nearby or flying over. Aggression was adults and juveniles attacking and displacing Least Sandpipers (*Calidris minutilla*) that landed and tried to feed on mudflats. The Least Sandpipers never tried to confront attacking Seaside Sparrows. They ran a short distance with raised wings and took flight. Seaside Sparrows chased running sandpipers but never pursued the chase into the air. During winter when several Nelson's Sparrows (*Ammodramus nelsoni*) migrated into this area, I observed few conflicts with Seaside Sparrows. Sporadically the Seaside Sparrow pointed its beak toward the Nelson's Sparrow and gaped. This Seaside Sparrow posture was usually enough to cause the Nelson's Sparrow to take flight and move to another feeding place. Also, Seaside Sparrows chased away Marsh Wrens (*Cistothorus palustris*) and Sedge Wrens (*C. stellaris*).

SELF-MAINTENANCE

Drinking.—Seaside Sparrows drink both salt and fresh water (Poulson 1969). Only salt water was available, except rain and dew. Seaside Sparrows walked into a small tidal creek or to the water edge and took sips of water, usually 2–3 sips. They also drank when wading inside flooded vegetation or took sips of salt water when clinched to emerging vegetation right above water level. I did not observe any drinking rain water or dew.

Defecation.—Seasides always defecated in the squatted position. I observed Seaside Sparrows defecate often; on the ground when walking or standing, on branches of small shrubs or when clinched to grass stems, even at the same time when trying to collect grass seeds. When clinched to a single grass stem only minimal squatting occurred. When defecating during walking, they stopped only for a short moment and kept walking right after defecation. They also defecated during disputes and in mid-air right after taking flight.

Using Uropygial Gland.—I observed Seaside Sparrows using their uropygial glands (also called preen or oil gland), usually in the morning, when preening and sometimes sunbathing. After initial preening of a few feathers, they raised the rump feathers easing access to the exposed nipple of the uropygial gland. They placed the mandible tips around the nipple and squeezed it for a moment (Fig. 6a and c). After this, the collected secretion was applied to the plumage, usually beginning with

Figure 6. Composite photographs illustrating Seaside Sparrows squeezing nipple of uropygial gland to collect secretion (a and c). Grasping tarsus near the heel joint with beak during oiling (d). Preening after uropygial gland secretion was collected – note acrobat ant clinched to the outer primary.

running flight feathers through the bill (Fig. 6b) followed by nibbling on other parts of the body. Plumage shakes were performed during short breaks between preening. The whole process was repeated in the same sequence several times, with new gland secretion collected by squeezing when needed. On 2 separate occasions, I observed Seaside Sparrows grasping the tibia or tarsus near the heel joint on the edge of the feather line with the beak during the oiling procedure (Fig. 6d).

Sunbathing.—I observed juveniles sunbathing at least 2 times during morning in breaks between preening. They perched on horizontal smooth cordgrass stems and took characteristic positions when facing the sun. Their bodies were relaxed, slightly stretched, head slightly lowered, both wings were partially outstretched and spread, and kept crossed over the back (Fig. 7a–c). Sometimes a sunbathing bird fanned the remiges and held them in spread position. One time one wing was stretched and spread and held above a fanned tail.

Head-shaking.—I observed this behavior, especially when food or mud were stucked to the beak or head. Also, shaking of the head occurred after wiping the beak against a branch or grass stem and after shaking plumage.

Wing-flapping.—Seaside Sparrows flapped their wings after wading in the water when foraging. From time to time they stopped foraging, stood up and when standing on stretched legs, flapped the wings for several seconds (Fig. 8b).

MISCELLANEOUS BEHAVIORS

Absence of anting behavior.—On 5 September 2007, I observed a juvenile with an acrobat ant

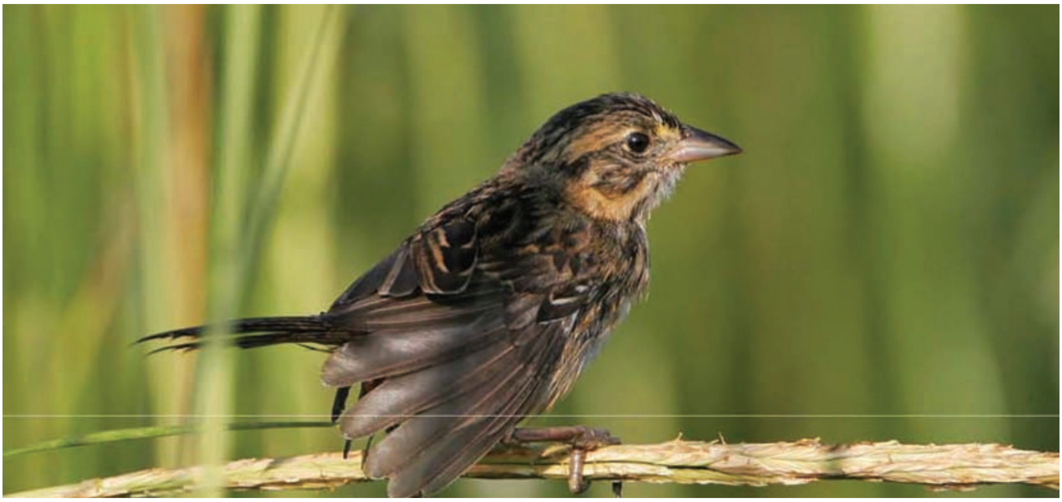

Figure 7. Photograph illustrating juvenile Seaside Sparrow sunbathing.

Figure 8. Composite photographs illustrating adult Seaside Sparrow foraging in water between marsh vegetation (a) and flapping wings during breaks in foraging (b).

Crematogaster sp. (*C. laeviuscula?*) clinched to the edge of outer primary on the left wing (Fig. 6b). The juvenile did not try to remove this ant even during preening primaries.

Play behavior.—Juveniles time manipulating natural and artificial objects. They often picked part of debris and kept dropping and picking it up. Perhaps most interesting were incidents when juveniles tried to break off a barb from the barbed wire, nub of a fence post or lift a flat stone half-buried in the ground (Fig. 10). In all these cases, juveniles applied a lot of force to objects and supported their efforts with leg muscles and wing flaps when holding the objects in the beak.

PLUMAGE ABNORMALITIES

I observed two partially leucistic Seaside Sparrows and one with an abnormal beak. I observed one partially leucistic specimen on 4 November 2007 at Salt Lake, Brazoria County (Fig. 11). This specimen in adult plumage had many white or partially white feathers: several remiges, proximal part and shafts of rectrices, remiges covers, both under and upper rectrices coverts (some showing yellow cast), at least one white feather in the vent area and an indication of many white contour feathers in the neck area. A second partially, adult leucistic specimen (Fig. 12c) was found on 29 September 2007 at salt-water marshes near Surfside, Brazoria County. It had only one visible partially white (edge

Figure 9. Composite photographs illustrating juvenile Seaside Sparrow grasping its tarsus and digit with beak (not related to oiling process) when perching on grass stem.

Figure 10. Composite photographs illustrating juvenile Seaside Sparrows manipulating different natural and artificial objects.

of outer web) outermost primary on the right wing (I did not observe a left wing). This specimen was also showing a number of white feathers on wing coverts, head (especially malar, auricular and eyering areas) and breast. Also on 29 September in the same location, I observed another adult with a deformed beak (Fig. 12a and b). The lower mandible was twisted to right side creating a "crossbill" effect. This bird appeared in good health and its plumage was looked normal. I did not have the opportunity to observe this specimen preening. Neither of described specimens was inspected in hand.

FORAGING BEHAVIOR

From late August through October 2007, adults and juveniles foraged almost constantly from dawn to dusk with only short breaks for chasing each other, preening, and perching. While foraging they waded in a low, crouched posture (with the belly often partially submerged. The diet included: seeds of smooth cordgrass *Spartina alterniflora* (Fig. 13a), sea blite *Suaeda linearis* and other marsh plants; leaves and fruits of *Suaeda linearis* (Fig. 13e and f) and leaves of saltwort *Batis maritima* (Fig. 13g and h); and adult insects or larvae.

Seaside Sparrows foraged on the ground probing mud, picking and gleaning food items from wet and dry mud, stem bases and stems and leaves of marsh plants; tried to snatch flying insects and took short jumps or flights; wadded in water gleaning from the surface or near the surface or probing substrate under shallow water or gleaned food items from stems and leaves when moving among grass stems, or from branches and leaves when visiting shrubs (most often high tide bush *Iva frutescens*). Seaside Sparrows did not hover or pursue flying insects on the wing, but those techniques are known to be used (Post and Greenlaw 1994).

When foraging on halophyte plants, adults and juveniles fed by braking tips of *Batis maritima* and *Suaeda linearis* leaves, often smashing them inside the bill, and then swallowing whole or smashed parts. Leaf tips of *Batis maritima* were usually broken from the tops of branches with new green leaves. *Suaeda linearis* fruits were usually swallowed whole. Seaside dragonlets (*Erythrodiplax berenice*) were abundant during summer/fall, but I only saw them snatched a few times, mostly from the ground when dragonflies flew close above the bird. I observed 2 cases of

Figure 11. Composite photographs showing Seaside Sparrow partial leucistic phenotype at different angles.

Seaside Sparrows eating seaside dragonlets where the bird emerged from the dense vegetation with an already dead dragonfly. The bird broke off the dragonfly legs and wings by grabbing the corpse in the beak and shaking and swallowing the bare corpse. In another observation, a Seaside Sparrow took a short flight and snatched a perching seaside dragonlet from the top of grass. The dragonfly was swallowed whole. Seaside Sparrows also tried, a few times, to snatch damselflies (*Zygoptera*) perched on the ground but without success.

In all cases collected small food items (e.g., seed, tip of leaf, small fruit), or accidentally acquired small piece of nonedible material (e.g., small rock) were held inside the beak, between the tongue and upper mandible for several seconds. During this time items were turned around inside the beak and probed with the tongue. When done with probing food items, the items were swallowed and nonedible items dropped.

DISCUSSION

Post and Greenlaw (1975) described 14 visual displays observed and documented as used by Seaside Sparrows. Three (Hunch down, Erect posture, Wing trailing) were observed only in captivity and another three were associated with breeding; mating (Copulatory display), courting (Flight display) and nesting (Distraction display). I observed at least nine postures and displays during territorial disputes in juveniles.

It may be argued that some juvenile aggressive interactions represent play. These behaviors are characteristic of adults, most often during the nesting period when they defend territories. On the other hand, young birds can go through a period of aggressiveness early in their lives that may be a part of the normal maturation process, and such activities are usually distinguished from play (Ficken 1977).

My observations suggest Seaside Sparrows quickly respond to any potential threat and look for

Figure 12. Composite photographs showing Seaside Sparrow partial leucistic phenotype (c) and another specimen with crossed beak deformities (a and b). Both specimens found on 29 September, 2007.

cover inside dense vegetation, and stay there until the threat is gone. They ignore most non-threatening species. They may attack and chase away all small and weaker species visiting their feeding grounds. Fast moving birds like wrens are usually ignored.

Post and Greenlaw (1994) listed invertebrates (adult and larval insects, spiders and spider eggs cases, amphipods, mollusks, marine worms) as the main foods consumed during the breeding season, and seeds and invertebrates (adult insects, spiders, decapods, amphipods, mollusks) during winter. I did not find any references of Seaside Sparrows feeding on halophytic plant leaves and fruits. They eat more seeds than invertebrates during fall and also leaves and fruits of halophytic plants. I compared the distribution of *S. linearis* and *B. maritima* (Plant database: <http://plants.usda.gov>) to the distribution of Seaside Sparrows (Post and Greenlaw 1994). The distribution of *S. linearis* in North America covers the distribution of Seaside Sparrows. The distribution area of *B. maritima* also covers the distribution of non-migrating Seaside Sparrows and the wintering ground of migratory populations. More studies are needed to determine whether Seaside Sparrows feed during fall/winter on these plants (or perhaps during other seasons as well). Seaside Sparrows fed only on leaf tips of new leaves of *B. maritima*. This may suggest salt or nutrient content (or both) are different in new versus old leaves, and these differences are important to Seaside Sparrows. Glenn and O'Leary (1984) found a positive relationship between salt accumulation and water content of halophytes. Seaside Sparrows may discriminate halophytes as a food source in different habitats. Additional studies are needed before drawing any conclusions.

With exception of hopping, my observations support published data (Post and Greenlaw 1994). I observed foraging birds hopping on the ground. Post and Greenlaw (1994) suggested walking and running as the usual modes of movement on the

Figure 13. Composite photographs documenting examples of Seaside Sparrow plant diet. *Spartina alterniflora* seeds (a); unidentified seeds and plant matter found on ground (b-d); *Suaeda linearis* leaves and fruits (e and f); *Batis maritime* leaf tips (g and h).

ground, or they may hop when crossing rough surfaces or moving between stems.

There is little data published about methods used by birds in applying uropygial gland secretion to their plumage. There are many hypotheses to explain functions, of the uropygial gland secretion (Elder 1954). Whitaker (1957) described Lark Sparrows (*Chondestes grammacus*) touching the gland with the beak and then transferring it to the feathers but admitted that despite taking numerous, long observations at about 25 cm (about 10 inches) distance from the sparrow, he did not observe the details of collecting the gland secretion. Hailman (1959) only referred to Fox Sparrows (*Passerella iliaca*) collecting the secretion as "manipulating the preen gland". I observed and documented in photographs the detailed process of using the uropygial gland by birds from several different orders, including other *Passeriformes* species. All observed birds always squeezed the nipple of the gland between the tips of their mandibles to collect the secretion (MBB unpub. data). The behavior of grasping the leg with the beak that some birds perform during the oiling process needs more study. I did not collect any evidence supporting the suggestion of oiling the leg skin reported by Whitaker (1957) and Hailman (1959). In all cases I observed, including other species, birds grasping only one leg, in one similar place, close to the heel joint (on both sides), and for a very short time. This behavior may be explained as a case in which the bird cleaned its bill by rubbing it on its leg.

Except for sunbathing most other comfort moments I observed in the field are known to be used by Seaside Sparrows (Post and Greenlaw 1994). The described sunbathing behavior is a first record of sunbathing by this species, but more observations are needed to establish its frequency. I am also not aware of any published description of the wing flapping during and after wading in the water.

The anting behavior has never recorded in Seaside Sparrows (Post and Greenlaw 1994). I did observe several ant mounds located on mudflat, but I never saw any anting by Seaside Sparrows. The described case of an ant clinched to the feather could have been accidental.

I classified the juvenile behavior of manipulating natural and artificial objects as play because birds repeated their actions of picking up and dropping debris or kept manipulating stationary objects (barb on barbwire, nub on fence post, stone piece buried in the ground). Avian play is still not defined precisely. Despite a growing number of studies of animal play, cognition and innovation, this field is not as developed as other behavioral research. In recent decades several authors summarized the knowledge of how the animal mind works (e.g., Hauser 2000, Reader and Laland 2003).

Enders and Post (1971) described several cases of leucistic specimens (white-spotting) found in the genus *Ammodramus* sp. and other grassland sparrows. In museum collections they did not find specimens of *Ammodramus maritimus fisheri* with white feathers, but only a small number of skins (37) were checked. Two *A. m. fisheri* described in this paper are the first records of this subspecies with leucistic plumage. Prevalence and distribution of *A. m. fisheri* leucistic phenotype need more studies to determine if these leucistic specimens occur in all populations of this subspecies or only in a few local populations.

The physical condition and behavior of the bill-deformed Seaside Sparrows seemed to be normal, and the sparrow survived to adulthood. Different causes have been proposed for beak deformations: genetic or developmental causes, injury, or disease. No causes have been identified in wild birds (Craves 1994, Rintoul 2005).

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CAPTURE RATES OF SHOREBIRDS AT MANAGED AND RIVERINE FRESHWATER WETLANDS NEAR THE CENTRAL TEXAS COAST

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ABSTRACT.—Shorebirds were mist-netted at 500-ha of moist soil units (Site A) and at a 400-ha riverine overflow basin (Site B) near the central Texas Coast from 1996-2001. A total of 3,745 shorebirds of 24 species were captured at the Site A at a rate of 76 birds per trip. A total of 1,543 shorebirds from 18 species were captured at the Site B at a rate of 106 birds per trip. Least Sandpiper (*Calidris minutilla*), Semipalmated Sandpiper (*Calidris pusilla*), Western Sandpiper (*Calidris mauri*), Dunlin (*Calidris alpina*), and Stilt Sandpiper (*Calidris himantopus*) were the most abundant species banded at Site A and were recaptured at the rate of 2.6%, 0.8%, 0.5%, 3.3%, and 0.8%, respectively. Least Sandpiper, Semipalmated Sandpiper, Western Sandpiper and Stilt Sandpiper were captured most frequently at Site B, and only two individuals were recaptured during years following banding. Banded birds were captured in Nebraska (Least Sandpiper), Ecuador (Semipalmated Sandpiper), and Alaska, British Columbia and Washington State (Western Sandpipers). More shorebirds were banded at Site A during spring and late summer/early fall at Site B.

Most species of shorebirds undertake phenomenal migrations from their wintering grounds as far south as Tierra del Fuego enroute to breeding grounds as far north as the Arctic Circle each year. To complete these extraordinary flights, shorebirds must store enormous fuel reserves. For many species common to North America, this is done at migration stopover areas, principally wetlands and associated habitats, which have high densities of food available at critical times (Brown et al. 2000). Skagen et al. (1999) indicated the central coast of Texas was a significant area for migrational stopovers. Despite ongoing conservation efforts, many shorebird populations face significant threats from habitat loss, human disturbance, pollution and predation throughout their range. This has led to population declines for several species (Brown et al. 2000). As a result, Texas Parks and Wildlife Department identified 22 of 38 regularly occurring shorebird species in Texas as species of conservation concern (Benson et al. 2005).

Wetland conservation managers along the coast regularly create <1 m deep freshwater impoundments (Site A) for waterfowl management. These impoundments are used extensively by waterfowl and to some extent by shorebirds. There is a large diversity of wetlands seasonally available in coastal Texas to shorebirds (Moulton et al. 1997). The Gulf Coast Joint Venture, a partnership of several conservation agencies/ organizations, is starting to direct shorebird management and information is needed on the use of man-made and natural wetlands to plan for their conservation (Bill Vermillion pers. comm.).

This study was conducted to determine relative capture rates of shorebirds using riverine and managed freshwater wetlands near the central Texas coast from 1996 through 2001.

METHODS

Shorebirds were mist-netted and banded at riverine wetlands (Guadalupe River overflow basin) in Victoria County (Site A) and at a managed Site A at the Whitmire Unit of the Aransas National Wildlife Refuge in Calhoun County (Site B) from 1996 through 2001 (Fig. 1). Shorebirds were captured with five 4-net sets of standard 12 m X 2 m, 36 mm mesh, 4-shelf black mist-nets. Nets were oriented in a straight line in high shorebird concentrations perpendicular to the wind. Nets were oriented in an L-shaped formation during calm conditions. Shorebirds typically fly into winds over wetlands; thus, net orientation is important to enhance capture rates. Nets were set up 1 h before sunset and run until 2 h after or were set 2 h before sunrise and run for 1 h after each day. Nets were only set during trapping periods when winds were <16 km/h and no precipitation. Shorebirds were netted

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Figure 1. Riverine Overflow Basin (A) and Managed Moist Soil Units (B) in Victoria and Calhoun Counties, Texas.

at weekly intervals whenever high concentrations occurred at either of Guadalupe River study sites.

Study Sites. The two sites were 38 km apart. The 400-ha Site B was about 15 km from San Antonio Bay and periodically received flood waters from the Guadalupe River. The wetlands flood to depths of 1.5 m during rainy seasons, and dry completely and become heavily vegetated during dry seasons. Site B was part of the Jess Womack Family Ranch and enrolled in the USDA Wetland Reserve Program. Periods most suitable for shorebirds were typically during late summer when dry seasons caused water levels to dwindle from deep to very shallow forming abundant mudflats.

The 500-ha of managed Site A at Whitmire Unit of Aransas National Wildlife Refuge in Calhoun County contains seven moist soil units. They are about 1 km from Matagorda Bay and actively managed for waterfowl. Units are typically flooded to depths of 0.5 m in late August to early September with irrigation water from the Guadalupe Blanco River Authority with drainage in late March. Site A is typically most suitable for shorebirds during spring because of large areas of mud flats created by draining of impoundments and waterfowl grazing of vegetation. Site A units become heavily vegetated when re-flooded during fall and are not used by many shorebirds until mudflats develop. At least one unit at Site A is not drained during spring to provide brood habitat for waterfowl during summer. As natural drying occurs within these brood areas, narrow zones of mudflats develop on the edge of wetlands and are used by migrating shorebirds during late summer.

Table 1. Banding dates at Guadalupe River Overflow Basin in Victoria County, TX.

	FEB	MAR	APR	MAY	JUL	AUG
1996	0	0	0	0	2	2
1998	0	0	0	1	0	0
1999	0	0	0	0	0	3
2000	0	0	0	0	1	2
2001	0	0	0	0	0	4
TOTAL	0	0	0	1	3	11

Table 2. Banding dates at Moist Soil Units of the Whitmire Unit of Aransas National Widlife Refuge, Calhoun County, TX.

	FEB	MAR	APR	MAY	JUL	AUG
1996	0	1	0	1	0	0
1997	0	0	0	0	5	0
1998	0	2	1	0	1	0
1999	2	5	5	5	0	0
2000	0	3	7	1	1	2
2001	0	2	5	0	0	0
TOTAL	2	13	18	7	7	2

RESULTS

From 1996 through 2001 (Tables 1–3) in 49 mist-net sessions at the Whitmire Site A, 3,745 shorebirds of 24 species (76 per trip) and 1,593 shorebirds from 18 species were banded during 15 sessions at the Guadalupe River Site B (106 per trip). Fifty-five individuals of seven species were recaptured at least one year following banding at Whitmire Site A and two individuals of two species at the Guadalupe River Site B. Two birds were also recaptured between both study sites during different seasons.

Least Sandpiper (*Calidris minutilla*), Semipalmated Sandpiper (*Calidris pusilla*), Western Sandpiper (*Calidris mauri*), Dunlin (*Calidris alpina*), and Stilt Sandpiper (*Calidris himantopus*) were the most abundant species captured at Site A. Recaptures of these species were 2.6%, 0.8%, 0.5%, 3.3%, and 0.8%, respectively. Least Sandpiper and Dunlin had higher recapture rates for the site and were species which wintered there as well as migrating through the area. Western Sandpiper also wintered locally, but individuals exhibited relatively low site fidelity compared to other species. Semipalmated and Stilt Sandpipers only migrated through Site A.

Least Sandpiper, Semipalmated Sandpiper, Western Sandpiper, and Stilt Sandpiper were captured most frequently at Guadalupe River Site B. Since the primary time for suitable habitat at this site was late summer, species with later migration were only caught in small numbers. Only two shorebirds were recaptured at this site; Least and Western Sandpipers.

A few birds netted were either originally banded or later recaptured elsewhere. A Least Sandpiper banded in Nebraska in 1994 was recaptured at Site A in 1999, and one banded at Site A in 1999 was recaptured at Guadalupe River Site B in 2001. A Semipalmated Sandpiper banded in Ecuador in 1999 was recaptured at Site A in 2000. Western Sandpipers were involved with most foreign recaptures. One banded in British Columbia in 1996 was recaptured at Site A in 1998. One banded at Site A in 1999 was recaptured in Alaska during 1999 and another banded at Site A in 1999 was recaptured in Washington State in 2001. One banded at Site A in 2001 was recaptured at Site B in 2001.

DISCUSSION

Statistical analyses comparing the sites were not conducted because of the high variability between study sites and different timings of major shorebird concentrations. Furthermore, recapture rates (recapturing a live-banded bird) and recovery rates (recovering a dead-banded bird) are frequently used to determine mortality and site fidelity of populations. Return rates for shorebirds are highly variable and can be difficult to interpret because each recapture is affected by survival, site fidelity, site availability and ability to recapture the bird (Sandercock 2003).

Nebel and Cooper (2008) reported low fidelity of Least Sandpipers to wintering and migratory staging areas. Page (1974) showed 26% of adults and 22% of juveniles returned the next year in California. Thomas (1987) recaptured four of 75 banded birds on the same 5-ha site one or two years later in Venezuela. Martinez (1979) using a much larger sample recaptured 1.7% of 9,034 banded birds in the Cheyenne Bottoms of Kansas in later years. We recaptured 2.6% at Site A and <1% at Guadalupe River Site B.

Smith and Stiles (1979) reported 3% band-return rates for wintering Western Sandpiper and 1% for Semipalmated Sandpiper in Costa Rica. Pfister et al. (1998) on the other hand reported 25% to 49% band-return rates for Semipalmated Sandpiper in Massachusetts at a high energy tidal zone. Gratto

Table 3. Total banded and recaptured shorebirds at Moist Soil Units in Calhoun County and a River Overflow Basin in Victoria County, TX, from 1996 thru 2001.

	Moist Soil Units (Site A)		Natural Wetlands (Site B)	
	TOTAL BANDED	RECAPTURES	TOTAL BANDED	RECAPTURES
American Golden Plover *Pluvialis dominica*	1	0	0	0
Wilson's Plover *Charadrius wilsonia*	4	0	0	0
Semipalmated Plover *Charadrius semipalmatus*	27	0	9	0
Killdeer *Charadrius vociferus*	35	1	3	0
Black-necked Stilt *Himantopus mexicanus*	36	0	1	0
American Avocet *Recurvirostra americanus*	1	0	0	0
Greater Yellowlegs *Tringa melanoleuca*	2	0	3	0
Lesser Yellowlegs *Tringa flavipes*	109	0	53	0
Solitary Sandpiper *Tringa solitaria*	5	0	14	0
Willet *Catoptrophorus semipalmatus*	2	0	0	0
Spotted Sandpiper *Actitis macularia*	17	0	64	0
Semipalmated Sandpiper *Calidris pusilla*	907	7	274	0
Western Sandpiper *Calidris mauri*	601	3	204	1
Least Sandpiper *Calidris minutilla*	932	24	689	1
White-rumped Sandpiper *Calidris fuscicollis*	26	0	52	0
Baird's Sandpiper *Calidris bairdii*	1	0	1	0
Pectoral Sandpiper *Calidris melanotos*	47	0	62	0
Dunlin *Calidris alpina*	510	17	0	0
Stilt Sandpiper *Calidris himantopns*	254	2	139	0
Buff-breasted Sandpiper *Tryngites subruficollis*	2	0	1	0
Short-billed Dowitcher *Limnodromus griseus*	5	0	1	0
Long-billed Dowitcher *Limnodromus scolopaceus*	199	1	14	0
Wilson's Snipe *Gallinago delicata*	9	0	0	0
Wilson's Phalarope *Phalaropus tricolor*	13	0	9	0
TOTAL	3,745	55	1,593	2

(1988) reported return rates of Semipalmated Sandpiper chicks (most banded 1–2 days after hatching) to their natal area varied from 4%–12%, average 7% (La Pérouse Bay, Manitoba). No further information is available on site fidelity of Semipalmated Sandpipers to wintering areas, but there is some evidence of high fidelity to tidal migratory staging areas (R. Morrison pers. comm., L. White unpubl. data). Our data showed <1% band-return rates for these two species at both study sites.

Very little data are available for Dunlin. Warnock (1994) reported adults have high fidelity to Bolinas Lagoon with resighting probabilities as high as years on wintering grounds in California. I had 3.3% recapture rates of all ages at Site B but did not have color marked birds as in Warnock's study.

Klima and Jehl (1998) speculated some fidelity of Stilt Sandpipers to migration stopovers and winter range, but there were no data. I had <1% recapture rates with a sample of about 400 birds.

Data from this study was comparable to some of the previous studies and adds more information on the variability of site use by wintering and migrating shorebirds. There appears to be stronger site fidelity of shorebirds to Site A likely resulting from consistent availability of mudflats during winter and spring. Site B on the other hand appeared to have much lower site fidelity, and I only recaptured two out of 1,500 banded shorebirds. The lower rate of site fidelity at this site was predictable because of the high variability of natural flooding and drying at the site.

Site A as managed during the study reliably provided habitat for large numbers of shorebirds each spring. A combination of high winter waterfowl use which ate much of the vegetation providing abundant mudflats in combination of prolonged water drawdowns in spring. The site was not very good for attracting shorebirds in late summer and early fall because of a lack of mudflats. Retaining water for waterfowl brood habitat did provide some mudflats on edges as impoundments dried and a fair number of shorebirds used this setting. However, very few shorebirds used Site A when re-flooded in fall primarily because of dense vegetation.

Site B provided high use by shorebirds typically in late summer/early fall, when the area received limited summer rains. This large overflow basin dried over many weeks and provided 10s of thousands of shorebird-use days annually when conditions were good. However, occurrences of suitable conditions were sporadic and not dependable. Good days did occur during periods when Site A were not suitable. Using my mist-netting trips as a rough scale of available habitat and large shorebird concentrations, suitable habitat was available >3 X at Site A than Site B.

Availability of both of these habitat types are very important for conservation of migrating shorebirds near the Texas Coast because of the seasons at which they occur.

ACKNOWLEGMENTS

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A SUCCESSFUL ARTIFICIAL NEST PLATFORM DESIGN FOR GREAT BLUE HERONS ON SMALL COASTAL ROOKERY ISLANDS IN TEXAS

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ABSTRACT.—Providing additional or improved nesting structure for wading birds requires active management. Artificial nest platforms may be an effective tool in waterbird rookery management. A successful nest platform design for Great Blue Herons (*Ardea herodias*) used in the Coastal Bend region of the Texas coast is described, and platform usage and nest success are discussed.

Enhancement of nesting habitat can result in increased nesting opportunities and nest success when conducted in appropriate areas. Construction of nest platforms for various heron species has been successfully used to mitigate nesting habitat loss where this is thought to be limiting (McIlhenny 1934). The Texas Colonial Waterbird Survey (2009) showed a decline in total nesting pairs of Great Blue Herons (*Ardea herodias*) over the past 35 years on coastal rookery islands. Efforts are being employed to address some probable causes for the declines in this and other associated species, including loss of vegetation, invasive and exotic plant and animal pests, and human disturbance. As part of these efforts, an artificial nesting platform was designed that could be partially pre-constructed, carried by a small skiff to a rookery island, and installed on site. The platforms are relatively inexpensive, and each platform provides five potential nest sites. From 2002 to 2008, thirty-one platforms of this construction were placed on islands in Aransas Bay, Nueces Bay, and the Upper Laguna Madre in the central coast of Texas

MATERIALS AND METHODS

Each platform requires the following lumber* and hardware:

(4) pressure-treated 4” x 4” x 10’
(4) pressure-treated 2” x 4” x 10’
(3) pressure-treated 2” x 4” x 12’
(4) pressure-treated 1” x 2” x 6’
15’ length of 3’ wide welded wire fencing with 2” x 4” mesh
2 lbs 16d galvanized nails
1 lb 3/4” galvanized fence staples

Tools needed for installation include:
Wire cutters
Claw hammer
Level
Post hole digger
Appropriate safety items (gloves, safety glasses, etc.)

The lateral nest baskets and the top nest basket can be pre-constructed with tools typically available in a home workshop. Construct two lateral nest baskets, each requiring (2) 2” x 4” x 10’; (4) 2” x 4” x 32 1/2” cut from a 2” x 4” x 12’; (2) 3’ x 3’ panels welded wire fencing (Fig. 1). Use nails to secure wood, and staples to affix fencing panels to the bottom (underside) of each basket segment.

Construct the top nest basket (Fig. 2) using (4) 2” x 4” x 34 1/2” cut from a 2” x 4” x 12’; and one 3’ x 3’ panel welded wire fencing. Using wire cutters, cut corners out of fencing panel so that each opening is at least 4” x 4” square to accommodate mounting posts during on-site installation.

When ready to install, haul the three pre-constructed components, (4) 4” x 4” x 10’ posts, post-hole digger, shovel, level, and nails to site. Use the top platform as a template to mark where post holes should be dug, one in each corner (on 29” centers). Dig four holes to approximately 24” depth. Substrate conditions may dictate more or less digging, but it is important that each hole be approximately the same depth.

Assembly requires at least three or four able-bodied persons. Lay the bottom nest basket on the

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*Lumber dimensions typically sold at hardware stores such as 4” x 4” and 2” x 4” refer to pre-milled dimensions, so actual dimensions are smaller. This platform design takes into account the reduced dimensions of these standard lumber items.

Editors note: Materials are not metric as they are not sold using that unit system.

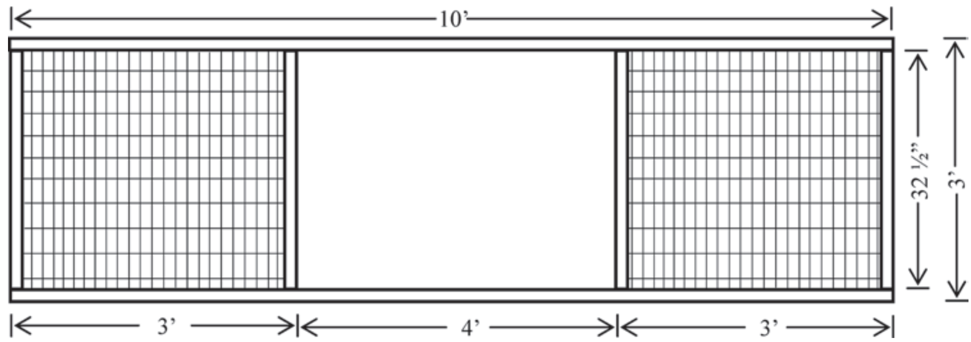

Figure 1. Lateral nest basket (top view).

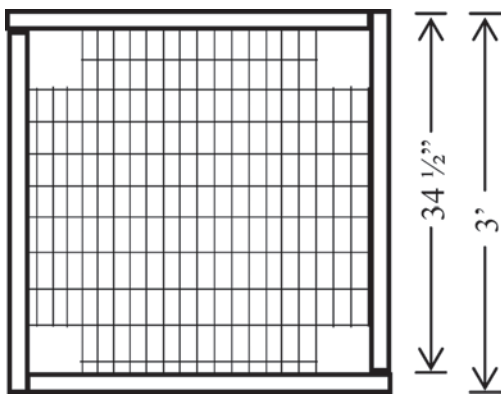

Figure 2. Top nest basket (top view).

ground so that the open middle section of the basket straddles the holes. This basket must be oriented so it will be perpendicular to the middle basket when erected.

Stand and hold the top nest basket, and middle nest basket, on edge parallel with each other while inserting the 4” x 4” posts through the open section of middle nest basket and the corners of the top nest basket. The ends of the 4” x 4” posts should be attached flush with the top of the top nest basket with at least two nails on both sides of each corner. Next, tack 4” x 4” posts to the inside of the middle basket, at least 2’ below the top basket. Tacking makes nails easier to remove if leveling adjustments are necessary after platform is upright, but tacks must be strong enough to withstand pressure when setting upright. When all contacts have been secured, rotate the structure until the posts are vertical (and posts are inside of the bottom nest basket lying on the ground), and let them fall into the holes (Fig. 3). It typically takes two people to lift the structure and one person to guide the legs into the holes.

Hold the legs of the structure vertically and level the top basket making adjustments by shoveling dirt into the hole supporting the lowest corner. Repeat until the top is relatively level. Once the top is horizontally level, and the legs are vertically level, fill in the holes surrounding the poles to stabilize

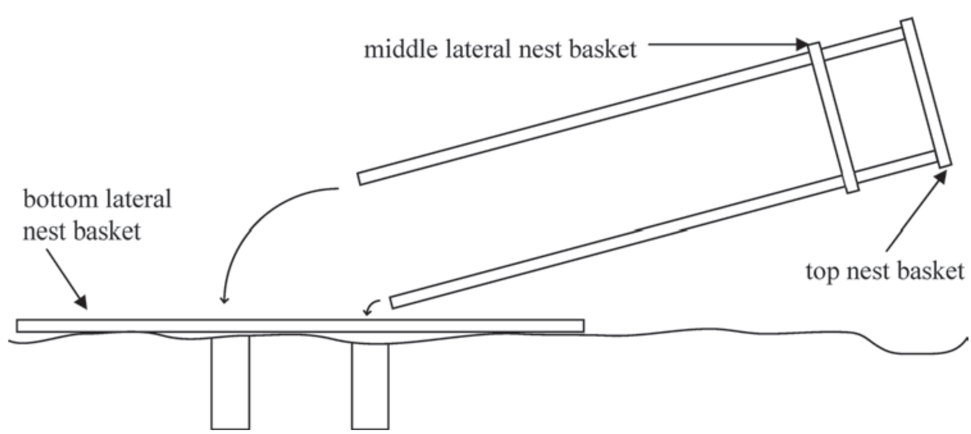

Figure 3. Assembly of platform structure on site.

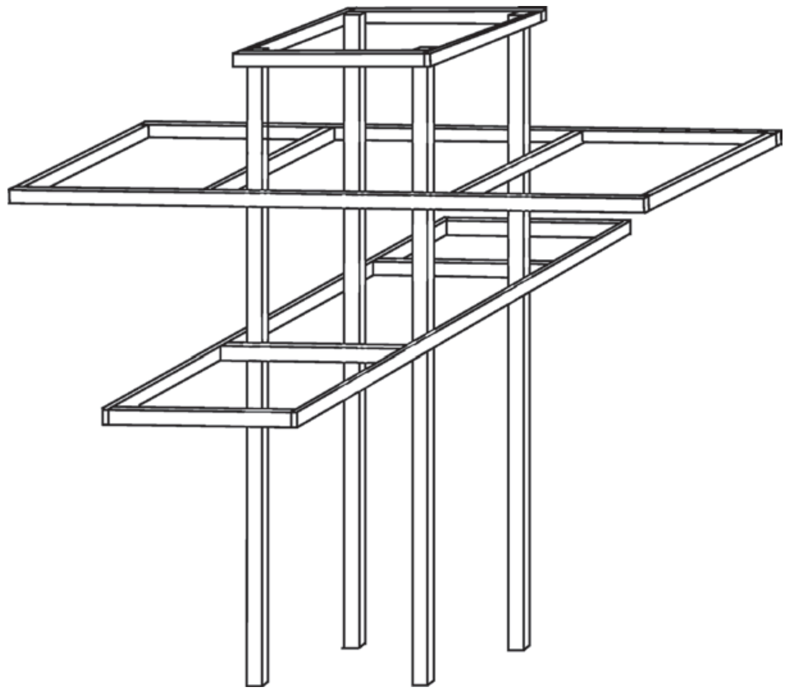

Figure 4. Completed platform structure (wire and diagonal braces not shown).

the structure. Diagonal braces (not shown) may be used to tie the 4” x 4” posts together for stability and prevent the structure twisting in high winds. Make any necessary adjustments to the middle nest basket by removing tacks and securing to posts when level. Lift the bottom nest basket up the posts until it is approximately 2’ below the middle nest basket, level, and nail to the 4” x 4” posts to complete the assembly (Fig. 4 and 5).

Maintenance and/or repair may be necessary after exposure in harsh conditions. Welded wire mesh may become rusted and brittle over time especially in highly salty environments. The mesh material can be easily replaced during the non-nesting season. Platforms exposed to high winds and installed in loose soils may lean and need straightening during the non-nesting season.

RESULTS

The first nest platform of this design was placed on Causeway Island in Nueces Bay (Nueces County, Texas) in November 2002. One nest was under construction by a subadult Great Blue Heron within a week of the platform’s construction, but it is unclear whether young were hatched and fledged. The following winter, four more platforms were built on the same island. Weekly observations were conducted from a boat offshore to track nest fate. In 2004, 12 nests occupied platforms which together fledged an estimated 27 young. In 2005, approximately 26 young were fledged from 13 nests. Since then, all platforms have supported at least three or four nests each in all years, and fledging success has been similar to 2004 and 2005.

A total of 31 platforms have been installed on small rookery islands in Aransas Bay, Little Bay, Nueces Bay, and the Upper Laguna Madre by November 2008. Nest success data have not been recorded on all islands, though all but one platform has supported at least one nest. In some cases, platforms were not used in the nesting season immediately following installation, but once nesting on platforms began on an island, every used platform has been re-used in subsequent years. Platforms in Upper Laguna Madre near Baffin Bay were occupied with at least three nests per platform in the first available year. It is suspected the immediate popularity of platforms is related to the lack of tall vegetative structure on any nearby available island.

To date, no species other than Great Blue Herons have nested on this type of platform.

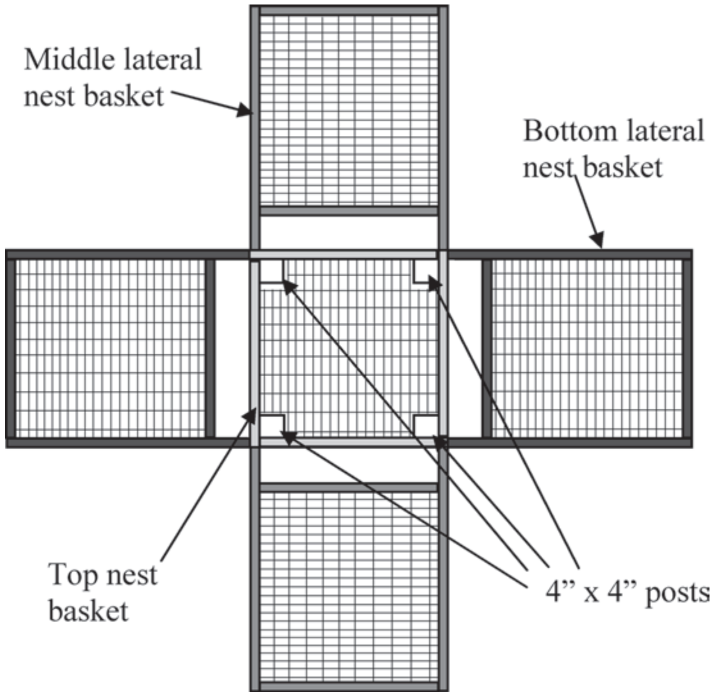

Figure 5. Top view of assembled platform, shade-coded to distinguish components.

DISCUSSION

We recommend platform construction be targeted to areas where lack of vegetative structure appears to be a major limiting factor for nesting by large wading birds. Platform construction in this area has typically been accompanied by plantings of native brush species (honey mesquite (*Prosopis glandulosa*), granjeno (*Celtis pallida*), huisache (*Acacia smallii*), and others) which are adapted to edaphic conditions on islands and provide good branching structure for wading bird nests. On islands that have not been occupied for several years due to other problems (i.e., presence of predators), platforms may attract Great Blue Herons to re-establish recently-abandoned colonies once other limiting factors have been addressed. As this species nests earlier than most others in our area, it is suspected they may serve as indicators of an island's suitability for nesting when other smaller herons arrive later to scout nest sites.

ACKNOWLEDGMENTS

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BAND RECOVERY AND HARVEST DATA SUGGEST ADDITIONAL AMERICAN BLACK DUCK RECORDS FROM TEXAS

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ABSTRACT.—We reviewed band recovery data and Cooperative Waterfowl Parts Collection Survey (PCS) data for records of American Black Ducks (*Anas rubripes*) shot in Texas. The PCS is an annual U.S. Fish and Wildlife Service (USFWS) survey of waterfowl harvest composition that relies on duck wings from a random sample of hunters. Between 1914 and 2009, 43 banded American Black Ducks were recovered in Texas; 74% of these recoveries involved American Black Ducks banded within their breeding range. Between the 1970–71 waterfowl hunting season and the 2008-2009 season, wings of 35 Texas harvested American Black Ducks were submitted to the PCS. For both data sets, over 50% of records were associated with the Coastal Prairies.

American Black Ducks (*Anas rubripes*) are rare in Texas. The Texas Bird Records Committee (TBRC) recognizes only eight records since 1950 (Lockwood and Freeman 2004). Seyffert (2001) reviewed 10 potential occurrences from the Texas Panhandle for the period 1934–1994. These included a duck captured and banded in Moore County and one taken by a hunter in Hemphill County.

American Black Ducks are a TBRC review species (Lockwood and Freeman 2004), meaning potential records will likely require firm documentation (e.g., photograph or specimen). They are similar in appearance to both Mottled Ducks (*A. fulvigula*) and Mexican Ducks (*A. platyrhynchos diazi*), two Texas residents (Bellrose 1980, Lockwood and Freeman 2004). Seyffert (2001) noted Mottled Ducks are encountered with a greater frequency in regions north of their traditional range and cautioned they could be mistaken for American Black Ducks. Similarly, Fedynich and Rhodes (1995) documented several "dark" ducks in the High Plains that resembled hybrid Mallard (*A. platyrhynchos*) x Mottled Ducks, hybrid Mallard x American Black Ducks, or Mexican Ducks. Thus, caution is warranted relative to potential American Black Duck sightings. Even so, we suspect American Black Ducks are more common in Texas than acknowledged sighting records suggest. To investigate this proposition, we examined band recovery data and PCS data for potential records from Texas.

METHODS

We searched data on waterfowl banding and band recovery locations held by the U.S. Geological Survey's Bird Banding Laboratory (BBL). All but the most recent data are available in a publicly-accessible database located online (U.S. Geological Survey 2009). We first queried the data for "American Black Ducks" banded "anywhere" and recovered in "Texas" during "any year." To minimize chances of including other species mistakenly identified as American Black Ducks when banded, we further filtered the data for ducks banded in the primary breeding range. We assumed banders highly familiar with American Black Ducks are less likely to band a similar species or hybrid by mistake. However, some records excluded in this second query included American Black Ducks banded in South Dakota and Saskatchewan, which are within the postbreeding dispersal range (late summer and early fall) of American Black Ducks (Wright 1954). Banders working in these areas regularly capture and band American Black Ducks; moreover, many banders working in this region are trained waterfowl biologists and are familiar with American Black Ducks. We also queried the same data set for hybrid "Mallard x American Black Ducks" banded "anywhere" and recovered in "Texas" during "any year."

Data from the PCS were reviewed for American Black Ducks wings submitted from Texas. This dataset is derived from an annual survey of random

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samples of waterfowl hunters in each state. The primary purpose of the PCS is to collect information on species, sex, and age composition of the annual waterfowl harvest. This information is used to monitor populations, evaluate annual production, set hunting regulations, and model population dynamics (e.g., Hestbeck 1995, Afton and Anderson 2001, Kennamer 2001, Raftovich et al. 2009). Hunters in the survey are instructed to submit, via postage-paid envelopes provided by the USFWS, one wing from each duck harvested during the waterfowl hunting season. Each wing is mailed separately in its own envelope. Depending on where the hunter lives, their wings are submitted to one of four "wingbees" held in the U.S. Texas waterfowl hunters submit their wings to the Central Flyway Wingbee. Hunters record harvest date, harvest county, and harvest state on each wing's envelope prior to mailing. Once wings arrive at wingbee sites, they are sorted by species and frozen. Data collected during wingbees include species, sex, and age (hatch year or after-hatch year) of each wing (Raftovich et al. 2009).

Staff (primarily wildlife biologists) representing federal and state conservation agencies attend wingbees, which are conducted in late winter after most waterfowl hunting seasons have closed. Biologists are separated into small groups (3–5 people), and each group is assigned a "checker." All checkers have received training and passed tests confirming their ability to identify wings by species, age, and sex. Biologists in each small group examine wings methodically, double checking species information and recording age and sex data. Criteria used to determine species, sex and age include color, color patterns, size, feather shape, feather wear, and wing size (Carney 1964, 1992, 1993). Each wing is then passed to the group's checker, and information recorded by biologists is then double checked. An unusual wing for a particular wingbee, such as an American Black Duck in the Central Flyway, would be checked a third time by one of at least two checkers regularly attending all four wingbees. These individuals have extensive experience identifying wings of all species of ducks harvested in the U.S.

Mottled Ducks are commonly encountered at Central, Mississippi, and Atlantic Flyway Wingbees and is most similar in appearance to American Black Ducks. However, there are clear differences in wing morphology of these two species (Fig. 1). Wings of American Black Ducks have less brown edging on coverts (lesser, middle, greater, and greater tertial) and tertials are much larger than Mottled Duck wings (Carney 1992). The wing notch lengths for adult male American Black Ducks and adult male Mottled Ducks average 290.6 mm (SE = 0.4) and 262.0 mm (SE = 1.4), respectively (Carney 1993). Moreover, the American Black Duck cohort with the smallest wing size, immature females, has wings on average (264.2 mm, SE = 0.3) longer than those of the Mottled Duck cohort with the largest wings, adult males (Carney 1993). Measuring wings is a regular part of the protocol for determining sex in both species.

Coordinates associated with band recovery records were displayed in a spatial database (ArcMAP 2006) to determine (1) location banded and (2) ecological region where recovered in Texas. Coordinates associated with banding records do not represent the exact location of where the specimen was encountered, but rather the center of the corresponding 10-min (latitude by longitude) block. Ecological regions follow the Natural Areas of Texas (Lyndon B. Johnson School of Public Affairs 1978) presented in the *TOS Handbook of Texas Birds* (Lockwood and Freeman 2004). American Black Duck records from PCS data were summarized by decade and county.

RESULTS

Between 1914 and 2009, nine hundred ninety-two thousand two hundred fifty-four American Black Ducks were banded. During this same time, 166,452 banded American Black Ducks were recovered (that is, recaptured, shot, or found dead and the band number reported to the BBL). Forty-three of the band recoveries occurred in Texas (Table 1) and 74% of these involved American Blacks Ducks banded within their breeding range (Longcore et al. 2000). Considering only American Black Ducks banded in their breeding range, Texas recoveries occurred in the Coastal Prairies (16), Post Oak Savannah and Blackland Prairies (5), Pineywoods (3), Edwards Plateau (2), Rolling Plains (2), and High Plains (2) (Fig. 2). Two others were recovered in Texas, but the specific recovery location is not available.

Two banded Mallard x American Black Duck hybrids were recovered in Texas. One was recovered in the Coastal Prairie and the other in the Post Oak Savannah and Blackland Prairie. As of

Figure 1. Examples of American Black Duck (left) and Mottled Duck (right) wings submitted to the Cooperative Waterfowl Parts Collection Survey during the 2008–2009 hunting season.

2009, there have been 25,814 Mallard x American Black Duck hybrids banded.

Hunters submitted 15,073 American Black Duck wings to the PCS during the 1970–71 through 2008–09 hunting seasons. Of those, 35 were submitted from Texas (Table 2) and these submissions accounted for 45% of American Black Duck wings submitted to the Central Flyway Wingbee. The number of wings submitted from Texas during each decade ranged from 2 (1970s, 2000s) to 18 (1980s). American Black Duck wings were submitted from 18 different counties (Fig. 2), with the most (9) coming from Jefferson Co.

DISCUSSION

Although far fewer than 1% of American Black Duck band recoveries or PCS wings came from Texas, we provide evidence this species occurs more frequently in Texas than suggested by TBRC records. The TBRC recognizes eight records since 1950. However, there have been 15 banded American Black Ducks encountered in Texas since 1950 and 35 American Black Ducks wings submitted through the PCS from Texas since the 1969–1970 hunting season. Eight additional band recoveries occurred in Texas during this period, but they involved American Black Ducks banded outside of their breeding range.

Data from band recoveries and PCS wings each have advantages over sighting records. Both are based on systematic observations by biologists of birds in the hand or wings in the hand. Banding crews typically have multiple individuals handling ducks, and difficult decisions concerning species identification are deferred to the most experienced banding crew members. Likewise, PCS wings are always examined by multiple personnel. Although both datasets rely on public cooperation, neither requires those cooperators to be able to identify birds. Both methods attempt to obtain representative

Table 1. Date and location data for banded American Black Ducks harvested in Texas through 2009. “Core range” indicates the duck was in the primary breeding range (Longcore et al. 2000) of the American Black Duck. Some banded ducks harvested by hunters never get reported to the Bird Banding Lab; records below represent only ducks reported.

Band Number	Banding Date	Banding Location	Core Range	Recovery Date	Recovery Region[1]
0000-04597	09-1920	Ontario	Yes	11-1920	Post Oak Sa./Blackland Pr.[2]
0002-28454	10-1922	Ontario	Yes	01-1923	Coastal Prairies
0002-97273	10-1923	Ontario	Yes	10-1923	Post Oak Sa./Blackland Pr.
0002-97813	09-1924	Ontario	Yes	11-1924	Coastal Prairies
0004-57556	10-1926	Ontario	Yes	12-1926	Coastal Prairies
0026-91144	09-1930	Wisconsin	Yes	01-1931	Rolling Plains
0026-94007	08-1931	Ontario	Yes	01-1933	Coastal Prairies
0026-94265	09-1934	Michigan	Yes	12-1934	Coastal Prairies
0046-31770	04-1936	Michigan	Yes	1937	Coastal Prairies
0346-38298	09-1938	Michigan	Yes	12-1938	Pineywoods
0397-25176	09-1939	Michigan	Yes	11-1939	Coastal Prairies
0387-03693	08-1938	South Dakota	No	12-1939	Pineywoods
0397-25107	09-1939	Michigan	Yes	12-1939	Coastal Prairies
0387-14587	10-1939	South Dakota	No	02-1940	Post Oak Sa./Blackland Pr.
0396-00675	11-1938	Louisiana	No	11-1940	Rolling Plains
0407-30931	11-1942	Illinois	Yes	01-1944	Texas[3]
0397-29245	05-1941	Michigan	Yes	12-1945	Coastal Prairies
0375-19811	10-1945	Indiana	Yes	12-1947	Pineywoods
0457-07646	11-1947	Illinois	Yes	12-1947	Coastal Prairies
0477-40767	11-1948	Illinois	Yes	01-1949	Texas[2]
0457-07663	11-1948	Illinois	Yes	12-1951	Coastal Prairies
0557-39139	01-1955	Oklahoma	No	02-1955	Post Oak Sa./Blackland Pr.
0557-39141	02-1955	Oklahoma	No	11-1955	Post Oak Sa./Blackland Pr.
0416-28382	10-1941	New York	Yes	01-1956	Coastal Prairies
0416-28482	10-1941	New York	Yes	01-1957	Coastal Prairies
0577-04500	02-1956	Oklahoma	No	01-1958	Post Oak Sa./Blackland Pr.
0827-91576	01-1967	Arkansas	No	03-1968	Texas
0777-83843	03-1966	Texas	No	12-1968	Post Oak Sa./Blackland Pr.
0727-41341	01-1966	Oklahoma	No	12-1968	Post Oak Sa./Blackland Pr.
0657-44122	07-1966	Wisconsin	Yes	11-1970	Rolling Plains
0897-41956	08-1974	New York	Yes	01-1976	Edwards Plateau
0947-25862	09-1969	Wisconsin	Yes	12-1980	Coastal Prairies
1167-11815	10-1979	Newfoundland	Yes	01-1982	Pineywoods
1457-02394	10-1985	Minnesota	Yes	12-1985	Coastal Prairies
1377-68444	09-1984	Montana	No	11-1989	Rolling Plains
1237-33717	01-1985	New Jersey	Yes	01-1995	Post Oak Sa./Blackland Pr.
2307-59370	07-1990	New Brunswick	Yes	12-1995	Coastal Prairies
2417-05590	08-1996	Saskatchewan	No	12-1999	Post Oak Sa./Blackland Pr.
2327-02221	08-1982	Maryland	Yes	12-2000	Edwards Plateau
1537-12839	09-1997	New Brunswick	Yes	12-2000	Post Oak Sa./Blackland Pr.
0957-79257	02-1979	Ohio	Yes	01-2001	High Plains
2397-55742	08-1997	Ontario	Yes	12-2003	Post Oak Sa./Blackland Pr.
1337-68497	02-1984	New York	Yes	01-2004	High Plains

[1]The Bird Banding Laboratory tracks recovery information by 10-minute (longitude by latitude) block; we used a spatial database to approximate which ecological region (Lyndon B. Johnson School of Public Affairs 1978) each band recovery was from.
[2]Post Oak Sa./Blackland Pr. = Post Oak Savannah and Blackland Prairies.
[3]Recovery location reported only as Texas.

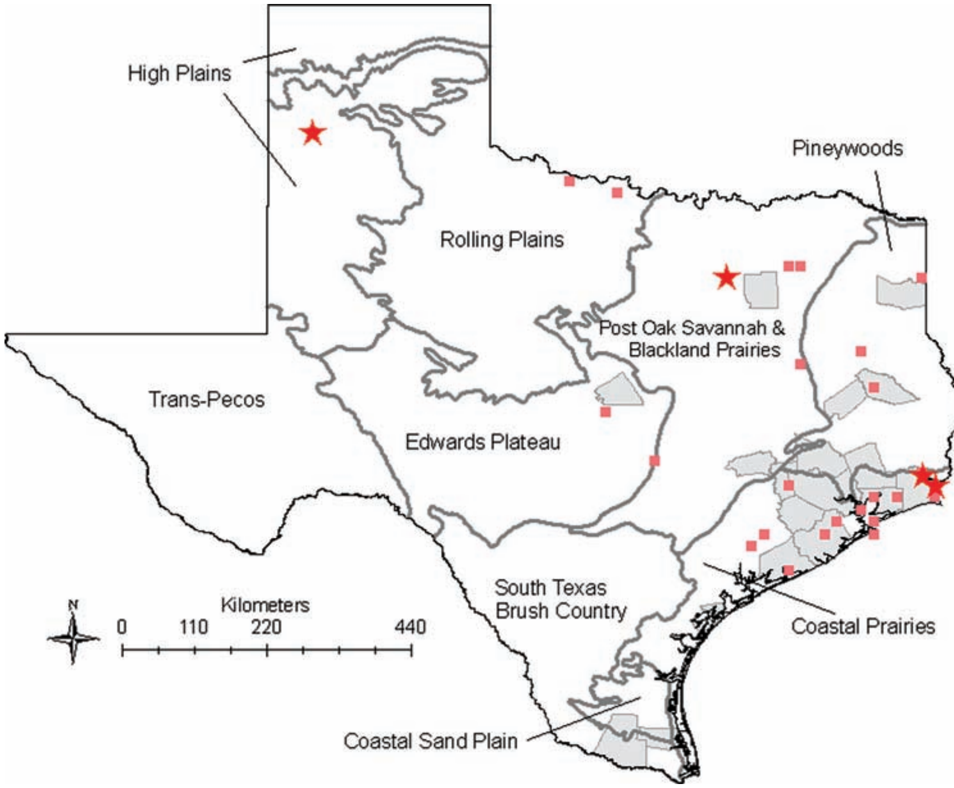

Figure 2. American Black Duck records in Texas based on band recoveries (pink square = 1; red star = 2) and Cooperative Waterfowl Parts Collection Survey records (shaded counties). Parts Collection Survey information is based on wings submitted by a random sample of hunters that agree to participate in a U.S. Fish and Wildlife Service survey. Some counties have multiple records (refer to Table 2).

Table 2. Texas counties corresponding to harvest location of American Black Ducks submitted to the Cooperative Waterfowl Parts Collection Survey (PCS) during the 1970–71 hunting season through the 2008–09 hunting season.

Hunting Year	Number of Wings from Texas	Texas Counties Represented in PCS (number of wings)
1972–73	1	Jefferson (1)
1974–75	1	Chambers (1)
1980–81	4	Harris (1), Jefferson (3)
1981–82	3	Jefferson (2), Trinity (1)
1983–84	1	Kaufman (1)
1986–87	2	Brazoria (2)
1988–89	3	Aransas (1), Chambers (1), Hidalgo (1)
1989–90	5	Angelina (1), Lampasas (2), Trinity (1), Willacy (1)
1990–91	4	Brazoria (1), Chambers (1), Fort Bend (1), Liberty (1)
1991–92	2	Jefferson (1), Montgomery (1)
1992–93	2	Chambers (1), Waller (1)
1993–94	1	Brazoria (1)
1994–95	3	Brazoria (1), Jefferson (2)
1997–98	1	Matagorda (1)
2002–03	1	Washington (1)
2008–09	1	Harrison (1)

samples of waterfowl populations, and the PCS is based on an explicit sampling frame.

The American Black Duck population averaged 477,715 from 1990 to 2009. In 2009, the breeding American Black Duck population was estimated to be between 414,600 and 522,100 (Zimpfer et al. 2009). Considering that a very small percentage of the American Black Duck population is banded at any one time and an even smaller proportion is recovered annually, it is improbable banded ducks we report represent all American Black Ducks occurring in Texas.

For our purposes, quality of banding data depends on (1) ability of banders to accurately identify species being banded, (2) accurate record keeping (e.g., species codes and location information), and (3) accurate reporting of location where the band was encountered (most likely harvested) by the individual reporting a band. We believe error is rare, and likely involves sexing and aging errors rather than species errors. Even so, we excluded records of American Black Ducks banded outside the primary breeding range to minimize the possibility of bander error. Unfortunately, as with many long-term datasets, there is no way of knowing what quality controls were in place for record keeping over the entire time series (80+ years). We suspect the state in which the band was encountered can be assumed correct, provided it was accurately reported to the BBL. Nonetheless, the most likely source of error in a data set is location information associated with reporting a band encounter. Although the BBL requests information associated with an actual encounter band (e.g., where duck was harvested), there is a possibility the individual reporting information mistakenly reported their home location, instead encounter location. For example, a Texas resident hunting out of state may returned home and report encounter location as his/her hometown. Another potential source of error is mis-read band numbers; however, the BBL attempts to follow up on suspect records.

Data from the PCS also supported our assertion American Black Ducks are more common in Texas than accepted sighting records indicate. Even within a shorter time series, this dataset contained wings of 35 American Black Ducks allegedly harvested in Texas. Although the PCS does not rely on the hunter's ability to indentify birds by species, it does rely upon hunters to accurately report state and county of harvest. We cannot exclude the possibility a hunter might report inaccurate information, but they are provided instructions on both harvest state and harvest county. When the hunter does not indicate state of harvest, it is assumed the bird was harvested in the hunter's state of residence. Even with the possibility of some potential mistakes with respect to harvest location, the relatively large number of American Black Duck wings submitted to the PCS from Texas provides support for their presence.

Although American Black Ducks wintering in eastern North America are strongly associated with coastal habitats (Morton et al. 1989, Gordon et al. 1998, Longcore et al. 2000), it is interesting 50% of band recoveries and PCS records came from the Coastal Prairies. This is the primary range of Mottled Ducks in Texas (Stutzenbaker 1988). This likely means many American Black Ducks harvested in this region go undetected by hunters due to similarities between the two species. Furthermore, if a hunter is not well connected to the birding community, even harvested American Black Ducks properly identified by a hunter may never be documented. Increased communication between birders and hunters might increase American Black Ducks reported to the TBRC. As suggested by Pulich (1988), hunters should save birds they believe may be American Black Ducks for proper identification. Effort should also be made to follow up on potential sightings by birders. Because of the chance of misidentification and possibility of encountering Mallard x American Black Duck hybrids, potential American Black Duck sightings on the coast and throughout the state should still be scrutinized.

The value of PCS wings for documenting ducks potentially rare to Texas or other Central Flyway states could be improved by archiving wings in a museum collection or in a photographic database. Because of the sheer number of wings handled by wingbees, archiving even rare wings in a collection could be logistically difficult. However, a system of archiving high quality photographs of "rare wings" and their corresponding envelopes could likely be developed with minimal effort. A similar database already exists in the Texas Photographic Records File housed at Texas A&M University, College Station.

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FEATURE ARTICLES

LONGEVITY OF THE BLACK-CAPPED VIREO

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ABSTRACT.—Little information on longevity of wild bird species is available. Black-capped Vireos (*Vireo atricapilla*) have been banded and monitored at Fort Hood Military Reservation for 23 years yielding considerable data on longevity of this species. Our goal was to summarize these data. We determined the distribution of expected longevities for vireos based on 16 cohorts of individuals banded at 1-year old. Individuals were short-lived. On average, 67% of individuals did not reach ages >1 year and only 3% reached ages ≥5 years. Mean age was 2.6 years. The greatest longevities were 12 and 9 years and all were males. These represent longevity records for the species. Age of the oldest female observed was 8 years. We captured relatively few females and color-banded females were difficult to observe. Consequently, females may reach greater ages than we observed. However, longevities we observed for males likely approximate longevity of the species in the wild because we banded over 9,000 individuals of this short-lived species and made considerable effort to recapture and re-sight them.

INTRODUCTION

Farner (1945) distinguished among several types of longevity. "Potential longevity" is the maximum life span attained under ideal environmental conditions such as in captivity; whereas, "natural potential longevity" is the maximum age reached in the wild. Several authors have compiled the latter type (hereafter "longevity") for North American birds (Kennard 1975, Clapp et al. 1982, 1983, Klimkiewicz et al. 1983, and Klimkiewicz and Futcher 1987, 1989). Currently, the Bird Banding Laboratory of the U.S. Geological Survey maintains and updates a list of longevity records for North American birds (Lutmerding and Love 2009). However, information on longevity of most bird species is limited because studies are of short duration or because too few birds have been banded and monitored throughout their lives.

The Black-capped Vireo (*Vireo atricapilla*) is a federally-listed endangered species that nests in shrub-dominated habitats (Grzybowski 1995). One of the largest known populations of this species breeds at Fort Hood Military Reservation in Bell and Coryell counties (Wilkins et al. 2006). Biologists have banded Black-capped Vireos at Fort Hood since 1987, and during these 23 years, 9,016 individuals were captured and marked. Approximately 40% of these birds were captured as adults and marked for individual recognition with colored leg bands in addition to a numbered aluminum U.S. Geological Survey (USGS) band. Many of these birds were subsequently recaptured or re-sighted in other years. This work has yielded considerable data on longevity of the species. Here, we summarize these data. Our objectives were to (1) determine the distribution of maximum ages reached by adult Black-capped Vireos, (2) list the numbers of males and females that reached the greatest ages, and (3) provide details concerning individual birds representing a longevity record for the species.

METHODS

Using both capture and sight records of all banded Black-capped Vireos on Fort Hood from 1987 to 2009, we determined the specific years each bird was present. Captures yielded reliable records because the observer recorded band number leaving no doubt of the bird's identity. Sight records were more subject to errors. For example, an

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observer could have mistaken position or color of bands. Also, birds could have changed their color combination by losing a color band, although we have found this rare. Because of the possibility of such errors, we checked the veracity of all sight records of birds with minimum ages ≥ 4 years. Unless extensive documentation existed, we rejected records of birds observed at locations distant (>1 km) from previous locations, or birds not observed in the previous two years. In most cases, such doubtful records included both conditions. This approach may have resulted in rejection of some valid records. Few such doubtful records were recorded after 2003, when project protocol required checking all doubtful records as soon as possible during a field season when it was still possible to observe or capture the bird in question.

We calculated minimum age based on the assumption all birds hatched on 1 June (Clapp et al. 1982). This approach was reasonable for the Black-capped Vireos at Fort Hood because most individuals in this population hatch from late April through June (The Nature Conservancy unpubl. data). When reporting minimum ages of oldest birds, we rounded down to the nearest month. We expressed ages in the form "years-months" (e.g., "7-2 year" for 7 years and 2 months). For all other purposes, we rounded age to the nearest year.

To determine the distribution of greatest ages achieved by adult vireos, we examined ages reached by individuals in 16 cohorts of birds originally banded at one year old (i.e., banding age code "second year"). Cohorts ranged in size from 11 to 88 birds and included a total of 645 individuals. Using this approach, we estimated the proportion of any cohort expected to reach any given age. First, we determined maximum observed age reached by each individual and then calculated the percentage of each age group in each cohort. We then determined the mean and standard error of the percentages of each age group across 16 cohorts (i.e., n = 16). The 16 cohorts were those for years 1988 through 2003, and the greatest age we observed in any of these was 7 years. By only considering cohorts only as recently as 2003, we allowed enough time for every bird to attain the age of 7 years. Ideally, we would have examined cohorts of birds banded at or near fledging age to get information concerning all ages and not just adults 1 year and older. However, such an approach would not yield realistic results because of large dispersal distances of birds banded as fledglings relative to those banded later in life. Dispersal plays a large role relative to mortality in our ability to observe birds banded as fledglings after they become adults. Most have simply dispersed to locations outside our study areas. Thus, inclusion of data from birds banded at ages <1 year would result in a strong negative bias in estimates of the proportion attaining ages ≥1 year. Consequently, we report only the distribution of ages reached by adult vireos. For mean age, we report a value based on all individuals in 16 cohorts (i.e., n = 645).

Most birds attaining greatest ages were banded at a minimum age of 2 years (banding code "after second year") rather than an age of 1 year. Consequently, the information based on cohorts described above does not include these birds. For this reason, we separately summarized data on maximum ages of all birds known to have reached an age of at least 4 years. We used 4 years as the lower limit (Lutmerding and Love 2009).

RESULTS

The estimated distribution of ages reached by Black-capped Vireos at Fort Hood is shown in Figure 1. On average, 67% of individuals in a cohort did not reach ages >1 year. Few individuals can be expected to reach maximum ages. For example, > 1% attained longevities of 6 and 7 years (Fig. 1). Mean longevity was 2.6 years. (i.e., 1.6 years after birds were banded).

Birds reaching greatest ages were originally banded when at least two-years-old. During the 23-year period, we observed 290 Black-capped Vireos which reached a minimum age of 4 years. Males comprised 78% of this group, and oldest individuals were all males (Table 1). Minimum ages of oldest males were 12-0 years (1 individual), 9-0 years (2 individuals), 8-10 years (1 individual), and 8-0 years (3 individuals). Minimum ages of oldest five females observed were 7-11 years, 6-11 years (3 individuals), and 6-1 years.

The oldest Black-capped Vireo, band number 3101-19283, was originally captured on 9 July 1998. The bander determined this bird was at least 2-years-old and marked him with three plastic color bands in addition to a USGS band. In 1999, this male defended a territory approximately 170 m northwest of his original capture location. In 2000, he relocated his territory approximately 330 m east, but he returned to this new location every year

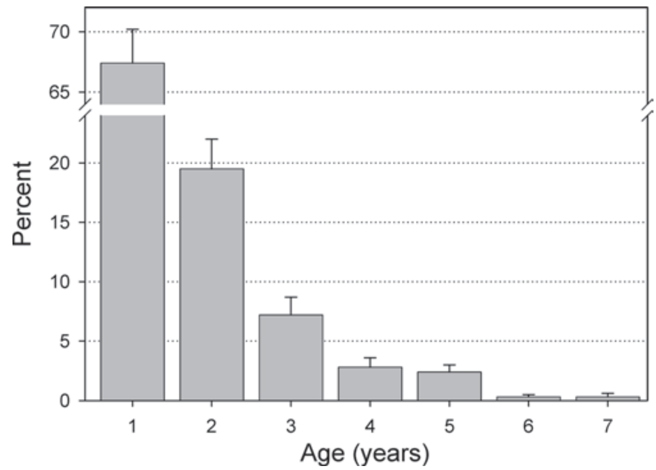

Figure 1. The distribution of ages attained by adult Black-capped Vireos as estimated from 16 cohorts of birds that were originally banded when they were 1 yr old. Lines extending from the tops of bars represent one standard error. Note the break in the vertical axis between 20 and 65.

afterward through 2008. On 25 June 2007, we recaptured him near the eastern edge of his territory. The last observation was on 23 June 2008 when his minimum age was 12-0 years. During the 10 years we monitored this bird's territory, we located 20 of his nests. Eight of these successfully fledged a total of 25 young.

The oldest female, band number 2191-26845, was originally captured on 7 June 1998. The bander determined she was at least 2-years-old and marked her with three color bands and an aluminum USGS band. She had at least three different males as mates during the three years we were aware of her presence. All observations for this bird were within a relatively small area with 300 m separating the most widely spread locations. We recaptured her on 12 May 2004 when her minimum age was 7–11 years and did not observe her afterward. We monitored four nests for this female and two successfully produced seven fledglings.

Table 1. The number of Black-capped Vireos at Fort Hood Military Reservation known to have achieved longevities (rounded to the nearest year) ≥4 yr during the period 1987 to 2009.

Longevity (years)	Females	Males
4	40	120
5	21	64
6	5	19
7	1	11
8	1	4
9	0	3
12	0	1

DISCUSSION

Clapp et al. (1982) suggested natural potential longevities can be approximated by observed longevities of relatively short-lived species as long as large numbers were banded. We believe this condition was satisfied in the case of Black-capped Vireos on Fort Hood because we banded large numbers over a 23-years. Furthermore, we invested considerable effort toward recapturing birds and collecting sight observations. Thus, longevity records we observed should represent maximum ages reached by this species in the wild.

Our results confirm the Black-capped Vireo is a relatively short-lived species. When we examined cohorts of birds banded in their first year of adulthood, we found only 3% ever reached an age ≥5 years. Furthermore, we estimated mean longevity to be 2.6 years. Thus, on average vireos that survive to adulthood experience only two breeding seasons.

The greatest maximum age we observed for the Black-capped Vireo was 12 years. The probability a bird will reach a given age can be calculated as the product of the separate probabilities it will survive each year. Kostecke and Cimprich (2008) estimated the survival probabilities for both young and adults of this species at Fort Hood. Using the range of probabilities from the best models presented by Kostecke and Cimprich (2008), we calculated the probability of a vireo reaching a given age as follows:

$$\text{Probability} = (\text{survival in the first year of life}) \cdot (\text{adult annual survival})^{\text{age-1}}$$

We then multiplied the result by 100 to express it as a percentage. For the 12-year-old bird this probability ranges from 0.001% to 0.007% depending on specific survival probabilities selected. For three males reaching the maximum age of 9, this probability would be 0.02–0.41%. For the oldest female (8 years), the probability rises to 0.15–0.73%. These low probabilities add significance to the record of the 12-year-old vireo. One would expect only one out of 14,000 to 100,000 banded birds to live this long, and we banded only about 9,000. Furthermore, the next oldest individuals we observed were 3 years younger than the 12-year-old bird.

Most oldest Black-capped Vireos we observed were males. Indeed, the oldest female was only the eighth oldest bird we encountered. This apparent disparity between sexes may have had more to do with our ability to observe females than with any actual difference in longevity. For example, females appeared to be harder to catch than males; only 29% of birds we banded were females. Additionally, it was relatively difficult to see females and determine their color band combinations. Males were much easier to locate visually because of their frequent, loud vocalizations. Furthermore, Kostecke and Cimprich (2008) determined males had a higher recapture probability (this included both capture in mist nets and detection by sight) than females. Thus, females may achieve greater ages than those we observed.

The oldest Black-capped Vireos described here represent longevity records for the species. Grzybowski (1995) noted observations of individuals at least 7 years old, but gave no further details. No other longevity records for this species have been published (Klimkiewicz et al. 1983, Klimkiewicz and Futcher 1989, Lutmerding and Love 2009). The age of 12-0 years we observed is among the oldest observed for any *Vireo* species, but not the oldest. Lutmerding and Love (2009) reported records of older individuals including a 13-6-year Hutton's Vireo (*V. huttoni*), a 13-1-year Warbling Vireo (*V. gilvus*), and a 12-10-year Puerto Rican Vireo (*V. latimeri*) (the age of this last bird is given as 13-2 years by Woodworth et al. 1999). Other shrub-nesting vireos have longevity records similar to but not as old as the 12-0-year Black-capped Vireo. For example, records exist of a White-eyed Vireo (*V. griseus*) age 10-11 years and a Least Bell's Vireo (*V. bellii*) age 9-1 years (Lutmerding and Love 2009).

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COLONIAL NESTING YELLOW-CROWNED NIGHT HERONS ON THE SAN ANTONIO RIVER WALK

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ABSTRACT.—Yellow-crowned Night Herons (*Nyctinassa violacea*) typically nest as single pairs or in small colonies of about four pairs with high internest distances. They are also reported as susceptible to disturbance and to avoid habitat with high human use. However, some Yellow-crowned Night Herons habituate to human-dominated landscapes and nest in residential areas. I located a colony of nesting Yellow-crowned Night Herons in San Antonio, Texas on the River Walk, a popular tourist destination with an estimated 2.5 million visitors annually. I located 68 and 71 active nests in 2008 and 2009, respectively. This suggests the breeding population of the colony was 142 adult birds (77 adult herons/linear km of River Walk) in 2009. Herons occurred in a colony with three nesting aggregations situated 241 (±14 SD) m apart. Aggregations averaged 23.7 (±8.7 SD) nests each with one–nine nests per tree; nest trees within each aggregation were usually adjacent. Nests averaged 16.7 m (±4.1 SD) above ground, with 56% of nests over the river, 23% over sidewalks, 17% over dining areas, and 3% over landscaping. Only bald cypress (*Taxodium distichum*) was used for nest trees, and these were significantly taller and larger in diameter than random bald cypress trees. The herons were habituated to pedestrian activities, often perching only a few meters over sidewalks or dining areas, and foraging along the water's edge as pedestrians passed within 4–5 m. Nests located over dining areas and sidewalks do impose some management issues. It is apparent the species is capable of habituating to human activities to exploit suitable urban settings for nesting and foraging habitat.

Yellow-crowned Night Herons (*Nyctinassa violacea*) have a wide distribution primarily along coastal areas of eastern and southeastern North America, Central American, north and northeastern South America and the Caribbean (Kushlan and Hancock 2005). Their principal habitat is described as coastal marshes and swamps, lagoons and shores. The species is also found inland along river swamps and marshes, but only where its primary prey is available (Watts 1995, Kushlan and Hancock 2005). In this, the Yellow-crowned Night Heron is unique among the Ardeidae as a crustacean specialist, with crabs and crayfish constituting 74 to 97% of the diet (Watts 1995). Habitat conservation may be especially important for Yellow-crowned Night Herons, as their crustacean prey, and hence, foraging opportunities, may be negatively influenced by water drawdowns in wetlands, and erosion and loss of coastal and shoreline habitat.

In contrast to most species of colonial waterbirds, Yellow-crowned Night Herons do not appear strongly colonial (Watts 1995). Although colonies in excess of 100 pairs of Yellow-crowned Night Herons have been reported (Holt 1933, Scott 1971), they were primarily on coastal islands and may be exceptional. More frequently, Yellow-crowned Night Herons nest as single pairs or in small colonies of about four pairs (Watts 1989, Laubhan and Reid 1991, Kushlan and Hancock 2005), a pattern that is apparently the norm for inland locations (Watts 1995). Furthermore, internest distance within colonies appears to be high with more than one nest in a tree being rare (Drennen et al. 1982, Watts 1989, Laubhan and Reid 1991).

Limited information suggests Yellow-crowned Night Herons are susceptible to disturbance by boat traffic (Peters and Otis 2006) and, therefore may avoid habitat with high human use. However, it is also evident that some Yellow-crowned Night Herons can habituate to human-dominated landscapes (Lyles 2000); 80% of nests in Virginia were in urban residential settings (Watts 1991,

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1995). In May 2008 I located a large colony of Yellow-crowned Night Herons in a highly urbanized inland setting in San Antonio, Texas. Here I report nesting numbers for 2008 and 2009, and characterize nesting habitat for this unique colony of Yellow-crowned Night Herons.

MATERIALS AND METHODS

Study Area.—This study was conducted on the River Walk of San Antonio, Texas. San Antonio is the seventh largest city in the United States, with a 2008 population of 1,351,305 people (http://factfinder. census.gov/; last accessed 31 May 2010). At the center of the city is the River Walk, an especially popular tourist destination visited by an estimated 2.5 million tourists each year (Joseph Cruz, River Operations Superintendent, pers. comm.). The River Walk is constructed along a historic natural oxbow of the San Antonio River. It is a highly urbanized site approximately 40 m wide and lined on each side with restaurants, shops, upscale multi-story hotels, and other commercial interests. This creates a narrow, shaded, canyon-like setting with a variety of trees, especially large bald cypress (*Taxodium distichum*) and magnolia (*Magnolia grandiflora*). Numerous public events are held throughout the year, but the area experiences high densities of pedestrian and boat traffic daily, especially late into the evening.

For this study, I surveyed the stretch of the San Antonio River from East Houston Street south to West Market Street (approximately 345 m), the River Walk loop east of the San Antonio River starting at Commerce Street to the north to Villita Street to the south (approximately 1,230 m), and the boat channel running from the River Walk loop at East Market Street eastward to the Rivercenter Mall (approximately 275 m) for a total surveyed area of 1,850 m.

Methods.—In May 2008, I observed numerous Yellow-crowned Night Herons in cypress trees along the River Walk and conducted an impromptu foot survey of the study area to inventory nesting pairs of herons. I returned in 30 and 31 March 2009 to repeat the survey during the nest-initiation stage and again from 19 to 20 May 2009 to assess reproductive success. I categorized nests as in incubation, nests with young present, or having failed.

I counted number of nests located per nest tree and identified nest tree species. I used a diameter at breast height (DBH) tape to measure diameter of nest trees and a clinometer to estimate height of tree and height of nest. I calculated percent of tree height where the nest was located by dividing nest height by tree height to obtain a relative measure of nest placement within the canopy. To compare nest trees to unused trees within nesting aggregations, I collected DBH and tree height at the closest accessible non-nest tree to nest trees. I visually identified substrate over which nests were placed. I classified substrates as water, sidewalks, outdoor dining areas, and landscaping.

To estimate nesting success in 2009, I attempted to count nestlings at all nests. However, in May numerous nests had young already perching on branches adjacent to nests; whereas, others had young too small to see or adult herons still incubating or brooding. Therefore, rather than estimating productivity, I report numbers of nests with young, those in an incubation stage, and those failed. I considered nesting attempts in the March survey that were either no longer present or not active in the May survey as having failed.

I report means ± standard deviations for all metrics. All statistical analyses are for the 2009 data only. I used an analysis of variance test to examine nest per tree density among different colonies and *t*-tests to examine differences between nest and random trees (Zar 1999).

RESULTS

Yellow-crowned Night Herons were the only heron species located on the River Walk during 2008 and 2009 surveys. I located 60 active Yellow-crowned Night Heron nests and eight inactive nests in May 2008. In March 2009 I counted 71 nests either under construction or with incubating herons. During the May 2009 survey, 60 nests were active and 11 had failed.

Watts and Byrd (1998) and Williams et al. (2007) defined a colony as being separated by >400 m or by distinctive barriers or discontinuity of habitat. Thus, I considered nesting herons on the River Walk as being in a single colony with three nesting aggregations dispersed in a triangular pattern along the northern, eastern, and southern stretches of the oxbow of River Walk, with an average distance of 241 (±14) m between each aggregate. The north aggregate consisted of 14 nests among six trees (2.3 ± 3.3; range 1–9), the east aggregate consisted of 26 nests among six trees (4.3 ± 2.8; range 1–8), and the south aggregate consisted of 31 nests among 13 trees (2.4 ± 1.5; range 1–6). There was no difference in nesting density within trees between the three aggregations ($F_{2,22} = 1.59$, $P = 0.226$).

I conducted measurements at 65 nests, 24 nest trees, and 22 unused trees in nest stands. Nests averaged 16.7 m (±4.1) above ground and 58% (±14%) of the nest tree total height. The majority of nests (36; 56 %) were over the river, 15 (23%) over sidewalks, 11 (17%) over dining areas, and 2 (3%) over landscaping. Because only cypress trees were used for nesting, I only included random cypress trees for comparison with nest trees. There were differences in height ($t_{44} = 3.47$, $P = 0.001$) between nest (28.0 ± 3.6 m) and unused (22.6 ± 6.6 m) trees, and in diameter ($t_{41} = 3.33$, $P = 0.002$) between nest (114.2 ± 26.0 cm) and unused (80.8 ± 39.2 cm) trees.

During the May 2009 survey I confirmed 33 nests had visible young, 27 were in an incubation or early brooding stage, and 11 had failed. For those nests with young, nestling ages ranged from recent hatchlings to almost fledging.

DISCUSSION

Although there are some historical exceptions (e.g., Holt 1933, Scott 1971) associated primarily with coastal environments, Yellow-crowned Night Herons are not considered strongly colonial. They usually nest as single pairs or in small colonies (Kushlan and Hancock 2005) with high internest distances (Watts 1989, Laubhan and Reid 1991), especially at inland locations (Watts 1995). Watts (1995) reported 25% of breeding Yellow-crowned Night Herons in Virginia occurred as single nesting pairs. Colonies in Missouri (Laubhan and Reid 1991) and Virginia (Watts 1989) averaged four nests (Laubhan and Reid 1991, Watts 1995). More recently, Watts and Byrd (1998) reported 35 colonies in Virginia with an average of 11.1 individual herons; this may suggest an approximate 5.5 nests per colony. However, Watts and Byrd (1998) also noted a range of 1 to 58 individuals per colony, which may suggest some colonies could consist of as many as 26 pairs. Whitmore et al. (1999) reported Yellow-crowned Night Heron colonies of six and 14 active nests on a salt water estuary in Baja California Sur. Thus, the 71-pair colony on the River Walk is comprised of substantially more Yellow-crowned Night Herons than typically reported for inland nest areas.

Nest heights of Yellow-crowned Night Herons are variable, ranging from the ground to as high as 35 m (Laubhan and Reid 1991). Nests in this study were mid-way in this range at 16 m, but they were generally situated at slightly higher than half the nest tree height. Thus, nest height may be more influenced by the tree used (e.g., Watts 1995) than any particular preference for height above ground (and, hence, distance from disturbance). Nests were also placed in substantially larger trees than randomly available. However, to my knowledge, this is the first report of the species using bald cypress trees for nests.

It is rare for more than a single pair of Yellow-crowned Night Herons to nest in a tree (Kushlan and Hancock 2005). No more than one nest was found per tree at colonies in Alabama (Drennen et al. 1982) and Missouri (Laubhan and Reid 1991). In Virginia, single nests in trees accounted for 82% of nesting attempts (Watts 1989). In contrast, I found one to nine nests per tree, and nest trees adjacent to each other within aggregations. Indeed, some trees in the River Walk colony contained more nests than many colonies reported elsewhere. Additionally, due to the physical structure of the River Walk, nest trees were over the same substrate: small bands (~2 to –3 m wide) of landscaping adjacent to the sidewalk and river. However, the canopy of trees spread out over the river, sidewalks, and restaurant dining patios. Thus, tree substrates did not vary, but substrate over which nests were positioned did. However, since nests were oriented around the tree, I suspect this was a result of intraspecific spacing within trees rather than any selection for substrate below the nest.

Human disturbance to nesting colonies of waterbirds is a known conservation issue (Vos et al. 1985, Burger et al. 1995, Carney and Sydeman 1999). Peters and Otis (2006) found Yellow-crowned Night Herons are sensitive to boat disturbance in foraging areas and avoid habitat with high human use. In contrast, over 80% of Yellow-crowned Night Herons nests in Virginia were in wooded residential areas with park-like settings (Watts 1989, 1991). Yellow-crowned Night Herons also occupy park-like setting of the San Antonio Zoo (Lyles 2000). However, residential areas may be relatively sedate and quiet compared to urbanized areas with high commercial or recreational activity; it is difficult to imagine a setting with greater human traffic and potential for disturbance than the San Antonio River Walk. Yet herons appear to be quite habituated to pedestrian traffic. During morning and evening hours some herons can be seen foraging along the water's edge while numerous River Walk tourists pass within 4–5 m. They also often perch only a few meters above the sidewalk and dining areas. This can cause some conflict with pedestrians and diners, and River Walk boat tour guides enjoy warning tourists to 'not look up'.

Although Yellow-crowned Night Herons have a relatively narrow foraging niche, Kushlan and Hancock (2005) suggested the relatively stable population trend reported for the species is due to its flexibility and adaptability to habituate to altered landscapes. Although there are no quantitative data, anecdotal information from long-term residents of San Antonio suggests Yellow-crowned Night Herons were once fairly common along the river in the 1930s and 40s but then disappeared from the area approximately 40 years ago (Joseph Cruz, River Operations Superintendent, pers. comm.). This coincides with increased development and urbanization of the area. Herons were only noted in the area again in the late 1990s (Joseph Cruz, River Operations Superintendent, pers. comm.), and these few birds have expanded to the population reported here.

These findings lead to numerous questions for futures studies of herons in this colony. Site and pair fidelity are unknown for this species, as is survival of both adults and offspring. Additionally, it is unknown what proportion of members of this colony forage in the River Walk area after business hours when tourist traffic is decreased, which members move up and down channels to forage, or if they move to other areas (golf courses, city parks) to seek foraging opportunities. Wherever they go, they find sufficient prey to support over 120 adults and to successfully fledge their offspring. Where these locations may be is an interesting questions given the species specialization on crustaceans.

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POLYGYNY IN THE GOLDEN-CHEEKED WARBLER

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ABSTRACT.—Cases of polygyny have been documented in eight of 21 species of the genus *Dendroica*. We document a case of polygyny in another member of this genus, the Golden-cheeked Warbler (*Dendroica chrysoparia*). The first female mated with a polygynous male made two nesting attempts before successfully fledging young, while the second female made three attempts. It is unclear whether the polygynous male was the mate of the second female during her first two nesting attempts. The second nesting attempt of the first female and the third nesting attempt of the second female were 400 m apart. No other territories were located between them. Two days after the third nesting attempt of the second female fledged, we located the male and fledglings 20 m away from the second nesting attempt of the first female. The male was alternating feeding trips between nestlings in this nest and fledglings. These observations demonstrate polygyny appears to be an alternative mating strategy for Golden-cheeked Warblers, but further examination of its prevalence and selective pressures favoring it in this species are needed.

Long-term studies of marked individuals have demonstrated mating systems of North American passerines are more complex than researchers once thought (reviewed in Ford 1983 and Parker and Burley 1998). Within the *Dendroica*, long-term studies of color-banded individuals have documented cases of polygyny in eight of 21 species (reviewed in Ford 1983; Nolan 1978, Petit et al. 1988, Barg et al. 2006). Although polygyny had been suggested for Golden-cheeked Warblers (*Dendroica chrysoparia*) (Ladd and Gaas 1999) the evidence was circumstantial and the species was considered socially monogamous (Ehrlich et al. 1988). Here we document the most comprehensive case of polygyny for this species.

The Golden-cheeked Warbler breeds only in the juniper-oak (*Juniperus ashei*-*Quercus* spp.) woodlands of central Texas. Males begin arriving on breeding grounds in early March with females arriving a few days later (Ladd and Gass 1999). Females begin construction of open-cup nests in mid-March and will make up to five nesting attempts throughout the breeding season if a previous attempt is not successful (RGP unpubl. data). Nests range in height from 2.0–14.7 m (n = 333; mean = 5.7±1.52) off the ground (RGP unpubl. data). Females usually lay three or four eggs per clutch but occasionally five eggs (Pulich 1976). Males do not assist in nest construction (but see Lockwood 1996, Graber et al. 2006), incubation, or brooding but feed females on the nest during incubation as well as nestlings and fledglings. Golden-cheeked Warblers begin departing for wintering grounds as early as mid-June although some individuals may remain on the breeding grounds until late August (Ladd and Gass 1999, RGP unpubl. data).

METHODS

We made observations of polygynous behavior while conducting field work for a long-term demographic study of the Golden-cheeked Warbler on Fort Hood Military Reservation in central Texas from March to mid-June 2008. For a detailed description of Fort Hood see Eckrich et al. (1999). We used recorded vocalizations to capture Golden-cheeked Warblers in mist nets throughout the breeding season. After capture, we marked all individuals with a U. S. Geological Survey aluminum band and a unique combination of color bands.

We observed territorial males at least once every five days and used adult behavioral cues to locate nests. We monitored nests at least every other day. At each visit, we recorded date, time of visit, nest stage (building, laying, incubation, or nestling), and

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described adult warbler activity at the nest. We confirmed fledging by visually locating fledglings or by observing parents carrying food either to fledglings or repeatedly to an area near the nest from which we heard begging calls. To determine the female's social mate, we used behavioral cues (male singing a muted song while closely following a female collecting nesting material, male feeding an incubating female, and male feeding young). Once eggs hatched, we increased length and frequency of our monitoring visits to confirm identity of a male feeding nestlings. We defined polygyny as a male maintaining pair bonds with at least two females simultaneously, placing emphasis on observations of male parental care (i.e., feeding offspring of a nest) as the best evidence of a pair bond.

RESULTS

On 25 March 2008, we observed a color-banded male (M1) intermittently singing a muted song, while closely following an unbanded female (F1) as she collected nesting material and delivered it to the nest. On 31 March F1 started laying eggs and began incubating them on 3 April. Eggs hatched on 15 April and M1 fed nestlings from 17 to 24 April. This nest failed on 25 April. We located M1 that afternoon and observed him intermittently singing a muted song while closely following F1 as she collected nesting material. On 26 April we located the second nesting attempt of F1. She continued to collect nesting material and deliver it to the nest while M1 continued to follow her. They attempted copulation at the nest. On 30 April F1 began laying eggs in the second nest and began incubating them on 2 May. Eggs hatched on 14 May and M1 fed nestlings from 20 to 23 May. On 25 May F1 fed two fledglings within 1 m of the nest.

On 26 March we observed another color-banded male (M2) intermittently singing a muted song, while closely following an unbanded female (F2) as she collected nesting material and delivered it to the nest. They attempted copulation during this time. F2 began laying eggs on 1 April. The nest failed on 4 April. We located M2 on 6 April as he intermittently sang a muted song and closely followed F2 while she collected nesting material. As we narrowed down the location of the nest, we observed M1 also was attempting to closely follow F2 as she collected material and delivered it to the nest. The two males chased and fought with each other while F2 continued to construct the nest. On 13 April F2 began laying eggs in the second nest and began incubating them on 16 April. F2's second nesting attempt failed on 17 April. We located M2 that afternoon 70 m from where F2 was constructing a third nesting attempt. M2 attempted to closely follow F2 as she collected nesting material, but M1 chased him away. While checking the progress of F2's third nesting attempt on 22 April, we observed M2 singing within 50 m of the nest. On 23 April F2 began laying eggs and began incubating them on 26 April. M1 fed F2 during incubation on 29 April. On 1 May M1 and M2 counter sang approximately 50 m from the nest; this was the last time we observed M2. M1 fed F2 again during incubation on 2 May. Eggs hatched on 8 May. M1 fed nestlings on 9, 10 and from 14 to 18 May. The third nesting attempt of F2 fledged on 18 May.

During the afternoon of 18 May, M1 fed two fledglings 100 m from the third nesting attempt of F2. M1 and fledglings were moving in the direction of the second nesting attempt of F1, which was in the nestling stage. The second nesting attempt of F1 and F2's third nesting attempt were 400 m apart. We believe these nests were located on opposite sides of M1's territory as no other territories were located between them and they approximated the extent of sightings for him throughout the breeding season. On 23 May M1 was located 20 m from the second nesting attempt of F1. He was alternating feeding trips between nestlings in this nest and fledglings consistent with the age of fledglings from the third nesting attempt of F2. He continued to feed nestlings of F1's second nesting attempt until they fledged on 25 May.

DISCUSSION

Originally, researchers studying avian mating systems hypothesized that polygyny occurred when a population's sex ratio was skewed (Chapman 1928, Ryves and Ryves 1934, Kendeigh 1941, Mayr 1941, Skutch 1935, Williams 1952). In the 1960s Verner (1964), Verner and Willson (1966), and Orians (1969) developed the polygyny-threshold model to explain female choice in polygynous breeding birds as a function of variation in territory quality among males. Other researchers have developed alternative hypotheses to describe how polygyny could be maintained under different selective pressures (von Haartman 1951, Weatherhead and Robertson 1979, Wootton et al. 1986, Leonard 1990). While these alternate hypotheses provide an explanation for how polygyny could be selected for within certain bird species, none of them explain polygyny in all species or even within one species under different selective pressures.

Regardless of species or selective pressures, polygyny should be advantageous to males because of its potential to increase their productivity. We found polygyny increased the number of offspring this male Golden-cheeked Warbler could produce in one breeding season. However, we do not know the paternity of offspring or if any of them survived to reproduce. The advantage for two females mating with this polygynous male instead of a monogamous one is less clear. The male assisted both females in feeding young, but we do not know the amount of assistance he provided to them compared to the amount of assistance a monogamous male would have provided. Polygyny did not appear to increase productivity of the two females; eventually both had only one successful brood. We would expect the same result if they had mated with a monogamous male, but it is possible the females' chances of producing young were greater by mating with a polygynous male on a higher quality territory than a monogamous one on a lower quality territory (Verner and Willson 1966, Orians 1969). We do not have data to examine how resources related to territory quality, like food abundance, affect productivity of this species.

Verner (1964) found nesting cycles of female Long-billed Marsh Wrens (*Telmatodytes palustris*) mated with polygynous males that assisted in feeding young were significantly staggered, so nestling stages did not overlap and the male could assist both females in feeding young while nesting cycles of females mated with polygynous males that did not assist in feeding young were synchronous. We believe this polygynous male Golden-cheeked Warbler increased the number of offspring produced in one breeding season because of differences in chronology of two successful nests. F1 was constructing her second nesting attempt and laying eggs in it when F2's third nesting attempt was in the incubation stage. Since F2 was no longer fertile and male Golden-cheeked Warblers do not assist in incubation, M1 could closely follow and attempt copulation with F1 while she was fertile and still assist F2 in feeding nestlings once eggs in her third nesting attempt hatched. Eggs of F1's second nesting attempt hatched a week after eggs of F2's third nesting attempt. After F2's third nesting attempt fledged, we located M1 and fledglings 20 m away from F1's second nesting attempt. Thus, he assisted F1 in feeding nestlings and continue to feed fledglings from F2's third nesting attempt.

These observations demonstrate polygyny appears to be an alternative mating strategy for Golden-cheeked Warblers. However, we are uncertain how prevalent this mating system is within the species. Male Golden-cheeked Warblers are frequently observed singing and closely following other females after they have already acquired a mate and begun nesting; behavior suggestive of polygyny. Furthermore, over the last seven years, we have observed polygynous behavior in male Golden-cheeked Warblers on 10 other occasions. For example, we observed one banded male alternating feeding trips between nestlings and two-week-old fledglings. We observed a different banded male intermittently singing a muted song and closely following an unbanded female as she constructed a nest, and later assisting a banded female in feeding nestlings at another nest. Unlike observations presented in this paper, those observations did not document the male with different females during nest construction and feeding nestlings at both nests because either we did not locate the nest during construction or nests failed before the eggs hatched. We recommend future studies of Golden-cheeked Warbler breeding ecology examine the prevalence of polygyny in this species as well as selective pressures that favor it.

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TEXAS BIRD RECORDS COMMITTEE REPORT FOR 2009

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The Texas Bird Records Committee (hereafter "TBRC" or "committee") of the Texas Ornithological Society requests and reviews documentation on any record of a TBRC Review List species (see TBRC web page at http://texasbirds.org/tbrc/ or Lockwood 2008). Annual reports of the committee's activities have appeared in the Bulletin of the Texas Ornithological Society since 1984. For more information about the Texas Ornithological Society or the TBRC, please visit www.texasbirds.org. The committee reached a final decision on 111 records during 2009: 92 records of 40 species were accepted and 19 records of 18 species were not accepted, an acceptance rate of 82.8% for this report. There were 147 observers who submitted documentation (to the TBRC or to other entities) that was reviewed by the committee during 2009.

In 2009, the TBRC did not accept any first state records. Therefore the official Texas State List remained at 634 species in good standing. This total does not include the four species listed on the Presumptive Species List.

In addition to the review of previously undocumented species, any committee member may request that a record of any species be reviewed. The committee requests written descriptions as well as photographs, video, and audio recordings if available. Information concerning a Review List species may be submitted to the committee secretary, Mark Lockwood, 402 E. Harriet Ave., Alpine, Texas 79830 (email: mark.lockwood@tpwd.state.tx.us). Guidelines for preparing rare bird documentation can be found in Dittmann and Lasley (1992) or at http://www.greglasley.net/document.html.

The records in this report are arranged taxonomically following the AOU Check-list of North American Birds (AOU 1998) through the 50th supplement (Banks et al. 2009). A number in parentheses after the species name represents the total number of accepted records in Texas for that species at the end of 2009. Species added to the Review List because of population declines in recent years do not have the total number of accepted records denoted as there are many documented records that are not subject to review (i.e., Brown Jay, Tamaulipas Crow, and Evening Grosbeak). All observers who submitted written documentation or photographs of accepted records are acknowledged by initials. If known, the initials of those who discovered a particular bird are in boldface but only if the discoverers submitted supporting documentation. The TBRC file number of each accepted record will follow the observers' initials. If photographs or video recordings are on file with the TBRC, the Texas Photo Record File (TPRF) (Texas A&M University) number is also given. If an audio recording of the bird is on file with the TBRC, the Texas Bird Sounds Library (TBSL) (Sam Houston State University) number is also given. Specimen records are denoted with an asterisk (*) followed by the institution where the specimen is housed and the catalog number. The information in each account is usually based on the information provided in the original submitted documentation; however, in some cases this information has been supplemented with a full range of dates the bird was present if that information was made available to the TBRC. All locations in italics are counties.

TBRC Membership—Members of the TBRC during 2009 who participated in decisions listed in this report were: Randy Pinkston, Chair, Keith Arnold, Academician, Mark Lockwood, Secretary, Eric Carpenter, Tim Fennell, Mary Gustafson, Brad McKinney, Cin-Ty Lee, Martin Reid, Willie Sekula and Ron Weeks. During 2009, McKinney's second term ended and Lee resigned because of other commitments; therefore, Tim Fennell and Mary Gustafson were elected as voting members. The Chair, Secretary and Academician were re-elected.

Contributors—**A&GM -** Alejandro & Gerda Martinez, **A&NK -** Amy & Noah Kearns, **AC -** Andrew Coker, **AC -** Arlie Cooksey, **AI -** Ada Ibarra, **AW** - Adam Wood, **BD -** Bill Daniel, **BFr -** Brush Freeman, **BGi -** Brian Gibbons, **BGr -** Beverly Grange, **BH -** Berlin Heck, **BK -** Barry Kinch, **BMc -** Brad McKinney, **BP -** Barrett Pierce,

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This Purple Sandpiper made its home on the South Padre Island jetty, Cameron Co. from 29 November 2008–26 May 2009, an amazingly long stay. Photograph by Fernando Cerra.

BSa - Billy Sandifer, **BSt** - Bob Stone, **BZ** - Barry Zimmer, **CaC** - Cameron Cox, **CCa** - Catherine Carroll, **CCo** - Charles Coker, **CE** - Carol Edwards, **CH** - Chris Harrison, **CJ** - Cynthia Johnson, **CL** - Chuck Lorenz, **CMc** - Connie McIntyre, **CMo** - Carla Morey, **CN** - Chris Neri, **CR** - Chris Runk, **CSm** - Charles Smith, **CSp** - Charie Spiekerman, **CTa** - Christopher Taylor, **CTL** - Cin-Ty Lee, **D&SM** - Dean & Susi Mitchell, **DBe** - David Benn, **DBo** - Devin Bosler, **DDC** - D. D. Currie, **DDi** - Drew Dickert, **DEl** - David Elkowitz, **DeM** - Derek Muschalek, **DEn** - Dodge Engleman, **DJ** - Delyse Jaeger, **DK** - Dan Kaspar, **DLa** - David Larson, **DLe** - Daniel Lebbin, **DMc** - David McDonald, **DMu** - Dan Murray, **DSa** - David Sarkozi, **DSc** - Deborah Scoggins, **DV** - Don Verser, **EB** - Erik Breden, **EC** - Eric Carpenter, **FB** - Frank Bumgardner, **FC** - Fernando Cerra, **GB** - Gene Blacklock, **GH** - Gilberto Hernandez, **GLa** - Greg Lavaty, **GM** - Gail Morris, **HW** - Howard Williams, **IL** - Ian Lewington, **JA** - John Arvin, **JaH** - Jake Herring, **JaP** - Jay Packer, **JB** - Jim Burns, **JGr** - John Groves, **JHa** - John Haynes, **JHe** - John Heaney, **JHu** - John Huckabee, **JiP** - Jimmy Paz, **JKa** - Joanne Kamo, **JKe** - John Kendall, **JM** - Jon McIntyre, **JoG** - Joe Grzybowski, **JPa** - Jim Paton, **JRe** - Jim Renfro, **JRi** - Jamie Ritter, **JRo** - Joshua Rose, **JZ** - Jimmy Zabriskie, **KA** - Keith Arnold, **KaL** - Kathleen Lacy, **KB** - Kelly Bryan, **KLa** - Kendal Larson, **KO** - Karl Overman, **LA** - Linda Alley, **LBa** - Lynn Barber, **LBr** - Lamont Brown, **LG** - Lorna Graham, **MA** - Mike Austin, **MaH** - Martin Hagne, **MBe** - Mikael Behrens, **MBS** - Mary Beth Stowe, **MC** - Mel Cooksey, **MF** - Mark Flippo, **MGr** - Michael Gray, **MGu** - Mary Gustafson, **MHa** - Martyn Hall, **MiR** - Micheal Retter, **MKl** - Mark Klym, **MKo** - Marcin Kojtka, **ML** - Mark Lockwood, **MLi** - Michael Lindsey, **MM** - Matthew Matthiessen, **MQ** - Maretin Quest, **MR** - Martin Reid, **MSc** - Marcy Scott, **MSm** - Macklin Smith, **NB** - Noreen Baker, **NN** - Nancy Norman, **P&RA** - Pam & Reid Allen, **PB** - Peter Billingham, **PD** - Pat DeWenter, **PH** - Petra Hockey, **PS** - Paul Sunby, **PT** - Phillip Terrell, **RB** - Rik Brittain, **RCh** - Russ Chantler, **RCr** - Robert Creglow, **RD** - Richard Damron, **RK** - Rich Kostecke, **RMe** - Rick Mellon, **RoM** - Rob Meade, **RPi** - Randy Pinkston, **RRe** - Roy Reinarz, **RRo** - Roy Rodriguez, **RRu** - Roger Russell, **RS** - Rex Stanford, **RW** - Ron Weeks, **SC** - Sheridan Coffey,

A female Crimson-collared Grosbeak was at the Frontera Audubon Sanctuary in Weslaco, Hidalgo Co., from 14 December 2008–14 April 2009. Photograph by Daniel Lebbin/American Bird Conservancy.

SF - Sean Fitzgerald, **SH** - Steve N.G. Howell, **SR** - Susan Riley, **SS** - Sam Strickland, **TA** - Tony Amos, **TC** - Tom Collins, **TeF** - Terry Ferguson, **TEl** - Taylor Ellis, **TEu** - Ted Eubanks, **TFe** - Tim Fennell, **TFr** - Tony Frank, **TFu** - Terry Fuller, **TH** - Troy Hibbits, **TM** - Terry McKee, **TP** - Tommy Power, **TP** - Tom Pendleton, **TR** - Thomas Roberts, **TSc** - Thomas Schulenberg, **TSe** - Ted Sears, **WB** - William Baker, **WS** - Willie Sekula.

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Additional Abbreviations—AOU = American Ornithologists' Union; NP = National Park; NWR = National Wildlife Refuge; SHS = State Historic Site; SNA = State Natural Area; SP = State Park; TBSL = Texas Bird Sounds Library (Sam Houston State University); TCWC = Texas Cooperative Wildlife Collection (Texas A&M University); WMA = Wildlife Management Area.

ACCEPTED RECORDS

Brant (*Branta bernicla*) (28). Two near Loyola Beach, *Kleberg*, on 22 November 2008 (RCr; 2008-99). One at Lubbock, *Lubbock*, from 2–10 December 2008 (**BGi**; 2008-105; TPRF 2690). One at Brazoria NWR, *Brazoria*, from 26 July–5 August 2009 (**JKa**, **GLa**, MLi, PS, DEn; 2009-63; TPRF 2737).

Eurasian Wigeon (*Anas penelope*) (49). A male at El Paso, *El Paso*, from 2 January–16 February 2009 (JGr; 2009-12; TPRF 2704). A male at Tornillo Reservoir, *El Paso*, on 21 March 2009 (**JPa**; 2009-22; TPRF 2709).

Masked Duck (*Nomonyx dominicus*) (82). Up to five at the East Lake unit of Lower Rio Grande Valley NWR, *Willacy*, from 14 December 2008–10 January 2009 (RS, DLe, LBa, DBo, PD, RRo, JM, GH, MHa, MBS, JHe, JRo; 2008-110; TPRF 2695). One near Delta Lake County Park, *Willacy*, from 14–23 January 2009 (**PH**; 2009-11). One at the

Unprecedented for summer, this very worn Brant was discovered at Brazoria N.W.R., Brazoria Co. on 26 July 2009. Photograph by Joanne Kamo.

Teniente unit of Lower Rio Grande Valley NWR, *Willacy*, from 30 January–1 February 2009 (CCa, KO; 2009–13; TPRF 2705). Up to two at Laguna Atascosa NWR, *Cameron*, from 16 March–30 May 2009 (**RS**, WB, CH, SF, BZ, EB; 2009-23; TPRF 2710). One at Estero Llano Grande SP, *Hidalgo*, on 1 April 2009 (RMe; 2009-34; TPRF 2716).

Red-necked Grebe (*Podiceps grisegena*) (22). One at Cox Bay, *Calhoun*, from 23–24 February 2009 (**BFr**; 2009-18). One in near alternate plumage on Lake Buchanan, *Llano*, from 15–24 March 2009 (**TFe**, EC; 2009-21; TPRF 2708).

Greater Shearwater (*Puffinus gravis*) (15). A specimen found on Mustang Island, *Nueces*, on 10 October 2006 (**TA**, KA; 2009-29; TPRF 2714; *TCWC 14,668).

Sooty Shearwater (*Puffinus griseus*) (15). A specimen found on Mustang Island, *Nueces*, on 11 June 2007 (**TA**, KA; 2009-28; TPRF 2713; *TCWC 14,625). One off South Padre Island, *Cameron*, on 19 September 2009 (**CH**, **BMc**, **EC**, **RPi**; 2009-78; TPRF 2745).

Leach's Storm-Petrel (*Oceanodroma leucorhoa*) (28). Two off South Padre Island, *Cameron*, on 25 July 2009 (**MGu**, **TH**, **CH**, **BMc**, **RPi**, **RRe**; 2009-62; TPRF 2736). Two off South Padre Island, *Cameron*, on 29 August 2009 (**BMc**, **MGu**; 2009-73; TPRF 2743).

Brown Booby (*Sula leucogaster*) (31). One at Quintana, *Brazoria*, on 19 August 2008 (**MR**; 2009-16; TPRF 2707).

Red-footed Booby (*Sula sula*) (3). A specimen found at Rockport, Aransas, on 2 October 2002

Black-legged Kittiwake are rare inland and more surprising were two at McNary Res., Hudspeth Co., from 16 November 2008–14 February 2009. Photograph by Mark Lockwood.

A great find was this heavily worn Kelp Gull at Quintana, Brazoria Co., from 8 November–24 December 2008. Photograph by Michael Lindsey.

(**TA**, KA; 2009-27; TPRF 2712; *TCWC 14,626). A specimen found at Galveston, *Galveston*, on 12 June 2008 (TEu, KA; 2009-05; TPRF 2899; *TCWC 14,601).

Jabiru (*Jabiru mycteria*) (10). An adult at Nueces Delta Preserve, *San Patricio*, on 10 June 2009 (**GB**, **JaH**, **CSp**; 2009-56; TPRF 2731). One at San Benito, *Cameron*, on 20 September 2009 (**TFu**; 2009-81).

Short-tailed Hawk (*Buteo brachyurus*) (35). A dark-morph individual at Troup, *Smith*, on 6 October 2008 (BGr; 2008-97; TPRF 2684).

Surfbird (*Aphriza virgata*) (10). One at Port Aransas, *Nueces*, from 1–9 May 2009 (**MGr**, RD, RB, LBa, NB, AW; 2009-40; TPRF 2722).

Purple Sandpiper (*Calidris maritima*) (20). One at South Padre Island, *Cameron*, from 29 November 2008–26 May 2009 (**NN**, MaH, P&RA, MR, BMc, LBr, RRo, FC, JM, SF BH; 2008-102; TPRF 2688). One at Port Aransas, *Nueces*, on 22 February 2009 (**MC**, MKo; 2009-26; TPRF 2711).

Curlew Sandpiper (*Calidris ferruginea*) (12). One at Corpus Christi, *Nueces*, from 17 August–4 September 2009 (**MC**, CTa, TFe, LBa, DeM; 2009-71; TPRF 2741).

Black-legged Kittiwake (*Rissa tridactyla*) (81). Up to two at McNary Reservoir, *Hudspeth*, from 16 November 2008–14 February 2009 (**JPa**, MSc, DLa, JGr, ML, BZ, JZ; 2008-96; TPRF 2683). One adult at South Padre Island, *Cameron*, from 27 March–13 April 2009 (**DR**, PW; 2009-30; TPRF 2715). Two (one adult and one first-winter) at Bolivar Peninsula, *Galveston*, from 13-15 April 2009 (**MiR**, CaC; 2009-55; TPRF 2730).

Little Gull (*Hydrocoloeus minutus*) (58). One adult and one first-winter bird at Lake Ray Hubbard, *Dallas*, from 30 December 2008–23 January 2009 (CR; 2009-17). One adult at White Rock Lake, *Dallas*, from 2 January–15 February 2009 (CR; 2009-24).

Mew Gull (*Larus canus*) (34). A first-winter bird at White Rock Lake, *Dallas*, from 22 December 2008–19 January 2009 (**CR**, BSt; 2008-111; TPRF 2696).

Yellow-legged Gull (*Larus michahellis*) (2). A first-winter bird at Corpus Christi, *Nueces*, 24 January–4 April 2004 (**WS**, MR, BP, MA, FB; 2004-15; TPRF 2673).

Kelp Gull (*Larus dominicanus*) (5). An adult at Quintana, *Brazoria*, from 8 November–24 December 2008 (**RW**, CTL, MLi, DBo, JaP, DMc, KO; 2008-94; TPRF 2681). A first-winter bird at Quintana, *Brazoria*, on 19 December 2008 (**MR**; 2009-01; TPRF 2697).

Brown Noddy (*Anous stolidus*) (18). One on Padre Island National Seashore, *Kleberg*, on 10 June 2009 (**BSa**; 2009-57; TPRF 2732). One on a petroleum platform off *Matagorda* on 8 July 2009 (**KLa**; 2009-60; TPRF 2735). Up to two at Port Aransas, *Nueces/Aransas*, from 8 August–8 September 2009 (**JM**, MA, AC, MC, TFr, TFe, RPi; 2009-72; TPRF 2742).

Brown/Black Noddy (*Anous stolidus/minutus*). One on a petroleum platform off Port Mansfield, *Willacy*, on 10 June 2008 (**AC**, **CCo**; 2008-51; TPRF 2675). Originally submitted as a Brown Noddy and not accepted as that species although the images provided in the documentation clearly showed an *Anous* species.

Ruddy Ground-Dove (*Columbina talpacoti*) (19). An adult male at Balmorhea Lake, *Reeves*, on 11 October 2008 (**TeF**; 2008-86; TPRF 2678). An adult female near San Angelo, *Tom Green*, from 11 December 2008–29 March 2009 (JaP, NB, KaL; 2009-07; TPRF 2701).

Mangrove Cuckoo (*Coccyzus minor*) (11). One at Laguna Atascosa NWR, *Cameron*, on 30 August 2009 (**TFu**; 2009-82; TPRF 2747).

Green Violetear (*Colibri thalassinus*) (67). One at Corpus Christi, *Nueces*, on 17 April 2009 (**LA**; 2009-35; TPRF 2717). One at Ingram, *Kerr*, from 19 May–29 June 2009 (MM, MKl; 2009-58; TPRF 2733). One at Bentsen-Rio Grande Valley SP, *Hidalgo*, on 20 May 2009 (**MGu**; 2009-49). One at Sonora, *Sonora*, from 26–27 May 2009 (**DJ**; 2009-50; TPRF 2728). One in *Gillespie* from 28 May–3 June 2009 (TC, CJ; 2009-52; TPRF 2729). One near Leakey, *Real*, from 21 June–24 July 2009 (**D&SM**; 2009-59; TPRF 2734). One near Grapeland, *Houston*, on 15 August 2009 (**JRe**; 2009-69; TPRF 2740).

Green-breasted Mango (*Anthracothorax prevostii*) (20). An immature bird in n. *Hays* from 1–2 August 2009 (**SS**; 2009-68; TPRF 2739). An immature bird at Corpus Christi, *Nueces*, on 12 August 2009 (**LA**; 2009-80; TPRF 2746).

White-eared Hummingbird (*Hylocharis leucotis*) (31). Up to 8 at the Davis Mountains Resort, *Jeff Davis*, from 7 April–14 September 2009 (ML, KB, RPi; 2009-32; TPRF 2771).

Violet-crowned Hummingbird (*Amazilia violiceps*) (16). One at Fort Davis, *Jeff Davis*, from 18 August–30 October 2008 (ML, CE, KB; 2008-73; TPRF 2676). One at Fort Stockton, *Pecos*, from 1 November 2008–8 January 2009 (**A&GM**, KB; 2008-104; TPRF 2689). One at Fort Davis, *Jeff Davis*, from 13 January–13 February 2009 (**CE**, KB; 2009-06; TPRF 2700).

Costa's Hummingbird (*Calypte costae*) (29). An adult male at Alpine, *Brewster*, from 16 September 2008–25 January 2009 (**ML**; 2008-85; TPRF 2677). An immature male at the Christmas Mountains, *Brewster*, on 19 October 2008 (**KB**; 2008-106; TPRF 2691). An immature male at Dripping Springs, *Hays*, from 17 November–15 December 2008 (**HW**, RPi; 2008-98; TPRF 2685). An immature male at Terlingua, *Brewster*, from 26 January–8 February 2009 (**MF**; 2009-19). An adult male at El Paso, *El Paso*, on 10 February 2009 (**BZ**; 2009-15; TPRF 2706). An adult male at Alpine, *Brewster*, from 3 September–19 October 2009 (**ML**; 2009-76; TPRF 2744). An adult male at Terlingua, *Brewster*, from 6 September–31 December 2009 (**MF**; 2009-83; TPRF 2748). An immature male at El Paso, *El Paso*, on 15 September 2009 (**BZ**; 2009-84).

Buff-breasted Flycatcher (*Empidonax fulvifrons*) (23). Two at Madera Canyon, Davis Mountains Preserve, *Jeff Davis*, from 12 April–27 July 2009 (**ML**; 2009-36; TPRF 2718). One at Road and Wolf Den Canyons, Davis Mountains Preserve, *Jeff Davis*, from 18 April–27 July 2009 (ML; 2009-43; TPRF 2725). Two in upper Madera Canyon, Davis Mountains Preserve, *Jeff Davis*, from 1 May–4 July 2009 (**ML**, RPi; 2009-37; TPRF 2719).

Dusky-capped Flycatcher (*Myiarchus tuberculifer*) (46). One at Sabal Palm Sanctuary, *Cameron*, from 5 November 2008–4 March 2009 (CL, KO, JiP; 2008-108; TPRF 2693). One near Brownsville, *Cameron*, on 14 January 2009 (**DBe**; 2009-09). A pair near Tobe Spring, Davis Mountains Preserve, *Jeff Davis*, from 1 May–4 July 2009 (**ML**, RPi; 2009-38; TPRF 2720). Two near Pinnacles Pass, Chisos Mountains, Big Bend NP, *Brewster*, from 3 May–18 July 2009 (EC; 2009-53). A pair near Pewee Spring, Davis Mountains Preserve, *Jeff Davis*, on 16 May 2009 (**ML**; 2009-44; TPRF 2726). Up to four at No-Name Canyon, Davis Mountains Preserve, *Jeff Davis*, on 23 May 2009 (**ML**; 2009-48; TPRF 2727).

Social Flycatcher (*Myiozetetes similis*) (3). A specimen located in the British Museum collected in *Cameron* on 15 February 1895 (**SH**, **IL**; 2009-39; TPRF 2721; *BMNH 98-7-12-88).

Sulphur-bellied/Streaked Flycatcher (*Myiodynastes luteiventris/maculatus*). One at Sabine Pass, *Jefferson*, from 10–11 September 2007 (**JHa**; 2007-05). Originally submitted as a Sulphur-bellied Flycatcher and not accepted as that species. Written details did not exclude Streaked Flycatcher as an alternate identification but were sufficient for acceptance as one of these two species.

Piratic/Variegated Flycatcher (*Legatus leucophaius*/*Empidonomus varius*). One at Houston, *Harris*, on 29 May 2006 (**DDi**, **MQ**; 2007-53; TPRF 2674). Originally submitted as a Variegated Flycatcher and not accepted as that species. Photos provided with the documentation eliminated other similar species but were not sufficient to allow species level identification beyond Piratic/Variegated Flycatcher.

Rose-throated Becard (*Pachyramphus aglaiae*) (40). An immature male at Estero Llano Grande SP, *Hidalgo*, from 6 November 2008–15 April 2009 (**WS**, MR, MGu, LBr, KO, DMc, SF; 2008-92; TPRF 2680). An immature male at Salineno, *Starr*, from 22 November–6 December 2008 (MGu; 2008-100; TPRF 2686).

Black-whiskered Vireo (*Vireo altiloquus*) (31). One at Sea Rim S.P., *Jefferson*, from 16–17 April 2009 (LBa; 2009-41; TPRF 2723). One at High Island, *Galveston*, from 30 April–3 May (GLa, JKa; 2009-42; TPRF 2724). One at Bellaire, *Harris*, on 10 May 2009 (**DV**; 2009-46). One at Port Aransas, *Nueces* on 12 May 2009 (**LBr**; 2009-47).

Rufous-backed Robin (*Turdus rufopalliatus*) (14). One at El Paso, *El Paso*, from 26–28 November 2008 (**JPa**, BZ; 2008-101; TPRF 2687).

Varied Thrush (*Ixoreus naevius*) (37). A male at Pine Canyon, Guadalupe Mountains NP, *Culberson*, on 31 October 2008 (**TEl**; 2008-95; TPRF 2682).

Rufous-capped Warbler (*Basileuterus rufifrons*) (25). Two along the Window Trail, Big Bend NP, *Brewster*, from 17 July–15 September 2009 (**BZ**, TSc; 2009-67; TPRF 2772).

Golden-crowned Sparrow (*Zonotrichia atricapilla*) (34). An adult in w. *Tarrant* on 25 October 2008 (**BD**, DDC, PB; 2008-89; TPRF 2679).

Flame-colored Tanager (*Piranga bidentata*) (8). A female in Boot Canyon, Big Bend NP, *Brewster*, on 18 July 2009 (**BZ**; 2009-66).

Crimson-collared Grosbeak (*Rhodothraupis celaeno*) (19). A female at the Frontera Audubon Sanctuary, Weslaco, *Hidalgo*, from 14 December 2008–14 April 2009 (**JRi**, RS, DBo, DLe, LBa, PD, MR, RRo, LBr, MBS, KO, DMc; 2008-109; TPRF 2694).

Blue Bunting (*Cyanocompsa parellina*) (34). A female at Frontera Audubon Sanctuary, Weslaco, *Hidalgo*, from 6 December 2008–1 May 2009 (MGu, DLe, LBa, PD, MR, RRo, LBr, TR, TP, KO, DMu, JM, SF; 2008-107; TPRF 2692). Two at Bentsen-Rio Grande Valley SP, *Hidalgo*, from 7 January–24 March 2009 (**LG**, MR, JRo, RCh, EB, A&NK; 2009-04; TPRF 2698). A male at Estero Llano Grande SP, *Hidalgo*, from 10 January–24 February 2009 (MGu, RS, RRo; 2009-08; TPRF 2702). Two at Laguna Atascosa NWR, *Cameron*, from 15 January–19 April 2009 (CN, RS, LBr, DMc, RRu; 2009-10; TPRF 2703).

Evening Grosbeak (*Coccothraustes vespertinus*). A male at El Paso, *El Paso*, from 15–16 June 2009 (**AI**, JGr; 2009-64; TPRF 2738).

ADDENDUM

American Flamingo (*Phoenicopterus ruber*) (7). An American Flamingo banded at the Ría Lagartos Biosphere Reserve, Yucatan, Mexico in August 2005 has been seen intermittently along the Texas coast since 14 October 2005. This individual reappeared at Freeport, *Brazoria*, from 16–17 May 2009 (DSa, TFr, TP) and in *Jackson* 15 August 2009 (SR; 2005-128; TPRF 2354).

Little Gull (*Hydrocoloeus minutus*). The adult reported in the 2008 annual report from Lake Ray Roberts, *Dallas*, on 16 December 2007 (2007-95; TPRF 2526) was actually found at Lake Ray Hubbard.

NOT ACCEPTED

A number of factors may contribute to a record being denied acceptance. It is quite uncommon for a record to not be accepted because the bird was obviously misidentified. More commonly, a record is not accepted because the material submitted was incomplete, insufficient, superficial, or just too vague to properly document the reported occurrence while eliminating *all* other similar species. Also, written documentation or descriptions prepared *entirely from memory* weeks, months, or years after a sighting are seldom voted on favorably. It is important that the simple act of not accepting a particular record should by no means indicate that the TBRC or any of its members feel the record did not occur as reported. The non-acceptance of any record simply reflects the opinion of the TBRC that the documentation, as submitted, did not meet the rigorous standards appropriate for adding data to the formal historical record. The TBRC makes every effort to be as fair and objective as possible regarding each record. If the committee is unsure about any particular record, it prefers to err on the conservative side and not accept a good record rather than validate a bad one. All records, whether accepted or not, remain on file and can be re-submitted to the committee if additional substantive material is presented.

Trumpeter Swan (*Cygnus buccinator*). Dublin, *Erath*, from 3 January–20 February 2009 (2009-14).

Masked Duck (*Nomonyx dominicus*). Guadalupe River Delta, *Calhoun*, on 29 November 2008 (2008-103).

Red-billed Tropicbird (*Phaethon aethereus*). Two in Aransas Bay, *Aransas*, on 21 May 2009 (2009-54).

Wood Sandpiper (*Tringa glareola*). Balmorhea Lake, *Reeves*, on 29 August 2008 (2008-93).

Black-legged Kittiwake (*Rissa tridactyla*). Quintana, *Brazoria*, on 14 December 2008 (2009-31).

Brown Noddy (*Anous stolidus*). Off Port Mansfield, *Willacy*, on 10 June 2008 (2008-51). 14 miles east of Port Aransas, *Nueces*, from 11–13 July 2008 (2008-62). TBRC 2008-51 was accepted as a Brown/Black Noddy (see above).

Ruddy Ground-Dove (*Columbina talpacoti*). Rio Grande Village, Big Bend NP, *Brewster*, on 1 May 2009 (2009-45).

Berylline Hummingbird (*Amazilia beryllina*). Window Trail, Big Bend NP, *Brewster*, on 29 July 2009 (2009-74).

Gila Woodpecker (*Melanerpes uropygialis*). Wichita Falls, *Wichita*, on 30 June 2008 (2008-74).

Greater Pewee (*Contopus pertinax*). Window Trail, Big Bend NP, *Brewster*, on 8 September 2009 (2009-79).

Pine Flycatcher (*Empidonax affinis*). Choke Canyon S.P., *McMullen*, from 13 December 2008-15 March 2009 (2009-02).

Tamaulipas Crow (*Corvus imparatus*). Brownsville Sanitary Landfill, *Cameron*, on 1 May 2009 (2009-70).

Connecticut Warbler (*Oporornis agilis*). Weslaco, *Hidalgo*, on 24 April 2003 (2009-51).

Slate-throated Redstart (*Myioborus miniatus*). Near Dripping Springs, *Hays*, on 24 July 2009 (2009-65).

Baird's Sparrow (*Ammodramus bairdii*). Near Sam Nail Ranchsite, Big Bend NP, *Brewster*, on 14 May 2008 (2008-40).

Dark-eyed (White-winged) Junco (*Junco hyemalis aikeni*). Dripping Springs, *Hays*, on 31 December 2008 (2009-03).

Black-vented Oriole (*Icterus wagleri*). Ingleside, *San Patricio*, on 16 September 2009 (2009-77).

Black-headed Siskin (*Spinus notata*). South Padre Island, *Cameron*, on 4 March 2009 (2009-20). The identification of this bird was not in question; the record was not accepted because of questions about provenance.

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PRODUCTIVITY IN AN URBAN WHITE-WINGED DOVE POPULATION ON THE EDWARDS PLATEAU, TEXAS

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ABSTRACT.—Eastern White-winged Doves (*Zenaida asiatica asiatica*) in Texas have expanded northward since about 1920 and established urban populations throughout the state. Although nest success has been measured indirectly using indices, actual productivity has yet to be thoroughly investigated. We were interested in determining recruitment into a White-winged Dove population with a known area of occupancy by measuring productivity (nest success and estimated fledgling survivorship). We used nest monitoring and mark-recapture techniques to assess these parameters in Mason, Texas (Mason County) from 25 May–11 August 2006.

Prior to 1920, Eastern White-winged Dove (*Zenaida asiatica asiatica*) breeding populations in Texas were primarily restricted to colonial nesting in riparian habitat along the Rio Grande delta at the state's southernmost tip (Schwertner et al. 2002; Small et al. 2006). This four-county region (Cameron, Hidalgo, Willacy, Starr) is traditionally known as the Lower Rio Grande Valley (LRGV) (Oberholser 1974). Since about 1900 agricultural and municipal developments resulted in destruction of >95% of native vegetation in the LRGV (Butterwick and Strong 1976, Jahrsdoerfer and Leslie 1988, Purdy and Tomlinson 1982, 1991).

Coinciding with habitat loss in the LRGV and continuing to present, White-winged Doves have been expanding their breeding range northward throughout Texas (George et al. 1994, Small et al. 2007). White-winged Doves outside the LRGV have become urban obligate breeders and some have become resident (Small et al. 2005, 2006, 2007) successfully breeding year-round (Hayslette and Hayslette 1999). Presently, more White-winged Doves breed outside the traditional LRGV than within (Schwertner et al. 2002).

Although White-winged Doves outside the LRGV have become dependent on urban areas for nesting sites, they continue to aggregate in large flocks in fall venturing outside urban areas in morning and evening feeding flights (Cottam and Trefethen 1968, Small et al. 2006) to forage in natural plant communities or agricultural tracts.

Urban nesting White-winged Doves remain available as a renewable resource for hunters because of these flights. It is important to understand demographic dynamics of these urban populations (Walters 1986). Our objectives were to 1) determine White-winged Dove productivity, 2) determine survivorship of fledged White-winged Doves, and 3) determine whether recruitment correlates with changes in population size during the breeding season.

METHODS

Study Area.—We conducted our study in and around Mason, Texas (Mason County) of the Edwards Plateau ecoregion (Gould et al. 1960). Mason (30.750° N, 99.230° W) encompasses 958.3 ha and has a human population of about 2,211 (City-data.com 2005). We classified urban residential land using the 1992 National Land Cover Data Set (NLCD) (U.S. Geological Survey 1999). The 1992 land classification system categorizes urban residential areas as low intensity or high intensity. Schwertner and Johnson (2005) showed about 95% of White-winged Doves in Mason inhabit urban residential areas and the area outward to 500 m.

We imported a NLCD 1992 map of Mason and surrounding area into geographic information systems (GIS) using ArcGIS version 9.2 (Environmental Systems Research Institute, Inc., Redlands, CA, USA) software (Fig. 1a). We then converted the map from a raster (pixel) file to a polygon file and removed all land classifications except urban residential (Fig. 1b). We

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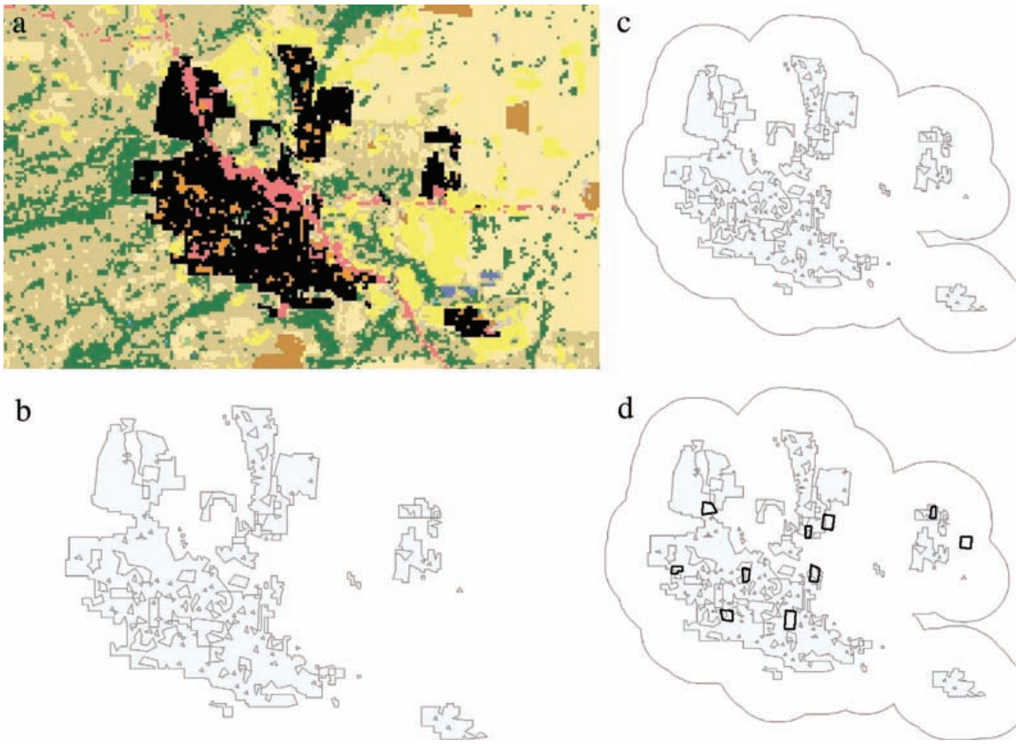

Figure 1. Depiction of Mason, Texas and surrounding area (a) using 1992 National Land Cover Dataset categories (black area designates residential areas), (b) with only residential areas visible, (c) with residential areas plus a 500-m buffer, and (d) with randomly selected study areas overlaid (dark black polygons).

then created a 500-m buffer around the urban residential land classification, thus designating our sample area (Fig. 1c).

We randomly selected 10 survey points for nesting White-winged Doves within Mason using GIS. We obtained landowner permission to access property from each point outward until contiguous plots of a minimum size of 0.75 ha were reached. All plots were polygons and ranged in size from 0.75 to 2.50 ha (Fig. 1d). Flexibility in plot size was necessary because private properties varied in size. The number of points and size of plots were chosen to ensure searches could be conducted by two individuals.

Nest Surveys.—We searched each plot for White-winged Dove nests from 25 May to 11 August 2006 (79 days). Searches for active White-winged Dove nests on each plot were conducted on the first and second day of each week. Although we did not count the number of trees per plot, we estimated potential nest tree density (any woody plant ≥2 m in height) (Cottam and Trefethen 1968) as 75 trees per ha. Nest height and tree species were recorded. Newly located nests were checked on the fourth day of the first week to confirm active status. Nests were designated as active if an adult was present on two consecutive visits. Nests were confirmed as active (i.e., at least one egg or nestling present) and monitored on the fourth and fifth days of each week using a wireless camera on an extendable pole with an LCD monitor (TreeTop Peeper 4, Sandpiper Technologies, Inc., Manteca, CA, USA). We searched for new nests each day.

We monitored all nests until abandoned and categorized each nest as successful (at least one young fledged) or unsuccessful (no young fledged). For unsuccessful nests, we attempted to determine cause of failure through observation of the nest site and adjacent area. Nest failures were categorized as abandoned, predation, destroyed, or unknown. Nests were assigned an unknown fate if the nest monitoring period ended prior to a determinable nest outcome. In addition, we determined number of young fledged for each nest (0, 1, or 2). These data were used to calculate empirical fledging success and compared to the Mayfield method, which estimates nest success based on survival days (Mayfield 1961, 1975).

Verification of Peak Productivity Period.—We tested our assumption that peak population size would coincide with peak production by having our monitoring period coincide with the peak of White-winged Dove productivity (Small et al. 2009).

We also trapped and banded White-winged Doves on 160 days from January through August 2006 to determine if peak captures of hatching-year (HY) doves coincided with maximum population size. We trapped White-winged Doves using standard wire funnel traps (92 × 60 × 15 cm; Reeves et al. 1968) baited with a mixture of commercial chicken scratch, black oil sunflower seeds, sorghum, and commercial wild bird feed (Purina Corp, St. Louis, MO, USA). We set 12–18 traps each day with trap location and spacing based on convenience; we located areas where White-winged Doves were feeding and set traps contingent on landowner permission. This was acceptable because the sample area was relatively small and White-winged Doves are capable of long feeding flights (Cottam and Trefethen 1968) making it reasonable to assume all individuals had an equal opportunity to be captured (White and Garrott 1990). We marked all captured birds with U.S. Fish and Wildlife Service numbered aluminum butt-end bands and recorded all captures and recaptures.

We established distance sampling point transects for morning and evening sampling using GIS and selected a pool of 125 random points within the entire sample area (i.e., urban and non-urban buffer) along roads (Breeden 2005). From this pool of points, we established six random subsets of 20 points. We learned from trial sampling 20 points per day could reasonably be surveyed within 2 h post-sunrise and pre-sunset, and 100 points across 5 days would provide sufficient observations to construct a probability of detection model which fit the data (Buckland et al. 2001). This also provided an additional five points to select from should access to any of the pre-selected points proved unobtainable. Model fit was evaluated using a Kolmogorov-Smirnov test (Sokal and Rohlf 1994) and considered a fit at $P \geq 0.25$. Different combinations of 20 points, chosen randomly from the pool of 125 points, were used for each weekly distance sampling transect, so we cycled through each group of 120 points every 6 days. Consequently, the majority of points sampled for each paired (morning and evening) sample period differed.

Productivity Analysis.—We determined total young fledged for the nest monitoring period from nest surveys. Total area of all sample plots was calculated using the area calculation function in ArcGIS version 9.0. We then computed the area of sample plots in the residential land classification and buffer area and calculated total sample area surveyed for each classification.

Mean number of young fledged per ha for plots was determined. Also, because some plots included both residential and non-residential areas, the percentage of mean young fledged per ha was calculated separately for land cover types to assess whether productivity by land classification (residential versus non-residential) differed. Because our sample design was random, we assumed productivity by land classification was representative, and extrapolated our sample calculations to the entire study area.

We used Program MARK (White and Burnham 1999) to estimate survivorship of HY White-winged Doves for the sample period by analyzing capture histories from our mark-recapture data and used recaptures only models with a sin link function and 2[nd] part variance estimation. We analyzed data using 20-day time-steps and compared four competing models estimating survivorship (Φ) and probability of capture (p) with and without time dependence. We used Akaikie Information Criterion corrected for small sample size (AICc) to ascertain the most parsimonious model (Burnham and Anderson 2002). Hatching year survivorship for the 79-day nest monitoring period was calculated by raising the 20-day survivorship estimate to exponent 3.95 (79/20 days) because survivorship was time-independent, and we determined a negative exponential survivorship curve was reasonable for this study.

All activities were conducted in accordance with Texas State University – San Marcos IACUC approval # 06-05CC59736D, state permit # SPR-0890-234, and federal permit # 06827.

RESULTS

Nest Surveys.—Our total study area encompassed 1,457.6 ha of which 314.5 ha (21.6%) was residential and 1,143.1 ha (78.4%) non-residential. Study plots ranged in area from 0.8 to 1.6 ha ($\bar{x}$ = 1.5 ha, sd = 0.55) and totaled 14.8 ha. Of this total 8.6 ha (58.3%) occurred in the residential land cover type and 6.2 ha (41.7%) non-residential.

We located 139 active nests. Eighteen (13.0%) had an unknown fate, 54 (38.8%) failed, one (0.7%) fledged one young, and 66 (47.5%) fledged two young for a total of 133 young. Nests failed because of predation, abandonment, or destruction. Nests with known fates produced a mean of 1.1 (SE = 0.1) young per nest. Empirical nest success was 55.4%.

Verification of Peak Productivity Period.—The estimated population size for the study area was lowest in February (1,060, 95% CI = 842-1,334) and highest in late July (4,742, 95% CI = 3,894-5,574; Fig. 1). Additionally, population size estimates derived from distance sampling from 17 May to 11 August, which encompassed the nest monitoring period showed a strong, increasing linear relationship over time ($r^2 = 1.0$, $F_{1, 4} = 3.67 \times 10^{30}$, $P < 0.001$). The estimated increase from 17 May to 11 August was 3,391 (95% CI = 2,821-4,073) and 2,513 (95% CI = 1,982-3,182) for the nest monitoring period. The first HY White-winged Doves were captured in April 2006 ($n = 6$). New HY captures from April through August 2006 increased linearly over time ($r^2 = 0.90$, $F_{1, 3} = 27.19$, $P = 0.01$). In particular, July and August 2006 had similar numbers of new HY captures with 234 and 247, respectively. Number of active nests per week indicated two peaks; one from 12–23 June and a second from 10–28 July (Fig. 2a). New weekly HY captures showed the same pattern, with a slight time delay, which allowed time for fledging (Fig. 2)

Productivity Analysis.—Extrapolating data from our study plots to the study area as a whole gave an estimated 2,710 White-winged Doves fledged in residential areas (8.6 fledged per ha) and 4,289 fledged in non-residential areas (3.8 fledged per ha) during the sampling period. Thus, an estimated 6,999 White-winged Doves fledged in the entire sampling area over the 78-day monitoring period (90 fledged/day).

We trapped 779 HY White-winged Doves on 71 trap-days from 27 April through 31 August 2006. We had 115 HY recaptures during this period. The most parsimonious survivorship model was $\Phi(.)p(\text{t})$ (AICc weight = 0.96). The 20-day survivorship estimate was 0.71 (95% CI = 0.39-0.91), thus survivorship for the 79-day nest monitoring period was $0.71^{3.95}$, or 0.26. By multiplying the estimated 79-day survivorship by estimated productivity (6,999), we had an estimated recruitment from fledgings of 1,809 (95% CI = 170.6-4,596.1).

DISCUSSION

Few studies have addressed nesting success and productivity by birds in urban environments. Our results show the importance of determining actual productivity versus an index of nest success. For instance, considering the standard definition of nest success as at least one young fledged, the Mayfield method (Mayfield 1961, 1975) of nest success would have given a result of 58.1%. While this estimate was extremely similar to our empirical value of 55.4% nest success, the potential productivity from the Mayfield method ranged from 67–134 individuals fledged (assuming two eggs per nest). The empirical productivity value for the sample period, 133 individuals fledged, was at the high extremity of the estimated range of values by the Mayfield method.

Estimated fledging productivity for the entire sample area for the sample period exceeded maximum population size estimates. The most plausible explanations for these differences are high levels of early dispersal of young or high post-fledging mortality, or some combination thereof. No similar studies on White-winged Doves have been conducted, so no comparisons are possible. However, low nest success in Northern Cardinals (*Cardinalis cardinalis*) was linked to high numbers of nest predators which precluded predictably safe nest sites ((Filliater et al. 1994). Also, low nest success in Hermit Thrushes (*Catharus guttatus*) was linked almost exclusively to nest predation (Martin and Roper 1988).

Recruitment based on fledgling survivorship estimates (1,809) was lower, but not significantly, from overall estimated population increase (2,513) based on overlapping confidence intervals for the same period. However, confidence intervals for estimated recruitment from fledging were extremely large.

Our results indicated about 40% of White-winged Dove nests in Mason failed; yet, we verified two peaks of nesting. This is consistent with observations indicating most White-winged Doves attempt two clutches per breeding season (Cottam and Trefethen 1968) and may even attempt four clutches (Schaefer et al. 2004). It is unclear whether White-winged Doves accomplish the production of multiple clutches by sequential monogamy or polygyny. However, for this species to be successful in the expansion of its distribution into urban environments, it must have nest site availability and the ability to produce multiple broods. These two factors may drive the

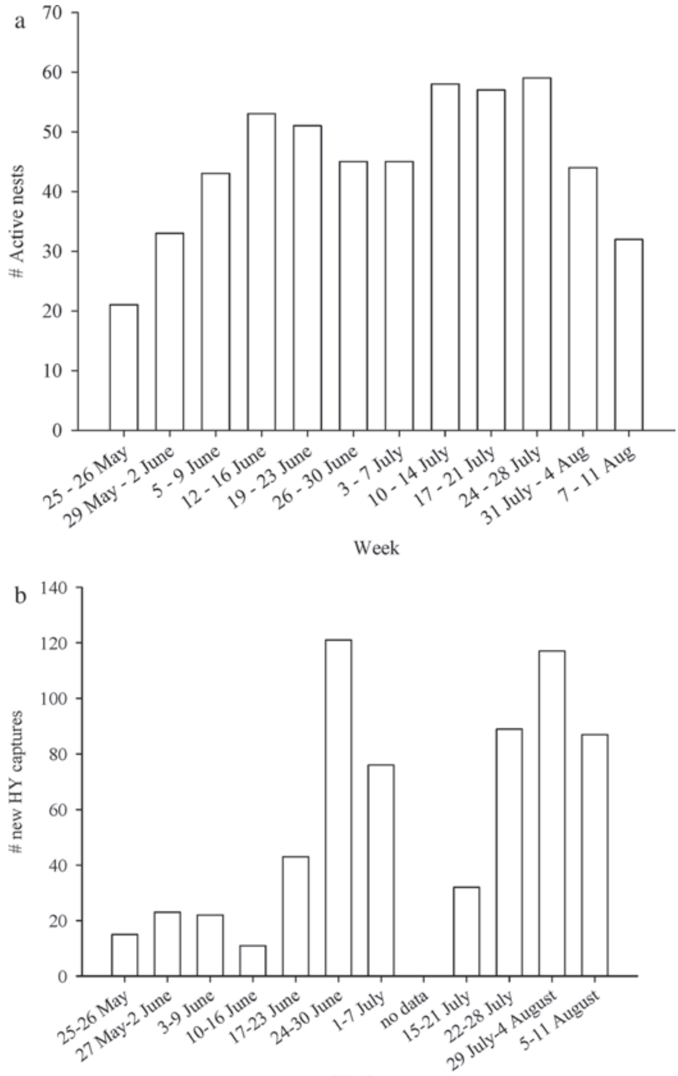

Figure 2. Number of (a) active White-winged Dove nests and (b) new HY captures in Mason County, Texas, measured by week from 25 May–11 August 2006.

distribution of White-winged Doves along an urbanization gradient, and nest site is a critical resource that regulates the distribution in urban environments (Reale and Blair 2005). Our findings are consistent with earlier findings of high mortality and transience in adult White-winged Doves in Mason for 2006 (Small et al. 2008).

ACKNOWLEDGMENTS

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HUTTON'S VIREO ESTABLISHMENT AS A BREEDING SPECIES IN THE TEXAS HILL COUNTRY

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ABSTRACT.—Once thought to be a sporadic visitor to the Texas Hill Country, increasing evidence suggests Hutton's Vireo (*Vireo huttoni*) is in fact a breeding resident. We documented several breeding events.

The 7th edition of the AOU check-list of North American Birds lists the Hutton's Vireo (*Vireo huttoni)* as casual in Real County, Texas (AOU 1998). However, Lockwood (2001) and Lockwood and Freeman (2004) suggested Hutton's Vireo may be a low density resident in the Texas Hill Country based on a known nesting attempt in 1990 at Prade Ranch in Real County. Additionally, there was in 2005 a successful breeding by Hutton's Vireo in Reagan Wells, Uvalde County near the Real County border (Arvin pers. comm.). We provide in this paper observational evidence verifying portions of northern Uvalde County and Real County are within the breeding range of Hutton's Vireo.

METHODS

We conducted bird surveys in an area comprising 480 ha for approximately 165 observer days for 5 h per day between 18 March 2009 and 3 July 2009 on portions of Big Springs Ranch for Children (29°50' N, 99°40' W), a private ranch in Real County, and in portions of Garner State Park (29°35' N, 99°45'W) in northern Uvalde County.

Whenever possible songs and calls of Hutton's Vireos were recorded using a Sennheiser shotgun microphone (Sennheiser Electronic Coorporation, Wedemark, Germany) and an iRiver© H320 media player/recorder (iRiver Inc. Irvine, CA 92618) using Rockbox© v1.28 J firmware upgrade. We measured note duration and minimum frequency from Sonograms created using SonoBird™ v1.6 beta at high resolution. We calculated mean and standard error of these durations for comparison with published Sonograms of Hutton's Vireo subspecies (Baril and Barlow 2000).

RESULTS

We identified no fewer than 27 individual Hutton's Vireos including 19 vocalizing adults. All individuals were found in mixed juniper-oak woodland containing mature ashe juniper (*Juniperus asheii*) and one or more oak species (*Quercus* sp.). The high count was seven individuals on 29 May at Garner State Park. Seven adults and two fledglings were digitally recorded between 6 April and 3 July. We confirmed successful breeding by observing eight fledglings in four sets being fed by adults. A fifth set, consisting of two Brown-headed Cowbirds (*Molthrus ater*) fed by one adult was also observed. On two additional occasions, we heard presumed fledgling begging calls in the presence of vocalizing adults, but we did not observe fledglings. Although these additional observations may be evidence of successful breeding, we could not verify success without visual confirmation of adults feeding begging fledglings or photographs of fledglings. We photographed all three sets of fledglings fed by adults. We made audio recordings of two adults feeding two fledglings at Garner State Park on 29 May. The first fledging was discovered at Big Springs on 10 May. It was fed by one vocal adult. The second set comprised of two fledglings fed by two adults was found on 29 May. The third set comprised of two adults tending four fledglings was discovered on18 June also at Garner State Park. The fourth set was located on 3 July on Big Springs Ranch. It consisted of one fledgling fed by one adult. One adult Hutton's Vireo fed and attended the two Brown-headed Cowbird fledglings found on 24 June at Garner State Park. This observation suggested an additional breeding attempt albeit a failed one.

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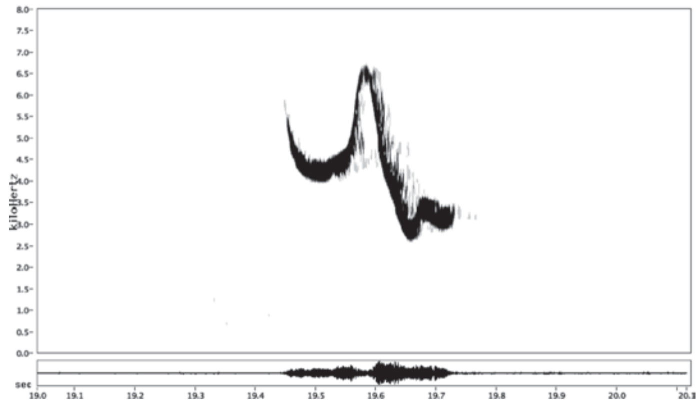

Figure 1. Sonogram of one syllable variant from a Hutton's Vireo recorded on Big Springs Ranch, Real County, TX on 28 May 2009.

The feather characteristics and behavior of the fledgling located on 10 May indicated a recent fledge date, and the estimated age of the bird was approximately 16 days. We estimated a hatch date on or near 26 April. The two fledglings located on 29 May at Garner State Park appeared to be older and more active, indicating an approximate age of 20 days and a hatch date on about 9 May. The feather characteristics and behavior of the third set of four fledglings found on 18 June caused us to estimate the fledglings' age also at 20 days, putting the hatch date on 29 May. We determined the bird found of 3 July was, possibly 18 days old, indicating hatch on 15 June.

We identified three distinctly different syllable variants (Figs. 1–3) in songs or calls from seven adults. The mean syllable duration for the three syllables was 0.357 sec $\pm$ 0.0548 (n = 3). The mean syllable duration for the three syllables closely matched the mean duration for the three syllables of Hutton's Vireo from the "Southwest Interior Group" recorded in Arizona, northwestern Mexico, West Texas and northeastern Mexico (mean = 0.34 $\pm$ 0.08 sec, n = 118). The birds we recorded more closely matched the Southwest Interior Group than Pacific Coast populations (California, Washington/Oregon, Mainland BC, and Vancouver Island) of Hutton's Vireo, which all averaged shorter syllables (0.27–0.30 sec; n = 112). The mean syllable low-frequency was 2,417 Hz $\pm$ 283 Hz. The minimum frequency did not closely match any group and was higher in frequency than any group.

DISCUSSION

Our observations represent the largest number of Hutton's Vireos observed in the Hill Country and include more successful breeding attempts than previously known. The four confirmed breeding attempts, two unconfirmed breeding attempts, and one instance of cowbird parasitism are the most

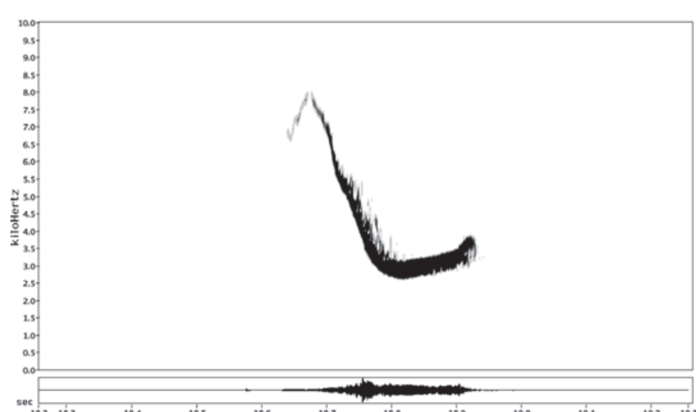

Figure 2. Sonogram of a second Hutton's Vireo variant syllable. Recorded on Big Springs Ranch Real County, Texas on 22 May 2009.

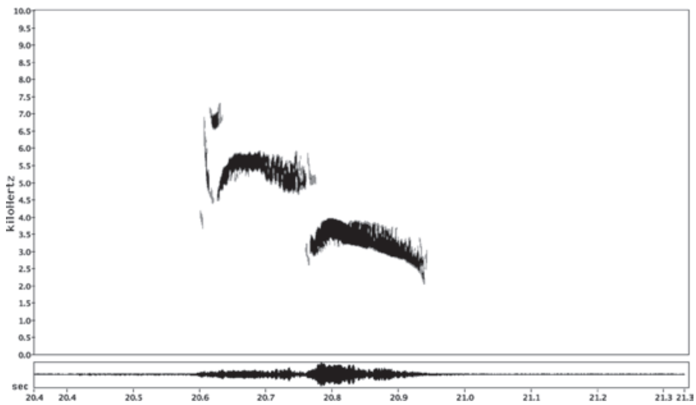

Figure 3. Sonogram of a third Hutton's Vireo variant syllable. Recorded on Garner State Park, Uvalde County, Texas on 29 May 2008.

thorough documentation of Hutton's Vireo breeding in Texas outside of the Trans-Pecos region of western Texas. The timing of our observations fits exactly with breeding expectations for this species from other portions its range. Hutton Vireo hatchlings fledge at approximately 14–17 days (Van Fleet 1919, Grinell and Linsdale 1936). After hatching and attaining full juvenile plumage typically after 16 days, adults may continue to feed young until approximately 21 days (Davis 1995). Davis (1995), citing records of the Western Foundation for Vertebrate Zoology's dates for complete clutches for Hutton's Vireos in California, found a mean clutch completion date of 23 April (with a range of dates extending from February to July), completely comparable with breeding timing of this bird. Our records strongly suggest Hutton's Vireo is a regular breeding species in the Texas Hill Country and is likely a low density resident of approximately one pair per 14 ha in suitable mixed juniper-oak habitat. Whether the lack of previous detections was due to observer bias, lack of observer access to suitable habitat, lack of sampling effort, or a recent range extension by the species from either portions of the species range in the Trans-Pecos region of western Texas or Mexico is unknown. Certainly the similarity of vocalizations to other sympatric species and similarity in appearance to the Ruby-crowned Kinglet (*Regulus calendula*), a winter resident in the Texas Hill Country may explain the lack of breeding information for Hutton's Vireo.

We were not surprised the syllable duration closely matches interior populations of Hutton's Vireo. An inspection of sonograms from birds we recorded revealed one variant closely matched one of the subspecific syllable variants from Hutton Vireos recorded in western Texas and northeastern Mexico (Baril and Barlow 2000). However, we find these results are inconclusive for any subspecific determination based on vocalizations.

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SHORT COMMUNICATIONS

REUSE OF AN OLD NEST PLATFORM BY NORTHERN CARDINALS

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Wanamaker (1942) reported Northern Cardinals (*Cardinalis cardinalis*) rarely reuse nests but, there is no report of the reuse of an old abandoned nest from previous years (Halkin and Linville 1999).

In the spring of 2008, a pair of Northern Cardinals built a partial nest on the top of the handle of a metal firewood holder (Fig. 1) located on the northeast-facing front porch of my apartment in Whitehouse, Smith County. The top of the handle of the holder is about 1 m above the porch floor and is overgrown by a peppervine (*Ampelopsis arborea*) which conceals the nest site. The nest was not completed and was abandoned. It deteriorated leaving only a platform of twigs. On 19 April 2010, a pair of Northern Cardinals began building a nest on the remaining platform, but it is not known if they are the same pair as built the nest in 2008. The nest was completed on 23 April, the first egg was laid on 28 April followed by two more eggs on 29 and 30 April. The morning of 1 May, all eggs were gone—probably from predation by a Texas rat snake (*Elaphe obsoleta lindheimer*i). These snakes are common and routinely seen in the vicinity and observed taking eggs from bird nests. The nest was immediately abandoned.

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Figure 1. Nest of Northern Cardinal on the handle of a firewood holder overgrown by a peppervine. Photo courtesy Ira and Paula Lawrence.

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NINETEENTH CENTURY REPORTS OF PARROTS IN TEXAS

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The Red-crowned Parrot (*Amazona viridigenalis*) and Yellow-headed Parrot (*Amazona oratrix*) are now seen on a regular basis in the Lower Rio Grande Valley of Texas (Lockwood and Freeman 2004, Neck 1986). However, prior to the early 1970s there were no records of the former and only a few credible sightings of the latter (Oberholser 1974). The northeastern breeding limit of both species was believed to be in the drainage basin of the Rio Soto la Marina in Tamaulipas, Mexico, about 321 km south of Brownsville, Texas (Gehlbach et al. 1976). During the late 19th Century, however, parrots were sometimes seen much closer to Brownsville, and on two occasions flocks were reported in southern Texas. This note describes two of these unusual migrations and weather events believed to have caused these migrations.

Conditions were unusually severe in the State of Tamaulipas, Mexico, during summer 1885. An extended drought reduced water flow in the San Fernando, Pilón and Corona rivers to nothing but potholes while the Rio Purificación was barely running. The corn crop at Cuidad Victoria was a complete failure since there was no water available for irrigation. Swarms of migratory locusts had also done considerable damage to the vegetation (Anon. 1885a). These adverse conditions apparently caused flocks of parrots to move northward during the latter part of summer.

Travelers arriving at Brownsville from Tamaulipas during late August 1885 reported flocks of 100 or more parrots at Santa Teresa and La Gloria, 63 km and 69 km, respectively, south of the city. Smaller flocks were seen at the Quijano Ranch about 34 km south of Brownsville (Anon. 1885a). By October, some flocks had crossed the Rio Grande and were seen in "the post oak country above Brownsville" (1885b). These sightings were presumably made in live oak (not post oak) groves along the road from Brownsville to Corpus Christi that passed through the Coastal Sand Plain (Fulbright et al. 1990) in Willacy and Kenedy counties. It was further noted the northward limit of parrots had heretofore been the Pelón River, 241 km south of Brownsville, and this was the first time they had been seen in Texas (Anon. 1885b).

Adverse conditions affecting parrots in Tamaulipas were again evident during February 1899. An arctic cold mass entered Texas on the 10th and quickly spread southward. It began to freeze at Brownsville on the evening of the following day with the temperature falling to −12° C and the formation of ice several inches thick (Anon. 1899a). "Thousands" of Plain Chachalaca (*Ortalis Jetula*) reportedly died of the cold in the Lower Rio Grande Valley (Smith 1910). At Tampico, Mexico, the temperature reached −4° C causing the destruction of "pretty much all" of the tropical fruits (Anon. 1899b) and the undergrowth in the forest (Anon. 1899g). The State of Veracruz experienced gale force winds along the coast, and the "unparalleled cold weather" caused considerable damage to the coffee, vanilla and tobacco plantations (Anon. 1899c, d). Vanilla and coffee were killed at Montemorelos in the State of Nuevo Leon (1899e). An extended drought in the State of Tamaulipas (Anon. 1898) added to the damage done by the freeze. An enormous forest fire near Tampico during early April 1899 caused thousands of birds to fly for safety and for a time the fire threatened to engulf the city (Anon. 1899h).

The blizzard of February 1899 was followed by additional northers and a drought in southern Texas. The weather at Beeville, Texas, between January and April 1899 was said to have been unprecedented – "the coldest, the hottest and the driest" with one cold, dry norther following another (Anon. 1899g). Then, in the midst of these weather extremes, travelers arriving at Corpus Christi on 21 March reported a flock of "several hundred" parrots in the "vicinity of Oso" where the road from Brownsville crossed Oso Creek just south of Corpus Christi. Most parrots were perched in trees but took flight when approached. Mexican hunters killed several during the few days they remained in the area. It was assumed by most people that the parrots were from Mexico and had been driven

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Figure 1. John Marion Priour (1848–1931). Florence and Vernon Bailey saw skins of Mexican parrots taken near Corpus Christi in Piour's workshop during April 1900. This photograph of Priour was taken during February 1922 when Frederic Kennard and his son were collecting in the vicinity of Corpus Christi (Kennard 1936).

from their former abode by the effects of the blizzard during the preceding month (Anon. 1899f).

Florence Merriam Bailey provided additional evidence for the occurrence of parrots near Corpus Christi. In April 1900 she and her husband, Vernon Bailey, visited the well-known ornithological collector John Marion Priour (Fig. 1) (Kennard 1936, Casto 1996) at his home on the outskirts of Corpus Christi. In Priour's workshop the Baileys were shown skins of several species of birds including those of "Mexican parrots said to have been taken near Corpus Christi when severe southern winds were blowing from below the boundary line" (Bailey 1916). Most likely these skins were from parrots on the Oso during March 1899. However, the Baileys apparently did not recognize the significance of these specimens and neglected to ask Priour for details regarding their acquisition.

Edgar Kincaid, editor of *The Bird Life of Texas*, did not believe that Red-crowned Parrots occurred naturally in Texas. However, he did consider the Yellow-headed Parrot to be a "possible casual visitor, at least formerly, to the Rio Grande Delta." All parrots reported later than 1920 were presumed escaped cage birds. The stories told to Oberholser by Harvey E. Melton of flocks numbering up to 500 birds in times past (presumably 1900 or earlier) were considered "rumors' since they were not documented by specimens or photographs (Oberholser 1974). Oberholser and Kincaid were both seemingly unaware of parrot skins seen by Florence and Vernon Bailey at John Priour's residence during April 1900.

People living in southern Texas during the late 19th Century were undoubtedly familiar with 'parrots' and there is no reason to doubt the veracity of their reports nor should the account of John Priour be dismissed. The testimony of these witnesses definitely lends credence to "rumors" of large flocks of parrots occasionally seen in the Lower Rio Grande Valley prior to 1900. Whether these early observations were of mixed flocks of Red-crowned and Yellow-headed Parrots or exclusively flocks of one or the other cannot be determined from the available evidence.

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ADJACENT CONTEMPORANEOUS NESTS IN COMMON RAVENS (*Corvus corax sinuatus*)

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On 23 April 2010, I took a group to Big Springs Ranch (Real County 29.8425° N, 99.66316° W) to observe Texas Hill Country specialty birds, notably Golden-cheeked Warblers (*Dendroica chrysoparia).* At the junction of the creek outlet for the river's largest headwaters springs, Big Springs, and the Frio River proper, we stopped to see a traditional nest of Common Ravens (*Corvus corax sinuatus)* on a peninsular limestone cliff face overlooking the river. This nesting 'pair' has provided close viewing opportunities and detailed looks for these trips for the past five years (T. Gallucci, pers. obs.) and have apparently used this same cliff face for at least the prior seven years (Ranch personnel, pers. comm.). The nearest known raven nests are on adjacent properties, Laity Lodge to the north and Lost Maples State Natural Area to the east. These nest locations are roughly 1.2 to 2 km distant, respectively. Possibly suitable cliff faces are available between both locations in deep canyons bordering the Frio River, Big Springs outlet, and Sabinal River, as are possibly suitable dense riparian woodland sites with tall baldcypress (*Taxodium distichum)*, escarpment black cherry (*Prunus serotina* var. *eximia*), and western sycamore (*Platanus occidentalis*) trees. A stand of the latter is within 50 m of this raven nest site. Outlying portions of the 3,035-ha Big Springs Ranch have not been surveyed for Common Raven nests, but canyons lack permanent water, and suitable cliffs are more distant than known nests on adjacent property. This nest site is located at approximately 12 m in remnants of a soft 'honeycomb' limestone outcropping. Along this cliff face, most of the exposed honeycombing has fallen away, leaving cup-like shelves shaded by overhangs. It is in one of these remnant cups ravens have built a nest for five years of my observations (2006–2010), and apparently well before my first access to the ranch.

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Observation of the nest site revealed two nests were present. In close to 40 years of observing ravens, I had never seen nor heard of more than one Common Raven nest at a site nor near another raven nest. Sensing its importance, I took an immediate interest. The second nest was built to the left as we faced the cliff, where there had been none in previous years. The two nests were >1 m apart and somewhat separated by a vertical lip, also a honeycomb remnant (Fig. 1).

The nests were observed intially over three consecutive days 23–25 April 2010 by a total of 26 observers. On the first day, 23 April, there were two young birds in the rightmost nest. These two were large, appeared fully feathered and stood on the lip of the nest. They constantly exercised their wings, occasionally clumsily tipping forward as though about to take flight, though I saw neither actually do so. In the leftmost nest, I could see beak tips, but not until an adult flew to the nest did I determine there were three nestlings present. At the adult's entry, all three popped up, beaks agape. These young were darkly feathered but clearly still had some pinfeathers, and distinctly yellow gapes. In the moment I estimated at least a week's age difference between birds in the two nests. During observations each of the three first days, I never saw an adult attend or feed the two larger young from the rightmost nest. Feedings of younger birds were unclocked, but were approximately 15 to 30 min apart. At one point, two birds from the rightmost nest made their way to the other nest along a small rise but were ignored by adults. On the second day of observation, 24 April, one of the two larger young had left the nest, could not be seen, but was heard calling from an area of large cliffside oaks (Texas oak, *Q. buckleyi* and plateau chinkapin oak, *Q. muhlenbergii* var. *brayi*). The situation remained virtually the same on day three, 25 April.

I returned to check the nest the following weekend, 2 May, and found the two larger birds had left the nest and were flying freely about the cliff face without apparent difficulty in landing, taking flight, nor in maintaining controlled flight. They were attended by a single adult at a time with much inter-individual communication and deliveries of food (Fig. 2). This single adult, or perhaps two trading flight, were regularly visible during times when two adults were attending and feeding the smaller young (Fig. 3), resulting in confirmation of at least a third adult involved with the young. Of the three younger birds, two remained at the nest site, perched on a vertical lip to the left of the nests (Fig. 3). These birds were near the size and appearance of the older cohort the previous week. One of the younger birds had either attempted to fly and not

Figure 1. Adult Common Raven on edge of nest with three younger chicks (left). Two older chicks on right, one heading left to beg unsuccessfully for food, at nest site near junction of Big Springs outlet and the Frio River, 23 April 2010.

Figure 2. Third adult Common Raven passing nest site while attending to previously fledged young, 2 May 2010.

gotten far, or tumbled from the nest, and was on a sloped ledge below and about 30 m to the right of the nest site. The third adult attending the two larger birds would occasionally make a low pass near this third chick but never landed nearby during observations, as did one of the adults attending the younger cohort. The young in the nest and their attending adults were filmed on 2 May and highlights can be accessed online at http://www.youtube.com/watch?v=I6fJ8QDN9bk. I visited again on 6, 7 and 29 May 2010 and all chicks seemed to have vacated the nests and the vicinity as none were located in observations at the nest site.

DISCUSSION

It is common for Common Ravens to built alternate nests, sometimes switching between nests year to year, and these secondary nests are occasionally used as roost sites by non-incubating pair members (Boarman and Heinrich 1999). However there is no documentation, anecdotal or otherwise, of colonial or communal nesting in Common Ravens anywhere within the current or historical holarctic range of the species as currently defined (Boarman and Heinrich 1999). While some Palearctic species (e.g., Jackdaws, *Corvus monedula*, Verhulst and Salomons 2004) can be described as colonial, Nearctic species are not so, strictly speaking. But loosely communal nesting is well documented among many species, including several North American *Corvus* species. These loose aggregations, in which birds nest in groups of trees up to 100 m apart, yet defend individual nest trees, is generally called 'clump' nesting and has been recorded in the American Crow (*Corvus brachyrhyncos*; Kilham 1989, Caffrey 1992, Verbeek and Caffrey 2002), Fish Crow (*Corvus ossifragus*; McGowan 2001), and Northwestern Crow (*Corvus caurinus*; Verbeek and Butler 1999). Little is known about nesting habits of the subtropical *Corvus* species of Mexico and the Caribbean, although anecdotally semi-colonial nesting is known for at least the Tamaulipas Crow (*Corvus imparatus*; T. Gallucci pers. obs.). In the

Figure 3. Two adult Common Ravens (right), attending two young (left) from younger cohort, on vertical honeycomb lip, 2 May 2010.

Chihuahuan Raven (*Corvus cryptoleucus*), the closest Nearctic relative of the Common Raven, situations resembling clump nesting may be related to scarcity of available nest sites and food (Bednarz and Raitt 2002, D'Auria and Caccamise 2007). However clump nesting has never been documented in Common Ravens and, in fact, only twice, at 70 m and 200 m (G. C. Goodlett pers. comm. quoted in Boarman and Heinrich 1999), single nests have been noted as closer than 300 m, and those were influenced by human density. In situations influenced by availability of powerline structures, 300 m internest distances have been noted (Dorn 1972, Steenhof et al. 1993), but more usual are larger territories (Dunk et al. 1994, Boarman and Heinrich 1999). While Chihuahuan Ravens are considered clump nesters, some studies indicate nests are placed no closer than 300 m (Bednarz and Raitt 2002). The large corvids share a propensity to maintain nesting territories significantly smaller than their home range, which allows for sociability and off-season bonding, and to take advantage of concentrated food sources such as dump sites, landfills, spawning grounds, and large road kills or carrion (Heinrich 1988, Marzluff and Heinrich 1991, Marzluff and Neatherlin 2006).

Bearing too on the status of these nests is the question of cooperative breeding among species in the genus *Corvus*. Helpers at the nest, progeny from previous years' nestings, have been noted among American (Kilham 1984, Caffrey 1992, 1999, 2000, Chamberlain-Auger et al. 1990), Fish (McNair 1985), and Northwestern Crows (Verbeek and Butler 1981, 1989), which are all single-brooded as are Common and Chihuahuan Ravens. There is evidence Holarctic species have evolved into less cooperative lineages (Caffrey 2000, Ekman and Ericson 2006). There is debate about circumstances of cooperative breeding in Chihuahuan Ravens (Bednarz and Raitt. 2002, D'Auria and Caccamise 2007). There are four known instances of a third bird present at the nest in Common Ravens with minimal evidence of 'helping' (Stiehl 1976, Bruggers 1988). Since some elements of the current nesting observations bring up speculation about the relatedness of birds nesting side by side, it is prudent to note recent genetic work (Omland et al. 2000) indicated the western forms of Common Raven are more closely allied to the Chihuahuan Raven than to other populations of *C. corax*. The near insular birds of the Texas Hill Country, which encompasses the nest site in question, are ascribed to *C.c. sinuatus*, which ranges from southern Canada, through the Rocky Mountains deep into Mexico (Boarman and Heinrich 1999).

Unfortunately I discovered the current situation after hatching, and at a point where two of the young were on the verge of fledging. This did not allow me to observe two pairs of adults tending separate nests. This opens the possibility that my intial impression – two nestings – were facilitated by coincidence. At issue first is the possibility the young birds in question represent five birds from the same nest which have partially dispersed into a second, abandoned nest for space. Five eggs are not only within the range of possiblity in *C. corax* but adheres to the expected norm in much of the Nearctic range of *C. corax* (5.3 $\pm$ 0.56 SD eggs per nest; $n = 6$; with up to eight in a nest; Boarman and Heinrich 1999). Weighing against a single nest. I favored the possibility of two nests. Because the nest-attending adults were focused on three nestlings and ignored the near-fledglings; (2) there was an apparent substantial difference in size between the two cohorts, seemingly about a week's difference in age, borne out by subsequent observations of the two larger birds fledging a week prior to the three younger birds; (3) there was previously no more than three fledglings from a single nest the previous four years (T. Gallucci, pers. obs.); and (4) the two fledged birds from the larger-sized cohort were attended and fed by a known third, and possibly fourth adult after fledging, than the two adults attending and feeding the smaller-sized cohort. In addition, despite a norm of five-plus eggs per clutch, hatching rates average 69–71% (Smith and Murphy 1973, Stiehl 1985), and the fledging rate of hatched eggs is generally low at 31% (Dorn 1972) to 47% (Smith and Murphy 1973). Also fledging success averages 2.5 young per nest ($\pm$0.48 SD) with a range of 1.7 (Dorn 1972) to 3.1 (Steenhof et al. 1993) fledglings (six studies as summarized in Boarman and Heinrich 1999).

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ABANDONMENT OF A UNIQUE BREEDING COLONY OF GREAT-TAILED GRACKLES IN NORTH-CENTRAL TEXAS

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In S Ennis, SE Ellis County (32°18′43.49″N, 96°35′56.76″W), there is an unusual breeding site of Great-tailed Grackles (*Quiscalus mexicanus*). Usual breeding sites are in shallow aquatic areas of emergent marsh vegetation or in urban trees (Johnson and Peer 2001). Indeed, in the City of Ennis, there are many scattered breeding pairs and small groups of grackles nesting in tall trees. However, the unusual site (Fig. 1) is in a small landscaped, triangular, median area of about 0.30 ha bordered by elevated Interstate Highway 45 and a turn-off access road which connects to S Kaufman Street (State Highway 75) near its juncture with FM 85 under a highway overpass. Nest-site vegetation is composed of a dense, close-spaced stand (13.1 m x 18.3 m) of 24 common crape myrtle (*Lagerstroemia indica*) shrubs (2.2–3.0 m high), an adjacent stand (3.6 m x 30.5 m) of 24 yaupon (*Ilex vomitoria*) shrubs (1.5–2.6 m high) in three closely-spaced clusters, and six young Shumard's oak (*Quercus shumardii*) trees (2.5–4.5 m high, 6–16 cm dbh). The site has been re-established annually for about 15 years as a breeding colony of Great-tailed Grackles (Larry Skinner pers. comm., Director of Parks and Recreation, City of Ennis). Nest heights vary from about 0.5–1.6 m (in yaupons) to 2.3–3.7 m (in trees). The total number of nests in the colony is about 259. Yaupons (17 of 24 used for nesting) contained 48 nests (one to five/plant,mean = 2.8, median = 2.5); oak trees (four of six used for nesting) contained 21 nests (two to eight nests/plant, mean = 5.2, median = 5.5).

Most nests (190) were in the crape myrtles (3-12/plant, mean = 7.9, median = 8.0); heights varied from 1.7–2.5 m.

During early April, male Great-tailed Grackles display in tops of plants and females build nests or repair old ones, lay eggs, and incubate. By late April, many eggs hatch and chicks are old enough to be banded. By early May, some chicks fledge. In April 2009, this usual annual behavior pattern was observed. However, in early May, the site was

Figure 1. Site of the Great-tailed Grackle breeding colony in Ennis (photo courtesy of Mark and Daniel Jones). Crape-myrtle shrubs to the right; yaupon shrubs from the center to the left; and, scattered Shumard's oak trees in the background.

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abruptly abandoned for no apparent cause. On 9 May, the colony was devoid of almost all birds. A random check revealed five scattered nests of one, two, two, two, and three eggs, respectively. Most nests did not contain any eggs, broken eggs, chicks, or remains of dead chicks. There were a few bits of broken egg shell fragments on the ground beneath a crape myrtle. One nest, in a crape myrtle containing monofilament twine, held a dead male suspended from it, a foot caught in the twine. However, this type of mortality is not unusual in the colony since such twine is brought in as nest material. On 31 May, there were only about six pairs of Great-tailed Grackles at the site, all in oak trees. They exhibited alarm call behavior indicating the presence of occupied nests.

Personnel of the Texas Department of Transportation, City of Ennis, and law enforcement of the Texas Parks and Wildlife Department had no knowledge of any human-caused disturbance that would have caused such abrupt abandonment. Routine spring-mowing of the rights-of-way is only a temporary disturbance to which birds are habituated. The weather pattern in the Ennis area had been near normal in temperature (15.4–22.8° C, March-May); wetter than normal in March and April (16.8 and 11.3 cm); but, below normal rainfall in May (6.43 cm) (Ron Vestal, local National Weather Service Weather Observer, pers. comm./data). Dr. Kristine Johnson (pers. comm.), an authority on Great-tailed Grackles (Johnson and Peer 2001) could not offer an explanation for this abandonment behavior. Also, Clifford Shackleford (pers. comm.), a Texas Parks and Wildlife Department ornithologist, could not provide an explanation nor had he heard of a similar situation in Texas.

I thank Mark and Daniel Jones and Cooper Gillespie for assisting with the nest survey. Mark and Daniel Jones also provided the site photograph. Ron Vestal sent me copies of his detailed weather summaries for March, April, and May.

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POSTSCRIPT

On 31 March 2010, male Great-tailed Grackles returned to the breeding colony site and began displaying. On 24 April, I entered the periphery of the colony. Females were attending nests. I checked two nests and found two and three eggs, respectively. I did not want to cause disturbance; so, I did not go farther into the colony. The nest-site vegetation was in excellent condition and there was no indication of any abnormal conditions. As in 2009, in the City of Ennis, there were many scattered breeding pairs and small groups of Great-tailed Grackles nesting in tall trees.

On 1 May, I returned to the colony and found it abandoned similar to 2009. The total number of nests was 129 (49.8% of the number of nests in 2009). Yaupons (17 of 24 used for nesting) contained 22 nests (one-three nests/plant, mean = 1.5, median = 1.0); oak trees (six of six used for nesting) contained 20 nests (one-five nests/plant, mean = 3.3, median = 3.5). Most nests (94) were in crape myrtles (one-six/plant, mean = 3.7, median = 4.0). Thus, compared to 2009, there were about 50% fewer nests in each type of vegetation.

The two nests I checked on 24 April were empty. I examined 38 other nests (29.5% of total nests in the colony); only 11 (27.5%) contained eggs; none contained chicks. All eggs were cold. Six nests contained one egg each, one nest contained two eggs, two nests contained three eggs each, and two nests contained four eggs each. In two nests containing one egg each, each egg consisted of only shell fragments; in one nest containing four eggs, one egg was fragmented; and, in one nest containing one egg, the egg was broken, rotten, and contained small fly maggots.

On 8 May 2010, I examined a second nesting colony reported to me by Mark Jones. It is in N Ennis, SE Ellis County (32°21′41.26″N, 96°37′58.75″W), about 6.3 km N of the first colony, in a densely-planted triangular stand (52.8 m x 52.8 m x 105.6 m) of crape myrtles (3.4–3.9 m high) at the N end of a 1.02 ha semicircular median between the overpass of U.S. Highway 75 above Interstate Highway 45 and the east access loop from U.S. Highway 75 leading N to join Interstate Highway 45.

There were 119 nests in 36 of 40 crape myrtle shrubs (one to eight nests/plant, mean = 3.30, median = 3.0); nest heights varied from 1.6–3.5 m, but most were above 2.5 m. All nests were current year, i.e., there were no remains of nests from previous years. Therefore, this is a new colony. Females were attending nests. Some nests were under construction; some completed but without eggs; some contained eggs; and, a few contained nestlings.

The number of nests and density per plant were similar to the abandoned colony. However, the first colony was abandoned between 24 April and 1

May, 2010. Therefore, the time necessary for relocation, male display, pairing, nest building, egg laying, incubation, and hatching would have required a minimum of about 26 days; so, these birds could not have come from the abandoned colony.

I returned to the second Great-tailed Grackle colony on May 16. Some nests were still under construction; some contained one to three eggs and small nestlings; and, there were some fledglings. One nest, containing monofilament twine, held a dead female suspended from it, a foot caught in the twine. As in the other colony, this type of mortality is not unusual since such twine is brought in as nest material. Therefore, the colony appeared to be normal and not affected by whatever caused abandonment of the first colony.

LATE BREEDING RECORD FOR THE COMMON NIGHTHAWK IN SOUTHWESTERN OKLAHOMA

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The Common Nighthawk (*Chordeiles minor*) is the most widely distributed nightjar in the United States (AOU 1998). However, like most caprimulgids, their behavior and ecology are poorly known due to their crepuscular and nocturnal lifestyles. Common Nighthawks are generally described as a single-brooded species with a nesting peak in June–July (Poulin et al. 1996), but second broods have been reported (Welbeck 1989). The latest known hatching date for this species is 10 August from Cypress Hills, Saskatchewan (Poulin et al. 1996). Here we describe a juvenile Common Nighthawk found in southwestern Oklahoma which appears to be the latest breeding record for the species.

A juvenile Common Nighthawk was found by students on the ground in a high foot-traffic area adjacent to the Cameron University library in Lawton, Comanche County, OK on 17 September 2008. Common Nighthawks regularly nest on the flat library roof (MSH, pers. observ.), but during the week this bird was found, the roof was being repaired. Roofers may have inadvertently forced the juvenile from its nest. Two adults were observed flying nearby, but whether these were the parents is unknown.

The juvenile bird, though not apparently injured, was unable to fly and observed in the same location for two days. Upon further examination, it had most, but not all primary feathers unsheathed, a small, uniform white patch on its wings, and down on its breast and abdomen. Fourteen-days-old Common Nighthawk chicks have partially unsheathed primaries and a chest and abdomen covered in down (Fowle 1946). First flight normally occurs at 18 days (Rust 1947). Thus the plumage pattern and inability to fly indicated the bird was about 17-days-old. Based on this age, the date of hatching was estimated as 29 August; 19 days later than the previously reported late date (Poulin et al. 1996).

It is possible this record is the result of an attempt at a second brood. Walbeck (1989) found Common Nighthawks fledglings from the first brood were between 38 and 40-days-old when a second nest was attempted. Using these age estimates and the average incubation and nestling duration for Common Nighthawks, a first nesting attempt would have been initiated by the juvenile's parents the first week of June during the normal peak of egg laying. This observation provides a new late nesting record for Common Nighthawks in North America and suggests that second broods in southern populations may be more common than previously reported.

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A CASE OF A HARRIS' HAWK (*PARABUTEO UNICINCTUS*) ELECTROCUTED WHILE SEIZING PREY

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Electrocution of raptors and other large birds due to contact with utility pole power lines has been an issue since the early 1970s (Lehman 2001). Improvements to existing electrical technologies have lead to a decrease in fatalities, however, many urban centers still have smaller poles and tighter spacing between power lines which are a problematic for larger avian species, particularly raptors (Lehman 2001, Lehman et al. 2007). Herein, we describe an occurrence of a raptor electrocution on a utility pole within an urban setting (Dwyer and Mannan 2007). While electrocuted Harris' Hawks (*Parabuteo unicinctus*) have been widely documented in southern Arizona (Dwyer 2006, Dwyer and Mannan 2009), this may represent the first case of electrocution in Texas.

On 19 November 2009, JCB was contacted by a neighbor, Keeton Turner, regarding a dead hawk in his backyard. The bird was found on the ground at 4210 Estate Dr., Corpus Christi, TX, 1.5 m from a utility pole (Fig. 1). The hawk was identified as a Harris' Hawk (*Parabuteo unicinctus)* and a fox squirrel (*Sciurus niger*) was grasped in its talons. Upon examination, the hawk and squirrel had evidence of electrocution burns on their extremities. The fox squirrel had a burn on its left hind pes, and the Harris' Hawk had a burn and exposed metatarsal bones on the left talon (Fig. 2).

The prepared hawk specimen was deposited at the Houston Museum of Natural Science (HMNS.VO 3104). During the preparation of the specimen (JCB spec. #632), the right metacarpals and attached primary flight feathers fell off the specimen (Fig. 3). We believe this was the exit location of the electrical current, or perhaps the point of contact completing the connection allowing current to flow between raptor and rodent upon landing on the utility pole. After preparation, the hawk was determined to be a female (ovary = 15 X 8 mm) with light intestinal belly and subcutaneous fat along the rump, no prey remains in the stomach or crop, and in slight sub-adult plumage (some white throat feathers; base of upper and lower mandibles grey in color) but otherwise an adult plumage specimen (Fig. 4). Based upon examined evidence, it appears the hawk had successfully captured the squirrel and was seeking a perch. Upon selecting the utility pole, the squirrel's foot and bird's wing came in contact with the utility power lines, electrocuting the predator and causing its subsequent demise.

It is of note that Harris' Hawks are primarily associated with open range, scrub/chaparral habitat (Bednarz 1995, JCB and DMB pers. obs.); however, this bird was found is an urban setting. Houses are closely spaced with small to average-sized backyards. The house is approximately 0.12 km from Corpus Christi Bay and Ocean Drive (a busy urban street). There is a city park (Lamar Park)

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Figure 1. Electrocuted Harris' Hawk next to squirrel prey.

Figure 2. Electrocution burns on Harris' Hawk left talon.

approximately 165 m from the house where the bird was collected. The house lot has more open grassy habitat with a few trees compared to the park and other surrounding lots.

As a supplementary note, the nearest population of Harris' Hawks that JCB (pers. obs.) has knowledge of within the city limits of Corpus Christi is located at the Hans and Pat Suter Wildlife Refuge (27°42.526 N, 097°20.274 W) on Ennis Joslin and Nile Roads on Oso Bay, across from Texas A&M - Corpus Christi Campus. This approximately 30-ha park is across from a city water treatment plant and a baseball park, and close to two golf courses. On at least four occasions, three individual hawks were sighted at Suter Refuge. The hawks are frequently seen perched in the same tree or on nearby telephone poles, preparing to hunt cooperatively (Bednarz 1995).

Kind thanks to Pat Kennedy for helpful comments on the ms., and for providing topical manuscripts.

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Figure 3. Disarticulated right metacarpal of electrocuted Harris' Hawk.

Figure 4. Head of Harris' Hawk showing sub-adult markings (white throat feathers; base of mandibles grey).

NESTING OF THE WHITE SUB-SPECIES OF GREAT BLUE HERON *ARDEA HERODIAS OCCIDENTALIS* IN THE TEXAS COASTAL BEND 2006–2010

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The white subspecies of Great Blue Heron (*Ardea herodias occidentalis)* occurs in North America mostly in the Florida Keys and adjacent south Florida and variously around the eastern and southern Caribbean basin. Both the AOU Checklist (1998) and Clements (2007) consider *A. h. occidentalis* a subspecies of Great Blue Heron, but Lockwood and Freeman (2004) state without elaboration there is some consideration that *A. h. occidentalis* is not a sub-species but a morph. In his monograph “Great Blue Heron”, Butler (1992) calls *A. h. occidentalis* “a color morph/subspecies of *A. herodias*”. Other authors (e.g., McGuire 2002) use the English name Great White Heron for *A. h. occidentalis*.

It is not our purpose to discuss taxonomic status and naming, but rather to document the occurrence and nesting of white Great Blue Herons (presumably *A. h. occidentalis*) with dark Great Blue Herons (presumably *A. h. wardi*) in the Texas Coastal Bend. Below we refer to *A. h. occidentalis* as white form and *A. h. wardi* as dark form.

Prior to 2004 there were four documented occurrences of white form Great Blue Herons in Texas (Lockwood and Freeman 2004). Rappole and Blacklock (1985) mentioned *A. h. occidentalis* had been reported on a few occasions in the Coastal Bend. McHenry and Dye (1983) reported a “white phase” (sic) juvenal Great Blue Heron in a nest on Pelican Island in Galveston Bay in June 1978; no adult white form was seen.

We report here the nesting of adult white form Great Blue Herons each season from 2006 to 2009 in the Second Chain of Islands in Ayres Bay and in 2010 in adjacent Mesquite Bay, Aransas County, Texas. All of these sightings, including McHenry and Dye (1983) were included in the Texas Colonial Waterbird Survey for the given year (Texas Colonial Waterbird Society, 2007).

The Second Chain of Islands consists of numerous small (between a few tens of meters to ~300 m), narrow un-named islets associated with linear oyster reefs at the southwestern extremity of San Antonio Bay where it narrows to a smaller embayment called Ayres Bay.

The flora is typical of Coastal Bend islands, with retama (*Parkinsonia aculeata*), granjeno (*Celtis pallida*), mesquite (*Prosopis glandulosa*), and black mangrove (*Avicennia germinalis*); various grasses and forbs including sunflowers (*Helianthus argophyllus*), sea ox-eye daisy (*Borrichia frutescens*), common cane (*Phragmites australis*) and smooth cordgrass (*Spartina alterniflora*). The surrounding water is very shallow and difficult to navigate. At least seven of the Second Chain islets host colonial waterbird rookeries with ~10 nesting pairs to ~350 nesting pairs per island including Great Blue Herons, Great Egrets (*Ardea alba*), Snowy Egrets (*Egretta thula*), Tricolored Herons (*Egretta tricolor*), Reddish Egrets (*Egretta rufescens*), Roseate Spoonbills (*Platalea ajaja*), Black-crowned Night Herons (*Nycticorax nycticorax*), White Ibis (*Plegadis chihi*), Gull-billed Terns (*Sterna nilotica*), Caspian Terns (*Sterna caspia*), Forster’s Terns (*Sterna forsteri*), and Black Skimmers (*Rynchops niger*).

We observed and photographed a white form adult Great Blue Heron at a nest during May 2006, 2007, and 2008. We documented a white form – dark form pair at their nest in April 2009 on an adjacent islet in the same island group (Fig. 1). McGuire (2002) discussed pairing of white form and dark form Great Blue Herons in Florida; white-dark pairs were less frequent than white-white or dark-dark.

An adult white form Great Blue Heron paired with an adult dark form nested on a very small islet in Mesquite Bay, approximately 5 km southwest of

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Figure 1. White form Great Blue Heron (*Ardea herodias occidentalis*) with dark form (A. *herodias wardi*) mate on nest in Ayres Bay, Aransas County, Texas.

the Second Chain group in 2010. Three dark form chicks were hatched which we observed with both the white and dark form parents present in April, May and June 2010. Blood samples were drawn from two of these chicks for genetic analysis by investigators from Texas State University-San Marcos and Texas A&M University – Kingsville on 24 June 2010 (Green, pers. com.). This nest and a few others in the area were damaged by high water caused by Hurricane Alex the first week of July 2010. The fate of chicks is unknown, but we found three fledgling Great Blue Herons feeding around the islet about 10 days post-storm.

We did not observe any white form chicks, and never more than one white form adult at a given time. Therefore, we do not know whether the white form birds we saw were the same or different individuals. In 2006–2009, young could have fledged and departed before observations. Butler (1992) reported Great Blue Heron adults and young disperse soon after fledging, nest-site fidelity is weak, and few young return to natal areas. However, only one adult white form has been seen recently in the Coastal Bend away from the Second Chain – Mesquite Bay colonies, flying near Redfish Bay ~40 km southwest Ayres and Mesquite Bays in February 2010 (by JWH).

The Second Chain Islands and the Mesquite Bay Island are accessible only by boat, and birds restricted to these areas can't be seen otherwise. However, observations will continue because these rookeries are visited regularly in season by commercial tour boats (by TM) and annual waterbird counts including the Texas Colonial Waterbird Survey (by JWH and CD, *inter alia*).

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PARENT CAROLINA WREN CARRYING DEAD CHICK FROM NEST BOX

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The Carolina Wren (*Thryothorus ludovicianus*) is a well-known, well-studied species (Haggerty and Morton 1995). However, apparently, there has not been a published report of a parent carrying a dead nestling away from its nest; although, adults carry fecal sacs away from their nest (Haggerty and Morton, pers. comm.) Ira Lawrence, a neighbor, notified me that he observed such behavior about 0930 CST on 14 July 2010. He had a wren nest box on the corner post of his front porch about 1.7 m above the porch floor. A parent emerged from the box with a dead nestling in its bill, flew with it about 16.5 m across the lawn, dropped it from a height of about 1 m; then, ascended to perch on a power line about 5.4 m above the spot where the nestling was dropped.

The nestling carcass was only slightly putrid; so, I was able to obtain it for observation and measurement. There was no external or internal injury. Data were compared to Haggerty (*in* Jongsomjit et al. 2007). The nestling was 8-days-old. Feather tract development was normal and morphometric data were within the min/max range of Haggerty's data with the exception of weight (6 g vs. 8.4–16.15 g, $n = 24$) and the gape (9.5 mm vs. 12.01–14.0 mm, $n = 20$). Thus, the width of the mouth may have been underdeveloped which may have prevented the intake of adequate food.

I thank Ira Lawrence for informing me of this interesting wren behavior. I sincerely appreciate Dr. Thomas Haggerty's review of the manuscript.

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BROWN PELICAN (*PELECANUS OCCIDENTALIS*) MORTALITY DUE TO SHOTGUN WOUND

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The Houston Museum of Natural Science's Department of Vertebrate Zoology received a salvaged specimen of a Brown Pelican (*Pelecanus occidentalis*) found on Matagorda Beach (Matagorda County, Texas) in 2009. The specimen was prepared as a study skin on 9 August 2010 by TM and accessioned into the collection with the catalog number HMNS.VO 3155.

The specimen was an adult male (skull completely ossified, left and right testes = 11.7 and 8.4 mm, respectively) weighing 2.3 kg and had no trace of subcutaneous fat. During preparation the stomach was inspected and 1.2 g of parasitic worms were found. Initially the skin appeared undamaged, but upon closer inspection three pellets of shotgun

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Figure 1: Brown Pelican specimen (HMNS.VO 3155) shot on Matagorda Beach (Matagorda County, Texas) in 2009. Three pellets of shot are shown in foreground, next to a penny for scale (Photo by Beth Copeland).

packing were found subcutaneously: two near the left side of the vent, and one on the left of the base of the neck. It is possible additional pellets penetrated deeper into flesh, but cursory inspection revealed nothing in this regard. Additionally the specimen incurred some bruising on the dorsal surface of the right shoulder and base of the wing.

It is assumed the shotgun injury was ultimately the cause of death, whether direct, or more likely through injury or released toxins. The presence of intestinal worms suggests poor health and since no subcutaneous fat was found, it was probably unable to catch fish and starved. Mean weight of male Brown Pelicans is 3.7 kg (*n* = 56, Dunning 2008), indicating the specimen was only 62% of average weight for male Brown Pelicans. The underweight nature of the specimen corroborates the hypothesis that this specimen was starving and in poor health.

Brown Pelicans are state listed Endangered Species [Texas Parks and Wildlife Department (TPWD) 2010a). Consequently the hunter of this specimen partook in illegal activity, violating Rule §65.171 of the Texas Administrative Code (TPWD 2010b).

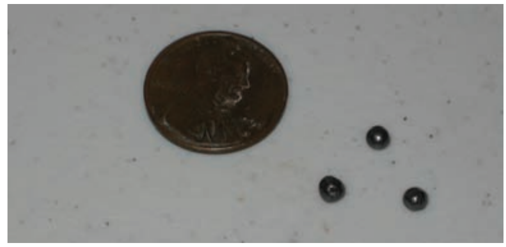

Figure 2: The three pellets of shot in foreground, next to a penny for scale (Photo by Beth Copeland).

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NOTEWORTHY BREEDING OF MASKED DUCKS IN LIVE OAK COUNTY, TEXAS

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The Masked Duck (*Nomonyx dominica*) is a tropical stifftail (Anatidae) ranging from South Texas to Argentina including most offshore islands (Eitniear 1999, Eitniear and Colon 2005). The Masked Duck, despite documented to nest throughout the year and having over 62 accepted records, is considered an infrequent breeder in Texas (Lockwood et al. 2003). Only one well documented nesting record exists for the State (Lockwood and Freeman 2004). This record was a female with 4 ducklings observed at Anahuac National Wildlife Refuge in Chambers County in 1967. Several additional likely records are included in Oberholser (1974) and Brush (2005) (Table 1), with the most recent being a group of 14 adults with 10 young observed at the Attwater National Wildlife Refuge (Colorado County.) from 29 July to 14 December 1994 (Brush 2005). This note reports on observations of young Masked Ducks observed near Lagartos in Live Oak County, Texas.

A pair of Masked Ducks with 8 ducklings was discovered on 23 October 2007 by Ron Wood, a local birdwatcher (Bartosik 2008) at a pond near Lagartos in Live Oak County, Texas. I visited the site (28^{o} 7’5.45’’ N, 98^{o} 0’ 30.41’’ W) 12.1 kms east of Highway 281 on FM 316[2] during 12 and 14 November. The family was readily observed inhabiting a flooded pond bisected by the highway during my visits. The eastern portion had a muddy shoreline, whereas, the western portion contained aquatic vegetation near the road but with grassy pasture and occasional thorn scrub type vegetation thoughout the remainder. I did not determine its exact size given the majority was a slowly receding flooded pasture on private property.

The male was not observed on 12 November, but the female and young were feeding in the larger pond on the west side of the road. The family was observed from 1000 to 1500 and traveled around the perimeter of the pond. They swam to the center of the pond after filter feeding along the perimeter and continue feeding by diving. This pattern was again observed from 1300–800 h on 14 November with the exception the ducks were in the pond located on the east side of the road. The foraging technique is consistent with bill morphology (Eitniear and Rylander 2008). The birds were extensively photographed by Mark Bartosik (Mark Bartosik 2008).

This is considered only the second documented breeding in Texas, but the lack of access to most areas of suitable habitat for this species has likely precluded accurate assessment of its breeding. Observations in the winter are often in more permanent water bodies, which are generally covered with vegetation (Anderson and Tacha 1999). Breeding requires abundant insect resources which are often the result of flooding normally dry pastures that contain small stock ponds (Baldassarre

Table 1. Historic breeding records for Masked Ducks in Texas.

Year	Location	Number	Authority
1934	San Benito, Cameron Co.	Female, 1 young	Oberholser 1974
1937	Harlingen, Cameron Co.	3 adults, 5 young	Oberholser 1974
1967	Anahuac (NWR), Chambers Co.	Female, 4 young	Lockwood and Freeman 2004
1968	Falfurrias, Brooks Co.	Female, 5 young	Webster 1968
1968	Sinton (WWR), San Patricio Co.	Pair, young	Oberholser 1974
1993	Sinton (WWR), San Patricio Co.	Female, 5 half-grown	Blankenship and Anderson 1993
1994	Attwater (NWR), Colorado Co.	14 adults, 10 young	Brush 2005
1994	Private land, San Patricio Co.	Female, 5 young	Lasley and Sexton 1994

NWR = National Wildlife Refuge; WWR = Welder Wildlife Foundation

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and Bolen 2006). Thus, the amount of breeding habitat during wet cycles is likely considerable.

The birds were photographed taking flight on 2 December which resulted in their leaving the area (Bartosik 2008). This observation was accepted by the Texas Bird Records Committee (TBRC 2007–81, Texas Photo Reference File 2516) in 2008 (Lockwood 2009).

ACKNOWLEDGMENT

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Figure 1. Young Masked Ducks resting near Lagartos, Texas. Photo by Marie Redwine.

VERMILION FLYCATCHER (*PYROCEPHALUS RUBINUS*) CAPTURING AND CONSUMING A MINNOW

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North American flycatchers (Family Tyrannidae) feed mainly on insects and small fruits, the latter especially during the nonbreeding season. Larger species in the genera Myiarchus, Tyrannus, and Pitangus have been recorded to catch lizards and other small vertebrates (Sibley 2001).

Among the 37 species of Tyrannid flycatchers breeding in the United States at least four have been observed catching and consuming small fish. The Great Kiskadee (*Pitangus sulphuratus*) regularly feeds on fish (Brush and Fitzpatrick 2002) whereas the behavior is rarely observed in the Black and Eastern Phoebes (*Sayaornis nigricans* and *S. phoebe*) (Binford 1957, Lawson 1975, Andrews and Sullivan 1996). There has been one report of a Vermilion Flycatcher (*Pyrocephalus rubinus*) taking small fish (Andrews and Sullivan 1996).

Herein we report an additional observation of a Vermilion Flycatcher capturing and feeding on small fish. On 6 January 2011 RN observed and photographed a male Vermilion Flycatcher capture a minnow at the El Franco Lee County Park (EFLCP), Harris County, Texas (Fig. 1). The bird sallied from a low perch, dipped its bill below the water surfaces, and on alighting held a minnow within its bill. The minnow was apparently still alive as the bird beat the fish against its perch before consumption.

Over the past three years a number of Vermilion Flycatchers, ranging from one to three, have wintered in EFLCP, frequenting a 32 ha, wetland with extensive stands of snags providing favored perches.

Up to three Vermillion Flycatchers were observed at EFLCP over the course of the 2010-2011 winter season. Following the observation on 6 January 2011, we extensively studied the foraging behavior of Vermillion Flycatchers at EFLCP. The three individuals were easily separated by their differing

Figure 1. A sub-adult Vermilion Flycatcher holds a minnow before consuming it on 6 January 2011 at El Franco Lee County Park, Harris County, Texas. Photo by Ron New.

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plumage characteristics, one a female plumaged-type bird, another sub-adult male, and an adult male. All three birds were exclusively seen on snags, stumps, and brush within the wetland, perching from > 1 meters to a maximum of 3 meters above the water surface. Foraging birds engaged in areal sallying and sallies toward the water where they dipped bills below the surface.

While we did not observe an additional capture of a minnow by a Vermilion Flycatcher we believe individuals wintering at EFLCP engage quite frequently in fishing behavior. From qualitative observations we concluded catching fish may be more important during cold days when flying insect activity is decreased. SL noticed Vermilion Flycatchers made more frequent sallies towards water during or after cold fronts. Additional studies and observations are needed to elucidate how the frequency of fishing behavior varies over range, weather conditions, and season.

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BIRDLIFE OF HOUSTON, GALVESTON, AND THE UPPER TEXAS COAST

Review by Clifford Shackelford[1]

Ted L. Eubanks, Jr, Robert A. Behrstock, and Ron J. Weeks, Texas A&M University Press, College Station, Texas. 2006: 328 pp, 50 color photos, 1 black-and-white photo, 3 maps. ISBN: 978-1-58544-510-3 (1-58544-510-x). $45.00 (cloth only).

Users of this book are going to need a mighty big backpack to carry it around. The size and shape is that of a college textbook. That being said, this book thoroughly showcases one of the hottest birding areas in the country. As a native Texan who has never missed a spring migration of birds on the Upper Texas Coast (UTC) for the past 24 years, I can attest to the richness and diversity of habitats and birds that occur in this area. The seven-county coverage area in this book has more species of birds recorded than 43 of the 50 states in the U.S. – and, by a handful of species, just barely trails behind diverse states like New Mexico and Arizona. Where else in the United States, with just three days afield in spring (especially when the weather cooperates), can one find over 200 species of birds, including over two dozen species of warblers and nearly three dozen species of shorebirds?

This book is separated into three main sections: introductory chapters, a photo gallery, and species accounts. Also included are two minor appendices, a bibliography, and a very generous and user-friendly index. The authors are certainly masters of the birdlife of the UTC and it shows while reading through the text. Yet, despite what is written on the outside back cover, only the third author, in birding terms, is actually a "permanent resident" in the area covered by this book. The authors often referred to this area as being East Texas. Most readers, including me, do not consider Houston, Galveston, or the Upper Texas Coast as being part of East Texas but rather, with its growing human population of several million, as its own entity known as The Greater Houston Area. Houston, from north to south, is virtually seamless from Conroe to Galveston and, from east to west, from Katy to Baytown. With so many people, this book has a tremendous market.

I enjoyed how the authors passionately describe birding on page 3, especially the clever use of the baseball game analogy. There is brief mention that some of the best birding areas frequented by birders are human-created. Examples include the massive oaks planted by the first settlers in seek of shade occurring in what is now the Houston Audubon Society sanctuaries in High Island. These trees have created stopover sites for migratory landbirds. Another is the Bolivar jetty obstructing the longshore current which created prime shorebird and waterbird habitat. And shade trees planted in parks and neighborhoods in parts of Houston where tallgrass prairies once occurred has changed the area's birdlife. Beginning birders or newcomers to the region should find this of interest. Tables 10 and 11, which list seasonal status and habitat partitioning of shorebirds, are pertinent and very important additions to the book. The conservation perspective on page 17 should be eye-opening to most readers. And the discussion on human population growth on page 29 is appropriate and often lacking and avoided in bird books. Throughout much of the book, the authors make excellent points on the region's drastic alterations to avian habitat. On page 21, however, 10 species are listed as threatened; yet, none is listed as such on any state or federal list. The arrival dates for migratory species from years of record-keeping are one of the more unique parts of the book. The habitat descriptions are also quite helpful. I enjoyed the family write-ups but they were not all present (i.e., nine family write-ups are lacking).

My two main criticisms of the book include: 1) the numerous editing errors, many mentioned below, and 2) dates throughout the book, when presented, did not include much recent information (i.e., few citations in the Bibliography were younger than the year 2000, dates in Table 4 end in 1997, dates in Table 9 end in 1992). Does this suggest the authors stopped keeping records nearly a decade before the book was printed? For a book that tries to synthesize decades of record-keeping, Table 9 is skin-and-bones with a low number of just eight Big Days worth highlighting out of decades of record-keeping.

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The name of the editor who completed what Harry C. Oberholser started but could not finish before his death - the barometer of our state's avifauna known as Bird Life of Texas - should be Edgar Kincaid and not "Edward" as listed on page 1. And on page 2, for nearly a decade the Texas Audubon Society has been known as Audubon Texas. On page 18, I've never heard of the Neotropical Migrant Bird Conservation Program in Texas.

Probably the most confusing addition to the book was the introduction of new terminology regarding the seasonal status of migratory birds. I found these terms to be taxing, unnecessary, and probably will be difficult for many readers to grasp. For example, the Wood Thrush (*Hylocichla mustelina*) is categorized as a "Common bi-seasonal transient migrant, uncommon and decreasing summer terminal migrant." I suppose that's code for "Common migrant, uncommon yet declining breeding species." Also, I found some inconsistencies in the use of these terms in accounts. For example, the Baltimore Oriole (*Icterus galbula*) was categorized as a "...spring and fall transient migrant..." but if the new terminology was used here shouldn't have read "...bi-seasonal transient migrant?" The legend on page 32 did not include the modifier "transient" for the bi-seasonal and mono-seasonal migrants (as opposed to a "terminal" migrant); yet, it was used throughout the Species Accounts.

Under the section on Climate, the personal account by Arthur Allen (1961) of Cornell University, one our country's first professors of ornithology, describing the birds and drastic weather change due to an arctic blast on the UTC in January 1925 would have fit nicely here. Citations are inconsistent in the introductory chapters and are lacking throughout parts of the section on Geology. And the statement that "less than 1% of the original grasslands remain" appears twice within four pages yet both times no citation is attached. Missing from the habitat discussions on grasslands are descriptions of mima mounds and gilgai (Diamond and Smeins 1984) which, before the plow, sprinkled the UTC and were likely important to birds.

The key to abbreviations starting on page 32 would have been better placed immediately before the Species Accounts and not the photo gallery. The three maps are a helpful addition yet none has an inset of the entire state for readers unfamiliar with the giant Lone Star State. The half-page chapter titled Exotic and Detrimental Species must have meant "avian" species because lacking was mention of introduced plants which are a major problem for the conservation of our birdlife. Instead, one of the three paragraphs in that section was oddly devoted to the Orange Bishop (*Euplectes franciscanus*) and a few other escaped caged birds with likely zero detriment to our birds. Table 4 includes migrant landbird numbers which are an interesting bonus, but since there is no mention of the methods used to collect the data, the raw numbers are just that. The reader has no idea if the same amount of time, observers, or coverage area were used on the surveys; one can draw few conclusions from these numbers.

There is no rhythm to the photo selection as the gallery includes only a small handful of birds and habitats found on the UTC. And since there are no page numbers nor are the photos labeled, it is difficult to refer to specific images. My favorite photo, since it depicts a scene many have witnessed while birding on the UTC, is the one of Bolivar Flats showing a swarm of waterbirds while an immense ship cruises by in the background. Sorely missing, since this area is known for it, are several photos of colorful warblers plus a fallout scene where a dozen migrant landbirds might be adorning a single shrub or water source. The habitat scenes are a treat, but the photo of longleaf pine (*Pinus palustris*), with its odd skyward orientation, does not capture the essence of a longleaf stand with well-spaced trees and a lush herbaceous ground cover. Moreover, I don't think the photo actually is longleaf pine.

The caption for the Armand Bayou photo states that this is one of the few unaltered bayous in the area; yet, the floating masses of the exotic and highly invasive water hyacinth (*Eichhornia crassipes*) in the scene depict a different kind of alteration. In two of the photo captions, Le Conte's should be written as two words while the last name for Don Bleitz, the only known person to ever photograph a living Eskimo Curlew (*Numenius borealis*), is misspelled in the caption for that species. Overall, the quality of most of the photos is good, but the dates on which they were snapped would have added value.

The Species Accounts consume most of the book's pages, and rightfully so since nearly 500 species are addressed, but accounts were inconsistent in content. For instance, almost twice as much was written about a few escaped Red-vented Bulbuls (*Pycnonotus cafer*) over the Marsh Wren (*Cistothorus palustris*) on the facing page. The authors recognize the *houstonensis* subspecies of the Henslow's Sparrow (*Ammodramus henslowii*), yet the American Ornithologists' Union has never recognized it mostly due to information found in Browning (1990). And in the account for the Rufous-crowned Sparrow (*Aimophila ruficeps*), the Edwards Plateau, like the Devils River in West Texas, should not have an apostrophe.

In the Ivory-billed Woodpecker (*Campephilus principalis*) account, a specimen record is erroneously listed from the northwest corner of the Texas Panhandle, home to the treeless shortgrass prairie. The most northwesterly specimen record in Texas actually comes from the Trinity River bottoms, a few miles downstream from downtown Dallas, which is a few hundred miles from the Panhandle (Shackelford 1998). And under the habitat description for this species, the authors state the species was found in mature pine forests without mentioning the importance of swampy hardwood forests like Tanner (1942) found next door in Louisiana. For this type of book, there was too much detail in the Red-cockaded Woodpecker (*Picoides borealis*; RCW) account. For example, all the pines occurring in eastern Texas, including the non-native slash pine (*Pinus elliottii*) were said to be fire-adapted but this is untrue for loblolly pine (*Pinus taeda*) seedlings (Conner et al. 2001:4). Thus loblolly is not self-perpetuating where fire is frequent. The term "colony" on page 178 is long defunct among biologists working on RCWs and nowhere was the bird mentioned to be a cooperative breeder. In the list of protected sites hosting RCWs, the national forests were completely omitted when, in fact, their lands support more breeding pairs of RCWs across the bird's entire range (especially in Texas) than anywhere else. Not only will RCWs join mixed flocks in winter, as stated by the authors, the species is considered to be the nucleus of such flocks (Schaefer et al. 2004). Again, too much detail for this type of book.

Despite these observations, the book does have a lot going for it. In fact, if you are planning to visit the UTC or the Houston area, then this book will be an essential reference before, during, and after your journey. Anyone interested in the birdlife of the UTC Texas, or the entire Gulf Coast will benefit from having this book. And don't be surprised, while reading the book, if you are lured to the coastal birding trail sites found along the UTC.

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BULLETIN OF THE TEXAS ORNITHOLOGICAL SOCIETY GUIDELINES FOR AUTHORS

SUBMISSION

For initial submission, e-mail one copy of the manuscript and photographs/illustrations[1] to editor@texasbirds.org or mail to Jack C. Eitniear, 218 Conway Drive, San Antonio, Texas 78209-1716. If you do not have access to the internet mail a DVD or CD containing a word processor version (MS WORD 1997-2003 preferred or OpenOffice 3.0). of the manuscript with all figures and tables, as separate documents

Submission Categories.—Manuscripts may be submitted as a Major Article or Short Communication. Major Articles generally are longer papers that are >5,000 character count including literature cited and figure captions, and excluding tables, figures, and spaces between characters. Manuscripts <5,000 characters in length including literature cited and figure captions, and excluding tables, figures, and spaces between characters will be considered Short Communications. Major articles must include an Abstract. The Editor may move a paper from one category to another at his discretion.

Multi-authored Submissions.—All authors should have contributed in a significant manner to designing and performing the research, writing the manuscript, and reading and approving the manuscript prior to submission.

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Prepare manuscripts on 8.5 X 11 inch format with 1-inch margins. Double-space all text, including literature cited, figure captions, and tables. Insert page numbers top right beginning on the second page. Use a font size of at least 11 point. Consult a recent issue of the journal for correct format and style as you prepare your manuscript.

Write in the active voice whenever possible. Use U.S. English and spelling. Use *italics* instead of underlining (i. e., scientific names, third-level headings, and standard statistical symbols). Use Roman typeface (**not boldface**) throughout the manuscript.

Common and scientific names of bird species that occur in North and Middle America should follow the AOU *Check-list of North American Birds* (1998, 7th ed., and its supplements in *The Auk*; http://aou.org.whsites.net/checklist/index). Names for other bird species should follow an appropriate standard (cite standard used). Use subspecific identification and list taxonomic authorities only when relevant. Give the scientific name at first mention of a species in the abstract and in the body of the paper. Capitalize common names of birds except when referred to as a group (i. e., Northern Cardinal, Golden-cheeked and Yellow warblers, vireos).

The common names of other organisms are lower case except for proper names (i. e., yellow pine, Ashe juniper, Texas kangaroo rat).

Cite each figure and table in the text. Sequence tables and figures in the order cited. Use "figure" only outside of parentheses; otherwise, use "Fig." if singular, "Figs." if plural (i. e., Fig. 1, Figs. 2–3). To cite figures or tables from another work, write figure, fig., or table in lowercase (i. e., figure 2 in Jones 1980; Jones 1980:fig. 2; Jones 1987: table 5).

Use the following abbreviations: d (day), wk (week), mon (month), yr (year), sec (second), min (minute), h (hour); report temperature as °C (i. e., 15° C). In text, do not abbreviate day, week, month, or year; months should be abbreviated (Jan, Feb, Mar, Apr, etc.) in figures and tables. Define and write out acronyms and abbreviations the first time they appear in text; abbreviate thereafter: "Second-year (SY) birds . . . We found SY birds in large numbers."

Present all measurements in metric units. Use continental dating (i. e., 15 August 2007), the 24-hour clock (i. e., 0500, 1230), and local standard time. Specify time as Standard Time (i. e., CST for Central

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Standard Time) at first reference to time of day. **Study site location(s) should be identified by latitude and longitude.** Present latitude and longitude with one space between each element (i. e., 28° 07’ N, 114° 31’ W). If latitude and longitude are not available indicate the distance and direction from the nearest permanent location. Abbreviate and capitalize direction (i. e., north = N, southwest = SW, or 5 km W Abilene, Taylor County). Also capitalize regions such as South Texas or Southwest United States.

Numbers.—Write out numbers unless a measurement or at the beginning of a sentence (i. e., 2 sec but We saw two birds); use numerals for numbers >10. Measurements: use numerals (6 min, 5 m, 10 years). Non-measurements: (a) if 0–9, write out number (eight nests); (b) if >10, use numeral (10 nests). Series: (a) for a series of related numbers (22 numbers), with at least one number being >10, use all numerals (2 marked individuals, 22 marked pairs, and 8 unmarked pairs); (b) if all numbers are <10, then write out the numbers (six males and eight females). Treat ordinal numbers as cardinal numbers (third, but 33rd).

Units of measurement include sec, min, h, day, week, month, and year. Use these examples to present numbers: 2,000 not 2000; always cover the . in numbers, 0.05 not .05 in the text, tables and figures; 70% not 70 percent; 10–30%; 2002–2007; 50 and 60%, respectively; from 20 to 30%; from 5 May to 1 June; between 4 August and 3 September. Round percentages to the nearest whole number unless there is a compelling reason not to do so. Use a forward slash or the word per between units (i. e., 6 pairs/ha, 10% per year).

Statistical Abbreviations.—Italicize the following abbreviations: F, G, H, k, n, P, R, r^2, t-test, U-test, Z, z. Use Roman type for these abbreviations: AIC, ANOVA, A^2, CI, CV, df, SD, SE, X^2. Carefully note that subscript typeface may differ from that of the abbreviation (i. e., AIC_c).

Reporting P-values.—If $P > 0.10$ then report to two decimal places (i. e., $P = 0.27$); if $0.001 < P < 0.100$ then report to three decimal places (i. e., $P = 0.057$); if $P < 0.001$, report as “$P < 0.001$.” Do not report P as “$P < 0.05$” or “$P > 0.05$” unless referring to a group of tests (i. e., “all $P < 0.05$”).

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Assemble a manuscript for Major Articles in this sequence: title page, abstract, text (introduction, methods, results, and discussion), acknowledgments, literature cited, tables, figure captions, and figures. Short Communications need not be subdivided into sections (optional), but must include an abstract.

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Up to three levels of headings may be used. First level: centered, all caps (includes METHODS, RESULTS, DISCUSSION, ACKNOWLEDGMENTS, and LITERATURE CITED). There is no heading for the Introduction. Second level: indent, capitalize initial letter of significant words and italize all words. Third level: indent, capitalize the initial letter of each word, followed by a period, three dashes, and then the text. In Major Articles, use headers in this sequence: First level, third level, and then second level (if needed). Keep headings to a minimum. Major Articles typically contain all first-level headings. Short Communications may or may not have these headings, depending on the topic and length of paper. Typical headings under Methods may include “Study Area” and “Statistical Analyses.” Consult a recent issue for examples.

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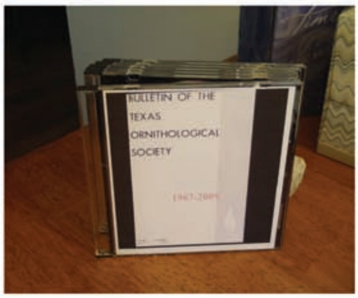
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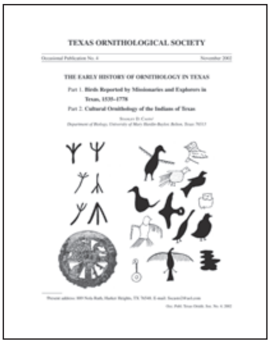

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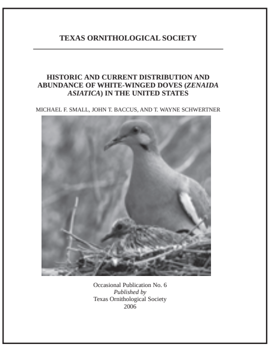

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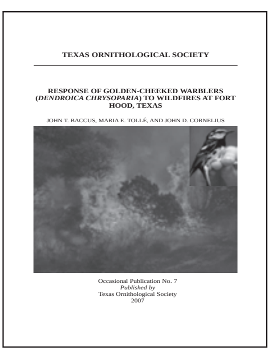

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