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[1]Starting with Vol. 42 both issues were combined..

Cover Photo: Rio Grande Wild turkey. Photo by Larry Ditto

INTRODUCTION TO VOLUME FIFTY TWO

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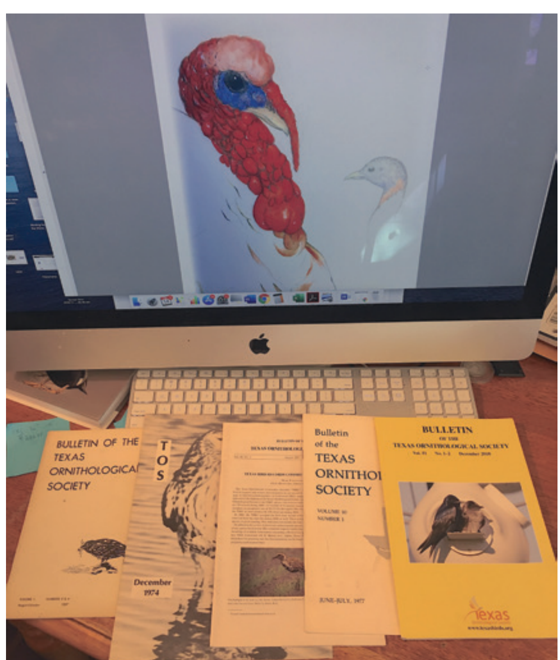
Over the past half century, the Bulletin of the Texas Ornithological Society has changed from a black & white magazine sized journal to a full color publication printed on glossy paper. During this time advances in technology have allowed for easier production from layout to printing. The biggest advancement was due to an arrangement with the Peregrine Fund to digitize all existing volumes. Having the journal in a searchable PDF format allowed us to participate with several online literature databases including SORA (Searchable Ornithological Research Archive) found at https://sora.unm.edu/, the currently being revised and updated OWL (Ornithological Worldwide Literature) and the Biodiversity Heritage Library (https://www.biodiversitylibrary.org/creator/231566#/titles). While a digital version of the Bulletin has been available for some time, it was not widely distributed to the membership. Starting with this issue (52) the publication is no longer being mailed to the membership as a hardcopy but is available for reading and download at the TOS website (www.texasbirds.org). A few hardcopies are being printed for authors and universities who are unable to access our digital version. Since the publication is a benefit of membership it is password protected. An email with the password will be sent soon after the latest issue is on the webpage. This change will save TOS a significant amount of money which can then be devoted to other projects. It will also save resources which so often create conflicts with wildlife such as the impact of logging and monoculture forests for paper production and the concerns over limiting our use of plastics. The TOS Board of Directors and the publication staff feel this is a "win..win" change.



Evolution of the Bulletin of the Texas ornithological Society 1967 to 2020

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Wild Turkey. Painting by Lynn Delvin.

BULLETIN OF THE

TEXAS ORNITHOLOGICAL SOCIETY

COMPARING EASTERN AND RIO GRANDE WILD TURKEY SURVEY METHODS IN NORTHEAST TEXAS

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ABSTRACT.—The aim of this study was to assess three survey methodologies to test their consistency and precision of relative abundance estimates. The specific objective of this project was to identify a survey method that provides the most consistent and precise estimate of Wild Turkey relative abundance. To achieve this, we conducted road, roost, and point count surveys for Rio Grande Wild Turkeys (*Meleagris gallopavo intermedia*) on Fort Wolters Training Center near Mineral Wells, TX and Eastern Wild Turkeys (*M. g. silvestris*) on Camp Maxey Training Center near Paris, TX. Both study sites were surveyed in March of 2017 and February, March, April, and December of 2018, and January, February, and March of 2019, with four to five days allotted to each study site per trip. Our analyses compared survey methods, time of the day (early morning versus late afternoon), and their interaction. Turkey detections were around 1 to 5 turkeys/hour higher for road surveys in both locations (Fort Wolters n = 377; Camp Maxey n = 85) compared to point count (Fort Wolters n = 67; Camp Maxey n = 18) and roost surveys (Fort Wolters n = 45; Camp Maxey n = 13). We found no differences in detection rates in relation to time of day for either study site.

The use of surveys are important for estimating the distribution and abundance of bird populations as well as assessing management practices and guiding conservation (Butler et al. 2006). Surveys of all wildlife species are useful for agencies and private landowners because they can be used to detect population trends, fluctuations, and can be used to evaluate the effectiveness of management techniques. Many survey methods have been tested for different Wild Turkey subspecies (*Meleagris gallopavo*) across the United States (Wunz and Shope 1980, Gribben 1986, DeYoung and Priebe 1987, Butler et al. 2005, Butler et al. 2006, Butler et al. 2007a). For example, brood surveys (Wunz and Shope 1980) were conducted for Eastern Wild Turkeys (*Meleagris gallopavo silvestris*) in Pennsylvania and mark/recapture surveys (Gribben 1986) have been performed in Mississippi. For Rio Grande Wild Turkeys (*Meleagris gallopavo intermedia*), roost (Butler et al. 2006), road surveys (Butler et al. 2005), and aerial surveys (Butler et al. 2007b) were conducted in the Texas Rolling Plains. DeYoung and Priebe (1987) studied different survey techniques by comparing estimates obtained from mark/recapture, line transects, and aerial surveys in South Texas. Although the Wild Turkey

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is one of the most extensively studied game birds in the U.S (Dickson 1992), there are few studies that have compared different sampling protocols to provide recommendation for a preferred method, or combination of methods, to obtain estimates of Wild Turkey abundance in Texas.

The goal of this study was to compare the consistency and precision of survey methods for Wild Turkeys in North Texas. The specific objective was to identify a survey method that provides greatest number of detections and more consistency (lower variance) of detections. We hypothesized that road surveys would provide better (i.e., more consistent and precise) estimates than point count and roost surveys. This is because road surveys take place during times of the day that Wild Turkeys are most active and because the surveyor is moving instead of remaining stationary.

METHODS

Study area

We studied Rio Grande Wild Turkeys at Fort Wolters. Eastern Wild Turkeys were studied at Camp Maxey. These two study areas were selected in North Texas as part of a wider effort to understand Wild Turkey population dynamics in this region.

Fort Wolters Training Center

Fort Wolters training center (Fig. 1a) is located near Mineral Wells, Texas in Parker County. This area is owned by the Texas Military Department and covers an area of 1,634 ha (Soldier Field Card 2013) in the Cross Timbers ecoregion of Texas. This ecoregion is a transitional area between the prairies of Central Texas and forested mountains of East Texas. The topography here is a mixture of hills separated by flat valleys and grasslands. The vegetation community is dominated by blackjack oak (*Quercus marilandica*) and post oak (*Quercus stellata*), with these two species making up around 90% of the canopy cover. Mixtures of little bluestem (*Schyzacharium scoparium*) and other Andropogoneae-dominated grassland transitions can be found mosaicked throughout the landscape. Other plants in the vegetation community include pecan (*Carya illinoinensis*), juniper (Juniperus spp.), and cedar elm (*Ulmus crassifolia*) (TAMU Forest Service 2017). Dominant soils in this area are sandy loams, shallow clay soils, limestones, sandstones, and alkaline soils (Texas Parks and Wildlife Department 2017). Sandy loam soils are found throughout the area and are productive for agricultural practices. Grasslands and other vegetative communities are supported by more alkaline soils. This area receives an average of 750 mm of rainfall per year.

Camp Maxey

Camp Maxey training center (Fig. 1b) comprises 2,691 ha (Soldier Field card 2013) in the post oak savannah ecoregion of Texas. This area is a transition zone between the blackland prairies of central Texas and the piney woods of east Texas. The vegetation is dominated by a variety of bluestems and gramas (*Bouteloua* spp.), however, mottes of post oak (*Quercus stellata*) and live oak (*Quercus virginiana*) can be found scattered throughout the landscape. The historic vegetation is slowly being replaced by yaupon holly (*Ilex vomitoria*), cedar elm (*Ulmus crassifolia*), and eastern red cedar (*Juniperus virginiana*) (Texas A&M Forest Service 2017). The upland areas of this ecoregion contain light colored, acidic sandy loams whereas bottomlands can range from sandy loams to mostly clays with darker colors (Texas A&M Forest Service 2017). This region's topography, much like the cross-timbers and prairies, is lightly rolling to hilly but flat areas can also be found throughout the landscape. This area of Texas has an average rainfall of 1000 mm per year.

Survey Methods

We tested three commonly used Wild Turkey survey methods: point count surveys (Flanders et al. 2006), roost surveys (Butler et al. 2006), and road surveys (Butler et al. 2007a, Erxleben et al. 2010). Both study areas were visited in March of 2017 (4 days per study site), February of 2018 (5 days per study site), March of 2018 (5 days per study site), April of 2018 (4 days per study site), December of 2018 (5 days per study site), January of 2019 (5 days per study site), February of 2019 (5 days per study site) and March 2019 (5 days per study site). The differences in the number of days were related to the Texas Military Department's access availability. For each visit, survey types were alternated in the mornings (2-3 days) and afternoons (2-3 days) to account for the effect of the time of day. Before each survey, rainfall and wind speed were assessed and surveys were not performed during times of inclement weather (e.g. heavy rain or high winds).

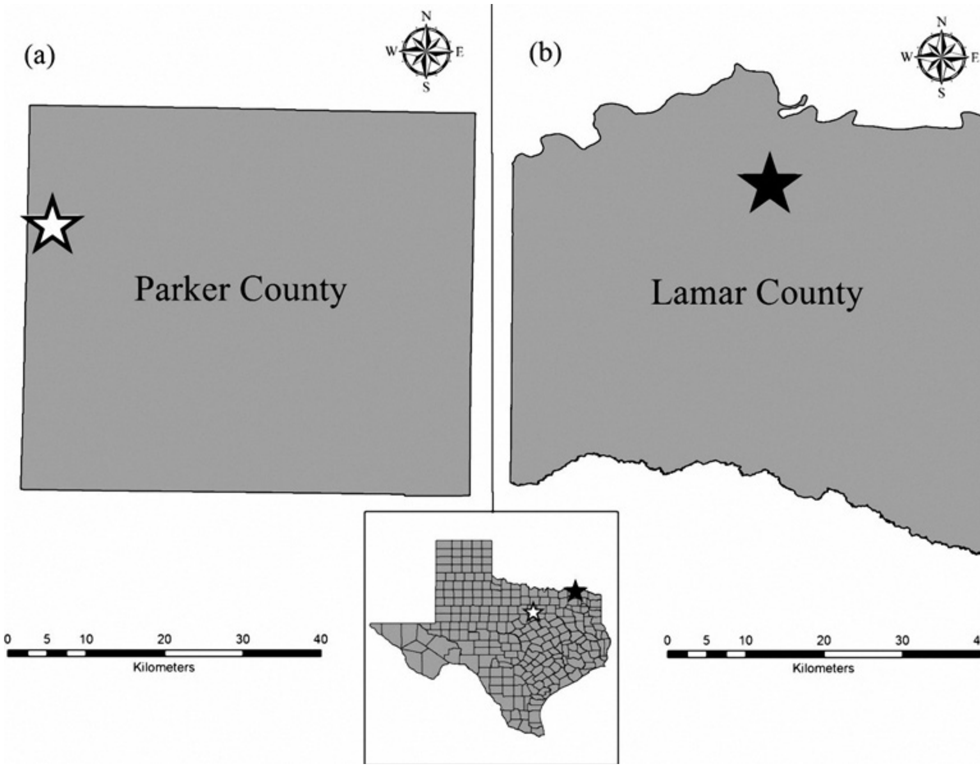

Figure 1. (a) Fort Wolters Training Center; (b) Camp Maxey Training Center.

Point count surveys

We used the point count survey method described by Flanders et al. (2006). Starting points for each survey route were established randomly and collected using a GPS unit (Juno T41, Trimble). Point counts were spaced at 800 meter intervals along a set route. The 800 meter distance between survey locations was set to minimize double counting turkeys and cover more ground in the survey route. This resulted in 24 points and covered a distance of 11.5 km for both Fort Wolters and Camp Maxey. Once a survey point had been reached, we waited 4-5 minutes before recording any observed calls. This allowed the birds to acclimate to our presence at each survey point (Hostetler and Main 2017). After the acclimation period, any Wild Turkey vocalizations detected were recorded. This included: gobbles, purrs, yelps, clucks, putts, and cackles. Each point count survey was conducted for four hours.

Roost counts

Roosts were located with the help of The Texas Military Department (TXMD) staff observations. Roost surveys were conducted alternating early mornings and late afternoons (Butler et al. 2006). The method used for this survey required the use of a Bushnell Equinox Z infrared scope. We sat approximately 300-400 m away from roosts that could be observed to minimize disturbance (Porter 2013) and recorded the number of turkeys at each roost site. The site was later revisited to record the GPS point of the tree used for roosting. We were not able to differentiate between sexes but only count the number of birds roosting at a particular site.

Road Surveys

Two 16-km survey routes were mapped out and driven each day for each study site. Like the other surveys, the road surveys were alternated between mornings and afternoon. Starting and ending points were marked on a GPS unit along with points throughout the survey where turkeys were observed. An average speed of 15 to 20 kph was used (Butler et al. 2007a). Once a turkey had been detected, we recorded a GPS point, the number of turkeys observed (these were also separated by sex), as well as the date and time of day. For turkeys farther away from roads, a TruPulse laser range finder was used to determine the distance of the turkeys from the road.

Data analysis

We standardized our data for each survey by effort. Total survey numbers for each day were averaged across the number of hours each survey required (road survey n = 2, point count survey n = 4, roost survey n = 1) which provided a "turkeys detected/seen per hour" value. To compare our survey methods, we used a randomized block design in which trips were blocks, survey techniques were treatments, and the time of day was a repeated measures effect. To test hypotheses about effects of survey method, time of day and their interaction, we used a linear mixed model (Mixed procedure in SAS, v. 9.4) with block and the interaction between block and survey method as random effects; fixed effects included survey method, time of day and their interaction (Kirk 2013). Because residuals were skewed (Shapiro-Wilk (1965) normality test), we analyzed square-root transformed count data but present back-transformed means as well as back-transformed means ± 1 SE. In addition to comparing survey methods with respect to mean number of detections, we wished to assess precision of estimates as related to survey method. Thus, we estimated the variance-covariance structure associated with the residuals for each treatment with the following candidate structures: variance components; first-order autoregressive moving average; unstructured; first-order autoregressive; compound symmetry, and Toeplitz, as well as heteroscedastic versions of the latter 3 structures. Additionally, we modeled the variance-covariance structure associated with the repeated measures effect with an unstructured variance-covariance matrix and a variance component structure.

RESULTS

Fort Wolters

We observed a total of 377 road detections (4.96/hour), 67 point count detections (0.44/hour), and 45 roost count detections (1.21/hour) from 2017 to 2019 (Table 1). Although detections per hour differed ($F_{2,11}$ = 12.77, P = 0.0013) among survey methods, these differences were consistent ($F_{2,37.5}$ = 0.47, P = 0.6259) between times of day. We found that road surveys had higher detections than point counts ($t_{8.49}$ = 4.95; P = 0.0009) and roost surveys

Table 1. Total and adjusted for effort counts for Fort Wolters Training Center. Counts are separated by survey type and month then averaged per season.

	Month	Road	Road/hour	Point	Point/hour	Roost	Roost/hour
Season 1	March 2017	60	7.38	7	0.44	1	0.25
Season 2	February 2018	105	10.5	12	0.6	6	1.2
	March 2018	92	9.2	22	1.1	11	2.2
	April 2018	21	2.63	18	1.13	0	0
Season 3	December 2018	11	1.1	0	0	6	1.5
	January 2019	10	1	2	0.1	5	1
	February 2019	59	5.9	6	0.3	5	1
	March 2019	20	2	0	0	11	2.2
Season 1 Average		60	7.36	7	0.44	1	0.25
Season 2 Average		72.67	7.79	17.33	0.923	5.67	1.2143
Season 3 Average		25	2.5	2	0.1	6.75	1.425
Total Average		9.92	4.96	1.76	0.44	1.22	1.22

($t_{7.8}$ = 3.79; P = 0.0055) but detected no difference ($t_{17.2}$ = 1.23, P = 0.2350) between point count and roost surveys (Fig. 2). Also, road surveys had a lower precision (SE = 0.3494, transformed scale) than point count (SE = 0.1864) or roost (SE = 0.1838) surveys.

Camp Maxey

We collected 85 road detections (1.03/hour), 18 point count detections (0.14/hour), and 13 roost detections (0.35/hour) (Table 2). As with Fort Wolters, detection rate differed ($F_{1,30}$ = 3.50, P = 0.0430) among survey methods but was consistent ($F_{2,30}$ = 1.19, P = 0.3179) among times of day. Road surveys had higher detections than point counts (t_{30} = 2.47; P = 0.0196) and roost surveys (t_{30} = 2.06; P = 0.0477); we detected no difference (t_{30} = 0.40, P = 0.6912) between point count and roost surveys (Fig. 3). In contrast to results at Fort Wolters, precision was similar among survey methods (SE = 0.2320).

DISCUSSION

Road survey techniques provided significantly higher detections than point count and roost surveys with no differences between point count and roost surveys for either Rio Grande or Eastern Wild Turkeys in North Texas. Although the precision of road surveys was lower at Fort Wolters, they still provided more detections than the other survey methods. Lower numbers in roost surveys

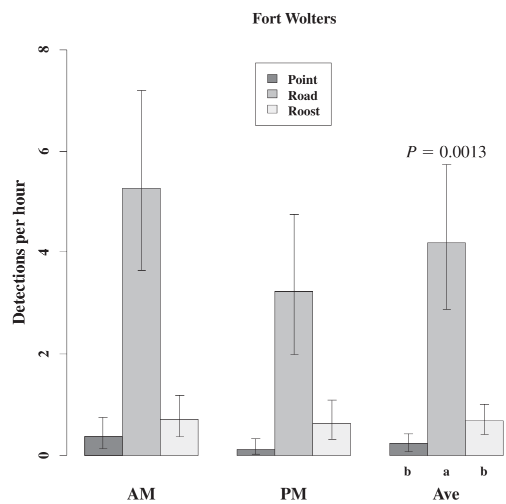

Figure 2. Comparison of survey methods for Rio Grande Wild Turkeys adjusted for effort in Fort Wolters, TX. P-value is from the test of survey method effect and shows that there is a significant difference between survey techniques.

Table 2. Total and adjusted for effort counts for Camp Maxey Training Center. Counts are separated by survey type and month then averaged per season.

	Month	Road	Road/hour	Point	Point/hour	Roost	Roost/hour
Season 1	March 2017	4	0.67	1	0.13	0	0
Season 2	February 2018	13	0.81	0	0	1	0.25
	March 2018	11	1.1	1	0.05	0	0
	April 2018	1	0.13	3	0.19	8	2
Season 3	December 2018	9	0.9	1	0.06	0	0
	January 2019	21	2.1	9	0.45	0	0
	February 2019	6	0.6	0	0	0	0
	March 2019	20	2	3	0.19	4	0.8
Season 1 Average		4	0.67	1	0.13	0	0
Season 2 Average		8.33	0.74	1.33	0.1	3	0.69
Season 3 Average		14	1.4	3.25	0.175	1	0.2
Total Average		2.07	1.04	0.56	0.14	0.35	0.35

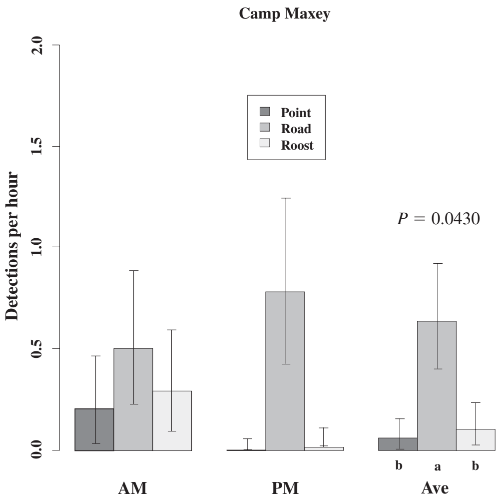

Figure 3. Comparison of survey methods adjusted for effort for Eastern Wild Turkeys in Camp Maxey, TX. P-value is from the test of survey method effect and shows that there is a significant difference between survey techniques.

may have been due to variable roosting patterns and lack of roost site fidelity (Butler et al. 2006). Also, disturbing of roost sites can cause Turkeys to seek alternate roosting locations (Porter 2013). Point count surveys, while beneficial during peak breeding season, can bias data due to lack of visual confirmation of the number of turkeys observed. Colbert et al. (2015) reported that using autonomous recording units might be a more feasible approach to point counts because they can record calls in multiple locations without the presence of a researcher. Conducting road surveys near or during breeding season may be useful because Turkeys use roads as display sites (DeYoung and Priebe 1987). However, road surveys are subject to variability due to the assumptions attributed to the surveys; 1) all animals on route were observed, 2) turkeys were not counted twice, and 3) sightings are independent.

Our analyses indicated that the time of the day did not influence detection rates for conducting surveys of Wild Turkey abundance in North Texas. However, linking time of surveys to animal activity can increase chances of detection. For example, conducting road surveys during the mornings and afternoons, when turkeys are more active, would most likely provide better estimates than if these surveys were done at times that turkeys are not as active such as during the heat of the day. Likewise, roost surveys would provide better results at night than during the day, and point counts may yield better results during the breeding season when Wild Turkeys are more vocal.

Butler et al. (2006) tested Wild Turkey roost survey methods and concluded that methods that apply new technology, such as infrared equipment, may provide more reliable results than traditional roost surveys. Other studies (e.g. Butler et al. 2007a) tested the feasibility of surveys for Wild Turkeys and detection success along road survey transects. Understanding which techniques provide the best abundance estimates with the highest precision can be useful to state and federal wildlife agencies to set daily bag limits as well as aiding in understanding the fluctuations of species population abundance. Our study showed that road surveys provided consistently higher detection rates than the other two methods in North Texas for two subspecies of Wild Turkey. These results can aid in more reliable relative population estimates.

ACKNOWLEDGMENTS

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BREEDING STATUS OF SWAINSON'S WARBLERS (*LIMNOTHLYPIS SWAINSONII*) IN THE BRAZOS RIVER VALLEY

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ABSTRACT.—With habitat fragmentation constituting one of the primary threats to many forest songbird species in North America, it is becoming ever more important to be cognizant of current population trends and breeding status of such uncommon species as the Swainson's Warbler (*Limnothylpis swainsonii*). The Brazos River Valley in Brazos County, Texas provides some of the most westerly known breeding areas for this species. Our goal in this study was to determine the current breeding status of the Swainson's Warbler at Lick Creek Park, a 523-acre tract of public land in Brazos County. In the summer breeding season of 2019, we conducted a series of standardized point count surveys, nest searches, and qualitative habitat assessments. We identified multiple singing male Swainson's Warblers on territories and were able to confirm breeding on-site by observing recently fledged young. Detection of warblers was associated with dense understory vegetation and abundant leaf litter. By confirming the presence of breeding Swainson's Warblers at this site we hope to promote more effective conservation measures of bottomland habitats in this immediate region.

Swainson's Warbler (*Limnothylpis swainsonii*) is a brownish, medium-sized member of the wood-warbler family Parulidae that is generally found in floodplain forests and riverine bottomlands with dense understory vegetation. It is a localized breeder across much of the southeastern United States and spends the winters in the Caribbean and the Yucatan Peninsula of Mexico (Anich et al. 2019). Globally, it has an estimated population size of 140,000 individuals (Rosenburg et al. 2016), and is listed as a national Species of Conservation Concern by the US Fish & Wildlife Service (2008). Its breeding populations are considered vulnerable in Texas (Texas Parks and Wildlife Department 2011). Threats to this species include habitat loss, fragmentation, and brood parasitism by the brown-headed cowbird (*Molothrus ater*) (Benson et al. 2010). Floodplain forests in the Brazos River Valley of Texas constitute some of the most westerly known breeding grounds for Swainson's Warblers (eBird, 2019).

For this project we sought to assess and confirm the breeding of Swainson's Warblers in 2019 at Lick Creek Park, a city park within the Brazos River Valley in Brazos County, Texas. Lick Creek Park is a popular location for birding and other outdoor recreation, and is one of the few large tracts of publicly owned and accessible land in the immediate region. By assessing the breeding status of Swainson's Warblers at this location we hope to raise local awareness of this species. Our results have implications for local conservation efforts and ecotourism because this species is sought-after by many recreational birders and difficult to observe in Texas.

To confirm breeding of Swainson's Warblers at this site we implemented a variety of field methodologies. Field work included an array of standardized point count observations, auditory playback/response, behavioral observations, and nest searching. Much of the available habitat at Lick Creek Park contains areas of dense understory vegetation. This made field work difficult, but home range sizes of Swainson's Warblers have been shown to be heavily dependent on understory density (Anich et al. 2010) with dense understories being preferable. The Texas Parks & Wildlife Department estimates that the home range of one breeding pair of Swainson's Warblers, in appropriate habitat, is around 25 acres. The home range of a species is generally defined as "that area traversed by the individual in its normal activities of food gathering, mating, and caring for young" (Burt, 1943).

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METHODS

Study Area—We performed this study in Lick Creek Park (Fig. 1), a 523-acre tract of land managed by the City of College Station to protect biodiversity in the Brazos River Valley and provide outdoor recreation opportunities. The park contains multiple major habitat types including sandy prairie, upland oak forest, transitional oak forest, alluvial and riverine bottomland hardwood, and oxbow marshes (Reed, n.d.) (Fig. 2). A wide range of Neotropical-Nearctic migratory bird species utilize different habitats within the park for their summer breeding grounds. To minimize our disturbance to the nesting of non-target species we made use of an established trail system throughout Lick Creek Park. This allowed us to access all major habitat types with little disturbance to the understory plant communities.

Point Count Surveys—Between 30 April and 2 June 2019 we conducted a total of six point-count survey repetitions. Kubel & Yahner (2007) found that some warbler species are less responsive to playback if further than 100-150 meters from the playback source. Therefore, to minimize our probability of double counting the same individual we established points every 150-250 meters along the trail system in Lick Creek Park. This allowed us to adequately cover the park, while also maintaining sufficient distances between our points to reduce multiple counts of an individual warbler. At each detection point, we actively observed birdsong for three minutes before beginning pre-recorded playback of a Swainson's Warbler song, to increase the likelihood of a response at each detection point (Sliwa & Sherry, 1992). Graves (1996) concluded that using playback to locate Swainson's Warblers on wintering grounds was the most effective survey method for the species, and we assumed that the birds would respond equally, if not more aggressively, to playback on their breeding grounds. We played the recording for 30 seconds and then resumed active observation for one minute. This limited our physical presence at each point to approximately five minutes, falling within the time period of highest response for migratory songbirds (Lynch, 1995). After detecting a response, we

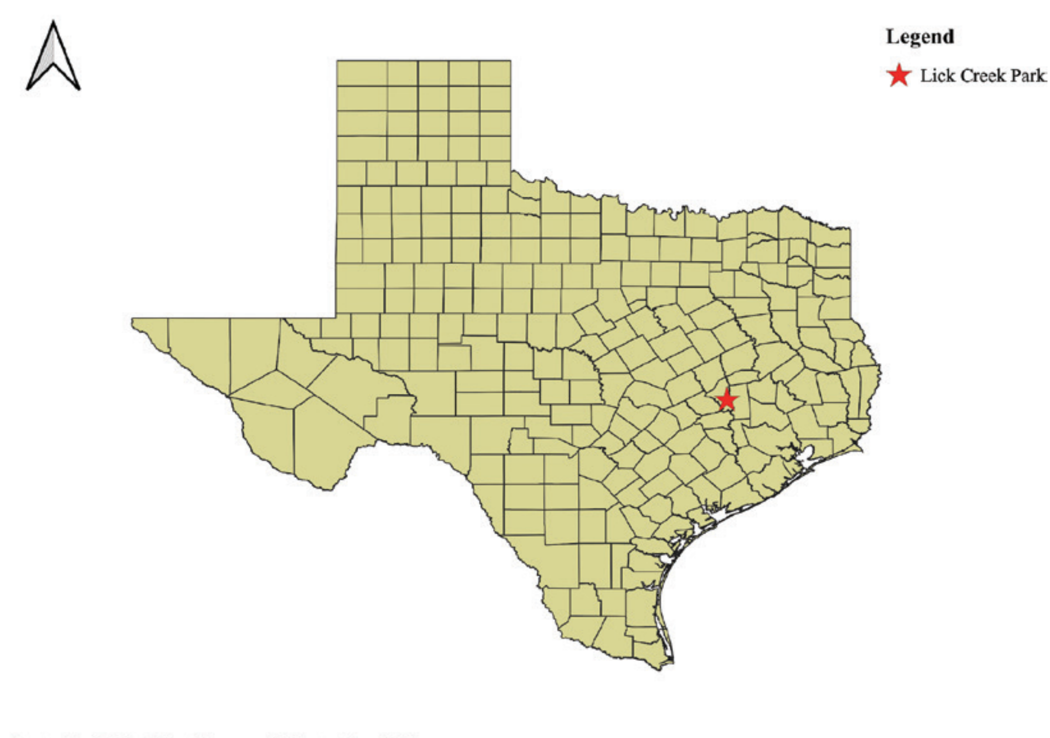

Figure 1. Location of Lick Creek Park within Brazos County in College Station, Texas, at 30.5672° N, 96.2110° W.

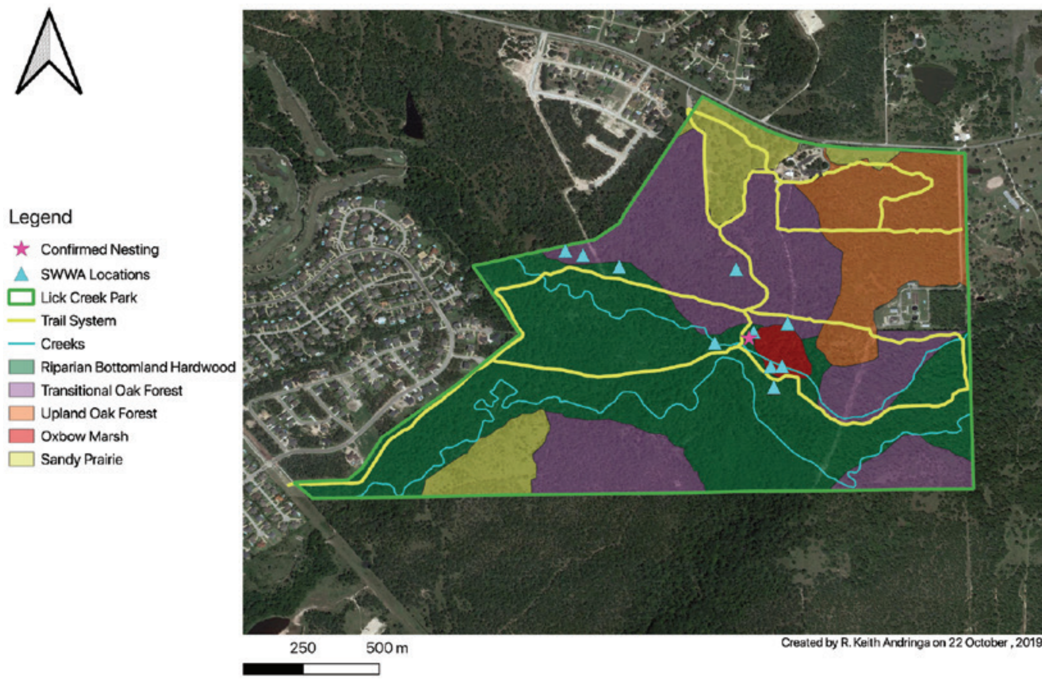

Figure 2. Distribution of major habitat types, observed Swainson's Warblers (SWWA) and confirmed nesting location within Lick Creek Park.

recorded the cardinal direction of the responding bird, along with the method of detection (visual or auditory). We also documented any breeding behavior displayed by observed individuals.

Breeding activity—We conducted nest searches and observed parental behavior of Swainson's Warblers to confirm breeding. Point count survey data was used to identify locations for nest searches. Priority habitats for nest searching were those that exhibited uniformly dense understory, high total canopy cover, high leaf litter depth, and high density of woody stems (Anich et al. 2009; Benson et al. 2009a). We marked the location of priority habitat in a handheld GPS system and did a preliminary search in these areas for nests or signs of breeding activity. We utilized playback to increase our chances of finding birds on territory (Benson et al. 2009b), recorded locations of any identified Swainson's Warblers in a handheld GPS system, and recorded parental behavior until the bird was lost from sight. Parental behavior is considered the most frequent cue for locating songbird nests (Rodewald, 2004). We returned to locations with recorded breeding activity and searched for nests within the understory of these areas.

Floristics—We recorded any plant species associated with Swainson's Warbler activity and breeding behavior. We identified plants being utilized by Swainson's Warblers opportunistically in the field. If a plant species was unknown, we took a photograph of the plant and identified it at a later date.

Regional Population Trends--To better understand regional trends in Swainson's Warbler populations we analyzed Breeding Bird Survey (BBS) data from Louisiana, Arkansas, and Mississippi. We did not include data from Texas due to the relatively small range of Swainson's Warblers in the state and the localized nature of BBS sampling protocol. We analyzed data from 1966 to 2018 and ran a simple linear regression on Swainson's Warbler occurrence data (average number recorded per route per year) over time in Arkansas, Louisiana, Mississippi, and on pooled regional data from all three states combined.

RESULTS

Point Count Surveys—We conducted six repetitions of 28 point count surveys (168 total points surveyed). We detected Swainson's Warblers on every repetition, for a total of 10 observations (0.357 Swainson's Warbler detections per point surveyed). We found Swainson's Warblers at seven of the 28 detection points, two of which had repeated detections (mean = 2.5 detections). Over the course of the sampling period, we found that visual and auditory detection of Swainson's Warbler males decreased as the breeding season progressed.

We found that approximately 89 hectares of Lick Creek Park were suitable Swainson's Warbler breeding habitat based on vegetation type and density. Using a mean territory size of 9.38 hectares (Anich et al. 2009) we calculated a maximum of 18 breeding male Swainson's Warblers in Lick Creek Park. Songbirds of declining populations and in spatially limited territory tend to have male-skewed sex ratios (Morrison et al. 2016), leading us to predict that there would be fewer than 18 breeding female Swainson's Warblers in Lick Creek Park at any given time. This is supported by our observations, because most of the Swainson's Warblers that were visually observed seemed to be unpaired well into the breeding season. Using the number of birds we observed as a minimum, we predict that the total population of adult Swainson's Warblers in Lick Creek Park is between 12 and 30 birds for the 2019 breeding season, with a probable male-skewed adult sex ratio.

During point count surveys a single mated pair was seen on 16 May 2019. The birds were following each other closely, and the male responded to playback with singing. Additionally, we observed a probable second pair on 1 June 2019. A single Swainson's Warbler was sighted following a second, unidentified bird after playback. We believe this bird to be another Swainson's Warbler based on size, coloration, and association with a definitive Swainson's Warbler, though visual confirmation could not be obtained.

Breeding Activity—We were unable to locate physical nests, but we were able to confirm breeding by observing a pair with two recently fledged young on 23 June 2019. The adult birds were observed foraging in leaf litter and feeding the fledglings by carrying prey items back to the young birds. On 26 June 2019 the adult pair was located again, this time without the fledglings. The adult pair was observed carrying insects and leaves to a location out of sight, suggesting a re-nesting attempt soon after the fledglings became independent.

Spatial Characteristics—Swainson's Warblers in this study utilized a wide variety of plant species including hardwood saplings, understory shrubs, and vines (Table 1). Swainson's Warblers utilized areas with uniform, dense understory vegetation and abundant leaf litter. We detected Swainson's

Table 1: List of plant species associated with Swainson's Warbler activity

Common Name	**Scientific Name**	**Warbler Behavior Observed**
Eastern redcedar	*Juniperus virginiana*	Perching, singing
Yaupon holly	*Ilex vomitoria*	Perching, preening, singing
Chinese privet	*Ligustrum sinense*	Perching
Greenbriar	*Smilax* spp.	Perching, foraging
Water oak	*Quercus nigra*	Perching, singing
Post oak	*Quercus stellata*	Perching
American sycamore	*Platanus occidentalis*	Perching, foraging
Peppervine	*Ampelopsis arborea*	Perching
Poison-ivy	*Toxicodendron radicans*	Perching, foraging
Winged elm	*Ulmus alata*	Foraging
Mustang grape	*Vitis mustangensis*	Perching, foraging
American beautyberry	*Callicarpa americana*	Foraging
Rusty blackhaw	*Viburnum rufidulum*	Perching, singing, foraging
Honey-locust	*Gleditsia triacanthos*	Perching, singing, foraging
Farkleberry	*Vaccinium arboreum*	Perching, singing

Warblers at a mean distance of 86.88 meters from a water source. However, we observed the pair with fledglings at a mean distance of 7.94 meters from a water source, suggesting that breeding behavior occurs in closer proximity to water bodies.

Regional Population Trends—Linear regressions of BBS data show no significant change in Swainson's Warbler populations between 1966 and 2018 in Louisiana ($p = 0.49233$), Mississippi ($p = 0.60409$), or in combined data from Arkansas, Louisiana, and Mississippi (Figure 4, $p = 0.32466$). A linear regression of Arkansas data indicates a slight increase in Swainson's Warbler populations during this period of approximately 1.5 percent per year (Figure 3, $p = 0.04438$).

DISCUSSION

We documented Swainson's Warblers utilizing dense, bottomland habitat at Lick Creek Park as breeding habitat. Plant associations did not seem

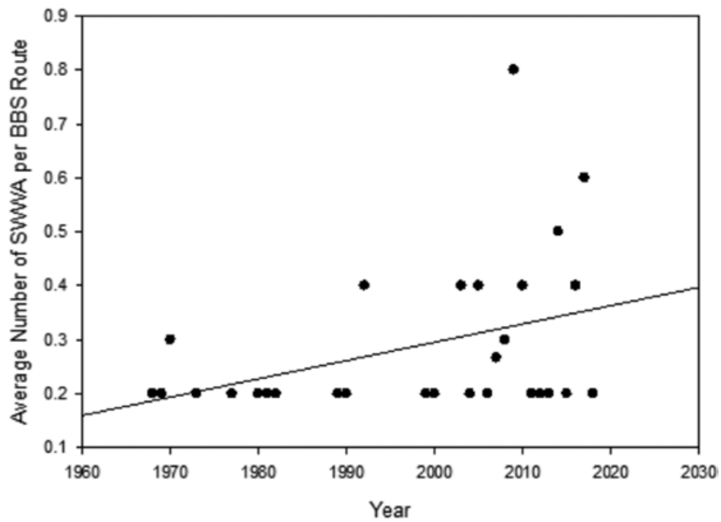

Figure 3. Average number of Swainson's Warblers (SWWA) recorded per BBS route per year, in Arkansas. $p = 0.04438$.

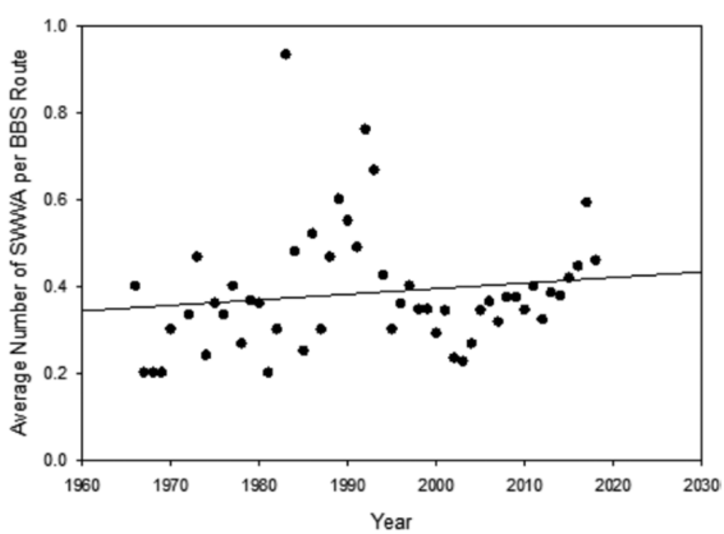

Figure 4. Average number of Swainson's Warblers (SWWA) recorded per BBS route per year, in combined data of Arkansas, Louisiana, and Mississippi. $p = 0.32466$

to affect habitat selection; the warblers utilized a variety of understory and midstory vegetation species. This is consistent with previous research findings in Arkansas, Louisiana, Mississippi, and Florida that floristics are unimportant to the selection of breeding territories for Swainson's Warblers (Graves, 2002). We observed three pairs of Swainson's Warblers, and an additional nine observations of solitary males. Males are more likely to be observed during point counts due to their high territoriality, and the occupation of females with incubation and brooding of young (Anich et al. 2019). Thus, more pairs may have been present than were directly observed. We also observed adults feeding recently fledged young, which confirmed breeding at this site. Swainson's Warblers are known to exhibit biparental feeding of young, which continues for up to four weeks post-fledging (Thompson 2005). Therefore, these fledglings could have resulted from egg-laying as early as 9 May, consistent with reported first breeding dates for the Gulf Coastal Plain (Anich et al. 2019). Data on second nesting attempts in this species are lacking, and it is unclear whether second broods are common or only occur after failure of the first brood (Anich et al. 2019). Because we did not observe the fledglings more than once, we cannot confirm that they were still alive when nesting activity was noted again for the adult pair. However, given their high mobility we believe it to be unlikely that both fledglings died in the three days between observations. Thus, our observations are most consistent with a second breeding attempt following a successful first nest.

By documenting the breeding ecology of Swainson's Warblers at this site we hope to strengthen protections for local bottomland habitat, which is threatened by continued suburban development. Additionally, by confirming breeding in this population we aim to increase birder visitation at Lick Creek Park and in the Brazos River Valley. The Swainson's Warbler is a secretive species that is uncommon in most of its range, and often difficult to see (Anich et al. 2019). Although our analysis of BBS data indicates a largely stable population in Arkansas, Louisiana, and Mississippi, Texas breeding populations are currently considered vulnerable and at a moderate risk of extirpation. This is likely due to habitat destruction and fragmentation (Texas Parks and Wildlife Department 2011) along with their relatively small breeding range in the state. Thus, increasing understanding of local breeding populations and habitat associations for this species is a priority.

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PREDATION OF EASTERN COTTONTAIL RABBIT (*SYLVILAGUS FLORIDANUS*) BY GREAT BLUE HERON (*ARDEA HERODIAS*)

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ABSTRACT.—An opportunistic predation by Great Blue Heron (*Ardea herodias*) on Eastern cottontail rabbit (*Sylvilagus floridanus*) was observed in south Texas on 31 Oct 2019. The Great Blue Heron had already captured the Eastern cottontail rabbit at the first observation but the maneuvering process, killing, and ingestion were recorded photographically, which make this observation unique even though this might constitute the second report on Great Blue Heron eating Eastern cottontail rabbits.

On 31 October 2019 at 1232 h (CST) JCL heard a worry cry in Laguna Vista, Texas (26° 06' N and 97° 18' W), she went to inspect what have emitted such sound. It turned out, it was an Eastern cottontail rabbit (*Sylvilagus floridanus*) recently caught by an adult Great Blue Heron (*Ardea herodias*), which most likely had obtained its prey by an stand and wait position *sensu* Kushlan (1976). The prey capture behavior is inferred from multiple (> 100) observations of the Great Blue Herons upright stand and wait (Kushlan op. cit.) individuals in the vicinity of the artificial pond were the incident happened.

It is well-known that Great Blue Heron primarily feed on fishes (Butler 1992) but their diet varies extensively with adults exhibiting more opportunistic behaviors (Butler 1997). Among the Great Blue Heron's diversified diet are—aside from Osteichthyes—Clapper Rail (*Rallus crepitans*) (Arnett 1951 in Stolen 2001); small mammals, frogs and grasshoppers (Peifer 1979); marine invertebrates, i.e., crabs, isopods, mud shrimp (Verbeek and Butler 1989); small mammals mainly Townsend's vole (*Sorex vagrans*) (Butler 1997); Pied-Billed Grebe (*Podilymbus podiceps*) (Stolen 2001); and Chondrichthyes i.e., Atlantic stingray *(Hypanus sabinus*) (Ajemian et al. 2011). In addition, Great Blue Herons are known for killing but not necessarily consuming Eared Grebe (*Podiceps nigricollis*) (Rivers and Kuehn 2006); and Horned Grebe (*Podiceps auritus*) (Hukee 2016).

METHODS

Upon observing the captured Eastern cottontail rabbit by the Great Blue Heron, JCL went to pick up the camera Canon EOS Rebel T7i with 75-300 mm lens and immediately started taking photographs.

RESULTS

The Great Blue Heron was first observed at 1232 h as it already had captured the Eastern cottontail rabbit which emitted its worry cry, and held its prey by the rostrum (Fig. 1a); the Great Blue Heron flew ~ 15 m across the pond upon noticing the observer (Fig. 1b). Once on the other side, the Great Blue Heron started to subdue the Eastern cottontail rabbit by grasping its head, the Eastern cottontail rabbit was maneuvered with the beaks until the Great Blue Heron faced its rostrum, then it was thrown to the floor (Fig. 1c-f), where the Great Blue Heron followed with a sharp beak blow to its head (Fig. 1g); throwing was repeated for about 2 min, with failed escape attempts (Fig. 1h) until the Eastern cottontail rabbit appeared to be death (Fig. 1i). At this point the Great Blue Heron took its victim and flew even farther away (Fig. 1j-k) ~ 90 m, and started to consume its victim head first (Fig.1l) at 1240 h while in the water.

DISCUSSION

To the authors awareness the only report available of the observed interaction between an Eastern

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Figure 1. Photographic sequence of a) captured Eastern cottontail rabbit (*Sylvilagus floridanus* = ECR) by Great Blue Heron (*Ardea herodias* = GBH), b) flown GBH, c-f) maneuvering and throwing, g) beak blow to ECR's head, h) failed escape attempt by ECR, i) death of ECR, j-k) flying GBH, and l) consumption. Photos by JCL.

cottontail rabbit and the Great Blue Heron, narrated one juvenile Eastern cottontail rabbit captured by a male radio-tagged Great Blue Heron out of the four individual Great Blue Herons studied by Peifer (1979). Although not confirmed the consumption of the Eastern cottontail rabbit by its predator might be assumed, as the author reported seeing the radio-tagged male feeding on fishes, as well as considered the rabbit - and all other organisms that were consumed by it - forage species. As a side note, the meaning of forage species is beyond what predators eat, as forage species depletion must have a detrimental effect on its consumers (Fujiwara et al. 2016), and doubtfully Eastern cottontail rabbits are forage species for Great Blue Heron given their varied diet. However, the use of foraging seems to be widespread in ornithological studies (see for example some of the titles reported in the literature cited). Noteworthy two out of the four Great Blue Herons studied by Peifer (op. cit.) fed exclusively on fishes, another individual captured three mammalian species: thirteen-lined ground squirrel (*Ictidomys tridecemlineatus*), Eastern chipmunk (*Tamias striatus*), and prairie pocket gopher (*Geomys bursarius*), but were not the majority of its potential diet which consisted of fishes; while the potential predator of one Eastern cottontail rabbit also captured an Eastern fox squirrel (*Sciurus niger*) as well as unidentified grasshopper species and 8 leopard frogs (*Rana pipiens*) with a total of 16 mammals, 10+ grasshopers, and 25+ bullhead (*Ameiurus melas*). Although the Great Blue Heron with the smallest feeding territory in Peifer (op. cit.) study showed the greater variation on its diet likely supporting MacArthur (1972) hypothesis of a broader diet for animals in "unproductive" environments, the hypothesis does not hold as the individual with the second smallest feeding territory fed exclusively on two fishes: bullhead and sunfish (*Lepomis* sp.). Even though, the potential consumption of one juvenile Eastern cottontail rabbit by one of the Great Blue Herons aforementioned might be the first record, the observation reported here, 40 years apart, might be unique (at least to the authors awareness) as it is documented with still images.

Aside from some of the first case consumption scenarios of a given prey mentioned in the introduction, and the different attempts of killing but unsuccessfully consuming Grebes, Herons are known to use tools for fishing purposes. For example, *Ardea herodias occidentalis* was observed using a stick to lure prey (Evans and Jackson 2019), under the passive bait fishing category *sensu* Gavin and Solomon (2009). Are Great Blue Herons learning how to use tools and/or forced to look for alternative prey as urbanization takes place? Bread—undoubtedly a wise monkey produced item—has been used as bait for fishing by Great Blue Heron (Zickefoose and Davis 1998), also under the passive bait-fishing category of Gavin and Solomon (op. cit.), as the bird benefitted from the humans feeding bread to Canada Geese (*Branta canadensis*) and Mallard (*Anas platyrhynchos*) by capturing four fishes (Zickefoose and Davis op. cit.). Seventy out of 93 strikes in 12 min at plant debris by an immature Great Blue Heron were successful, perhaps three of those strikes captured fishes but no confirmation of any prey was possible, bill-stabbing resulted in even stick manipulation once; the stick was maneuvered in the beaks to simulate ingestion during this "practice" foraging behavior (Davis 2001). Evans and Jackson (op. cit.) suggested that individuals of the species could be exposed initially to human bait-fishing through observation and learn to at least bait-fish passively. The potential diversification of diet might not necessary follow habitat degradation as urbanization takes place, because during harsher conditions (i.e., winter) Great Blue Herons are known to augment their diet by consuming small grassland mammals (Butler 1997).

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WINTER NOCTURNAL NEST BOX USE OF THE BLACK-CRESTED TITMOUSE (*BAEOLOPHUS ATRICRISTATUS*)

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ABSTRACT.—Nest boxes are used during the breeding season by many cavity-nesting birds; however, less is known about the use of nest boxes as sites for roosting during the winter non-breeding season. The Black-crested Titmouse (*Baeolophus atricristatus;* hereafter BCTI) is a member of the family Paridae, which is a family containing birds known to utilize nest boxes during the winter seasons. However, the BCTI is a species with undocumented or unknown roosting behavior. For this study, possible factors influencing the propensity for winter roosting in the BCTI were examined. We conducted nocturnal surveys on nest boxes with the use of a wireless infrared cavity inspection camera across two winter field seasons. We analyzed the influence of nightly weather conditions as well as the effect of habitat and vegetation on winter roosting. For the weather variables affecting the probability of roosting, a decrease in temperature was found to increase BCTI roosting. Vegetation density 15 m from nest boxes was also found to influence roosting with an increase in vegetation leading to an increase in roosting frequency. This study has shown nest boxes are of use to BCTI during the non-breeding season and has shed light on some of the factors influencing their winter roosting behavior.

Information about the winter ecology of many avian species is lacking due to a general focus in the literature on breeding ecology. Hence, there are significant gaps in our understanding of the nature of behavior and social interactions of many wintering birds (Brawn and Samson 1983).

Wintering birds are confronted with various abiotic factors which can affect their behaviors and survival. Colder temperatures, a decrease in resource and food availability, and shorter day length leading to longer periods of fasting can all affect the energy balance of winter acclimatized birds (Mayer et al. 1982). The effects of colder temperatures are more pronounced at night for diurnal birds as they are not usually foraging, and temperatures are at their lowest, leading to a decrease in body temperature (Baldwin and Kendeigh 1932). Passerine species survival drops markedly after a decrease in winter temperatures (Krams et al. 2013, Macias-Duarte et al. 2017). However, some birds make behavioral and physiological adjustments in response to winter conditions. For example, the White-breasted Nuthatch (*Sitta carolinensis*) caches food reserves to obtain later when resources become scarce in winter (Carrascal and Moreno 1994). In addition, changes in insulation, body mass, feathers, or lipid content help passerines maintain thermoregulation (Evans 1969, Waite 1992, Gavrilov et al. 2013, Møller 2015, Petit et al. 2017).

The importance of thermoregulation to a bird can depend on several factors. Size, for example, can be a major advantage for thermoregulating. Small bodied animals have lower survivorship in cold temperatures compared to their larger bodied conspecifics (Riesenfeld 1981). An increase in size of passerines relates to lower metabolic stress with lowered body temperatures as well as a reduction in the relative amount of energy required by a bird (Kendeigh 1969, Buttemer 1985).

The selection by smaller-bodied birds of certain overnight roosting sites can minimize the demands of thermoregulation (Du Plessis and Williams 1994). Roosting in trees, dense vegetation, and both natural and artificial cavities helps birds to thermoregulate because wood is a good insulator of heat. For example, roosting in cavities is advantageous for House Sparrows (*Passer domesticus*) who conserve more energy on colder nights when in cavities (Kendeigh 1961). Mountain Chickadees (*Poecile gambeli*) and Juniper Titmice (*Baeolophus ridgwayi*)

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who roost overnight in introduced nest boxes (Fig.1) have energy savings of 25% (Cooper 1999). Roosting sites also aid in reducing the impact of precipitation and wind. Phainopepla (*Phainopepla nitens*) receive more of a thermal benefit from the shielding of wind rather than insulation against radiation heat loss when in roosting sites (Walsberg 1986).

Overnight roosting behaviors vary among species. For example, Carolina Chickadees (*Poecile carolinensis*) prefer to roost alone overnight and switch between different roosts throughout the season (Pitts 1976), while others, such as the Downy Woodpecker (*Picoides pubescens*) and the White-breasted Nuthatch choose to use the same roost repeatedly (Kilham 1971). Some birds like the Eastern Bluebird (*Sialia sialis*), Pinyon Jay (*Gymnorhinus cyanocephalus*), and the Green Woodhoopoe (*Phoeniculus purpureus*) use huddling behaviors and communal roosting, both of which lead to enhanced thermoregulation (Frazier and Nolan 1959, Balda et al. 1977, Du Plessis and Williams 1994).

Due to the limited behavioral ecology research on the Black-crested Titmouse (*Baeolophus atricristatus*; hereafter BCTI), the species is an ideal candidate for research on winter roosting ecology. Little is known about roosting habits for BCTI, however Tufted Titmice (*Baeolophus bicolor*) seek out denser vegetation and canopy cover on especially cold and windy nights (Brawn and Samson 1983) and Tufted Titmice have been observed to use naturally occurring cavities for roosting (Pitts 1976). Great Tits (*Parus major*), another species within the family Paridae, also use denser coniferous vegetation significantly more than less dense leafy vegetation for both cold and windy aviary mimicked conditions (Vel'ky et al. 2010). But, even within species, roost use may not be consistent. For example, Blue Tits (*Cyanistes caeruleus*) in southern France use nest boxes for roosting while Blue Tits on the nearby island of Corsica do not (Dhondt et al. 2010).

In this study we examined if introduced nest boxes are used by Black-crested Titmice (B*aeolophus atricristatus*; hereafter BCTI) during the non-breeding winter season and explored variables affecting winter roost site selection in nest boxes. We tested the hypothesis that temperature would affect the use of cavity nest boxes by BCTI, and we predicted BCTI roost in cavity nest boxes more frequently on nights of colder temperatures. We also tested the hypothesis that wind speed would affect the use of nest boxes by BCTI, and we predicted BCTI would roost in nest boxes more frequently on nights with higher wind speeds. Finally, we tested the hypothesis that vegetation surrounding nest boxes affects BCTI nest box use, predicting that BCTI preferentially roost in cavity nest boxes in areas with denser vegetation and canopy cover.

Study Species

The BCTI, a member of the Paridae family, is a small non-migratory songbird residing in the Edwards Plateau of central Texas (USA). The BCTI is characterized by mouse-gray plumage on the dorsum and light gray plumage on the venter with tawny-buff flanks. The BCTI reaches 15 to 22 cm in length and weighs 16.5 gm on average at maturity (Patten and Smith-Patten 2008, Peterson 2008).

As the BCTI is a permanent resident, it is an ideal species for year-round study. Until recently, the BCTI was considered to be a sub-species

Figure 1. A roosting black-crested titmouse during wintertime in artificial nest box on Freeman Ranch, Hays County, TX.

of the Tufted Titmouse, based partly on species hybridization. However, the degree of genetic differentiation between the BCTI and the Tufted Titmouse indicates the BCTI should be considered a distinct species (Braun, et al. 1984, Banks et al. 2002). Since the BCTI has been recognized as a different species for a relatively short period of time, there is a lack of research considering the behavioral ecology of the species apart from the Tufted Titmouse (Patten and Smith-Patten 2008).

METHODS

Study Area

This study was conducted at the Freeman Center (29° 56' N, 98° 00'W), a 1416 ha property, owned by Texas State University and located 10 km NW of San Marcos, Hays County. Much of the habitat at the Freeman Center is dominated by oak-juniper woodland (*Quercus fusiformis, Juniperus ashei*) scattered with honey mesquite (*Prosopis glandulosa*), huisache (*Acacia farnesiana*), and various shrubs and grasses. The Freeman Center was historically a working livestock ranch for free-range cattle, but the site is now largely undeveloped habitat aside from a few grazing pastures for cattle and sheep.

At the Freeman Center BCTI are relatively abundant throughout and have been studied at the site since 2013 (RJR unpubl. data). Since 2013, over 800 BCTI individuals have been uniquely marked with both aluminum and color bands and 71 nest boxes have been erected and monitored during the breeding season. Many BCTI pairs have used the nest boxes during the breeding season.

Winter Roosting

To examine the winter roosting habits of BCTI, we surveyed 40 of the 71 nest boxes located on the Freeman Center. We chose these 40 boxes because of their proximity to each other and to useable roads making it possible to survey several boxes in one night. We conducted surveys twice a week, checking 20 boxes one night of the week and the remaining 20 boxes another night of the same week. We began surveying no sooner than 30 min after sunset, late Dec. through Feb. in 2016 and early Nov. through Feb. in 2018. We surveyed with the use of a wireless infrared cavity inspection camera (ibwo.org 6-inch wireless light emitting diode (LED) camera system) to minimize disturbance to roosting activity (Santos et al. 2008, Tyller et al. 2012). The camera transmitted images to a handheld monitor which we used to capture still images or short videos. We checked each box for the presence/absence of BCTI or any other avian species. We recorded environmental conditions for each survey night using a Kestrel 4500 Weather Meter for wind speed, relative humidity, and temperature measurements. We also recorded a sky code measurement ranging from 0 to 3 with each score corresponding to a cloud coverage category (e.g., 0 for clear skies with 0% to 25% cloud cover, 1 for 25% to 50% cloud cover, 2 for 50% to 75% cloud cover, and 3 for 75% to 100% cloud cover) as well as time of sunset for each survey night.

Vegetation Analysis

We surveyed the vegetation surrounding used and unused nest boxes using a spherical densiometer while standing at the entrance hole of each nest box to measure canopy cover. A vegetation profile board (VPB), of 2.5 m in height and 30.5 cm wide, was used to measure horizontal vegetation cover. The VPB was marked with alternating white and orange sections at 0.5 m intervals each. VPB measurements were taken at the nest box from each cardinal direction and measured at 5 and 15 m out from each direction. The proportion of each 0.5 m white and orange interval obstructed by vegetation was recorded as a score from 1 to 5 with each score corresponding to a range in percent cover (e.g., 1 corresponded to 0% to 20% cover, 2 being 20% to 40%, and so on). The VBP would be split in half for maneuverability into thicker vegetation and was reconnected once in place. The distance from each nest box to the nearest tree above 2 m was also measured. Lastly, habitat types at each box were recorded as woodland, shrubland, or grassland.

Statistical Analysis

To determine the weather variables affecting nest box use overnight we assessed presence and absence of BCTI, and other avian species, using logistic regression analysis with program R 3.3.1. We used general linear mixed effect models with temperature, humidity, sky code, and wind speed as fixed factors and the nest box as a random factor. We created two logistic regression models with the same factors as predictors. The first model with presence or absence of any bird as the response variable (model 1) and the second model having presence or absence of BCTI as the response variable (model 2).

We used poisson regression analysis to determine vegetation variables affecting box use. Once again, we created two models using the parameters of canopy cover, horizontal vegetation cover at 5 m, horizontal vegetation cover at 15 m, the nearest tree above 2 m, and habitat type. For the first model We used the total number of visits per nest box from any bird as the response variable (model 3). For the second model we used the total number of BCTI visits per box as the response variable (model 4). We combined the habitat type category of shrubland with the woodland category for analysis as only three boxes were designated as shrubland. The three shrubland designations were of similar vegetative composition to the woodland habitats having ample Live Oak and Ashe Juniper trees but with less pronounced tree height.

RESULTS

Across two seasons of overnight nest box surveys we conducted a total of 691 surveys on the 40 nest boxes, with a total of 111 surveys having bird presence. BCTI made up 54 of the 111 surveys, with the remainder consisting of 46 Ladder-backed Woodpeckers (*Picoides scalaris*) and 11 Bewick's Wrens (*Thryomanes bewickii*).

When we analyzed the weather variables potentially affecting box selection, the presence of any bird species increased with lower temperatures. Model 1 showed that lower temperature was a significant indicator of bird presence (P = 0.002) as well as model 2 which showed lower temperature as a significant indicator of BCTI presence (P = 0.001; Fig. 2). No other weather variables were found to have a significant effect on bird or BCTI roost selection including wind speed (P = 0.206; Fig. 3).

When we analyzed the vegetation parameters taken for each nest box, the horizontal vegetation cover at 15 m from the nest box was shown to be a significant indicator of bird presence. As horizontal vegetation cover at 15 m out increased there was an increase in bird and BCTI presence. Model 3 showed horizontal vegetation cover at 15 m was a significant indicator for the presence of any bird species (P = 0.003) as well as model 4 which also showed horizontal vegetation cover at 15 m as a significant indicator for BCTI presence (P = 0.004; Fig. 4). Habitat type, canopy cover, nearest tree, and horizontal vegetation cover within 5 m of the box did not influence box use for birds or BCTI.

DISCUSSION

Prior to my research the winter roosting habits of BCTI were not well known. This study is the first to scientifically examine the factors influencing

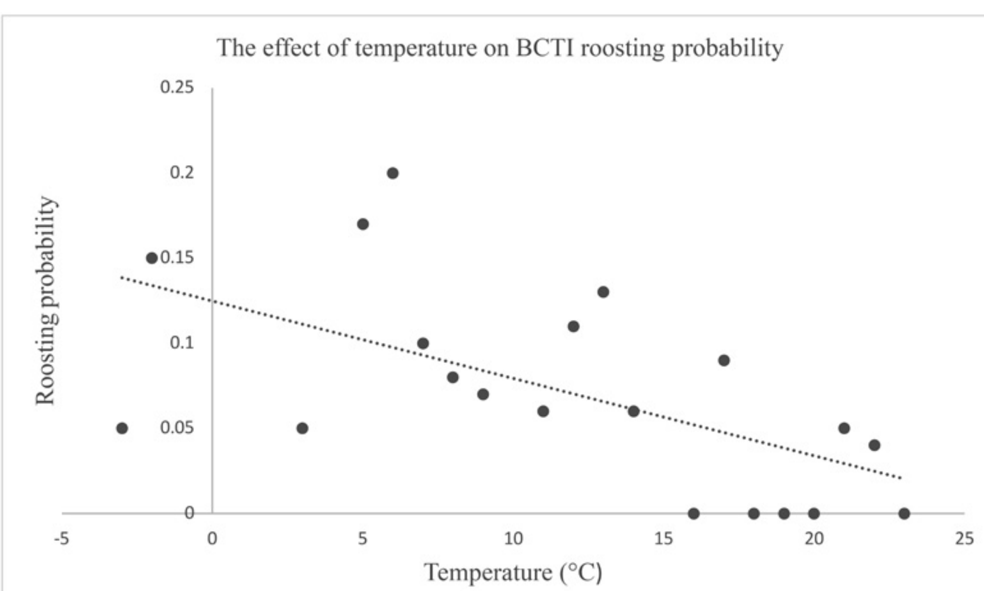

Figure 2. The temperature recorded for each BCTI visit to a nest box (n = 53) at the Freeman Center from Dec. 2016–Feb. 2017 and Nov. 2017–Feb. 2018. Temperature has a significant effect on BCTI roosting presence (P = 0.001).

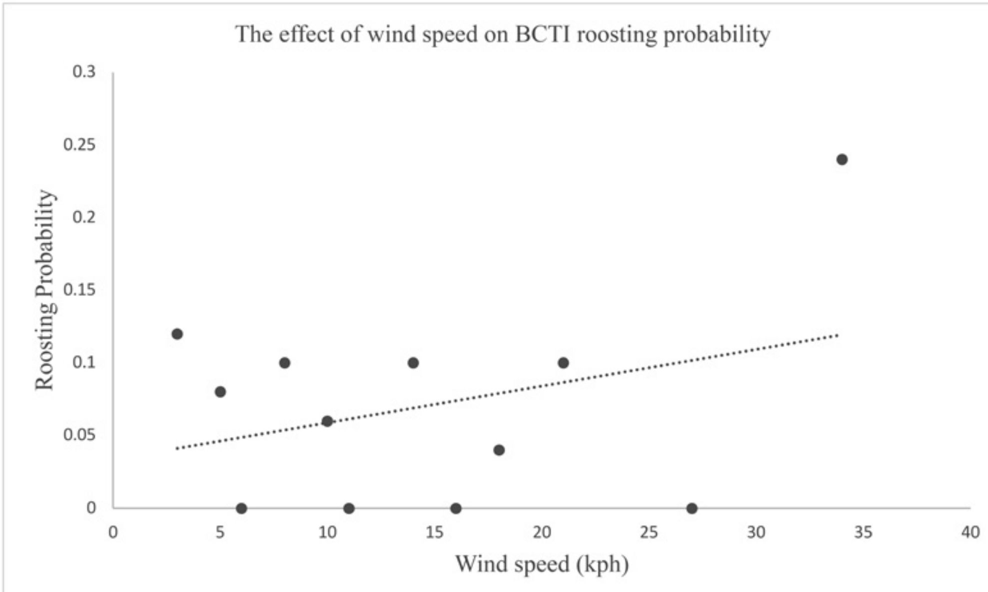

Figure 3. Wind Speed recordings for each BCTI visit to a nest box (n = 53) at the Freeman Center from Dec. 2016–Feb. 2017 and Nov. 2017–Feb. 2018. Wind Speed did not significantly influence BCTI roosting presence (P = 0.206).

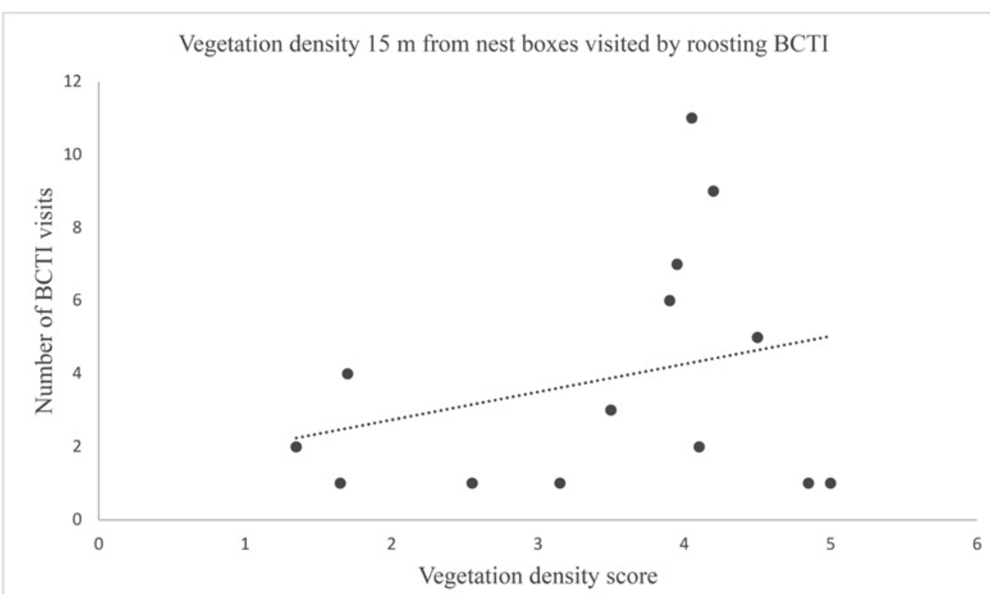

Figure 4. Vegetation density surrounding each nest box used by a BCTI for roosting. Vegetation scores correspond to a range in percent cover (1 = 0% to 20%, 2 = 20% to 40%, 3 = 40% to 60%, 4 = 60% to 80%, 5 = 80% to 100%) A total of 14 of the 40 nest boxes survey at the Freeman Center were used by BCTI during both winter field seasons. Vegetation cover at 15 m was a significant indicator for BCTI presence (P = 0.004).

winter roosting behavior of the BCTI. This study has demonstrated nest boxes are used for winter roosting by BCTI, as well as Bewick's Wrens and Ladder-backed Woodpeckers, and has shed light on some of the variables influencing winter roosting.

We found support for the hypothesis that temperature affects nest box use by BCTI, because BCTI used boxes significantly more on nights with colder temperatures. BCTI likely use nest boxes more on colder nights to conserve energy and minimize heat loss. This is an advantageous strategy for BCTI, because other passerine species have decreased energy expenditure and heat loss when roosting in cavities (Kendeigh 1961, Mayer et al. 1982, Cooper 1999). Little Owls (*Athene noctua*) were also found to roost more frequently during colder nights (Bock et al. 2013). However, most of the research on cavity roosting in the field has been conducted in regions with extremely cold winters where birds roost consistently each night (Vel'ky et. al 2010, Dhondt and Eyckerman 1980). Since BCTI are only found in regions with relatively mild winters this study demonstrates nest boxes can be beneficial to individuals of a species other than those inhabiting regions with harsh winter climates.

Wind speed was not found to be a significant indicator of nest box use for BCTI. In tropical latitudes wind may not have the same influences on nest box use as temperature. However, wind speeds at the time wind was surveyed (after birds were already roosting) was not indicative of winds speeds when birds went to roost earlier in the evening. This finding could also be due to a lack of surveys nights with high wind speeds. BCTI were found roosting on the night the highest wind speed was recorded (34 kph), but most survey nights had relatively low wind speeds with the average wind speed across both seasons being 10.9 kph. However, it has been suggested that even extremely low wind speeds increase energy expenditure while roosting (Du Plessis et al. 1994). Furthermore, birds receive more thermal benefits from the shielding of wind than the shielding of temperature (Walsberg 1986, Webb and Rogers 1988). Thus, the limited range of collected wind speeds in this study's dataset might not adequately assess the effect of wind speed on nocturnal nest box use. Future studies should aim to increase the number of nights surveyed to incorporate a greater range for wind speeds.

Horizontal vegetation cover 15 m away from nest boxes was a significant indicator of BCTI nest box use. This finding was somewhat unexpected as research has shown several different bird species select roosting sites with denser vegetation comprising the roost or near the roost site (Walsberg 1986, Vel'ky et al. 2010). However, there may be benefits to roosting in sites with sparse vegetation directly around a site and dense vegetation in the periphery. Less vegetation directly surrounding a nest box may make accessing a box more difficult for nocturnal predators. In temperate latitudes, the greatest threat to birds during winter nights is more likely temperature than predators, thus warranting dense vegetation surrounding roosting sites. This may not be the case for birds roosting in subtropical latitudes. BCTI may use nest boxes in less dense vegetation to balance the tradeoff between the cost of predation with thermal benefits from a cavity.

My research has demonstrated nest boxes are useful for roosting in subtropical climates and serve as winter refuge sites for different bird species. These findings can be useful to wildlife managers who aim to increase health and survival of their resident passerine populations. Nest boxes are also a viable option for managers to implement in areas with few or decreasing natural cavities. Implementing nest boxes will be an increasingly important management tool to consider as the effects of climate change continue to progress. Harsher winters due to fluctuating climate will increase the need for available roosting sites.

We investigated some of the variables potentially influencing nest box cavity roosting, but there are likely other variables affecting box use. Precipitation is a possible factor influencing roosting which was not factored into analysis. Precipitation was a limiting factor on nights with extreme rainfall when equipment and survey routes would have been hindered. Another possible influence on roost site selection is the presence of ectoparasites. Ectoparasites are known to be a deterrent for nest box roosting birds, but their presence was neither observed nor tested (Christe et al. 1994).

Future studies in this line of research may choose to identify BCTI individuals using nest boxes for roosting. This study was conducted in a way which minimized disturbance to roosting birds, to ensure repeated overnight visits could be sustained. But this method inhibited the ability to determine individual birds. Though many BCTI at the Freeman Center have unique color bands, these bands were never visible during nest box cavity inspections if present. However, as of the 2017 breeding season several BCTI are now equipped with passive integrated transponder (PIT) tags as well as color bands. Future research could still maintain a non-invasive approach to cavity inspection while gathering additional data on BCTI roosting patterns.

ACKNOWLEDGMENTS

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SHORT COMMUNICATIONS

TEXAS BIRD RECORDS COMMITTEE REPORT FOR 2018

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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://www.texasbirdrecordscommittee.org). 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 98 records during 2018: 86 records of 46 species were accepted and 12 records of 10 species were not accepted, an acceptance rate of 88.0% for this report. Four additional records were withdrawn by the observers. A total of 170 observers submitted documentation (to the TBRC or to other entities) that was reviewed by the committee during 2018.

The TBRC accepted 2 first state records in 2018: White-crowned Pigeon and Great Black Hawk. These two additions bring the official Texas State List to 649 species in good standing. This total does not include the 5 species on the Presumptive Species List, nor the 2 species on the Supplemental 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, Eric Carpenter, 674 Goodnight Trail, Dripping Springs, Texas 78620 (email: ecarpe@gmail.com). 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 AOS Check-list of North American Birds (AOU 1998) through the 59th supplement (Chesser et al. 2018). A number in parentheses after the species name represents the total number of accepted records in Texas for that species at the end of 2018. Species added to the Review List because of population declines or dwindling occurrence in recent years do not have the total number of accepted records denoted as there are many documented records that were not subjected to review (e.g. Brown Jay, Pinyon Jay, Tamaulipas Crow, and Evening Grosbeak). All observers who submitted written documentation or photographs/recordings 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 discoverer(s) 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. Please note that the county designations of offshore records are used only as a reference to the nearest point of land.

TBRC Membership—Members of the TBRC during 2018 who participated in decisions listed in this report were: Randy Pinkston, Chair; Keith Arnold, Academician; Eric Carpenter, (non-voting) Secretary; Greg Cook, Tony Frank, Mary Gustafson, Petra Hockey, Dan Jones, Mark Lockwood, Stephan Lorenz, Chris Runk, and Willie Sekula.

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Additional Abbreviations—A.O.S. = American Ornithologists' Society; A.O.U. = American Ornithologists' Union; N.P. = National Park; N.S. = National Seashore; N.W.R. = National Wildlife Refuge; S.H.S. = State Historic Site; S.N.A. = State Natural Area; S.P. = State Park; W.M.A. = Wildlife Management Area.

ACCEPTED RECORDS

Trumpeter Swan (*Cygnus buccinator*) (14). One at Ft. Worth Nature Center, *Tarrant* on 14 December 2017 (**EW**, SG; 2017-86; TPRF 3553).

Eurasian Wigeon (*Mareca penelope*) (56). One at Katy Prairie, *Waller* on 5-11 April 2018 (MS, AW, TF, JR, JH, ST; 2018-36; TPRF 3580).

American Black Duck (*Anas rubripes*) (10). One at White Rock Lake, *Dallas* on 1 January - 5 March 2018 (**AG**, AW, EW, BS, SS, SH, DA, KK; 2018-02; TPRF 3560).

White-crowned Pigeon (*Patagioenas leucocephala*) (1). One near Galveston ferry, *Galveston* on 7 October 2017 (TL, SP, SM; 2017-41; TPRF 3529). This represents the first fully documented record for Texas.

Ruddy Ground-Dove (*Columbina talpacoti*) (23). One at Terlingua, *Brewster* on 28 January 2018 (**MF**; 2018-19; TPRF 3571).

Mexican Violetear (*Colibri thalassinus*) (85). One north of Rio Hondo, *Cameron* on 28 April 2018 (**CC**; 2018-46; TPRF 3586).

Green-breasted Mango (*Anthracothorax prevostii*) (21). One at Quinta Mazatlan S.P., *Hidalgo* on 2-11 December 2017 (**JB**, BC, AO, MBS; 2017-65; TPRF 3547).

Costa's Hummingbird (*Calypte costae*) (43). One at El Paso, *El Paso* on 29 September 2017 - 6 February 2018 (**BZ**; 2018-01; TPRF 3528). One at Chisos Basin sewage ponds, Big Bend N.P., *Brewster* on 18 October 2017 (**EC**; 2017-43; TPRF 3531). One at Christmas Mountains, *Brewster* on 4-9 November 2017 (**COJ**; 2017-51; TPRF 3539). One at U.T.E.P. Campus, El Paso, *El Paso* on 14 March 2018 (**KF**; 2018-59; TPRF 3577).

Violet-crowned Hummingbird (*Amazilia violiceps*) (22). One at Sanderson, *Terrell* on 13 December 2017 - 2 January 2018 (**MC**, DS, BL, DJ, RP, LH, TF, PF, ML, ByS; 2017-83; TPRF 3552). One at Calallen, *Nueces* on 21 April - 11 May 2018 (EW, JH, MC, JuB; 2018-45; TPRF 3583). One at Daniel's Ranch, Big Bend N.P., *Brewster* on 10 May 2018 (**BT**; 2018-51).

White-eared Hummingbird (*Hylocharis leucotis*) (42). One at Boot Canyon, Big Bend N.P., *Brewster* on 3 August 2017 (**RV**; 2018-33; TPRF 3524).

Northern Jacana (*Jacana spinosa*) (42). One at South Texas Botanical Gardens, Corpus Christi, *Nueces* on 14-18 April 2018 (**EB, NW**, JM, MC, GR; 2018-38; TPRF 3581).

Ruff (*Calidris pugnax*) (39). One west of Victoria, *Victoria* on 28 February 2018 (**MT**; 2018-29; TPRF 3576).

Purple Sandpiper (*Calidris maritima*) (27). One at Point Comfort, *Calhoun* on 16 February - 2 May 2018 (**BF**, DS, JM, PH, AW, JH, RP, GL, AM, AL; 2018-26; TPRF 3574).

South Polar Skua (*Stercorarius maccormicki*) (2). One ~102 miles southeast of Matagorda Island, *Calhoun* on 15 October 2017 (**DS, BF**; 2017-42; TPRF 3530).

Long-tailed Jaeger (*Stercorarius longicaudus*) (26). One at Hornsby Bend, *Travis* on 30 August - 1 September 2017 (**MAW, TM, EC**, GC; 2017-39; TPRF 3527).

Black-legged Kittiwake (*Rissa tridactyla*) (111). One at Packery Channel, *Nueces* on 2 December 2012 (AO; 2017-40; TPRF 3514). One at Crystal Beach, *Galveston* on 3-4 November 2017 (**RB**; 2017-59; TPRF 3538). One at La Porte, *Chambers/Harris* on 16 December 2017 - 25 January 2018 (**RH**, DS, JoB, TF, PF, AW, CM, CD; 2017-85; TPRF 3554). One at Boca Chica jetty, *Cameron* on 3 January 2018 (**SB**, AH; 2018-04; TPRF 3561). One at Matagorda Island, *Calhoun* on 9 January 2018 (**PH**; 2018-09). One at Tornillo Reservoir, *El Paso* on 10 January 2018 (**MD**; 2018-21; TPRF 3563). One at Boca Chica jetty, *Cameron* on 13-20 January 2018 (**GV**; 2018-12; TPRF 3564).

Mew Gull (*Larus canus*) (41). One at Lake Arlington, *Tarrant* on 8 February 2018 (**MW**; 2018-25; TPRF 3572).

Great Black-backed Gull (*Larus marinus*) (62). One at Texas City Dike and Bolivar Flats, *Galveston* on 2 January - 13 May 2017 (**BB**, CoM, SH, DB, RW, BF, MK, PR; 2017-02; TPRF 3517). One at Texas City Dike and Bolivar Flats, *Galveston* on 14 November 2017 - 14 April 2018 (**JaR**, DS, BB, JH, FC; 2017-53; TPRF 3543). One at Lake Meredith, *Hutchinson* on 13-27 January 2018 (**WS**, BP; 2018-14; TPRF 3565). One at Galveston Island, Bolivar Flats and San Luis Pass, *Galveston* on 4-26 April 2018 (**KC**, KA, DA, GC; 2018-41; TPRF 3579).

Brown Noddy (*Anous stolidus*) (22). One ~14 miles east of Port Aransas, *Aransas* on 23 May 2018 (**JM**; 2018-60; TPRF 3589).

Elegant Tern (*Thalasseus elegans*) (9). Up to three at Padre Island N.S., *Kleberg* on 18-25 July 2017 (**GL, MR**, MC, JM, DS, DJ, AM; 2017-33; TPRF 3521). One at San Jose Island, *Aransas* on 23 July 2017 (**RL**; 2017-38; TPRF 3522). One at Surfside Jetty, *Brazoria* on 2-19 December 2017 (**AM**, BL, AW, KT; 2017-66; TPRF 3548).

Leach's Storm-Petrel (*Hydrobates leucorhoa*) (36). One at Padre Island N.S., *Kleberg* on 17 June 2018 (**DR**, MC; 2018-57; TPRF 3591).

Jabiru (*Jabiru mycteria*) (14). One at Hynes Bay Unit, Guadalupe Delta W.M.A., *Refugio* on 24 July 2017 (**RK**; 2017-64; TPRF 3523).

Red-footed Booby (*Sula sula*) (5). One 25 miles southeast of Packery Channel, *Kleberg* on 2 November 2017 (**JM**; 2017-49; TPRF 3536). One ~89 miles southeast of Matagorda Island, *Calhoun* on 9 January 2018 (**JM**; 2018-06; TPRF 3562).

Bare-throated Tiger-Heron (*Tigrisoma mexicanum*) (2). One at undisclosed location, *Uvalde* on 1 February 2017 - 31 May 2018 (MC; 2018-49; TPRF 3518).

Northern Goshawk (*Accipiter gentilis*) (26). One at Pine Springs, Guadalupe Mts N.P., *Culberson* on 22 November 2017 (**DeS**; 2017-58).

Great Black Hawk (*Buteogallus urubitinga*) (1). One at South Padre Island, *Cameron* on 24 April 2018 (**JG**; 2018-44; TPRF 3584). This represents the first documented record for Texas.

Short-tailed Hawk (*Buteo brachyurus*) (55). One at Hazel Bazemore, *Nueces* on 14 November 2016

(EJ; 2018-10; TPRF 3516). One west of Fort Davis, *Jeff Davis* on 6 May 2018 (**DD, SC**; 2018-55).

Snowy Owl (*Bubo scandiacus*) (12). One at North Texas Regional Airport, Denison, *Grayson* on 20 December 2017 (BPRC; 2018-20; TPRF 3555). One southwest of Gruver, *Hansford* on 29 December 2017 (**ChM**; 2018-05; TPRF 3557). One at northeast Odessa, *Ector/Midland* on 23 January - 13 March 2018 (**JvdW**, DS, EC, JH, ML, JM, MS, MC, SeC, CW, BiL; 2018-17; TPRF 3568). One at Amarillo, *Randall* on 26-28 January 2018 (**RaB**, JS, PK, BP; 2018-18; TPRF 3569). One at Fort Worth, *Tarrant* on 21-23 February 2018 (**JoS**, RP; 2018-28; TPRF 3575).

Northern Pygmy-Owl (*Glaucidium gnoma*) (7). One at McKittrick Canyon, Guadalupe Mountains N.P., *Culberson* on 24 October 2017 (**PH**; 2017-46). One at McKittrick Canyon, Guadalupe Mountains N.P., *Culberson* on 27 March - 7 April 2018 (**CR**, WS; 2018-35; TPRF 3578).

Northern Saw-whet Owl (*Aegolius acadicus*) (34). One west of Fort Davis, *Jeff Davis* on 6 October 2016 (**DD, SC**; 2018-56). One to two at Tejas Camp, Guadalupe Mountains N.P., *Culberson* on 20 May - 3 September 2017 (**CR**, EC, JuB, WE, BF; 2017-23; TPRF 3520).

Elegant Trogon (*Trogon elegans*) (7). One at Landa Park, New Braunfels, *Comal* on 27 January - 8 February 2018 (**JA**, EC, DS, JH, RP, HF; 2018-23; TPRF 3570).

Rose-throated Becard (*Pachyramphus aglaiae*) (61). One at Santa Ana N.W.R., *Hidalgo* on 11 November 2017 - 7 January 2018 (**RoW**, CH, AVN, GJ; 2017-57; TPRF 3540). One northeast of Los Fresnos, *Cameron* on 25 November 2017 - 3 March 2018 (**RTD, MaW**, BM, GaR; 2017-62; TPRF 3544). One at Santa Ana N.W.R., *Hidalgo* on 15 January - 15 February 2018 (MH, JP, HB; 2018-13; TPRF 3567). One at Hugh Ramsey Park, Harlingen, *Cameron* on 12 May 2018 (**GV**; 2018-61; TPRF 3588).

Sulphur-bellied Flycatcher (*Myiodynastes luteiventris*) (31). One at Casa Santa Ana, near Santa Ana N.W.R., *Hidalgo* on 6 August 2017 (**JoM**; 2017-35; TPRF 3525).

Greater Pewee (*Contopus pertinax*) (32). One to two at Bear Creek Park & Memorial Oaks Cemetery, *Harris* on 20 September 2016 - 22 March 2017 (**JeM**, DW, MaK, MS; 2016-78; TPRF 3515). One at Pharr, *Hidalgo* on 9 April 2017 (**SK**, MM; 2018-03; TPRF 3519). One at Bear Creek Park, Houston, *Harris* on 10 December 2017 - 10 March 2018 (NR, JH; 2018-32; TPRF 3550). One near Bridge Gap, Davis Mountains Preserve, *Jeff Davis* on 23 May 2018 (**EC**; 2018-52; TPRF 3590).

Clark's Nutcracker (*Nucifraga columbiana*) (25). One at Davis Mountains, *Jeff Davis* on 25-27 October 2017 (**DF**; 2018-15; TPRF 3532). Six to eight at South Rim, Chisos Mountains, Big Bend N.P., *Brewster* on 28 October 2017 (**MaH**; 2017-61).

Tamaulipas Crow (*Corvus imparatus*) (15). One 44 miles southeast of Packery Channel, *Kleberg* on 2 November 2017 (**JM**; 2017-50; TPRF 3537). Three at Laguna Atascosa, *Cameron* on 12 November 2017 (**CB**; 2017-63; TPRF 3541). One at East Beach area, *Galveston* on 26 November - 5 December 2017 (**MHa, KOH**, TF, PF, JR, RF, DC, JoH; 2017-60; TPRF 3545). One at San Luis Pass area, *Galveston/Brazoria* on 27-28 November 2017 (AW, AlW; 2017-89; TPRF 3546). One near Goose Island S.P., *Aransas* on 29 December 2017 - 3 January 2018 (PH, LL, IS, JM, AJ, AM; 2017-88; TPRF 3558). One at Quintana, *Brazoria* on 15 April 2018 (**TF**, MiW, JW; 2018-43; TPRF 3582).

Rufous-backed Robin (*Turdus rufopalliatus*) (24). One at Palo Duro S.P., *Randall* on 28 October 2017 (**ChW**, AB; 2017-47; TPRF 3534).

Varied Thrush (*Ixoreus naevius*) (48). One at Canyon, *Randall* on 1 November 2017 (**RM**; 2018-08; TPRF 3535).

Aztec Thrush (*Ridgwayia pinicola*) (7). One north of San Perlita, *Willacy* on 3-5 May 2018 (**TW**, DJ, BM; 2018-48; TPRF 3587).

Evening Grosbeak (*Coccothraustes vespertinus*) (20). One west of Fort Davis, *Jeff Davis* on 26-27 October 2017 (**KB**, DS, BF; 2017-45; TPRF 3533). One at Amarillo, *Potter* on 12 November 2017 (**TJ**; 2017-55; TPRF 3542).

Common Redpoll (*Acanthis flammea*) (18). One at Lake Rita Blanca, *Hartley* on 27 December 2017 (**CWo**; 2017-87; TPRF 3556). One west-southwest of Lufkin, *Angelina* on 10-15 February 2018 (**EI**; 2018-27; TPRF 3573).

White-winged Crossbill (*Loxia leucoptera*) (10). One at Friendswood, *Galveston* on 26 April 2018 (**DL**, TF, PH, DS; 2018-42; TPRF 3585).

Golden-crowned Sparrow (*Zonotrichia atricapilla*) (42). One to two at Lake Palo Duro, *Hansford* on 9-28 December 2017 (**DeS**, DS, JF, ChB, DA; 2017-81; TPRF 3549). One north of Cibolo, *Guadalupe* on 11 December 2017 - 26 April 2018 (**JoW**, SuS, EH, RP, MC, CH, JM, CG, ByS, MWa; 2017-80; TPRF 3551). One at Lake Meredith, *Potter* on 6 February 2018 (**BP**; 2018-24).

Golden-crowned Warbler (*Basileuterus culicivorus*) (25). One at Lions/Shelley Park, Refugio, *Refugio* on 14 January - 15 February 2018 (**SoB**, LW, JoP; 2018-11; TPRF 3566).

Slate-throated Redstart (*Myioborus miniatus*) (15). One at Tobe Canyon, *Jeff Davis* on 13-31 August 2017 (**RP**, AM, PS, RiH, RiK, CeR, MG; 2017-36; TPRF 3526).

Blue Bunting (*Cyanocompsa parellina*) (51). One at Quinta Mazatlan S.P., McAllen, *Hidalgo* on 30 December 2017 - 21 March 2018 (**JB**, JH, DS, AW, IS, PaR; 2018-22; TPRF 3559).

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 due to a bird being 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.

White-cheeked Pintail (*Anas bahamensis*). One at Richland Creek W.M.A., *Freestone* on 26 March - 10 October 2017 (2017-84).

Vaux's Swift (*Chaetura vauxi*). Three at Comanche Park, Odessa, *Ector* on 10-11 December 2016 (2016-83).

Mexican Violetear (*Colibri thalassinus*). One at west Austin, *Travis* on 13 May 2017 (2018-31).

Purple Sandpiper (*Calidris maritima*). One at Lavaca Bay Causeway, *Calhoun* on 28 November 1996 (2018-65).

Black-headed Gull (*Chroicocephalus ridibundus*). One ~148 miles southeast of Freeport, *Brazoria* on 10 January 2018 (2018-07).

Black-capped Petrel (*Pterodroma hasitata*). One ~43 miles southeast of Matagorda Island, *Calhoun* on 24 January 2017 (2017-06).

Short-tailed Hawk (*Buteo brachyurus*). One west of Fort Davis, *Jeff Davis* on 11 August 2017 (2017-37). One at Sunset Lake, Portland, *San Patricio* on 19 November 2017 (2017-56).

Thick-billed Parrot (*Rhynchopsitta pachyrhyncha*). One at “Rio Grande, Texas”, *unknown* (county) on 22 January 1905 (2018-34). The location given on this specimen “Rio Grande, Texas” is speculated to have been Rio Grande City, Texas though there are questions about the exact circumstances and location where the bird was originally collected.

Tamaulipas Crow (*Corvus imparatus*). One at Heron Flats, Aransas N.W.R., *Aransas* on 1 March 2018 (2018-30). One at LaFitte's Cove, west Galveston Island, *Galveston* on 21 April 2018 (2018-50).

Connecticut Warbler (*Oporornis agilis*). One at Smith Point, *Chambers* on 11 October 2017 (2017-67).

LITERATURE CITED

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Chesser, R. Terry, K. J. Burns, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., D. F. Stoltz, Benjamin M. Winger and K. Winkler, 2017. Fifty-ninth supplement to the American Ornithologists' Society Check-list of North American Birds. Auk 135:798-813.

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TEXAS BIRD RECORDS COMMITTEE REPORT FOR 2019

Eric Carpenter[1]

674 Goodnight Trail, Dripping Springs, Texas 78620

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://www.texasbirdrecordscommittee.org). 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 93 records during 2019: 72 records of 41 species were accepted and 21 records of 16 species were not accepted, an acceptance rate of 77.0% for this report. A total of 155 observers submitted documentation (to the TBRC or to other entities) that was reviewed by the committee during 2019.

The TBRC accepted 3 first state records in 2019: Black Swift, Yellow Grosbeak and Black Turnstone. These three additions bring the official Texas State List to 652 species in good standing. This total does not include the 5 species on the Presumptive Species List, nor the 2 species on the Supplemental 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, Eric Carpenter, 674 Goodnight Trail, Dripping Springs, Texas 78620 (email: ecarpe@gmail.com). 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 AOS Check-list of North American Birds (AOU 1998) through the 60th supplement (Chesser et al. 2019). A number in parentheses after the species name represents the total number of accepted records in Texas for that species at the end of 2019. Species added to the Review List because of population declines or dwindling occurrence in recent years do not have the total number of accepted records denoted as there are many documented records that were not subjected to review (e.g. Brown Jay, Pinyon Jay, Tamaulipas Crow, and Evening Grosbeak). All observers who submitted written documentation or photographs/recordings 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 discoverer(s) 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. Please note that the county designations of offshore records are used only as a reference to the nearest point of land.

TBRC Membership—Members of the TBRC during 2019 who participated in decisions listed in this report were: Randy Pinkston, Chair (until Annual Meeting); Tony Frank, Chair (after Annual Meeting); Keith Arnold, Academician; Eric Carpenter, (non-voting) Secretary; Mel Cooksey, Mary Gustafson, Petra Hockey, Dan Jones, Stephan Lorenz, Chris Runk, and Willie Sekula.

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Additional Abbreviations—A.O.S. = American Ornithologists' Society; A.O.U. = American Ornithologists' Union; N.P. = National Park; N.S. = National Seashore; N.W.R. = National Wildlife Refuge; S.H.S. = State Historic Site; S.N.A. = State Natural Area; S.P. = State Park; W.M.A. = Wildlife Management Area.

ACCEPTED RECORDS

White-crowned Pigeon (*Patagioenas leucocephala*) (3). One at South Padre Island Birding & Nature Center, *Cameron* on 2-14 October 2018 (**MM**, DS, PH, EC, TF, PF, LW, RP, JH, LB; 2018-76; TPRF 3608).

Black Swift (*Cypseloides niger*) (2). One at El Paso, *El Paso* on 26 May 2018 (**JG**; 2018-54; TPRF 3596). There was a previously accepted sight record but this represents the first fully documented record for Texas.

Mexican Violetear (*Colibri thalassinus*) (89). One at Kerrville, *Kerr* on 17-22 May 2018 (CD, PS; 2018-62). One at Quinta Mazatlan S.P., *Hidalgo* on 7-18 June 2018 (BN, JB, DH; 2018-63; TPRF 3597). One at Estero Llano Grande S.P., *Hidalgo* on 11 May 2019 (MG; 2019-37). One at San Antonio, *Bexar* on 12-16 May 2019 (**LT**, RS; 2019-38; TPRF 3649).

Green-breasted Mango (*Anthracothorax prevostii*) (22). One at McAllen, *Hidalgo* on 28-29 August 2018 (**JoG**; 2018-78; TPRF 3602).

Costa's Hummingbird (*Calypte costae*) (46). One at El Paso, *El Paso* on 4-10 August 2018 (**BZ**; 2018-64; TPRF 3599). One at Alpine, *Brewster* on 23-30 August 2018 (**LS**, COJ, DS; 2018-68; TPRF 3600). One southeast of Emory, *Rains* on 9 November 2018 (**PI**; 2018-94; TPRF 3616).

White-eared Hummingbird (*Hylocharis leucotis*) (43). One west of Fort Davis, *Jeff Davis* on 28 August - 8 September 2018 (**KB**, DS; 2018-71; TPRF 3601).

Northern Jacana (*Jacana spinosa*) (43). One at Delta Lake, *Hidalgo* on 29 June - 3 July 2018 (**JS, ES**, SK, RoP; 2018-84; TPRF 3598).

Black Turnstone (*Arenaria melanocephala*) (1). One at Sea Rim S.P., *Jefferson* on 3 May 2019 (**JM**; 2019-33; TPRF 3645). This represents the first documented record for Texas.

Red Phalarope (*Phalaropus fulicarius*) (49). One at Imperial Reservoir, *Pecos* on 5 October 2018 (**WS**; 2018-77). One at Jersey Village, *Harris* on 1-3 June 2019 (DS, TF, MS, JH, MC, LW; 2019-39; TPRF 3652).

Long-tailed Jaeger (*Stercorarius longicaudus*) (27). One ~69 miles southeast of Packery Channel, *Nueces* on 31 August 2018 (**EC, JoM, JuB, AM, JOB**; 2018-69; TPRF 3603).

Western Gull (*Larus occidentalis*) (5). One at Port Aransas jetty, *Nueces/Aransas* on 25-27 October 2018 (**AO**, JoM, WS, EC, TF, PF, AM, RP, MC; 2018-85; TPRF 3612). One at White Rock Lake, *Dallas* on 21 February - 8 March 2019 (**CR**, RoS, KY, PA; 2019-19; TPRF 3631).

Brown Noddy (*Anous stolidus*) (23). One ~85 miles southeast. of Port Aransas, *Nueces* on 31 August 2018 (**EC, JoM, TF**; 2018-67; TPRF 3604).

Jabiru (*Jabiru mycteria*) (15). One northwest of El Campo, *Wharton* on 6 September 2017 (**RR**, RP; 2018-92; TPRF 3592).

Red-footed Booby (*Sula sula*) (6). One at Galveston seawall, *Galveston* on 5 February 2019 (RG, JoH; 2019-14; TPRF 3630).

Northern Goshawk (*Accipiter gentilis*) (28). One at Balmorhea Lake, *Reeves* on 27 December 2018 (**AC**; 2019-01; TPRF 3623). One at Palo Duro Canyon S.P., *Randall* on 10 January 2019 (**ME**; 2019-65; TPRF 3627).

Roadside Hawk (*Rupornis magnirostris*) (11). One at Anzalduas County Park, *Hidalgo* on 20 October 2018 (**AB**; 2018-89; TPRF 3611). One at Bentsen Rio Grande S.P./National Butterfly Center, *Hidalgo* on 8 November - 13 December 2018 (**SI**, DS, JH, TS; 2018-90; TPRF 3614).

Short-tailed Hawk (*Buteo brachyurus*) (58). One at Hazel Bazemore, Calallen, *Nueces* on 11 October 2018 (**CW**; 2018-79). One at Leakey, *Real* on 7 March 2019 (**SS**; 2019-66; TPRF 3634). One at Government Canyon S.N.A., *Bexar* on 27 April 2019 (**AV**; 2019-60; TPRF 3643).

Snowy Owl (*Bubo scandiacus*) (13). One at Fritch Fortress, Lake Meredith, *Hutchinson* on 30 December 2018 (**BP**; 2019-17).

Rose-throated Becard (*Pachyramphus aglaiae*) (66). One at Arroyo Colorado Unit, Las Palomas W.M.A., *Cameron* on 8 November 2018 (**OW, DM**; 2018-93; TPRF 3615). One at Salineno, *Starr* on 4 December 2018 (**NM**; 2018-97; TPRF 3618). One at Bentsen Rio Grande S.P., *Hidalgo* on 5 April 2019 (**JaM**; 2019-27). One at Quinta Mazatlan S.P., *Hidalgo* on 6 April 2019 (**BD**, RaS; 2019-26; TPRF 3637). One at National Butterfly Center, Mission, *Hidalgo* on 26 April - 25 May 2019 (TH, MeM, SH; 2019-55; TPRF 3641).

Sulphur-bellied Flycatcher (*Myiodynastes luteiventris*) (33). One at Rosehill Cemetery, Corpus Christi, *Nueces* on 25 April 2019 (CP; 2019-68; TPRF 3640). One at Boot Canyon, Big Bend N.P., *Brewster* on 25 May 2019 (**KM, EN**; 2019-58; TPRF 3651).

Piratic Flycatcher (*Legatus leucophaius*) (7). One at South Llano River S.P., *Kimble* on 22 September 2018 (**BL**; 2018-75; TPRF 3606).

Thick-billed Kingbird (*Tyrannus crassirostris*) (19). One at Lawrence E. Wood Picnic Area, *Jeff Davis* on 21 June 2019 (**WM**; 2019-45; TPRF 3653).

Gray Kingbird (*Tyrannus dominicensis*) (16). One at west Galveston Island, *Galveston* on 31 August 2018 (**JiS**; 2018-70; TPRF 3605). One at Sea Rim S.P., *Jefferson* on 5 May 2019 (SM; 2019-34; TPRF 3647). One at Mad Island Marsh, *Matagorda* on 15 May 2019 (**TG**; 2019-44; TPRF 3650).

Fork-tailed Flycatcher (*Tyrannus savana*) (36). One east of Rio Hondo, *Cameron* on 19-24 October 2018 (**JuB**, JoM, BO, GH, BM; 2018-82; TPRF 3610). One north-northeast of Damon, *Fort Bend* on 17-18 November 2018 (**RW**, TF, PF, JH,MS; 2018-91; TPRF 3617). One east of Los Fresnos, *Cameron* on 13-14 December 2018 (**JR**, DJ; 2018-98; TPRF 3619). One south-southwest of San Marcos, *Hays* on 16 December 2018 (**CoR**; 2018-99; TPRF 3621). One north of Wills Point, *Van Zandt* on 27 December 2018 - 10 January 2019 (**JeS**, AaB, PI; 2019-08; TPRF 3624). One at T.N.C. Brazos Woods Preserve, *Brazoria* on 27 December 2018 - 15 February 2019 (AT, RK, TF, AW, MaC, JW, WM; 2019-02; TPRF 3622). One near Anahuac N.W.R., *Chambers* on 12-13 April 2019 (TF, CC; 2019-32; TPRF 3638).

Greater Pewee (*Contopus pertinax*) (33). One near East Columbia, *Brazoria* on 5 January 2019 (**BS**; 2019-10).

Black-whiskered Vireo (*Vireo altiloquus*) (41). One at South Padre Island Convention Center, *Cameron* on 22-23 May 2018 (**CM**, DJ, GW; 2018-53; TPRF 3595).

Tamaulipas Crow (*Corvus imports*) (19). Up to eight at South Padre Island, *Cameron* on 5 November 2017 - 5 May 2018 (**DI**, BM, EB, JaG, RZ, HDF, JSh, JC, BiS, MaE; 2017-52; TPRF 3593). Up to twenty-eight at Brownsville Landfill and south Cameron, *Cameron* on 10 November 2017 - 28 June 2018 (ReS, DI, RP, BM, JJ, MBS, LK, MP, MB, SK, JaW; 2017-54; TPRF 3594). One at Aransas N.W.R., *Aransas* on 18 April 2018 (**BB**; 2018-39). One at Packery Channel, *Nueces* on 22 April 2019 (; 2019-30).

Rufous-backed Robin (*Turdus rufopalliatus*) (25). One west-southwest of Uvalde, *Uvalde* on 1 January - 1 February 2019 (**TD**, SC, CG, JH, DS, RP, MC, GY; 2019-03; TPRF 3625).

Varied Thrush (*Ixoreus naevius*) (50). One at National Butterfly Center, Mission, *Hidalgo* on 6-8 November 2018 (DS, BW, MiG; 2018-88; TPRF 3613). One at Davis Mountains S.P., *Jeff Davis* on 3-6 May 2019 (**BSD**, SW, PW; 2019-35; TPRF 3646).

Blue Mockingbird (*Melanotis carelessness*) (4). One along the Rio Grande, far eastern Brewster, *Brewster* on 21 February 2019 (**SP**; 2019-28).

Bohemian Waxwing (*Bombycilla garrulus*) (18). One at Lake Graham, *Young* on 13-19 January 2019 (**SL**, LB, AW; 2019-06; TPRF 3628).

Evening Grosbeak (*Coccothraustes vespertinus*) (21). One near Poynor, *Anderson* on 3-4 March 2019 (**JL, KL**; 2019-24; TPRF 3633).

Lawrence's Goldfinch (*Spinus lawrencei*) (20). Nine at Frijole Ranch, Guadalupe Mountains N.P., *Culberson* on 4 October 2018 (**DaH**; 2018-87; TPRF 3609).

Golden-crowned Sparrow (*Zonotrichia atricapilla*) (45). One 10 miles south of Kent, *Jeff Davis* on 28 February 2019 (**RK**; 2019-18; TPRF 3632). One at Balmorhea, *Reeves* on 17-26 March 2019 (**CeR, MGr**, WS; 2019-25; TPRF 3635). One ~5 miles northwest of Cedar Creek, *Bastrop* on 27 March 2019 (**CoR**; 2019-67; TPRF 3636).

Black-vented Oriole (*Icterus wagleri*) (11). One at Packery Channel, *Nueces* on 23-25 April 2019 (**DT**, KR; 2019-31; TPRF 3639).

Gray-crowned Yellowthroat (*Geothlypis poliocephala*) (47). One at Quinta Mazatlan S.P., *Hidalgo* on 3-4 May 2019 (**DaT, ToD**, ROD, JuW, JoS; 2019-59; TPRF 3644).

Rufous-capped Warbler (*Basileuterus rufifrons*) (35). One at Dolan Falls Preserve, *Val Verde* on 6 May - 2 October 2019 (**RS, EC**; 2019-36; TPRF 3648).

Golden-crowned Warbler (*Basileuterus culicivorus*) (27). One at Frontera Audubon, Weslaco, *Hidalgo* on 26 September 2018 - 19 February 2019 (RP, JH, AnV, NF; 2018-80; TPRF 3607). One at Valley Nature Center, Weslaco, *Hidalgo* on 16 December 2018 - 1 March 2019 (**DSm**, JoM, JH, NM; 2018-100; TPRF 3620).

Flame-colored Tanager (*Piranga bidentata*) (14). One at South Padre Island, *Cameron* on 26 April 2019 (JaG, JaL; 2019-69; TPRF 3642).

Crimson-collared Grosbeak (*Rhodothraupis celaeno*) (42). One at Quinta Mazatlan S.P., *Hidalgo* on 18 Jan - 25 April 2019 (**ThH**, JoM, JH, CS; 2019-16; TPRF 3629).

Yellow Grosbeak (*Pheucticus chrysopeplus*) (1). One north of Concan, *Uvalde* on 4 January - 5 April 2019 (BoS, TD, CG, KK, SC, AW, PH, JH, MR,JoM, EC, DJ, JuB, DeH; 2019-09; TPRF 3626). This represents the first documented record for Texas.

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 due to a bird being 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*). One near Dumas, *Moore* on 20 December 2018 (2019-07).

Western Gull (*Larus occidentalis*). One at Elliot Landfill, Corpus Christi, *Nueces* on 14 February - 9 April 2004 (2014-60).

Brown Booby (*Sula leucogaster*). One at South Padre Island, *Cameron* on 21 May 2016 (2016-48).

Northern Goshawk (*Accipiter gentilis*). One south of Lake Pauline, *Hardeman* on 23 November 2018 (2019-05).

Short-tailed Hawk (*Buteo brachyurus*). One at Elbow Canyon, Davis Mountains Preserve, *Jeff Davis* on 22 May 2018 (2018-73). One at Hazel Bazemore, Calallen, *Nueces* on 10 September 2018 (2018-72).

Northern Pygmy-Owl (*Glaucidium gnoma*). One at McKittrick Canyon, Guadalupe Mountains N.P., *Culberson* on 16 November 2018 (2018-95).

Northern Saw-whet Owl (*Aegolius acadicus*). One at Davis Mountains Preserve, *Jeff Davis* on 16-17 March 2019 (2019-22).

Fork-tailed Flycatcher (*Tyrannus savana*). One south of Walter E. Long Lake, *Travis* on 14 September 2018 (2018-74).

Buff-breasted Flycatcher (*Empidonax fulvifrons*). One at Madera Canyon, Davis Mountains Preserve, *Jeff Davis* on 10 August 2018 (2018-66).

Black-whiskered Vireo (*Vireo altiloquus*). One at Sabine Woods, *Jefferson* on 20 April 2018 (2018-40). One at Sabine Woods, *Jefferson* on 6 May 2018 (2018-47).

Tamaulipas Crow (*Corvus imparatus*). One at Mustang Island, *Nueces* on 14 April 2018 (2018-37). One at Oso Bay, *Nueces* on 23 June 2018 (2018-58). One at Port Aransas jetty, *Nueces* on 20 October 2018 (2018-83).

Varied Thrush (*Ixoreus naevius*). One at El Paso, *El Paso* on 22 November 2018 (2018-96).

Blue Mockingbird (*Melanotis caerulescens*). One at Laredo, *Webb* on 29 December 2018 (2019-20).

Olive Warbler (*Peucedramus taeniatus*). One at Quinta Mazatlan S.P., *Hidalgo* on 15 March 2019 (2019-21).

Golden-crowned Warbler (*Basileuterus culicivorus*). One north of Laredo, *Webb* on 29 December 2018 (2019-12).

Blue Bunting (*Cyanocompsa parellina*). One at Hazel Bazemore, Calallen, *Nueces* on 7 October 2018 (2019-40). Two north of Laredo, *Webb* on 29 December 2018 (2019-11).

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MIGRATION ROUTES AND TIMING OF PURPLE MARTINS FROM THE HIGH PLAINS OF TEXAS

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Like many North American aerial insectivores, the Purple Martin (*Progne subis*) is experiencing long-term population declines across much of its eastern breeding range (Sauer et al. 2017) with the most severe declines in the Great Lakes, Maritime states and provinces, and Gulf Coast states including parts of Texas (Tautin et al. 2009, Ray 2015). Much research is underway to determine causes of these declines, and these studies are focusing on both the breeding and non-breeding seasons (Ray 2012, Fraser et al. 2017, Jervis et al. 2019, Raleigh et al. 2019).

Recent advances in tracking technology, including light-level geolocator data-loggers, has greatly advanced the ability of ornithologists to track migratory songbirds during their annual travels (Stutchbury et al. 2009, McKinnon et al. 2013, McKinnon and Love 2018). Geolocators measure the intensity of visible light, and sunrise and sunset times can be determined and converted to latitudinal and longitudinal coordinates (Stutchbury et al. 2009). As part of a larger international effort studying the migration ecology and conservation needs of the Purple Martin through the non-breeding season (Fraser et al. 2012, 2017, Fournier et al. 2019), we analyzed data from geolocators retrieved from four Purple Martins from a breeding site in the High Plains of Texas to illustrate the migratory pathways, timing and wintering areas of birds originating from the southwest breeding range.

METHODS

Study Colony

The study colony was located in Randall County, 3.2 km N/NW (35° 2’23.01” N, 101°56’ 0.41” W) of Canyon, Texas. Nesting occurs in provisioned bird housing comprised of a 10-compartment wooden birdhouse, two six-compartment aluminum birdhouses, two single-compartment wooden birdhouses, and 41 artificial gourds made of plastic. The houses and each cavity are accessible for trapping. The site was first occupied by two pairs of Purple Martins in 2005 and now hosts 55-65 pairs annually.

Methods

In June 2018, we trapped 16 adult Purple Martins in their nesting cavities and fitted them with geolocator data-loggers (Lotek, model MK5490) using leg-loop backpack harnesses made of Teflon ribbon (Stutchbury et al. 2009). We trapped the birds using door-drop traps as well as long-handled paint rollers to trap adult birds in their cavity when they entered to provision young with food. We weighed, banded, and measured each bird, and identified the age (second year or after-second-year) and sex based on plumage characteristics (Pyle 1997).

We retrieved geolocators from two male and two female Purple Martins (25% retrieval rate) during the spring of 2019 when they returned to their breeding sites. Migration tracking data were obtained from the geolocators and decompressed into .lig files using BASTrak software (British Antarctic Survey). Data then processed for analyses in R (ver. 3.6.1, R Core Team 2019) using RStudio (ver. 1.2.1335) and the package BAStag (ver. 0.1.3, Wotherspoon et al. 2016). Data was then processed using the FLightR package (ver. 0.5.0, Rakhimberdiev et al. 2017). Migration maps were compiled using the Leaflet package (ver. 2.0.2, Cheng et al. 2019).

We determined migration departure and arrival times based on the output from FlightR. Fall departure dates were determined by a steady or

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sharp decrease (> 2°) in latitude from the breeding site. Fall arrival dates at the non-breeding range in South America were determined at the point where longitudinal coordinates were consistent for more than seven days. Longitude was used to determine non-breeding arrival dates (and spring departure dates) because migration movements within South America are primarily longitudinal (Fraser et al. 2013). Major fall roost stopover duration for each bird was determined using the 'GeoLight' package (ver. 2.0.0, Lisovski and Hahn 2013). We used the 'changeLight' function to estimate residency periods, with the threshold for determining residency periods set to 7 days. Sites that were spatially close together were grouped into one larger site. Spring departure dates form the non-breeding range were determined by a steady or sharp increase in longitude (> 2°). Spring arrival date was determined as the date where latitude and longitude reached those of the deployment site and remained within ~ 2°.

RESULTS AND DISCUSSION

The travels of the four Purple Martins tracked through the non-breeding season of 2018-19 followed what appears to be the typical migration strategy for the species (Fraser et al. 2013). Purple Martins generally gather at premigratory roosts near their breeding sites for 4-6 weeks prior to fall migration (Fraser et al. 2013, Bridge et al. 2015). From there migration typically features a rapid initial migration with prolonged stopovers in and around the Yucatan Peninsula (Fraser et al. 2013). The Purple Martins departed the breeding colony site in fall between June 27, 2018 and July 9, 2018 (Table 1) and traveled distances of 500-800 km to various roost sites between Dallas and Houston, Texas (Table 2). The average roost duration among all four birds was about 20 days (Table 2). The birds arrived at the roost as early as July 7 and departed as late as August 26.

From there, they each flew southeast to the vicinity of the mouth of the Rio Grande River before crossing the far western Gulf of Mexico

Table 1. Migration departure and arrival times for each geolocator retrieved from a banded Purple Martin, based on FlightR results obtained in R using RStudio.

	Date (dd-mm-yyyy)
Band no. 26415520, Geo#008, ASY* Female	
Fall departure from colony/from first fall TX roost	05-07-2018/ 10-08-2018
Fall arrival	22-09-2018
Spring departure	10-03-2019
Spring arrival	08-04-2019
Band no. 210168723, Geo#012, SY** Male	
Fall departure from colony/from first fall TX roost	27-06-2018/ 14-08-2018
Fall arrival	19-09-2018
Spring departure	13-03-2019
Spring arrival	26-03-2019
Band no. 270168898, Geo#015, ASY Male	
Fall departure from colony/from first fall TX roost	06-07-2018/ 25-07-2018
Fall arrival	16-09-2018
Spring departure	15-03-2019
Spring arrival	12-04-2019
Band no. 273138001, Geo#004, ASY Female	
Fall departure from colony/from first fall TX roost	09-07-2018/ 13-08-2018
Fall arrival	12-09-2018
Spring departure	22-03-2019
Spring arrival	22-04-2019

** ASY=After-second-year*
*** SY=Second year*

to stopover sites on the Yucatan Peninsula. Once migration resumes, eastern Purple Martins typically continue at a slower rate of travel on to the Amazon Basin in South America (Fraser et al. 2013). The Purple Martins in our study made their way along the land route through southern Mexico and Central America, and on down to eastern sections of the Amazon Basin in Brazil (Figures 1-4). All four birds arrived in their wintering area between 12 and 22 Sept (Table 1), an average of 41 days after leaving their breeding colony. Preferred roost sites in stopover and wintering areas can best be described as "island habitat," where a tree or group of trees or brush stands taller than the surrounding vegetation or water (Fraser et al. 2017, Fournier et al. 2019). In North America, roost sites are often in urban areas (Bridge et al. 2015).

The spring migration is flown at a much faster rate (km/day) and with shorter stopovers (Stutchbury et al. 2009). Our four birds initiated spring migration between 10 and 22 March and took more direct paths through the land route of Central America and

Table 2. Estimated time (in days) spent at a major fall roost stopover in 2018 for each tracked Purple Martin.

Band number	Number of days	Date range	Latitude/Longitude of roost
26415520	39	July 7 to August 15	31.3° N, -96.3° W
210168723	12	July 31 to August 12	32.2° N, -97.1° W
270168898	21	July 20 to August 18	30.6° N, -96.1° W
273138001	9	August 17 to August 26	31.2° N, -96.5° W

Figure 1. Migration map for an after-second-year (ASY) female Purple Martin.

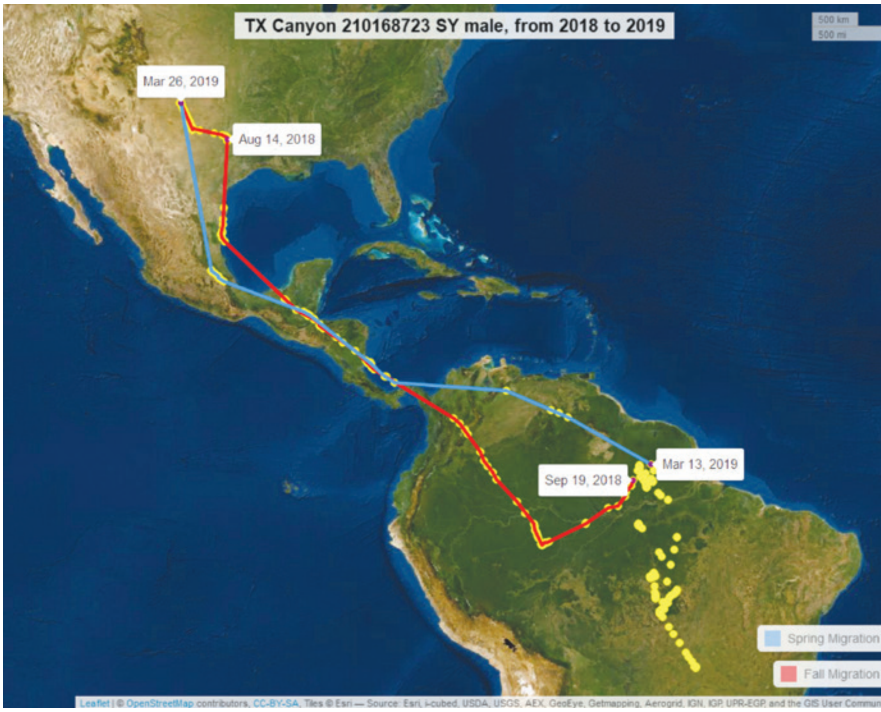

Figure 2. Migration map for a second-year (SY) male Purple Martin.

Figure 3. Migration map for an after-second-year (ASY) male Purple Martin.

Figure 4. Migration map for an after second-year (ASY) female Purple Martin.

Mexico and on to the breeding colony. All arrived between 26 March and 22 April, and average of 25 days after initiating spring migration. One bird, made the trip in 13 days (Table 1).

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SENTINEL AND ALARM CALLS LINKED TO MOTIONLESS POSTURE BEHAVIOR IN A BONDED PAIR OF SCALED QUAIL (*CALLIPEPLA SQUAMATA*)

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The Scaled Quail (*Callipepla squamata*) is distributed across much of the northern half of Mexico and the southwestern U. S. including the western third of Texas (Dabbert et al. 2009, Sibley 2014). In Texas it most commonly inhabits desert grasslands, mesquite savannah, and open brush country (Lockwood 2007). In the more open arid grassland habitats taller patches of grasses, forbs, and shrubs are used for nesting and refugia (Dabbert et al. 2009). Common predators of Scaled Quail include snakes, mammals, and raptors (Dabbert et al. 2009) with hawks having the most detrimental effect on Scaled Quail populations (Bailey 1928). In their response to predators, Scaled Quail will generally fly or run into heavy cover however for avian predators they may react by freezing motionless (Dabbert et al. 2009).

The following observations were made adjacent to the Barton Warnock Visitor Center of Big Bend Ranch State Park (29.269902º N, −103.757351º W; 732 m) bordering State Hwy. 170, Brewster Co., Texas. On 25 May 2018 at ca. 1800 h, a Scaled Quail pair was initially observed walking and pecking the ground. The male then rapidly moved up a ca. 1.5 m ridge to its top edge with the female still walking ca. 5 m behind. The male Scaled Quail probably called based on several bill and head movements while running up the ridge, however auditory clarity was poor due to observational distance and nearby noise from highway traffic. The male Scaled Quail perched on a lower lateral limb of a small eight-trunk mesquite (*Prosopis glandulosa*) tree growing on the top of the ridge. It immediately was observed producing a short call, with the early part of the call heard as an indistinct high note and the end of the call as a muffled low note. The female remained below the slope on flat gravelly ground. When the male called she instantly stopped in a crouched position with her head lowered level with her body, as if to be looking closely at invertebrate prey on the substrate. This motionless posture continued for ca. 3:07 min (first 30 sec was estimated then the posture was timed). While the female was motionless a single Zone-tailed Hawk (*Buteo albonotatus*) was observed flying low overhead. At the end of this motionless period, the female walked forward towards the male about three to four body lengths. The male was then seen to raise its bill and call (unheard) and again the female became motionless as described during the first motionless period. The Zone-tailed Hawk was still visible above the area. The second motionless period was timed for 5:21 min.

When the second motionless period ended, the female quickly walked up the slope and went under the lower mesquite limb where the male was perched. The Zone-tailed Hawk was no longer observed overhead. The female Scaled Quail sat down among the eight mesquite tree trunks. About 4-5 min later, the male Scaled Quail moved away from the mesquite tree toward the highway closely followed by the female. The Scaled Quail pair rapidly walked across the highway and went out of view.

Sentinel behavior is generally defined as an individual of a species observing from a high structure and giving an alarm call when a predator or danger is detected (Bednekoff 2015). Sentinel behavior for quail usually is done by a male perched above or near a mate, family unit, or covey (Bent 1932, Lepper 1978). Dabbert et al. (2009) noted that Scaled Quail sometimes will respond to avian predators by freezing motionless (motionless posture), although they did not relate the behavior

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as being coordinated with sentinel behavior or alarm calls. For the Scaled Quail pair described herein, the two periods of motionless posture by the female were linked to the sequence of sentinel behavior and alarm calls by the male. While perched high under the cover of mesquite tree branches, the sentinel male was able to visualize an avian threat and vocalize an alarm call to his mate. As an antipredatory strategy for a soaring hawk, the female did not respond to the hawk directly but in cooperative behavior responded to the call of the sentinel male by becoming motionless.

Also of note is that when the female moved after the first motionless period, while the Zone-tailed Hawk was still overhead, the male almost immediately called, thus triggering the female to enter the second motionless posture period. This sequence suggests that Scaled Quail probably do not use an 'all-clear' call and that individual quail in motionless posture return to movement inherently. With a nearby avian predator, short periods of staying motionless would be selected against, resulting in populations of individuals that stay motionless for longer periods.

Although calls by the male were either muffled or unheard due to distance and background noise, the male Scaled Quail was obviously calling based on the physical actions of his head and bill. The only call that was heard included an early high note followed by a muffled low note. Of the three alarm and one threat/attack vocalizations made by Scaled Quail, Anderson (1978) described the *TiChunk* call specifically being given when related to a threat by a hawk. This may have been the call used by the male Scaled Quail, however the exact call was indeterminate because of the poor acoustics.

For the congeneric California Quail (*C. californica*), antipredator strategies include sentinel behavior (Bent 1932, Lepper 1978) and alarm calls that generally have quail run or flush into the nearest cover (Calkins et al. 2014). Gambel's Quail (*C. gambelii*) will use a sentinel over a foraging flock (Rylander 2002) and usually respond to aerial predators by flushing into dense brush or other cover however, mammalian predators may elicit these quail to initially freeze motionless (motionless posture) and subsequently hide in nearby heavy vegetation (Gee et al. 2013). Of the 10 described calls for captive *C. gambelii*, several different calls are produced in response to predators or danger (Ellis and Stokes 1966).

Mountain Quail (*Oreortyx pictus*) individuals may act as sentinels on an elevated perch (Bryan 1901, Gutierrez and Delehanty 1999) and in their response to predators will usually escape by flying into the tree canopy (Grinnell and Swarth 1913). However, when approached by humans Mountain Quail will sometimes crouch motionless with their tails toward the perceived human threat (Gutierrez and Delehanty 1999). For avian predators they will vocalize their *Scree* alarm call and covey members may freeze motionless (Gutierrez 1980, Gutierrez and Delehanty 1999). In response to an avian predator, Montezuma Quail (*Cyrtonyx montezumae*) will crouch close to the ground with their heads lowered. They will remain motionless for a period of time (Stromberg 1990, 2000), followed by flying away noisily and suddenly dropping to the ground (Rylander 2002). For the Northern Bobwhite Quail (*Colinus virginianus*) known antipredator responses are scarce (see Brennan et al. 2014). Burger et al. (1995) inferred that breeding males may tend to be more vulnerable to avian predation because of their displaying and calling from prominent locations, but included no descriptions of their responses to avian predators.

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LATERAL DEVIATION OF BILL IN CURVE-BILLED THRASHER (*TOXOSTOMA CURVIROSTRE*) FROM TEXAS

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The Curve-billed Thrasher (*Toxostoma curvirostre*) is an uncommon to common resident in the western half of Texas (Lockwood and Freeman 2014) where it occupies mixed desert scrub and open brushy habitat in arid and semiarid environments with sufficient shrubs and small trees for nesting and refuge (Rylander 2002, Lockwood 2007). Individual birds will forage in cacti, shrubs, and trees for berries and fruit although Curve-billed Thrashers generally forage on the ground for insects and seeds by probing and tossing plant litter and digging the soil with their long, decurved bills (Tweit 1996, Rylander 2002). The end of their decurved bill can be used like a hoe to excavate insects and other arthropods from burrows or crevices in the soil. Accordingly, the longitudinal alignment and structure of the bill is a critical component to foraging on the ground.

On 5 March 2019 at 1135 h, a Curve-billed Thrasher was initially observed flying into dense woodland adjacent to Pond 2 at Lake Alan Henry Wildlife Mitigation Area (LAHWMA), ca. 5.0 km N, 13.0 km E of Justiceburg (33.090493° N, -101.065017° W), Garza Co., Texas. The thrasher was noted to have an unusual profile as it was flying across the field of view. After finding the Curve-billed Thrasher by binocular in a large Netleaf Hackberry (*Celtis reticulata*) tree, the thrasher indicated a deviated bill with a left bend about three-quarters the distance from its base (Fig. 1).

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The upper and lower mandibles were aligned along the bend and there was no decurved aspect of the bill tip.

Figure 1. Curve-billed Thrasher (*Toxostoma curvirostre*) with a lateral deviation of the bill perched in a Netleaf Hackberry *(Celtis reticulata*) tree at Lake Alan Henry Wildlife Mitigation Area, Garza Co., Texas on 5 March 2019.

The Curve-billed Thrasher was moving normally and looked healthy although its feathers seemed to be in some disorder. The thrasher was observed from the rear prodding small branches of the hackberry tree with the distal part of the bend, not the tip of the bill. Initially the thrasher was thought to be feeding on hackberry fruit, however insect galls along the branches were later deemed to be more of its focus. After flying to a heavier branch, the thrasher was photographed holding a light colored object, which may have been an insect larva. This presumed insect larva was being held near the part of the bend that was in longitudinal alignment with the head.

Only two previous cases of a Curve-billed Thrasher with a deformed bill are known. An adult with an aligned, extremely long decurved bill (both upper and lower mandibles) was collected in Mexico. Radiographs indicated that the bone of the bill was of average length and shape but the rhamphotheca (keratin sheath covering the bone) was about 50% longer than normal (Contreras-Balderas and Garcia-Salas 1991). In Arizona, a juvenile male was found deceased with a bill that was three times the normal length. The upper mandible was decurved to the right in a half-circle and the lower mandible was shorter and decurved to the left resulting in a crossed bill with the mandible tips being extremely separated (Thompson and Terkanian 1991). Radiographs indicated that the bones of the bill appeared normal in structure with the excessive growth being in the rhamphotheca. In a similar deformity, Fox (1952) described a California Thrasher (*Toxostoma redivivum*) with the rhamphotheca of both the upper and lower mandibles being very long with the lower mandible forming a half circle.

Approximately 24 individuals with bill deformities have been documented for the Brown Thrasher (*Toxostoma rufum*) of which at least 20 are from the state of Florida (Steffee 1968, Stitt 1968, Taylor and Anderson 1972, Taylor 1973, Brown 1976). Craves (1994) suggested that the higher incidence of Brown Thrashers with bill deformities during the late 1960s to early 1970s, especially from central Florida, was most likely correlated with the wide use of DDT in agricultural practices during that period. Bill deformities in the Brown Thrasher vary widely and include the rhamphotheca of the upper mandible being only moderately longer and slightly decurved (Goertz and Mowbray 1969, Taylor and Anderson 1972, Wolfe et al. 2012) to the rhamphotheca of the upper mandible being extremely long and highly decurved (Prescott 1968, Brown 1976, Post 1985). In an extreme case, the rhamphotheca of the upper mandible was more than four times the average length and greatly decurved with the lower mandible being broken and its rhamphotheca growing two and a half times longer than normal; the bill also was crossed (Post 1985). Steffee (1968) listed six individual Brown Thrashers from Florida as having sickle-shaped bills.

Bill deformities in wild birds are often associated with an injury to the bill (Arendt and Arendt 1986), but also can be indicators of disease, exposure to chemicals, and calcium deficiencies (Craves 1994, Wolfe et al. 2012). In captive birds, it has been shown that an injury to the dermotheca, the underlying tissue of the rhamphotheca, will most likely cause uneven wear or uneven and uncontrolled growth of the rhamphotheca (Fox 1952).

Of the two previously known bill deformities in the Curve-billed Thrasher, each was from an overgrown rhamphotheca with each radiograph indicating that the bone in the bill was of normal size and shape. The Curve-billed Thrasher from LAHWMA differs from these two records of bill deformities for the species in that the underlying bone appears to be incorporated in the deformity (Fig 1). In addition, this bone deformity may be novel among the three *Toxostoma* species described herein. In a review of the literature, all deformed bills are related to damage and/or overgrowth of the rhamphotheca and none were directly described as being changes in the underlying bone except for breakage. For the LAHWMA Curve-billed Thrasher, the bend in the bill is uniform between the upper and lower mandibles and the rhamphotheca is evenly distributed along the bill with no obvious overgrowth. The end of the bill did not have a decurved shape of the upper rhamphotheca. Basically the bill is structurally normal except for a ca. 80° left bend in the entire bill at about three-quarters distance from its base.

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LEUCISTIC NORTHERN CARDINAL OBSERVED IN GILLESPIE COUNTY, TEXAS

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A partially white Northern Cardinal was first observed on a feeder in November 2019. It was sighted with a resident group of typically seen cardinals, both males and females. There have been feeders that attracted cardinals on this property in Gillespie Country, Texas for approximately 10 years. This was the first appearance of a Northern Cardinal of this coloration at the feeders.

The bird is completely white with the exception of pale red coloration on wings, tail, and crest, reminiscent of red highlighting. It has black eyes and the beak color is typical for a cardinal.

At the first sightings the assumption was that the bird was albino because of its lack of body color. Upon closer observation, it was determined that it did not have the primary trait of albinism—lack of eye pigment, making the eye look pink due the underlying blood vessels.

This bird's coloration is consistent with fully leucistic Northern Cardinals, according to Homann(2011): "These birds can produce melanin, so the eye appears black, but something prevents them from depositing melanin in the growing feathers. The red carotenoid pigment is unaffected so the feathers are red in all the normal places..." The opinion that the bird observed is fully leucistic is based in part on articles published by Sibley (2011) and Homann (2003).

Leucistic Northern Cardinals have previously been reported in Texas (Jones 2016) and elsewhere (Kruitbosch 2012).

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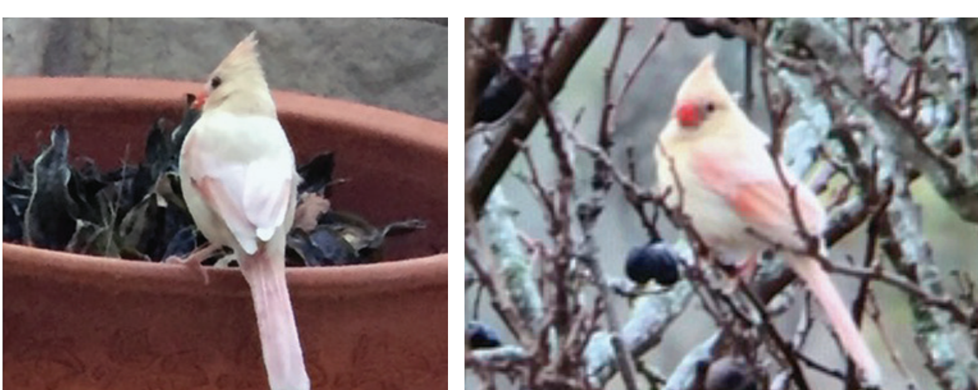

Fig 1. Leucistic Northern Cardinal (Photo by author)

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THE TBRC IS CHARGED WITH MAINTAINING A "TEXAS STATE LIST"

Why is Egyptian Goose (or insert another one of your favorite exotic/introduced species) not on the state list for Texas? The TBRC, designated keepers of this state list, has long answered that question with a response about the need to document that the species is established but we had fallen behind in publishing the exact details of what that really means.

So, we have created a that covers this topic as it addresses the criteria for determining if/when a species is considered established and thus a species that could be put on the state list.

The TBRC is charged with maintaining a "Texas State List" which covers the bird species that have been documented to occur in the state which are considered to be naturally occurring. Naturally occurring indicates that the individual(s) are free-flying non-captive birds that were born and survive in the wild on their own. For most native species that are encountered in Texas, there is rarely a question about their provenance/origin and most native species documented in Texas are part of the *Texas State List*.

Where the lines get a bit more fuzzy is when numbers of a particular introduced/exotic species are documented in the state for a period of time. Such species typically originated from older generations that were clearly at one point in the past part of a captive population. Individuals from these populations were either released into the wild or escaped from captivity and started at some point to reproduce and possibly thrive in small areas. Depending on where you live, you may see these exotics often and wonder why they aren't on the *Texas State List*. The reason is most likely because they have not been accepted as established by the TBRC.

For the TBRC to consider an exotic to be established, members of the committee must review documentation provided to them based on the criteria stated below and agree that the documentation supports that criteria. The TBRC's criteria closely mirrors the American Birding Association's (ABA) own "Criteria for Determining Establishment of Exotics" http://listing.aba.org/criteria-determining-establishment-exotics/

The EIGHT criteria that must be met for an exotic species to be considered established follow:

1) **Physical documentation must be made available to the TBRC**. This requirement is no different than any other species on the Texas State List. Species identification must be confirmed by photo(s), video(s), audio recording(s) and/or specimen(s).

2) **There is a more-or-less-contiguous population of interacting or potentially interacting individuals, rather than a scattering of isolated individuals or pairs.** Most exotics present in Texas occur in and near metropolitan areas. For persistence, it is vital that exotic birds in these areas are not isolated from each other but rather occur in sufficient proximity to allow interaction and therefore gene flow.

3) **The population is not currently, and is not likely to be, the subject of a control program where eradication may be a management goal that is likely to succeed.** Some exotics (e.g., Mute Swan) present a clear danger to native species or habitats, or to agriculture or commerce, in some areas, and listing these species as established may

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create a conflict between some birders and land management personnel.

4) **The population is large enough to survive a routine amount of mortality or nesting failure.** We cannot provide a stand-alone numerical threshold for determining when an exotic species is established. The reason for this is hopefully clear: No single number would be adequate for populations as varied as large, long-lived parrots with low reproductive potential and small, short-lived finches with high reproductive potential. Demographic characteristics such as habitat preferences, lifespan, reproductive output, dispersal frequencies and distances, and genetic viability will be considered separately for each species. Members of the TBRC will critically review each species based on the documentation provided and will make a judgment based on the best available evidence. Much attention will be given to factors such as population size, distribution, and, particularly, evidence of successful breeding. However, we recognize that some number of individuals is preferable as a baseline to judge when a species may be established. It is preferable that this baseline number be a census of well over a hundred individuals but the TBRC can and will consider populations with lesser numbers. In almost all cases, populations numbering only dozens of individuals may be too small to be considered established. Additionally, information should be provided to indicate that there is little or no evidence that ongoing releases play a substantial role in population maintenance. For species whose numbers may be artificially supplemented from time to time, evidence should be provided that these releases are not necessary to maintain population size or persistence.

5) **Sufficient offspring are being produced to maintain or increase the population.** Such criteria will vary from species to species, according to factors affecting the population, both natural (competition from other species; effects of hurricanes) and artificial (recapture for the pet trade; culling by hunters). Certainly, a species whose numbers are increasing and whose range is expanding is a better candidate for establishment than a species whose numbers and range are stable. Species with declining numbers and/or contracting range should have a much greater evidentiary threshold to meet before being considered established.

6) **The population has been present for at least 15 years.** Previous criteria considered by the ABA used a 10-year persistence threshold. Based on several cases, the ABA determined 10 years is an insufficient period to judge the likelihood that an exotic will persist.and increased the persistence criteria to 15 years. The TBRC will use this same 15 year minimum though we realize that 15 years may still be insufficient in some cases to determine establishment; populations of many exotics follow a "boom and bust" cycle over several decades. With long-lived species (e.g., *Amazona* parrots) or when other exotic populations are regularly subsidized, one could argue that persistence should be for 30 or more years for genuine trends in the population to become obvious. Our point here is that like numerical criteria, no simple formula of the number of years for persistence can apply to all species. Flexible persistence criteria ("at least 15 years") and lack of numerical criteria will allow TBRC members to exercise their own judgment in potentially uncertain or controversial cases, but only in the context of strong biological evidence and with the intention that the final judgment be a conservative one.

7) **The population is not directly dependent on human support.** Although somewhat subjective, this criterion is meant to exclude from consideration those exotics that rely on direct human support for their ongoing survival and/or persistence (reliance on bird feeders; periodic releases of additional individuals).

8) **A publication, ideally in a peer-reviewed journal or book, describes, how, when, and where the above seven criteria have been met.** A publication will streamline the voting process by clearly presenting evidence of establishment. In the absence of a publication, the TBRC may still officially consider adding an exotic to the *Texas State List* if such evidence has been gathered by a Committee member or other interested individual. In all cases, the TBRC can provide guidance/assistance in getting the documentation published in the TOS Bulletin.

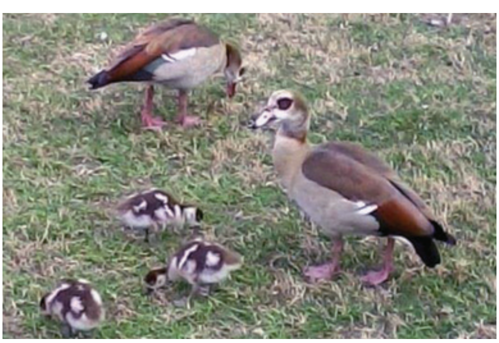
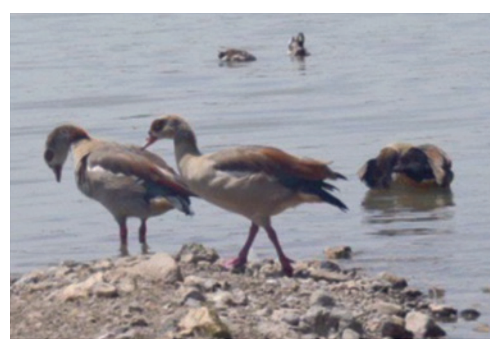
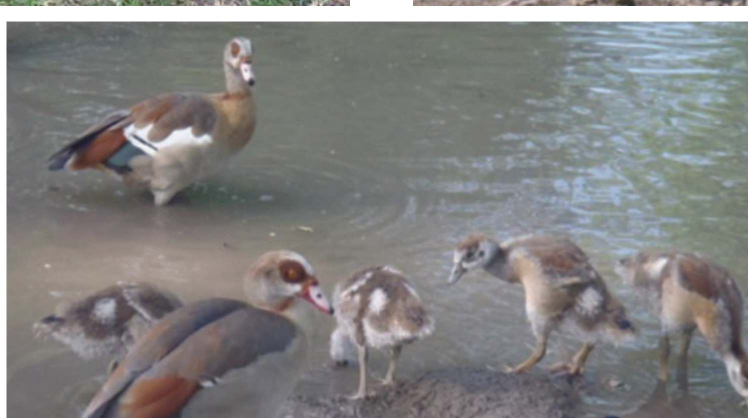
Other aspects might certainly play a factor in the TBRC's decision to add/not add a species to the *Texas State List*; the more documentation that can be provided, the stronger the case will be.

The TBRC holds neither a generic "for" position in favor of the addition of exotic species the state list nor do we hold a generic "against" position where exotics are seen as unwelcome additions. In addition, the TBRC is not the entity that will tell you if an exotic species (or any species) you may see is "countable" or not. Countability of any given species is a personal decision that may or may not follow TBRC decisions and may or may not follow what is or is not on the *Texas State List*. For exotic species, it is the goal of the TBRC to weigh the merits of the documentation provided in view of the criteria listed above in regard to a species being established and to make a judgement based upon that data.

There are a few exotics already on the *Texas State Lis*t that did not go through this same process using this criteria outlined above. Several of them (House Sparrow, Eurasian Starling, Rock Pigeon, etc.) have long histories in the state and are so widespread that they are as abundant and conspicuous as many of our native species. A smaller number are not as obviously abundant and the TBRC acknowledges that they are "grandfathered in" without having gone through the process/criteria outlined above. The most obvious examples of this are Green Parakeet and Red-crowned Parrot. Neither had as formal or as detailed a criteria for being added to the state list though both were considered by the TBRC along very similar principles around what is considered established as per the content presented here. Please see the 1995 Annual Meeting Minutes that covers the background that lead to both species being added to the *Texas State List*.

The TBRC is willing and able to help out any individuals or groups that wish to present a case for an exotic species to be added to the state list but it will most likely not be the case that TBRC member(s) will be the driving force behind such efforts. Such efforts may best be left up to individuals and groups that live in areas where they can regularly see and document any emerging population(s).

Texas Bird Records Committee
https://www.texasbirdrecordscommittee.org/

Egyptian Goose *Alopochen aegyptiaca* at Woodlawn and Brackenridge parks, San Antonio. Photo John Eitniear.

URBAN NESTING BY A BROAD-WINGED HAWK PAIR IN THE SOUTHERN HIGH PLAINS OF TEXAS

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The Broad-winged Hawk (*Buteo platypterus*) is a small, migratory raptor that is present in North America during the summer. As a breeding bird, the species is widely distributed across eastern North America where deciduous and mixed deciduous-coniferous forests and woodlands are available (Goodrich et al. 2014). Longitudinally, it occurs from the east edge of the Great Plains to the eastern seaboard, and latitudinally from the gulf coast north to approximately 50° degrees latitude in eastern Canada (see Goodrich et al. 2014, Wheeler 2018). However, at northern latitudes in Canada the species breeding distribution extends westward as far as northern British Columbia (Wheeler 2018). Further, a general westward expansion has been suggested by Farmer et al. (2008).

Broad-winged hawks are considered a common migrant but rare and local as a breeding bird in Texas, primarily occurring in the northeastern part of the state, also known as the Pineywoods, westward to the eastern portion of the Edwards Plateau (Lockwood and Freeman 2014).

The Texas Breeding Bird Atlas reports nesting by Broad-winged Hawks only in the eastern quarter to third of the state (Benson and Arnold 2001). Reports from eBird for observations of the species in Texas from June to July, which would presumably be breeding birds if adults, from 2010 to 2019 indicate occurrences primarily east of an approximate longitudinal line from the Dallas – Fort Worth to Austin and San Antonio areas. This is approximately longitudinally consistent with other reports (e.g., Benson and Arnold 2001, Lockwood and Freeman 2014). Additionally, there is a report of one unknown aged Broad-winged Hawk seen in Haskell County in 2019, and a photo-documented report of an immature Broad-winged Hawk on 28 July 2018 in Midland County Texas. Estimates based on Breeding Bird Survey data suggest an increase in population numbers in Texas from 1966-2015 (Sauer et al. 2017). However, given Broad-winged Hawk's proclivity for deciduous or mixed-deciduous forests and woodlands, usually with water nearby (Goodrich et al. 2014), it is understandable why they have not expanded farther west into the arid Rolling Plains, High Plains, or Trans-Pecos regions of Texas. Here I report the unusual occurrence of a nesting pair of Broad-winged Hawks in Lubbock, TX in 2019.

While conducting surveys for urban nesting Mississippi Kites (*Ictinia mississippiensis*), I observed an adult Broad-winged Hawk in an urban park in Lubbock, TX on 14 June 2019. The adult light morph hawk flushed from a large cottonwood tree (*Populus* spp.) and flew off over the adjacent residential area. When conducting a subsequent check of kite nests on 19 June 2019, I again observed an adult light morph Broad-winged Hawk perched in the same clump of cottonwood trees (Fig. 1). Upon closer investigation, I located a well concealed nest occupied by a second light morph Broad-winged Hawk laying low in an incubation/brooding position (Fig. 2). I continued to check the nest at approximately 4-day intervals, though due to the height of the nest and foliage of the tree, I was never able to visually confirm the number of nestlings. However, the nesting attempt was confirmed as successful when I located two fledglings that were food-begging and flying between the nest tree and adjacent trees and utility poles (Fig. 3, 4) on 12 July 2019.

The nest tree had a diameter at breast height of 89.2cm and was 16m tall. The nest was located in a crotch of the main stem at a height of 11m above the ground and 5m from the top of the tree and situated 1m out from the east side of the main bole of the tree. The nest tree was in a small cluster of trees; within a 60m radius of the nest tree (1.1ha) there were 19 deciduous and 3 coniferous trees creating a small, open grove-like structure. Additionally, the nest tree was 44m from the edge of a large urban lake. This is generally consistent with descriptions

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Figure 1. Adult Broad-winged Hawk perched near nest site in Lubbock, TX, June 2019. Photograph courtesy of Clint Boal

of deciduous woodlands with openings and nearby water serving as nesting habitat for the species. What is unique is that a primary 4-lane city street was 71m from the nest, and a 2-lane residential street was 48m from the nest. Additionally, the front doors of 6 residences were within 100m (mean = 81.5m ± 10.2 SD) of the nest tree.

Several raptor species have adapted to urban landscapes as both wintering and breeding birds (Boal and Dykstra 2018). However, the influence of urbanization is unclear for Broad-winged Hawks. Robbins (1979) found Broad-winged Hawks appeared to abandon forest areas that had undergone severe fragmentation, suggesting a decrease in woodland space may be detrimental. Indeed, it has been suggested that forest fragmentation for anthropogenic developments may increase stress on nesting birds. For example, Armstrong and Euler (1983) believed anthropogenic nest disturbance could be a deleterious effect near lakefront areas in Canada. More recently, Pruitt (2017) found breeding range declines of Broad-winged Hawks associated with increasing urbanization and agriculture land covers among 25km^2 blocks in the northern Appalachian region of the United States. Tilghman (1987) found Broad-winged Hawks were rare in urban woodlands of Springfield, MA, and they were never observed in woodlots smaller than 5ha. Similarly, during a breeding bird survey at 150 points among 49 greenspaces in Pittsburg, PA, Broad-winged Hawks were detected at only one point (Latta et al. 2013). In contrast, Bosakowski and Smith (1997) suggested Broad-winged Hawks appeared to show little sensitivity to urbanization. Additionally, in an assessment of raptors occurring in urban settings during the breeding season, Boal (2018) noted Broad-winged Hawks were reported in 5 of 10 cities sampled within the species distribution. Still, there is little documentation for actual nesting by the species in urban settings.

Broad-winged Hawks are generally considered a secretive species on the breeding grounds (Goodrich et al. 2014). This may partly explain the lack of urban nesting documentation. However, Bildstein (2017) noted that some Broad-winged Hawks nesting in suburban areas will dive at and strike pedestrians that venture near the nest. In my study, I found no evidence of aggression by the hawks; rather they displayed a tendency to flush and fly from the area during checks.

Figure 2. Adult Broad-winged Hawk in incubation/brooding position on the nest, Lubbock, TX, June 2019. Photograph courtesy of Clint Boal.

Figure 3. Fledgling Broad-winged Hawk number 1, calling from a perch in the nest tree, Lubbock, TX, July 2019. Photograph courtesy of Clint Boal.

Figure 4. Fledgling Broad-winged Hawk number 2, perched on a utility pole near the nest tree, Lubbock, TX, July 2019. Photograph courtesy of Clint Boal.

An additional item of interest is the potential for agonistic interactions among nesting raptors. The behavior of Broad-winged Hawks toward other raptors during the breeding season is not well documented (Goodrich et al. 2014) and conflicting. The species is reported to respond aggressively to both conspecifics and Red-tailed Hawks (*B. jamaicensis*) that intrude into their nesting area (Keran 1978, Armstrong and Euler 1983). In contrast, Fitch (1974) reported overlapping home-ranges and no aggression between Broad-winged Hawks and Red-shouldered Hawks (*B. lineatus*). In the case of the Lubbock nest, there were 9 Mississippi Kite nests in the same park as the Broad-winged Hawk nest. The known Mississippi Kite nests ranged from 54m to 563m (mean = 287m ± 170 SD) from the Broad-winged Hawk nest, though there may have been other close nests in the residential area adjacent to the park. During nest checks, I never observed any agonistic interactions between the species.

There are many questions that would be intriguing to address regarding these observations. For example, the apparent lack of agonistic interaction would be worthwhile to confirm, as it would provide some insight to the community dynamics and structuring of these novel urban wildlife communities. Additionally, the diet of these urban hawks is intriguing, and something I hope to address in the future if the pair return in subsequent years. Finally, this nest was found as part of a study of a different species. It is quite possible more Broad-winged Hawks are nesting in urban areas of the region but have so far gone unnoticed or unreported. Regardless of these unanswered questions, this paper is documentation of the presence of, and successful urban nesting by, Broad-winged Hawks in the Southern High Plains.

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C. D. OLDRIGHT AND THE CATALOGUE OF TEXAS BIRDS

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Charles Durand Oldright (1872-1896) was the second and only surviving child of John Edward Oldright (1836-1924) and Julia Isabel Durand (1849-1925), an older brother having died as an infant the year before Charles was born. His father emigrated from Canada to the United States in 1858 and was working in Austin as the Acting Secretary of State at the time of Charles' birth. The Oldright family placed a high value on education, and young Charlie received most of his education at home before entering the University of Texas in 1888 (Benedict 1910). During his short but productive life, he was a devotee of learning with an intense interest in ornithology, philosophy and a variety of other subjects. In 1891, Oldright and Harry Yandell Benedict (1869-1937) announced the preparation

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of a catalogue and bibliography of the birds of Texas, a grand vision that was not realized until the publication in 1974 of Oberholser's *The Bird Life of Texas*.

EARLY INTEREST IN ORNITHOLOGY

Charles Oldright was 13 years old in September 1885 when he published a notice in *The Golden Argosy* magazine hoping to exchange a small "printing press" for a good pair of steel climbers (Oldright 1885). Although his early interest was in birds' eggs, he soon began to prepare study skins.

The Oldright family moved from Austin to Waco sometime around 1886, and it was here that Charles began a serious study of birds. His earliest specimen records date from December 1886 when he collected an Eastern Hairy Woodpecker (Oberholser n.d.) and five American Crossbills (Oldright 1887) at Waco. Years later, J. K. Strecker described Oldright as an "enthusiastic and accurate bird student" and the first ornithologist to work in McLennan County (Strecker 1927). Although the Strecker and Oldright apparently never met, they corresponded and Strecker later credited Oldright for providing him with information on the "haunts of the rarer species" of McLennan County (Strecker 1927).

Not all of Oldright's time at Waco was spent studying birds. The Waco City Directory for 1886-1887 listed him as a clerk in the business where his father worked as a stenographer. He also studied taxidermy, and the directory for the following year gives his profession as a taxidermist. He probably did very little taxidermy work at Waco since in September 1888 his family moved back to Austin.

THE CATALOGUE OF TEXAS BIRDS

Oldright enrolled in the fall of 1888 in the Bachelor of Science program at the University of Texas where he took courses in zoology, geology, chemistry, as well as in German and Spanish. His experience in geology included field work during the summer of 1890 with Professor Robert Thomas Hill of the U. S. Geological Survey (Benedict 1910). Recognizing the importance of contributing to a national program, Oldright also sent records of the migration of birds at Austin during 1890 to the Biological Survey in Washington, D. C. (Simmons 1925).

Three of Oldright's papers on the birds were published during 1890. The first paper was a brief note reporting the first collection of an Inca Dove in Travis County on 23 October 1889 (Oldright 1890a) The second paper dealt with the five species of thrushes—Wood Thrush, American Robin, Gray Catbird, Northern Mockingbird and Brown Thrasher found in Travis County giving information on their occurrence, abundance, habitat, nesting, food and enemies (Oldright 1890b). The third paper listed 125 species of birds occurring in McLennan County. Strangely, the McLennan County list was published under the pseudonym "Elanoides", the genus name of the Swallow-tailed Kite (Oldright 1890c).

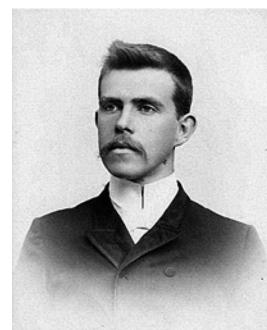

Figure 1. Charles Durand Oldright. Photograph from Ancestry.com.

Perhaps as important as his field studies was Oldright's association with fellow student and bird enthusiast Harry Yandell Benedict. Oldright and Benedict first met in the spring of 1889 and in 1891 the two young men announced that they were engaged in the preparation of a "catalogue of the birds of Texas" (Anon. 1891a,b). Prominent ornithologists had promised cooperation and unpublished information was requested. The catalogue was to consist of a list of the birds of Texas and their distribution with respect to topographic and climatic conditions, as well as a bibliography of Texas ornithology. It was anticipated that the catalogue would be published in 1892 under the auspices of the University of Texas. The catalogue was a grand vision that was never realized since in 1893 Oldright left Texas for two years of study in Germany while Benedict left that same year for a job at the University of Virginia.

THE BAHAMAS AND STUDY ABROAD

During June 1893 Oldright worked with University of Texas Prof. Charles L. Edwards and five other students studying the marine life of the Bahamas, and in July the last of his bird papers, "The Wrens of Travis County, Texas," was published (Anon. 1893, Benedict 1910, Oldright 1893). In September 1893, Oldright left Austin for Breslau, Germany, where two of his friends, Frederich Opp of Llano and Leonidas Edwin 'Ed' Hill of Galveston, were the United States Consul and Secretary, respectively. Little is known of the two years Oldright spent at the University of Breslau other than that his studies were in the area of zoology, and that for a time he filled in for Ed Hill as secretary at the consular office (Benedict 1910).

RETURN TO THE UNITED STATES

Oldright moved from Breslau to the University at Munich where he spent one semester before returning to the United States in the fall of 1895. Although offered a scholarship at the University of Cincinnati where Prof. Edwards was then employed, he returned to Austin to be near his mother who was in poor health. Professor Wesley Walker Norman, chairman of the biology department at the University of Texas, appointed him an assistant in biology, and it was in this role that the final months of his life were spent (Benedict 1910).

University life was to the liking of Charles Oldright, and he was determined to be an active part of the political and social life of the campus. His friend, Ed Hill, had returned from Germany and in December 1895 the two young men founded *The Alcalde*, the first weekly paper published at the university. Oldright also renewed his research in ornithology but in less than a month he was unexpectedly found dead in his apartment.

Oldright passed from this world on 19 January 1896. It was erroneously reported that he died of "laryngitis" whereas the cause of death was actually diphtheria (Anon. 1896a; Durand 1897). His sudden demise was a shock to the university. Suitable resolutions were adopted by the faculty and the chapter of Chi Phi fraternity of which he was a member, and all university activities were suspended so that the faculty and students could attend the funeral.

Oldright was remembered as having "excellent character" with the "promise of a useful life." He was further lauded as having talent, ambition, energy and a devotion to learning. By habit, he was said to be a quiet, modest young man, generous in spirit and true to his friends and to his principles (Editor 1896). Noticeably absent in the accounts of his death is any mention of his passion for birds and his interest in philosophy.

Most of Oldright's ornithological specimens and notes were lost to posterity. His bird skins became moth-eaten and were destroyed while he was in Germany. His egg collection data were lost after his death, as well as many notes, diaries and papers. Among the remaining papers was a manuscript list of Austin birds (Simmons 1925). His egg collection was eventually donated by his mother to the University of Texas (Hargrave 1933).

A few of Oldright's specimens are still in existence. An Eastern Phoebe (#134884) collected in Williamson County during December 1889 is at the National Museum of Natural History, and the skin of a Black-capped Vireo (#758852) taken in April 1889 at Austin is at the American Museum of Natural History. Eleven sets of eggs taken in Williamson and Travis counties are at the Western Foundation of Vertebrate Zoology. The skin of a Merriam's Pocket Mouse taken at Austin is at the National Museum of Natural History.

OLDRIGHT AND PHILOSOPHY

Oldright's intellectual pursuits seemingly changed following his return from Germany in 1895. The 1894 and 1895 editions of Cassino's *The Naturalists' Directory* list his interests as "Philology, Ornithology, and General Biology" (Cassino l894, 1895). The term "Philology", is used here in its obsolete definition as "the love of learning and literature", a context consistent with Oldright's pursuit of knowledge in all forms. Philology and ornithology were deleted from the 1896 edition of *The Naturalists' Directory* and Oldright's interests are given as psychology and general biology and his profession as "Instructor in Botany."

Oldright probably never took a formal course in philosophy although he and Harry Benedict studied the works of Immanuel Kant during weekly meetings in the home of Dr. Walter Lefevre, professor of philosophy and political science at the university (Benedict 1910, Flanary 1914). However, even though philosophy was not his main focus, it is the subject for which Oldright is best remembered rather than for his contributions to the ornithology of Texas. This selective remembrance is perhaps due in part to the fact that Oldright was the subject of a widely-distributed memorial and the establishment of the Charles Durand Fellowship in Philosophy.

THE PASSING OF ASCHREL

Rather than being called by his given name, Oldright was often referred to by his friends as 'Aschrel', a monicker formed by scrambling the letters of the name "Charles." Thus, it came to be that in September 1896 Oldright was memorialized by his close friend and fellow-student Robert Lee Ziller in a 19-page poem of 86 verses titled "*The Passing of Aschrel*." Ziller was a chemistry major with a love for nature and a talent for writing poetry, as well as sharing Oldright's interest in philosophy. Ziller's memorial was distributed among Oldright's friends and, since it is considered to be a classic piece of literature, it is now accessible on the Internet. In this epic poem Ziller declared that he and Oldright "were like brothers" in their hearts as they searched the woods for "bird's nests with their mottled prize." However, if they "heard the mother's cries" when about to take the eggs, Oldright would often decide to "leave the nest since," if the eggs were taken, "No song would reach her forlorn breast." Oldright's maturing interest in the deeper questions of life was also described in poetic terms. "With philosophic mind he searched, The fauna of the land and sea; He thought, perchance, he there might find, The key to solve life's mystery" (Zeller 1896).

THE OLDRIGHT FELLOWSHIP IN PHILOSOPHY

"Little Charlie" was Julia Oldright's only surviving child, and his death was a tragedy that weighed heavily on her mind. In June 1910 Julia donated $10,000 to endow the Charles Durand Oldright Fellowship in Philosophy at the University of Texas, and a short biography of Oldright by H. Y. Benedict was published in *The University of Texas Record* (Benedict 1910). After presenting the basic events of Oldright's life, Benedict recalled their personal relationship and provided a perspective on the breadth of Oldright's interests.

> *"Together we studied geology and chemistry, and cherished a taste for ornithology. On long walks in search of rare specimens we discussed science and criticized poetry. His knowledge was great and his views sound. Twenty years ago he anticipated several of the conclusions of the present workers on geographical distribution. Nothing in the universe from poetry to the principles of perspective, from Empedocles to Weismann, escaped attention. In literature he read extensively and with a catholic appreciation; with youthful daring he wrote on various things in various ways."*

Figure 2. Harry Yandell Benedict. Photograph from *Birds of the Austin Region* by George Finlay Simmons (1925).

The original endowment of $10,000 earned yearly interest in excess of the $600 limit for the fellowship and Julia Oldright later arranged for the excess monies to be used for the Charles Durand Oldright Loan Fund (University of Texas 1920). Loans from this fund were not restricted to students majoring in philosophy but were to be given to any "worthy and capable" young man above the rank of freshman enrolled in any department of the University.

OLDRIGHT AND BENEDICT'S VISION FINALLY REALIZED

The life of Charles Oldright was cut prematurely short, and it cannot be known what direction it would have taken had he lived and continued teaching at the university. His commitment to the sciences, particularly ornithology, was strong, yet he enjoyed literature and poetry and was fascinated by the metaphysical aspects of philosophy. Perhaps he and Harry Benedict would have someday completed and published their "Catalogue of the Birds of Texas." While this outcome is purely speculative, it is not unreasonable. Harry Benedict left the University of Texas but returned in 1899 as an instructor in mathematics and in later years served as Dean of the College of Arts and Sciences and President of the University. Benedict's commitment to ornithology was unwavering and, in his official capacity as an administrator, he encouraged George Finlay Simmons and Harry Oberholser in their work. Oldright's manuscript list of the birds of Austin was vastly enlarged by Simmons and published in 1925 as *Birds of the Austin Region* whereas Oberholser's catalogue and bibliography was published in 1974 as *The Bird Life of Texas* (Casto 2013, 2018). Neither Oldright nor Benedict lived to see the attainment of the goal they had envisioned years earlier but they would have undoubtedly been pleased to know that others had carried on their work.

ACKNOWLEDGMENTS

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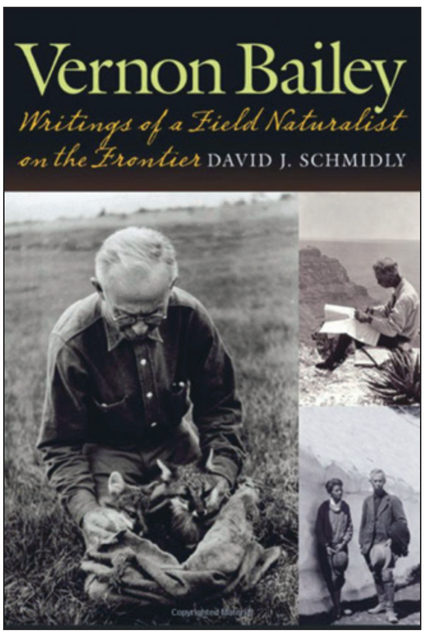
BOOK REVIEWS

VERNON BAILEY WRITINGS OF A FIELD NATURALIST ON THE FRONTIER

David J. Schmidly, Texas A&M University Press, 452 pages



Vernon Bailey represents an exhausting biography of the eminent naturalist and mammologist who contributed greatly to the body of scientific knowledge about mammals and their geographic distribution across the western United States during the late 19th and early 20th centuries. The book thoroughly traces his professional development from a Minnesota farm boy and amateur collector/taxidermist to becoming chief naturalist of the Bureau of Biological Survey (predecessor to the US Fish and Wildlife Service) under the tutelage of his mentor, C. Hart Merriam (founder of the American Ornithologists Union and the Biological Survey). Bailey exemplifies one of the last eminent naturalists who was self-taught without academic credentials. Although not formally trained, he was a prolific writer and provided much of the foundational research for understanding the mammals in the western US.

The structure of the book is founded largely on the voluminous letters and notes that Bailey composed to his family and Merriam during his collecting travels. Experiencing the narrative directly from the naturalist's letters provides for an enriched experience, and best conveys the ardors of a field naturalist's life in the late 19th century without the use of the automobile. Schmidly does an excellent job of integrating all the letters into a cogent story line that is easily followed. My criticism would be that some of the details in the letters are tedious and burden the narrative's pace. Some further editing by Schmidly would have improved the book in my opinion and made the book more palatable for those not as committed to dissecting all the minutiae of Bailey's daily life.

In addition to Bailey's development as a naturalist, the reader will receive an education in the evolution of natural history studies in the late 19th and early 20th century. Bailey began his career as a traditional collector which entailed trapping in a given geographic area and preparing the specimen for future display or study by scientists. Bailey took as many specimens as he could collect in an area, no matter if they were considered to be a rare species. Not until 1915, when a new director assumed the leadership of the Biological Survey, did the Survey re-direct its focus from traditional collecting to observation of animal behavior and studying the life history of species. Bailey made amends for his voluminous collecting later in life by designing and advocating for live catch traps that allowed animals to be collected without harm and/or be re-located. People marveled at Bailey's ability to remove live skunks and foxes from traps using only a calm demeanor and quiet coaxing.

One of my disappointments is that the book provides little mention other than a reference to the period Bailey spent collecting in west Texas from 1892-1905. The capstone to Bailey's Texas survey was the "Biological Survey of Texas" which still serves well today as a comparative baseline study of mammal distribution in Texas. One of Bailey's assistants during this time was Harry Oberholser who was commissioned to study the birds of Texas. Many of you may know the story of how the posthumous publication of Oberholser's work did not occur until 1974, after editing by Edgar Kincaid Jr. and others.

In summary, Vernon Bailey is a book written for those who love reading in detail about the travails of the early naturalists. His letters provide first-hand experiences which sometimes make you marvel and other times may bore the casual reader. All in all, it serves as an important contribution in highlighting this exemplary man who dedicated his life to furthering the scientific knowledge of mammals in the United States.

Lonnie Childs

TOS PRESENTS TWO NEW AWARDS

CHARLES MCNEESE AWARD

In 1952, Charles McNeese contacted a few friends and placed an "advertisement" in The Spoonbill of the Ornithology Group, Houston Outdoor Nature Club. On February 14, 1953, McNeese and a group that responded to his ad met in Austin and formed the Texas Ornithological Society. McNeese and his efforts established TOS so it seems fitting that we name our new award after him "For significantly furthering the goals of birding through leadership in a Texas non-profit organization".

Cecilia Riley (L) presented award by Shelia Harguis)

TOS is proud to present the first Charles McNeese Award to Cecilia Riley, Director Emeritus, of the Gulf Coast Bird Observatory (GCBO) A native Texan, biologist and avid bird watcher, Cecilia has committed her life's work to avian research and natural history in both North America and Latin America. Cecilia's educational background includes a B.S. in Ecology from the University of Texas at Arlington and an M.S. in Zoology from the University of Arkansas. Prior to her position at the GCBO, she spent 2 years as the state coordinator for Texas Partners in Flight and 8 years as a research associate of marine studies at the University of Texas Marine Science Institute in Port Aransas.

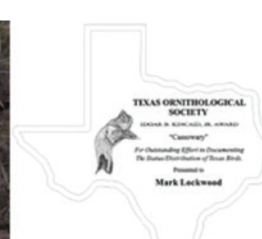
Cecilia led GCBO for nearly 20 years before retiring in 2015. Through her leadership GCBO established its 71 member Site Partner Network, established permanent endowments for land acquisition, assisted partners throughout the Americas in protecting more than 17,000 acres of tropical forests in 10 countries as well as thousands of acres in the U.S., conducted many avian field studies, spearheaded the completion of the new Avian Conservation Science Center, and of course much more.

EDGAR B. KINCAID, JR. AWARD

Without Kincaid's herculean effort editing Oberholser's The Bird Life of Texas the tome would never had seen the light of day. Edgar kept meticulous records of species expansions and retractions and continually expressed concern over the future of this feathered friends. Birds were so much of this native Texan's life he often gave his friends "bird names". As an early editor of the TOS Newsletter and Bird life of Texas it is only fitting that we honor Edgar by naming an award after him. Given to individuals or organizations that document, and/or act to conserve birdlife in Texas.

It is with great pleasure that TOS presents the first Edgar B Kincaid, Jr Award to Mark W. Lockwood. Mark is a conservation biologist with the Texas Parks and Wildlife Department.

He is a member of the Texas Bird Records Committee (TBRC; involvement 1995-2011, 2012-2018) and a former member of the American Birding Association's Checklist Committee. He is the regional editor of the quarterly Texas column that appears in North American Birds and was awarded the Ludlow Griscom Award for Outstanding Contributions in Regional Ornithology from the American Birding Association in 2012. He is the author of eight books, including The TOS Handbook of Texas Birds. He lives in Alpine, Texas.



Mark Lockwoood

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A partially white Northern Cardinal observed in Gillespie County. Photo by Sharon Corley

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