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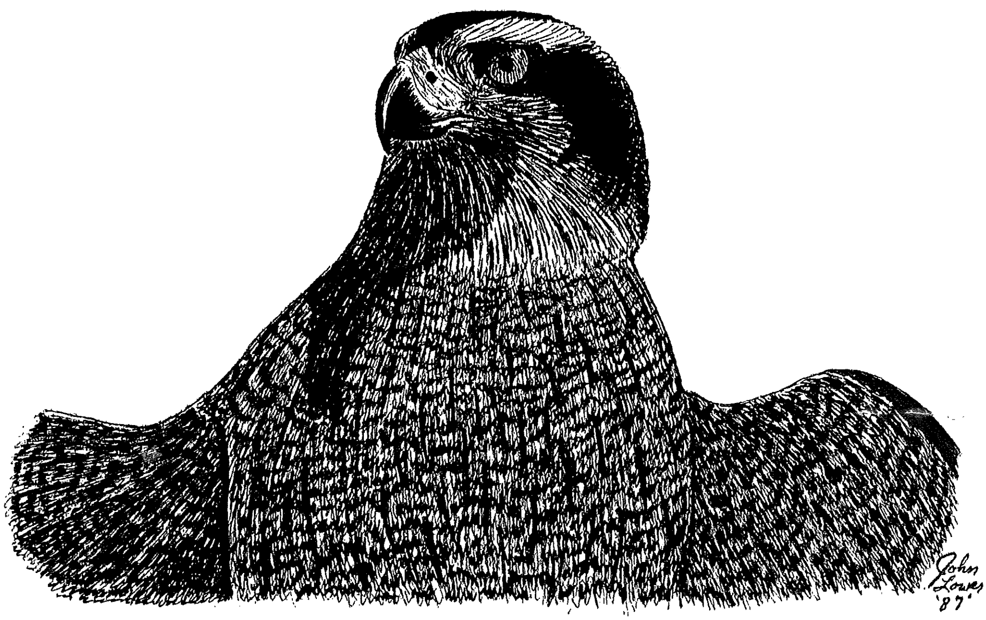
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Contents

First Documented Record of the Mangrove Cuckoo for Texas

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ABSTRACT.—Details are provided of the occurrence of a Mangrove Cuckoo in Galveston County, Texas from 30 December 1981 to 13 January 1982. Habitat selection and behavioral characteristics were noted. Research into the origin of the bird and subspecific identity resulted in clarification of the distribution of various races in Mexico and its relationship to birds reported from Texas. Photographs of the Galveston County bird provide the first documentation of the species occurrence in Texas and provide evidence that the bird was from populations described as *Coccyzus minor continentalis*.

On 30 December 1981 two groups of visiting birders independently identified a Mangrove Cuckoo, *Coccyzus minor,* as it fed in a marshy, overgrown pasture along Texas Highway 87 at the tip of Bolivar Peninsula near the ferry landing, Galveston County, southeast Texas. The original observers, including Eugene Armstrong of Booneville, Iowa, reported the bird to the Upper Texas Coast Rare Bird Alert. It was first located by local observers, Jan and Will Risser, on 1 January 1982 and was seen almost daily until ice storms the morning of 13 January. It was last seen that morning by David Dauphin. Other observers failed to locate the bird during intense searches between 15 and 17 January 1982.

The bird was most often seen as it fed along a barbed-wire fenceline bordering a pasture with standing water. The pasture proper was in an invaded, overgrazed condition with vegetation consisting mainly of rattlebean, *Sesbania drummondii,* mesquite, *Prosopis* sp., and baccharis, *Baccharis angustifolia,* all at about 2–3 meters in height; and scattered sedges and tall grasses, especially *Spartina* sp., occasionally reaching one-half meter, with a solid grass ground-cover. A large dense clump of oleander, *Nerium oleander,* was present at the north corner of the invaded section. Surrounding pasture was actively grazed and closely cropped.

The bird appeared to use the oleander as a roosting place and was often found there early in the morning and late in the afternoon. When feeding in the rattlebean along the fenceline it was most often found between 1000 and 1400 CST.

Gallucci played a tape of a Mangrove Cuckoo (from Jamaica; Cornell University 1971) and the bird immediately called back. The voice of the Bolivar bird was, to our ears, identical to the tape; low, throaty, frog-like and of the "bouncing-ball" pattern characteristic of the genus. It responded vocally only the once, but continued to be curious at repeated playbacks and was thus lured into view several times allowing Morgan to photograph the bird from seven meters. The photographs provide the first documentation of this cuckoo's presence in Texas (the best photo was deposited in the Texas Photo-record File and catalogued as #257 and is reproduced here as Fig. 1).

To the best of our knowledge there are only five previous sight records for

Fig. 1. First documented record of the Mangrove Cuckoo for Texas. Bolivar Peninsula, Galveston County, 30 December 1981 to 13 January 1982. Photo by James G. Morgan.

Texas and two records since the Bolivar bird. The reports are as follows: 1941, Cameron Co., Brownsville (Davis 1966; Texas Ornithological Society 1974); 30 December 1964, Galveston Co., Galveston, record accepted by the Upper Texas Coast Bird Records Committee based on details published in *The Spoonbill* (Ellis and Ellis 1965; Ornithology Group 1980; Texas Ornithological Society 1974); May 1966, Chambers Co., near Anahuac National Wildlife Refuge, apparently seen twice but the authors were unable to locate specific details (Texas Ornithological Society 1974); 20 May 1975, Hidalgo Co., Santa Ana National Wildlife Refuge (Webster 1975); 24 September 1975, Hidalgo Co., Santa Ana National Wildlife Refuge, perhaps the same bird as the previous report (Webster 1976); 26–27 August 1982, Hidalgo Co., Santa Ana National Wildlife Refuge; 4 May 1987, Harris Co., Houston, White Oak Bayou (fide Greg Lasley, Texas Ornithological Society Bird Records Committee). The authors have no first hand knowledge of any of these other reports. Details of three of these records, the 1964, the Sept. 1975 and the 1987 sightings, have been submitted to the Texas Bird Records Committee.

Morgan's photographs show all the known field marks and the authors took great pains to eliminate all the other similar species of *Coccyzus,* including: the Black-billed Cuckoo, *C. erythropthalmus*; the Yellow-billed Cuckoo, *C. americanus*; the Dark-billed Cuckoo, *C. melacoryphus*; and the Gray-capped Cuckoo, *C. lansbergi.* No other *Coccyzus* resembles *C. minor* so closely as to not be easily disqualified by the use of obvious field characters.

It is difficult to assign subspecific identity without a specimen but the photographs of the Bolivar bird are helpful in conjecturing on the origin of the bird. In addition, confusion exists over the nomenclature of Mexican birds and discourse about the Texas bird's origin helps solve the problem.

The Bolivar bird was buffier below, especially on the throat and upper breast, than was shown in North American field guides of the period (i.e., Robbins et al. 1966). Field guides depicted birds of Florida or West Indian origin since that is where the guides would be useful to the average American birder. Local birder Ron Braun, who was also familiar with the Mangrove Cuckoo in Florida, noted, in addition to the buffier underparts, that the back of the Bolivar bird was grayer than he was accustomed to seeing.

Dr. John P. O'Neill compared the slide to the specimen series in the Museum of Zoology, Louisiana State University and wrote: "A check of our material indicates that the cuckoo is not *C. minor maynardi* from Florida, etc., which has a white throat, a pearly gray upper breast, and a buffy lower breast and belly. *C. m. continentalis* of E. Mexico and *C. m. palloris* are both all buffy below, but the bird is probably *C. m. continentalis* . . ." based on geographic probability (O'Neill pers. comm., 17 March 1982).

C. m. continentalis occurs from central Tamaulipas south through Central America (Friedmann et al. 1950; Paynter 1955) and its occurrence so far north in Mexico makes it likely the source of the Bolivar bird. *C. m. palloris* is found on the Tres Marias Islands and in the Pacific lowlands from central Sinaloa south. There is another described Mexican form, *C. m. cozumelae* (van Rossem 1934), of Isla Cozumel, but Paynter (1955) considers the race untenable and merges it with *C. m. continentalis.*

The description of *C. m. continentalis* separates it from the nominate form and *C. m. maynardi* by its darker underparts, buffier throat, more pronounced, broader black mask, and smaller size; characters that fit the Bolivar bird.

Despite a lack of documentation, the first edition of the Check-list of the Birds of Texas (Texas Ornithological Society 1974) assigns hypothetical sight records to the race *C. m. continentalis.* That designation was based on geographic probability (Keith Arnold, pers. comm., 12 March 1982). The second edition (Texas Ornithological Society 1984) lists Mangrove Cuckoo without subspecific delineation. L. Irby Davis (1966), in his annotated checklist of birds of the Rio Grande Valley, referred the Brownsville sighting to *C. m. minor.* He cites Ridgway's (1916) listing of a Matamoros, Tamaulipas, Mexico specimen as *C. m. minor.* Matamoros is directly across the border from Brownsville. Ridgway noted that the Matamoros specimen was smaller and darker than other specimens he had examined. *C. m. continentalis* was not described until 18 years later (van Rossem 1934) and the continued listing of *C. m. minor* from Mexico is in error. The whereabouts of the Matamoros specimen is unknown and it is possibly lost.

To the best of our knowledge, the Mangrove Cuckoo is unrecorded in the continental United States outside of Florida and Texas. Older derivative literature lists Mangrove Cuckoo as occurring east to Louisiana. Sometimes credit for this is given to Ridgway (i.e., Herklots 1961). This is also apparently an error of continuation since no substantiating data appears in the literature and modern Louisiana Ornithologists make no mention of the bird having ever occurred there (Oberholser 1938; Lowery 1974). Search of the recent periodical literature reveals no additional records.

It is interesting to note in conclusion that some authors consider *C. m. continentalis* the least obliged to occupy mangrove habitats of all the Mangrove Cuckoos. Paynter (1955) reports the bird occurs in deciduous forest on the Yucatan Peninsula. Blake (1953) notes it to 4,000 feet in Mexico, and Slud (1964) lists the bird to 6,000 feet in Costa Rica.

At least 40 people were able to observe the Bolivar bird and many took photographs. In addition to Morgan's photograph, written details by Gallucci and Morgan were supplied to the Texas Bird Records Committee of the Texas Ornithological Society, and written details by Risser (1982) were published in *The Spoonbill.*

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We would like to thank Dr. John O'Neill for critical examination and comment on the photo, Dr. Keith Arnold for information on the Texas Bird Record Committee's handling of previous records and for filing the slide in the photo-record file, Greg Lasley for information on the current status of the Texas Bird Committee's handling of other Mangrove Cuckoo records and for sharing his immense knowledge of Texas avifauna, Katherine Pruitt for answering questions about specimens at the U.S. National Museum, two anonymous reviewers for their comments on the manuscript, and the many people we engaged on meaningful discussion of this record.

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Habitat Used by Brown-headed Nuthatches

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ABSTRACT.—Habitat use data collected during the breeding season from 62 Brown-headed Nuthatch (*Sitta pusilla*) foraging areas were compared to data from 33 random areas in eastern Texas to describe foraging habitat. Analysis of variance and discriminant function analysis of data showed that Brown-headed Nuthatches selected foraging habitat with fewer hardwood trees and a more open grown pine overstory. Management for open mature pine sawtimber stands in which hardwoods have been controlled, and snags retained, should benefit the Brown-headed Nuthatch.

The Brown-headed Nuthatch (*Sitta pusilla*) is a small cavity-nesting bird of the southeastern United States. Its habitat has been described as restricted to mature pine woods or older-aged longleaf pine (*Pinus palustris*) forests (Bent 1948; Johnston and Odum 1956; Norris 1958; Morse 1967; and Nesbitt and Hedrick 1976). Because of these restrictive habitat requirements, the Brown-headed Nuthatch is considered to be an indicator species of mature southern pine forests (Hedrick 1982).

Foods of the Brown-headed Nuthatch include insects and pine seeds (Morse 1967; Nesbitt and Hedrick 1976). Because Brown-headed Nuthatches are primarily insectivorous, maintenance of viable populations may be of importance to integrated pest management programs aimed at reducing insect damage to southern pine forests.

Foraging territories range from 2 to 4 ha and may or may not include the nest site (Norris 1958). Nest cavities are usually situated low, often less than 3 m above the ground in snags or fence posts.

Intensive management of pines for wood fiber, where rotation ages are shorter than sawtimber rotation ages, could be a threat to maintaining viable Brown-headed Nuthatch populations. Harvest of softwood sawtimber from within the range of the Brown-headed Nuthatch has increased from 11,881 million board feet in 1952 to 18,938 million board feet in 1976 (USDA Forest Service 1982). With the probable intensification of timber management in the future, a better understanding of habitat requirements of this species within mature pine forests is needed.

This paper compares foraging habitat selected by Brown-headed Nuthatches with randomly selected habitat from pole and sawtimber pine stands. Nesting habitat was also examined.

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Methods

Study Area

The study area lies within the Pine Woods Region of Texas, a major timber-producing area (Chambers 1946). Forested areas within a 105-km radius of Nacogdoches, Texas were searched. The landscape varies from level to gently rolling with well drained sandy soils. Longleaf pine, loblolly pine (*P. taeda*), and shortleaf pine (*P. echinata*) are native to the area. Slash pine (*P. elliottii*) has been successfully introduced and can be found throughout the region. Virtually all timber is second-growth.

Field Measurements and Definitions

Habitat measurements were made on two categories of plots: occupied and random. Plots where Brown-headed Nuthatches were observed foraging are referred to as occupied. Plots randomly selected within specified forest types are referred to as random. The purpose of random sampling was to investigate habitat that apparently fit the traditional description of Brown-headed Nuthatch foraging habitat and was accessible to the nuthatches, but was not necessarily selected by them. Therefore, random plots should indicate what was available to the birds, with occupied plots representing what the birds had specifically selected. Comparison of occupied and random plots could indicate differences between these stands and aid in understanding foraging habitat of the Brown-headed Nuthatch.

Study plots were selected and sampled between 1 March 1983 and 30 June 1983, the breeding season of Brown-headed Nuthatches, a season when the nuthatches forage independently of the mixed flocks (Morse 1970).

Study plots were selected only from stands classified as pole or saw timber pine on the Angelina National Forest (USDA For. Serv. 1981). These stands provided suitable habitat for the nuthatches but allowed for a spectrum of different forest stand types to be selected for measurements. Occupied plots also were located in areas outside the national forest where observations of Brown-headed Nuthatches had been reported.

The tree in which the bird was initially observed foraging was used as the plot center of occupied plots. In foraging plots, after a minimum observation period of 5 minutes, another plot was selected. This minimum length of time allowed the bird to move through several trees and "select" a new foraging site for an occupied plot. Only 3 plots per bird or stand were measured each day. This 3 plot limit and 5 minute time period should minimize any potential violation of independence in sampling.

Random plots were located by pacing a randomly determined distance into a preselected forest stand. In the 33 random plots, a dominant or codominant tree was randomly selected as plot center.

Habitat measurements were taken in $\frac{1}{25}$ ha plots (11.2 m radius) to describe the vegetation on both occupied and randomly selected plots. The species, bark thickness, and dbh of plot center tree and two dominant or codominant trees were measured. Total tree height and height to the base of live crown were measured with a Suunto clinometer and age was determined from increment borings of the 3 trees. Crown weight was calculated from published aboveground biomass equations for predicting total crown weight as a function of dbh and total height (Taras and Clark 1975; Clark and Taras 1976; Taras and Clark 1977; Taras and Phillips 1978; Clark et al. 1980). Percent canopy closure of the midstory and overstory were estimated with a modified abney level with an attached mirror angled to reflect vertically.

Basal area and density of overstory and midstory of pines, hardwoods, and snags 6 cm diameter at breast height (dbh) or larger were measured. Basal area was measured with a 1 factor metric prism. Classification of snags as overstory or midstory was based on height of the snag in relation to height of the overstory or midstory.

Measurements were made on nest trees encountered during the study. Specific information about the cavity site was recorded, and the habitat measurements of the foraging plots were taken where possible. Age and species could not always be determined when the nest snag was very decayed. When the nest tree was in water, total height was recorded from water level to the top of the tree.

Statistical Analysis

Thirty-four variables were considered for use in the comparing the stand characteristics of occupied and random plots. Principal factor analyses (PFA) with a variety of rotations and intercorrelations of the 34 variables were examined to select the best subset of variables to further analyze nuthatch habitat data. Thirteen variables were used in the final comparisons (Table 1). Comparison of occupied versus random plots was done with univariate one-way analysis of variance (ANOVA), and Kruskal-Wallis one-way ANOVA to compare individual variables for parametric and nonparametric data, respectively. Stepwise discriminant function analysis (DFA) was used to differentiate between occupied and random areas (Nie et al. 1975; Hull and Nie 1981). Prior probabilities were adjusted for unequal group sample size (occupied N = 62, random N = 33).

Results and Discussion

Comparison of Occupied and Random Plots

Forest stand structure differed statistically between areas selected by Brown-headed Nuthatches and similar randomly selected areas. Nine variables were significantly lower in foraging habitat than in random plots (Table 1). Overall, the occupied plots tended to have lower basal area and be more open than random plots.

Results of the DFA reinforce the results of the univariate analysis. Using DFA, four variables entered the stepwise analysis and habitat was correctly classified in 89.5% of the cases ($p < 0.001$). Basal areas of the hardwood midstory (BHMS) and the pine overstory (BPOS) had the highest magnitudes of the standardized coefficients and therefore were the two most important variables used to separate the groups in the analysis (Table 1). Both of these variables have lower average values for the occupied plots, suggesting that occupied plots are distinguished from random plots by having less hardwood midstory and less basal area of overstory pine.

Correlations of the original variables to the discriminant function indicate that canopy closure and average canopy width may also be influential in biologically distinguishing between groups (Table 1). These correlations indicate that Brown-

Table 1. Habitat variables used in the analysis of Brown-headed Nuthatch foraging habitat in eastern Texas.

Variable	Code	Occupied[a] $\bar{x}^{b} \pm$ S.D.	Random $\bar{x} \pm$ S.D.	Standardized coefficient[c]	Correlation to the discriminant function
Bark thickness (cm)	BRKT	1.86 ± 0.6	2.13 ± 0.7*		−0.028
Basal area of pine overstory (m^2/ha)	BPOS	11.94 ± 5.4	14.41 ± 4.9*	0.790	0.196
Basal area of pine midstory (m^2/ha)	BPMS	3.10 ± 3.3	3.32 ± 3.1		−0.140
Basal area of hardwood overstory (m^2/ha)	BHOS	0.31 ± 0.6	1.88 ± 2.5**	0.373	0.421
Basal area of hardwood midstory (m^2/ha)	BHMS	1.09 ± 2.3	6.29 ± 3.6**	1.007	0.776
Basal area of snag overstory (m^2/ha)	BSOS	0.18 ± 0.4	0.15 ± 0.4		−0.060
Basal area of snag midstory (m^2/ha)	BSMS	0.37 ± 0.7	0.94 ± 1.2*		0.124
Average height of trees (m)	ATHT	23.45 ± 4.0	25.07 ± 3.8	−0.546	0.172
Average height to canopy layer (m)	ACHT	14.95 ± 4.8	17.38 ± 3.1*		0.170
Average age of the stand (yr)	AAGE	46.39 ± 15.3	50.02 ± 14.7		0.229
Average DBH of the stand (cm)	ADBH	38.00 ± 5.3	41.66 ± 7.2**		0.192
Average crown weight (kg)	ACWT	268.30 ± 95.4	352.51 ± 191.7**		0.268
Canopy closure (%)	CANCL	31.17 ± 18.9	55.38 ± 17.9**		0.416

[a] N = 62 occupied 33 random.

[b] Asterisks denote differences (* $P < 0.05$, ** < 0.01) between occupied and random sites. Kruskal-Wallis test used for all basal areas except BPOS, ANOVA used for all other variables.

[c] Only 4 variables entered the DF equation.

headed Nuthatches selected more open habitat with less hardwood basal area and canopy closure than what was available at random. The discriminant equation generated for use in predicting habitat suitability for Brown-headed Nuthatches within the specified forest types was:

$$d = 0.175 + 0.359(\text{BHMS}) + 0.150(\text{BPOS}) + 0.238(\text{BHOS}) - 0.139(\text{ATHT}).$$

Values of the field measurements of the four variables from habitat to be evaluated are multiplied by the proper coefficient, and the constant added, yielding the discriminant score, d. The score generated is compared to the group centroids, or the multivariate averages for occupied (−0.829) and random (1.558) plots. If the calculated d value is less than the midpoint between the group centroids (0.364), that value would be closer to the group centroid for occupied plots, thus classifying the habitat as favorable for Brown-headed Nuthatches (Klecka 1980). If the d value is greater than the midpoint value, the habitat being evaluated might not be high quality habitat for the nuthatch.

The primary differences between occupied and random stands cannot be based on any one variable; it is the stand structure that is important to Brown-headed Nuthatches. The stands used by nuthatches were slightly younger (46.4 yrs) than the random stands (50.0 yrs), but this does not indicate that young pine stands (<35 yrs) would provide suitable foraging habitat. We evaluated only older forest stands in the study. Had younger stands been included, we believe that the observed age difference in occupied and random plots would not have been present. The type of stand structure of the occupied plots would be more typical of a managed mature pine stand that was burned periodically to retard or prohibit the growth of hardwoods.

The conclusions from this study are in general agreement with other published data on Brown-headed Nuthatches. Meyers and Johnson (1978) studied bird communities and succession of pine forests and found Brown-headed Nuthatches in pine stands aged 35–45+ yrs, with highest densities of Brown-headed Nuthatches recorded in the mature pine stands greater than 45 yrs. Morse (1970) studied foraging flocks of birds in three areas that had varying ratios of pines to hardwoods. He found Brown-headed Nuthatches commonly in the longleaf pine area, rarely in the mixed area and had no observations of Brown-headed Nuthatches in the deciduous area. Dickson et al. (1980) listed Brown-headed Nuthatches as occurring regularly during the breeding season in mature pine stands, absent in mature hardwood stands, and present in young and intermediate pine stands. The presence of Brown-headed Nuthatches in regenerating young stands may be due to the occurrence of snags suitable for nesting or roosting. Dickson and Segelquist (1979a) and Conner et al. (1983) reported that, during the breeding season, Brown-headed Nuthatches preferred pole size pine stands that contained fewer hardwoods than older stands. In a winter study, Dickson and Segelquist (1979b) reported higher densities of Brown-headed Nuthatches in pine sawtimber than in pole stage pine. In general, these studies showed that Brown-headed Nuthatches selected older pure pine stands.

Nest Sites

Seven nest sites were located and measurements were taken. Cavities were excavated in very decayed, broken top snags with the bark missing on the upper portion of the snag. Cavities were located in both pine and hardwood snags. Fungal conks were present on 5 of the 7 snags. Total height of the nest snags averaged 3.1 m (range, 1.4–7.9 m), nest heights averaged 2.4 m (range, 0.75–7.6 m), and nest snags averaged 25.6 cm dbh (range, 16.4–43.8 cm). Nest sites were in open areas; canopy closure averaged 15.0% (ranges, 0.0–57.5%) and basal area of the overstory averaged 5.6 m^2/ha (range, 0.0–17.5 m^2/ha). Basal area of midstory trees was also very low ($\bar{x}$ = 1.14 m^2/ha, range 0.0–4.0 m^2/ha). Three of the nest sites were located in snags standing in water along lake edges outside of foraging habitat. The remaining 4 snags were on the edge of the forest or near small open areas within the forest stand. Four of the 7 nest sites were down by the 1984 nesting season, and the 3 still standing were unusable by Brown-headed Nuthatches due to woodpecker foraging activity at these sites.

Although forest structure was important in determining suitability of nuthatch foraging habitat, structure may play only a small role in nest site selection. Snags are produced through many mechanisms: lightning, insects, disease, fire, competition among trees, and human activities. Thus forest structures around nest sites may be nearly independent of nest site suitability. The fact that three nest sites were located on the edges of lakes in snags surrounded by water tends to support this idea. Even wooden fence posts outside of foraging areas have been used by Brown-headed Nuthatches as nest sites (Norris 1958; Morris 1982). Since nuthatches do nest outside their foraging habitat there may be a paucity of suitable nest sites within the foraging habitat.

Management Considerations

Forest management practices that would benefit the Brown-headed Nuthatch include: hardwood control, limiting pine density, sawtimber rotations, and snag retention. Frequent burning could preclude development of a hardwood midstory. Relatively low pine basal area could be maintained through planting spacing, thinnings, and harvest cuts. Rotation ages of stands must be long enough to provide suitable habitat because the Brown-headed Nuthatch uses older stands. Stands managed for mature pine sawtimber could provide foraging habitat for the Brown-headed Nuthatch if they are adequately thinned. Stands managed for the Red-cockaded Woodpecker (*Picoides borealis*) should also benefit Brown-headed Nuthatches since that woodpecker prefers open mature pine stands (Hooper et al. 1979). Snags should be left for nesting sites, since Brown-headed Nuthatches require snags for nestings. If snag density is low within nuthatch foraging habitat, providing snags in surrounding stands may be beneficial to Brown-headed Nuthatches.

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An Inventory of Upper Texas Coast Woodlots, Valuable Migratory Bird Habitat

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ABSTRACT.—The few scattered woodlots on the upper Texas coast provide vital stopover habitat for both trans- and circum-Gulf of Mexico migrating birds. Twenty-seven woodlots occur in this area, with concentrations at Sabine Pass, High Island, and the Colorado River delta. Seven vegetative associations were identified with oak motte and hackberry motte being the most important. There were no detectable changes in the size of any woodlots from 1980 to 1986.

Management recommendations for Texas coastal woodlots are presented.

Migratory songbirds, like waterfowl, need migration stopover habitat. In this paper I inventory and describe one group of important migratory song bird stopover areas, the upper Texas coast woodlots and examine the management needs of these areas.

Most long distance migrants must stop to feed enroute (Berthold 1975). Coastal woodlots are used by migrants both as feeding and resting areas, and as emergency shelter during storms. Migrants select suitable habitats in Texas woodlots and set up temporary feeding territories to regain their strength (Rappole and Warner 1976).

This pattern of migrating, feeding, and resting is frequently broken by sudden storms that hit the upper Texas coast and Gulf of Mexico. Birds migrating around the Gulf stop at the nearest protective cover, but birds flying across the Gulf must reach land or perish. In a spring storm, James (1956) recorded the death of at least 10,000 warblers at Padre Island. King (1976) found 5,000 dead birds on Galveston Island beaches in May 1974 following a storm. Emaciated birds are regularly found on oil rigs in the Gulf of Mexico (Morse 1980; Pulich and Dellinger 1980).

During a spring storm, coastal woodlots are a haven for thousands of birds, a "fall-out." If these woodlots were unavailable for use as spring migration emergency stopping points, there could be a noticeable reduction in breeding bird populations throughout the mid-western United States and central Canada (Hamilton and Noble 1975). The importance of upper Texas coast woodlots to fall migrants is not clearly understood. Certainly bird use of the woodlots is substantial during that period, but there is no spectacular buildup similar to the spring fall-outs.

Methods

The study area extends approximately 310 km along the upper Texas coast from Sabine Pass to Cedar Bayou on Matagorda Island and includes all areas adjacent to or gulfward of the Gulf Intracoastal Waterway (Fig. 1). All woodlots at least 0.5 ha in size with trees over 6 m tall are included. Several areas with shrubs under 6 m (brush-mottes) are also discussed, but the inventory of those areas is not complete.

Using 1979 1:65,000 scale and 1975 1:40,000 scale color infrared aerial photographs, the woodlots were located, mapped, and measured with a compensating polar planimeter. Aerial measurements are given only to the nearest 0.5 ha because of the small scale of the photography used and difficulties in defining exact edges of the woodlots. Shrub fringes and irregular shapes frequently make exact boundaries a matter of judgement.

In 1980 each woodlot was visited at least once during spring migration and most during fall migration. Vegetative composition was determined by qualitative observations and understory density estimated based on the prevailing sight distance. Dense represents a sight distance of <4 m, moderate a sight distance >4 m but <15 m, and sparse a sight distance of >15 m. Heights of the tallest trees were measured using an optical reading clinometer. The entire study area was observed from a light airplane in 1980 and again in 1986, in an effort to detect any changes.

Results

Twenty-seven woodlots were identified in the study area (Fig. 1 and Table 1). In addition, many brush-mottes, with woody vegetation less than 6 m high, were found (Table 2), but since this study concentrated on the woodlots, not all brush-mottes were located. Numerous hedge rows and small patches of woody vegetation also used by migrants are not identified in this study.

Woodlots are grouped closely together near Sabine Pass, at High Island, and the Colorado River delta (Fig. 1). Bolivar Peninsula and Galveston Island each have several scattered woodlots. There are no woodlots in the study area west of the Colorado River delta; however, there are 10 cedar brush-mottes on Matagorda Peninsula and one, the Lighthouse Brush-motte, on Matagorda Island. Other brush-mottes are scattered throughout the study area with concentrations on west Galveston Island, Follets Island, and at the Colorado River delta.

Just inland from the study area there are sizable wooded areas at Freeport and along the Colorado River. Although not investigated during this study, it is likely that these areas also receive substantial migrant bird use.

Seven vegetative associations were identified (Table 3). The oak, elm, and pecan associations occur only in woodlots, while the mesquite and cedar associations occur only in the brush-mottes. The hackberry and tallow associations are found in both the woodlots and brush-mottes. In general, the larger trees of the woodlots allow the development of a more diverse understory and have more habitat diversity than the smaller brush-mottes. The presence or absence of livestock grazing appears to be the most important determinant of understory density and diversity.

The vegetation (Table 3) in most of the woodlots and brush-mottes shows the influence of man's horticultural activities. Several woodlots are existing or abandoned home sites with extensive native and exotic plantings. Both of the pecan groves (Table 1) are the result of commercial operations.

There were no detectable changes in the size of any woodlots between the 1980 and 1986 inventories. Only one of the brush-mottes listed in Table 2, BM-U2,

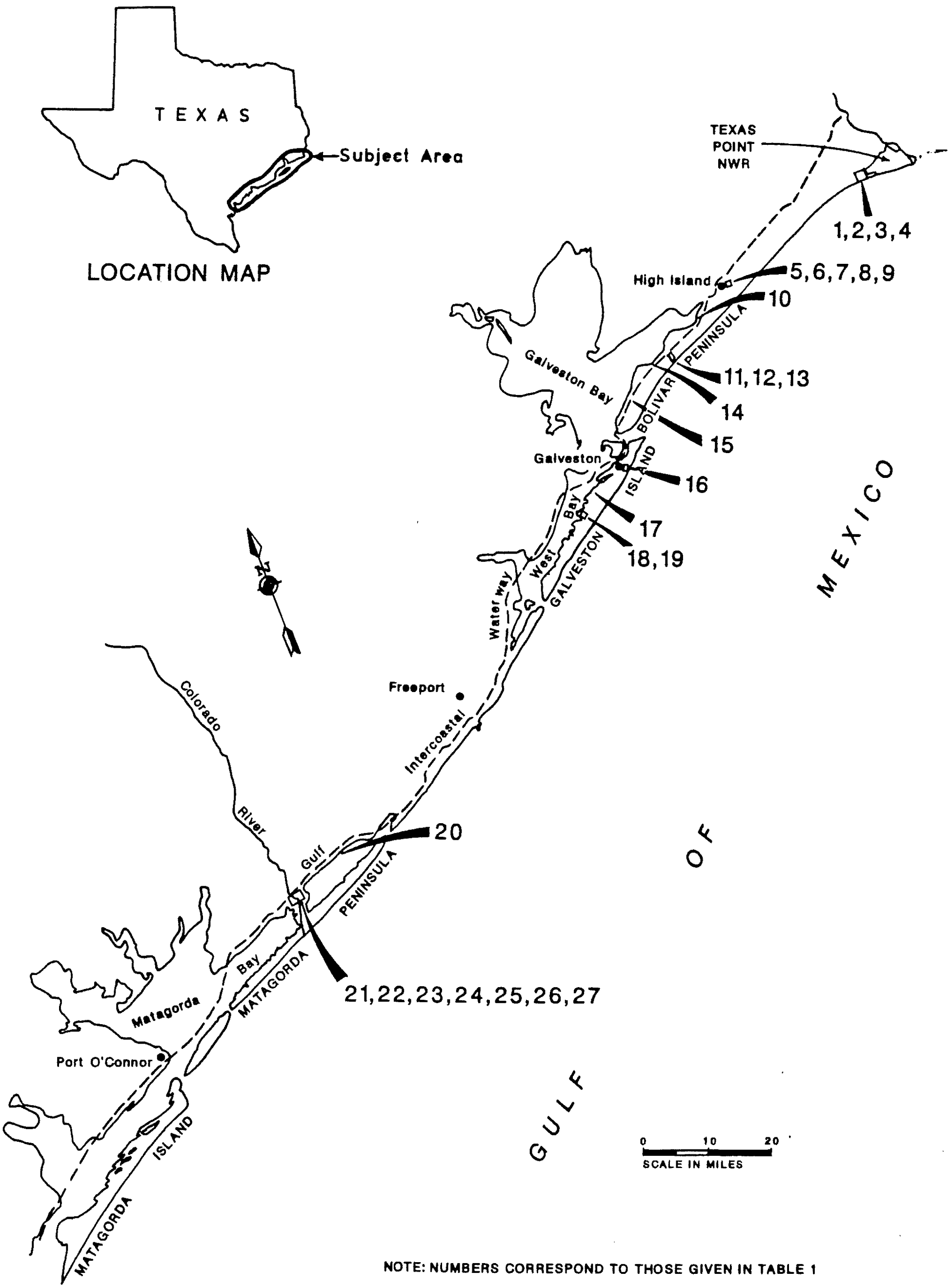

Fig. 1. Woodlots of the upper Texas coast.

Table 1. Characteristics of woodlots on the upper Texas coast.

Location number	Name	Size (ha)	Vegetative association	Max. tree height (M)	Understory density
1[1]	Refuge Woods	1.5	Hackberry Motte	11	sparse–dense
2	Commercial Grove	1.0	Pecan Grove	14	sparse
3	Helicopter Woods	1.0	Pecan Grove	12	dense
4	Sabine Woods	1.0	Oak Motte	16	moderate
5	Louis Smith Bird Sanctuary	5.5	Hackberry Motte	15	dense
6	High Island House	3.0	Oak Motte	10	dense
7	High Island Center	5.0	Tallow Motte	6	moderate
8	High Island West	7.0	Tallow Motte	8	moderate
9	Smith Oaks	8.0	Oak Motte	20	dense
10	Sun Oil Motte	1.0	Hackberry Motte	8	sparse
11	W-U1[2]	4.0	Hackberry Motte	11	sparse–moderate
12	W-U2	1.0	Hackberry Motte	8	dense
13	W-U3	3.0	Hackberry Motte	6	dense
14	Elm Grove	7.0	Elm Motte	8	moderate
15	Johnson's House	0.5	Oak Motte	15	moderate
16	East Urban Galveston	34.5	Oak Motte	15	sparse–moderate
17	Moody Ranch	1.0	Oak Motte	14	sparse
18	Kite Woods	1.0	Oak Motte	10	sparse
19	Live Oak Grove	8.0	Oak Motte	12	dense–sparse
20	Texasgulf	1.0	Hackberry Motte	13	sparse
21	W-U4	20.0	Hackberry Motte	12	moderate
22	W-U5	4.0	Hackberry Motte	12	dense
23	Lock Woods	4.0	Hackberry Motte	12	dense
24	Town Woods	3.0	Hackberry Motte	14	dense
25	W-U6	15.0	Hackberry Motte	12	sparse
26	W-U7	10.0	Hackberry Motte	11	moderate
27	W-U8	6.0	Hackberry Motte	8	dense

[1] Numbers correspond to locations given on Figure 1.
[2] W-U = woodlot—unnamed.

was reduced in size. In 1980, this area was 5.0 ha in size, but by 1986 3.0 ha had been cleared for an unknown purpose.

Discussion and Management Recommendations

Over the six years of this study, there were no losses of upper Texas coastal woodlots; however, some may be lost in the near future. Texasgulf and Live Oak Grove are threatened by planned industrial and residential developments. Frequently, portions of East Urban Galveston are cleared to meet development needs.

Table 2. Characteristics of selected brush-mottes on the upper Texas coast.

Name	Size (ha)	Vegetative association	Location
BM-U1[1]	1.0	Cedar Brush-motte	Bolivar Peninsula
BM-U2	2.0	Mesquite Brush-motte	Colorado River delta
BM-U3	4.0	Mesquite Brush-motte	Colorado River delta
BM-U4	44.5	Mesquite Brush-motte	Colorado River delta
Port O'Conner	10.0	Mesquite Brush-motte	Port O'Conner
Lighthouse	1.0	Cedar Brush-motte	Matagorda Island

[1] BM-U = brush-motte—unnamed.

Table 3. Common plants found in upper Texas coast woodlots and brush-mottes (nomenclature follows Scott and Wasser [1980] and Correll and Johnston [1970]).

Species	Vegetative association						
	Oak	Hackberry	Elm	Pecan	Mesquite	Cedar	Tallow
St. Augustine grass (*Stenotaphrum secundatum*)	CG	CG		X			
Common Bermuda grass (*Cynodon dactylon*)	CG	CG		CG			CG
Coast sandbur (*Cenchrus incertus*)	CG	CG				X	X
Dwarf palmetto (*Sabal minor*)	X		CU				
Greenbrier (*Smilax* spp.)	CU	CU		X			
Pecan hickory (*Carya illinoensis*)	X	X		CO			
Common live oak (*Quercus virginiana*)	CO	X		X	X		X
Sugar hackberry (*Celtis laevigata*)	X	CO-C	X	X	X		
Cedar elm (*Ulmus crassifolia*)			CO				
Red mulberry (*Morus rubra*)	X	X					
Blackberry (*Rubus* spp.)	X	X					
Honey mesquite (*Prosopis glandulosa*)		X			C		
Black locust (*Robinia pseudoacacia*)		X		CO			
Vetch (*Vicia* spp.)		X		CG			
Lime prickly ash (*Zanthoxylum fagara*)	X	X	X		X		X
Common tallow tree (*Sapium sebiferum*)	X	X		X			CO-C
Common poison-ivy (*Toxicodendron radicans*)	CU	CU	X	X			
Yaupon holly (*Ilex vomitoria*)	CU	CU					
Jaboncillo (*Sapindus saponaria*)		X					
Mustang grape (*Vitis mustangensis*)	CU	CU	X	X			X
French tamarisk (*Tamarix gallica*)	X	X				C	
Ash (*Fraxinus* spp.)	X	CO					
Common oleander (*Nerium oleander*)	CU	X					
Japanese honeysuckle (*Lonicera japonica*)	CU	CU		CU			X
American elder (*Sambucus canadensis*)	CU	CU		X			
Groundsel baccharis (*Baccharis halimifolia*)		X	X				

X—Present.
CG—Common ground cover species in at least one woodlot.
CU—Common understory species in at least one woodlot.
CO—Common overstory species in at least one woodlot.
C—Most common woody species in at least one brush-motte.

Four woodlots (W-U5, W-U6, W-U7, and W-U8) are in Corps of Engineers designated dredged spoil disposal areas. If spoil disposal unavoidably destroys these woodlots, they should be replaced by managed plantings at suitable coastal locations.

There are several state, county, and city parks and national wildlife refuges on the upper Texas coast. Some of these, especially the state parks and national wildlife refuges, would be suitable for the establishment of woodlots designed for migrant bird use. Planted woodlots would be especially valuable in the southern part of the study area where there are no existing woodlots.

Existing woodlots could be bought or management easements obtained by public agencies or private organizations to assure their continued value as migratory bird habitat. Refuge Woods is already partially on Texas Point National Wildlife Refuge with the remaining portion and Sabine Woods logical additions to that refuge. The U.S. Fish and Wildlife Service has identified Smith Oaks (Smith Woods) as a unique ecosystem (Fish and Wildlife Service 1979) and the Houston Audubon Society recently obtained the Louis Smith Bird Sanctuary and a partial interest in Smith Oaks.

With adequate protection from over-grazing and cutting, some brush-mottes have the potential to develop into woodlots. Some of the mesquite brush-mottes with good numbers of common live oaks and sugar hackberries will likely succeed into oak or hackberry mottes. However, most mesquite brush-mottes are heavily grazed and, therefore, will remain in a brush stage of succession.

Several factors could be important in determining the value of a woodlot to migrant birds: size (Martin 1980; Graber and Graber 1983; Blake 1986), structural vegetative diversity (Martin 1980), tree height, isolation from other woodlots (Martin 1980), freshwater availability, and others. Habitat suitability is important to those species using woodlots for extended feeding, but availability and ease of identification by trans-Gulf migrants are probably the most important woodlot characteristics during a spring storm. Identification of the important factors is a subject worthy of quantitative research.

While the woodlots provide valuable habitat for the traditionally undermanaged migrant songbirds, they also are popular recreation areas for birdwatchers. Any upper Texas coast refuge or park would greatly increase its visitation rate by allowing public access to a newly established or existing coastal woodlot. Bird watchers already provide a significant income to the local economy of several coastal areas, and this could be greatly increased through concerted efforts to manage for woodlots and brush-mottes.

Acknowledgments

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Habitat Selection By Spring Migrants In A Texas Coastal Woodlot

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ABSTRACT.—Spring migrants in a Galveston Island, Texas coastal woodlot made greater use of the portion with larger trees and a denser understory. The greater vegetative height diversity likely provided greater food availability, a larger number of feeding niches, and greater protection from storms.

Texas coastal woodlots are heavily used by migrant birds. During storms, especially in the spring, the woodlots provide cover for trans-Gulf of Mexico migrants (Feltner 1980). Under calmer weather conditions, the woodlots provide feeding habitat that allows migrants to regain their strength (Rappole and Warner 1976). Both cover value and food abundance are likely related to vegetative diversity and density. This paper examines spring migrant use of a Texas coastal woodlot in relation to vegetative diversity and density.

Methods

The study area is Live Oak Grove on west Galveston Island, Texas (Fig. 1). Live Oak Grove is an 8.0 ha oak motte with two contiguous but distinct vegetative types, herein referred to as large woods and small woods. Qualitative observations were made of the vegetative composition. Understory density was estimated based on the prevailing sight distance. "Dense" represents a sight distance of <4 m, "moderate" a sight distance >4 m but <15 m, and "sparse" a sight distance of >15 m. Tree heights were measured using an optical reading clinometer.

A 556 m transect was established through the large (344 m) and small woods (212 m). The transect was walked 20 times during the spring migration periods (March 20 to May 27) from 1979 to 1984. The species, number, and location of all birds seen or heard were recorded.

To compensate for the greater transect length in the large woods, both the number of species and the number of birds in the small woods were multiplied by 1.6 (344/212). Frequency (=number of censuses on which a species was observed) was not adjusted. In an effort to limit the study to migrant use of the woodlot, only observations from transient species and from summer and winter resident species that are most common during migration (Mueller 1981) were used. After adjustment, the number of species and the number of birds were analysed for differences using the paired t-test (Snedecor and Cochran 1967).

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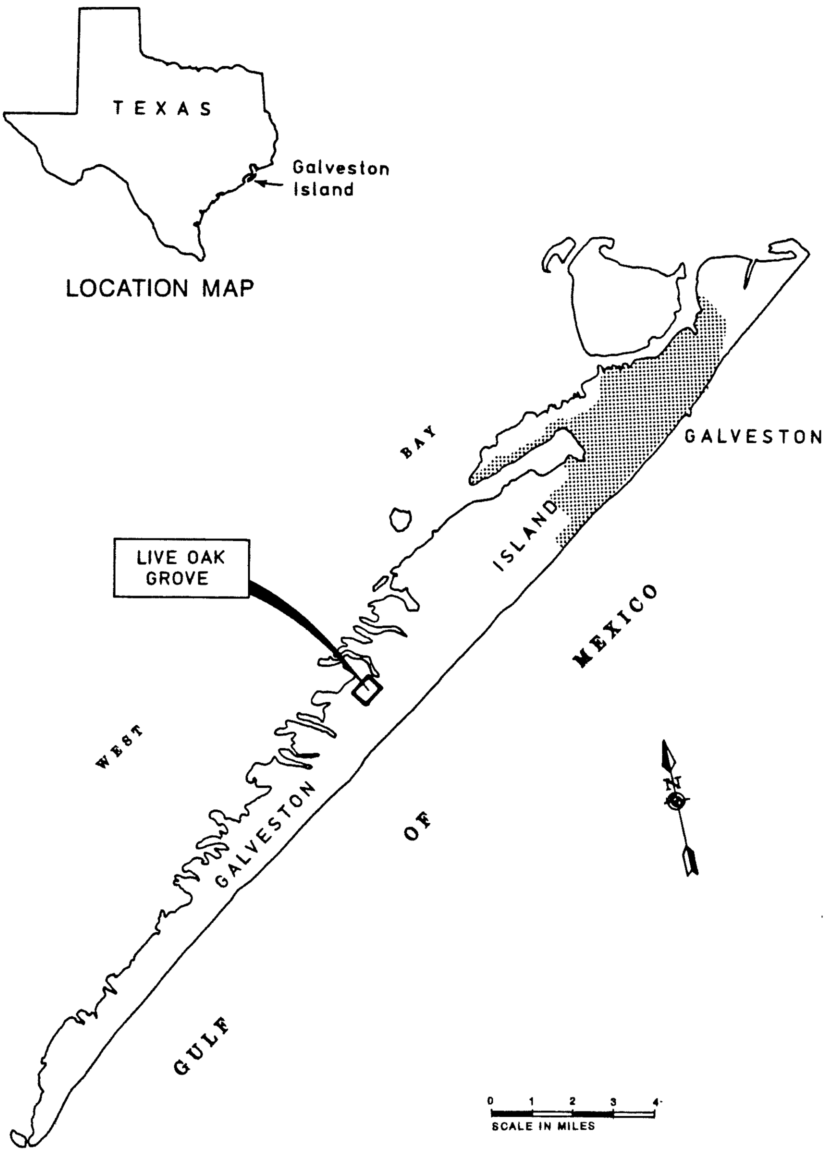

Fig. 1. Location of Live Oak Grove.

Results

Similar plant species occur in the large and the small woods (Table 1). The tallest trees in the large woods were about 12 m and many trees were greater than 10 m high. In the small woods, the tallest trees were 7 m with most less than 5 m high. The large woods had a dense understory, whereas the small woods, which were more heavily grazed, had a sparse understory.

We recorded 62 migrant species in the large woods and 40 species in the small woods (Table 2). All species found in the small woods were also recorded in the large woods. Only the Chestnut-sided Warbler (*Dendroica pensylvanica*) occurred

Table 1. The primary species of vegetation occurring in both the large and small woods, Live Oak Grove.

Overstory
Common live oak (*Quercus virginiana*)
Sugar hackberry (*Celtis laevigata*)
Red mulberry (*Morus rubra*)
Lime prickly ash (*Zanthoxylum fagara*)
Common tallow tree (*Sapium sebiferum*)
Understory
Greenbrier (*Smilax* spp.)
Common poison-ivy (*Toxicodendron radicans*)
Yaupon holly (*Ilex vomitoria*)
Mustang grape (*Vitis mustangensis*)
French tamarisk (*Tamarix gallica*)
Common oleander (*Nerium oleander*)
Japanese honeysuckle (*Lonicera japonica*)
Wooly bucket bumelia (*Bumelia lanuginosa*)
Ground Cover
St. Augustine grass (*Stenotaphrum secundatum*)
Common Bermuda grass (*Cynodon dactylon*)
Coast sandbur (*Cenchrus incertus*)
Blackberry (*Rubus* spp.)

more frequently in the small woods than in the large woods. The large woods averaged 13.8 species per census, while the small woods averaged 5.5 (8.8 adjusted). This difference is highly significant ($t = 3.59$, $p \leq .005$).

The small woods averaged only 17.8 (28.5 adjusted) individual birds per census. In seven of the 20 censuses, no birds were recorded in the small woods. The large woods averaged 64.1 individuals per census, with 3 the fewest and 285 the greatest number. Again, this difference is highly significant ($t = 3.81$, $p < .005$).

Discussion

In general, migrants select the available niche closest to that used during the rest of the year (Hamilton and Noble 1975; Parnell 1969; Power 1971). Niche availability is most important to those species establishing temporary feeding territories (Rappole and Warner 1976). Forsyth and James (1971) and Gauthreaux (1972) report indications of selection between Gulf coastal woodlots based on habitat differences, even under storm conditions, when the birds would seemingly be less selective. Martin (1980) found in South Dakota woodlots, that while woodlot size was the most important determinant of migrant abundance, food availability was also important.

In Live Oak Grove, factors that could govern migrant use such as areal size, weather, detectability of the woodlot, freshwater availability, and isolation from other woodlots are constant for both the large and small woods. These factors could influence a bird's selection of Live Oak Grove, but once in Live Oak Grove, habitat considerations should govern the bird's location within the woodlot.

Food availability is an important characteristic of migration stopover habitats (Rappole and Warner 1976; Martin 1980; Graber and Graber 1983). The large woods had larger trees and a much more dense understory. Logically, this would result in greater food availability. Red mulberries (*Morus rubra*), which have ripe

Table 2. Migrant species recorded on Live Oak Grove during this study, March 20–May 27, 1979–1984.

Species	Frequency[1]	
	Large woods	Small woods[2]
American Swallow-tailed Kite (*Elanoides forficatus*)	1	
Sharp-shinned Hawk (*Accipiter striatus*)	2	1
Cooper's Hawk (*A. cooperi*)	1	
Broad-winged Hawk (*Buteo platypterus*)	2	
Black-billed Cuckoo (*Coccyzus erythropthalmus*)	2	
Yellow-billed Cuckoo—SR[3] (*C. americanus*)	7	1
Lesser Nighthawk (*Chordeiles acutipennis*)	2	
Chuck-will's-widow (*Caprimulgus carolinensis*)	2	
Ruby-throated Hummingbird (*Archilochus colubris*)	11	3
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	2	
Yellow-bellied Sapsucker—WR[3] (*Sphyrapicus varius*)	4	1
Northern Flicker—WR (*Colaptes auratus*)	1	
Eastern Wood-pewee (*Contopus virens*)	7	1
Empidonax sp.	4	1
Great Crested Flycatcher (*Myiarchus crinitus*)	2	
Western Kingbird (*Tyrannus verticalis*)	1	
Eastern Kingbird—SR (*T. tyrannus*)	5	1
House Wren—WR (*Troglodytes aedon*)	1	
Blue-gray Gnatcatcher—WR (*Polioptila caerulea*)	7	5
Veery (*Catharus fuscescens*)	3	1
Gray-cheeked Thrush (*C. minimus*)	4	3
Swainson's Thrush (*C. ustulatus*)	8	3
Wood Thrush (*Hylocichla mustelina*)	7	3
Gray Catbird—WR (*Dumetella carolinensis*)	11	7
White-eyed Vireo (*Vireo griseus*)	11	5
Yellow-throated Vireo (*V. flavifrons*)	5	2
Warbling Vireo (*V. gilvus*)	2	1
Philadelphia Vireo (*V. philadelphicus*)	5	3
Red-eyed Vireo (*V. olivaceus*)	6	5
Blue-winged Warbler (*Vermivora pinus*)	6	1
"Brewster's Warbler"[4]	2	
Golden-winged Warbler (*V. chrysoptera*)	3	2
Tennessee Warbler (*V. peregrina*)	5	3
Nashville Warbler (*V. ruficapilla*)	2	1
Northern Parula (*Parula americana*)	3	
Yellow Warbler (*Dendroica petechia*)	2	
Chestnut-sided Warbler (*D. pensylvanica*)	2	4
Magnolia Warbler (*D. magnolia*)	6	4
Black-throated Green Warbler (*D. virens*)	4	1
Blackburnian Warbler (*D. fusca*)	4	2
Yellow-throated Warbler (*D. dominica*)	1	
Bay-breasted Warbler (*D. castanea*)	5	4
Blackpoll Warbler (*D. striata*)	2	1
Black-and-white Warbler—SR (*Mniotilta varia*)	14	5
American Redstart (*Setophaga ruticilla*)	5	5
Prothonotary Warbler (*Protonotaria citrea*)	1	
Worm-eating Warbler (*Helmitheros vermivorus*)	3	
Ovenbird (*Seiurus aurocapillus*)	5	4
Northern Waterthrush (*S. noveboracensis*)	2	
Kentucky Warbler (*Oporornis formosus*)	1	1
Common Yellowthroat—WR (*Geothlypis trichas*)	6	
Hooded Warbler (*Wilsonia citrina*)	10	4
Wilson's Warbler—WR (*Wilsonia pusilla*)	1	
Canada Warbler (*W. canadensis*)	1	1
Summer Tanager (*Piranga rubra*)	9	3
Scarlet Tanager (*P. olivacea*)	5	5
Western Tanager (*P. ludoviciana*)	1	

Table 2. Continued.

Species	Frequency[1]	
	Large woods	Small woods[2]
Rose-breasted Grosbeak (*Pheucticus ludovicianus*)	10	5
Blue Grosbeak (*Guiraca caerulea*)	2	2
Indigo Bunting (*Passerina cyanea*)	12	3
Dickcissel (*Spiza americana*)	1	
Bobolink (*Dolichonyx oryzivorus*)	1	
Orchard Oriole—SR (*Icterus spurius*)	6	
Northern Oriole (*I. galbula*)	8	3

[1] Based on a total of 20 censuses.
[2] Frequency is not adjusted for the shorter transect length in the small woods.
[3] SR—summer resident, WR—winter resident. Although these species are not exclusively transients, they are clearly more common during migration.
[4] This was not treated as a separate species in the statistical analyses.

fruit during the spring migration period, attract large numbers of migrants. However, both the large and small woods had several of these trees, so we do not think that this one major food source affected the difference in bird use.

The increased vegetative height diversity of the large woods also provided more feeding niches than did the small woods. For instance, the large amount of limb and bark area on taller trees, especially the common live oak (*Quercus virginiana*), is of special benefit to the bark gleaning birds such as woodpeckers and the Black-and-white Warbler (*Mniotilta varia*).

Within Live Oak Grove, spring migrants clearly preferred the area with the greater vegetative height diversity—taller trees and denser understory. To maximize migrant bird use, coastal woodlots should be managed to achieve a high level of vegetative diversity. Controlling grazing and special efforts to preserve large trees and promote a shade tolerant understory would contribute to that goal.

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SHORT COMMUNICATIONS

Lucy's Warbler Nest in Brewster County, Texas

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The Lucy's Warbler *Vermivora luciae,* has been reported as a breeding bird in the Trans-Pecos region of Texas (Oberholser 1974; Gallucci 1979). Fledglings were seen by Peter Scott (pers. comm.) in 1986. I report here the discovery of a Lucy's Warbler nest in Big Bend National Park, Brewster County.

On the morning of 1 May 1987 I drove to the Cottonwood Campground area on the west end of Big Bend National Park to conduct field work for the Texas Breeding Bird Atlas. Cottonwood campground is riparian habitat located on the floodplain of the Rio Grande River and supports a large variety of breeding birds. The area is several hectares in size, dominant vegetation consists of mesquite (*Prosopis* sp.), Rio Grande Cottonwood (*Populus fremontii*) and Giant Cane (*Arundiraria gigantea*).

In the course of searching for nesting birds I observed an adult Lucy's Warbler singing and feeding in a mesquite tree. By sitting quietly and watching I saw this adult disappear from view, then reappear quickly. Upon closer examination of the area I flushed an incubating adult off a nest containing three eggs. The nest was located in a cavity between two dead limbs on a mesquite tree. The two limbs formed a crack and a partial hole had been excavated by woodpeckers. Part of the nest was showing outside the cavity. The nest was cuplike and constructed of grasses, several bark fibers from cottonwood trees and black cattle or horsehair lined the cup of the nest. The three eggs were creamy white with reddish brown specks scattered over the entire surface with heavier concentration at the larger end. The nest was approximately five and a half feet from ground level.

Although fledgling Lucy's Warblers have been reported from the Trans-Pecos region, this is the first reported discovery of an active nest.

Literature Cited

Oberholser, H. C. 1974. The bird life of Texas (E. G. Kincaid, ed.). Univ. Texas Press, Austin, TX, p. 729–730.

Gallucci, Tony. 1979. Successful breeding of Lucy's Warbler in Texas. Bull. Texas Ornith. Soc. 12(2):37–41.

Combined Feeding Groups of Bonaparte's Gulls, Lesser Scaup and Bufflehead

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On 21 January 1988 Dr. A. W. O'Neil and I sighted a "raft" of mixed dark and light birds floating on the waters of the Laguna Salada at Site 55, a Texas A&I University biological research station in southern Kleberg County. The Laguna Salada is the shallow estuary of Los Olmos Creek; it is generally brackish and forms one arm of Baffin Bay, the largest secondary bay in Kleberg County. We could easily determine with binoculars that the flotilla was composed of ducks and gulls, about 50 birds in all. Observing through telescopes, we identified the gulls as Bonaparte's (*Larus philadelphia*). They made up about half of the total number of birds. About 15 of the ducks were Lesser Scaup (*Aythya affinis*); the remaining 10 or so were Buffleheads (*Bucephala albeola*), mostly female.

The raft was very compact and moved about over the surface of the water as a unit. The birds were obviously feeding, the ducks diving frequently. The gulls not only dipped their heads into the water but also made pecking motions toward the ducks. The ducks sometimes returned the gestures. As neither of us had ever observed the behavior before, we were curious and watched the group for about 20 minutes.

We then moved to another portion of the site, still on the Laguna Salada, and were surprised to find another, virtually identical congregation. The second group not only had the same species composition and essentially the same numbers, but its members were engaged in identical activities.

I subsequently learned from G. W. Blacklock of the Welder Wildlife Foundation that he had once witnessed the same behavior. We had all concluded the birds were following schools of small fish, feeding upon them. Blacklock noted that the gulls feeding alone would have been limited to what they could catch within a few inches of the surface, but by joining the ducks and pilfering part of what they brought up from greater depths, the gulls were able to improve their feeding success. Possibly there was also some advantage to the diving ducks from this arrangement, but, if so, it is not immediately apparent.

Similar exploitation by piscivorous birds of the diving skills of other species was witnessed several times in 1986 by Anthony F. Amos of the University of Texas Marine Science Institute and by others. After the "red tide" phenomenon off Mustang Island had seriously reduced the abundance of some of the fish species normally preyed upon by American White Pelicans (*Pelecanus erythrorhynchos*), the pelicans began to force Double-crested Cormorants (*Phalacrocorax auritus*) to surrender fish they had caught by diving to levels the pelicans could not reach. A number of cormorants were killed in the encounters.

Recent Articles about Texas Birds

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—1986—

Baker, R. H. 1986. Barn owl prey selection: 1938 and 1984. Southwest. Nat. 31(3):401. Pellets collected in Colorado County, Texas in 1938 contained 74.2% insectivorous mammal remains whereas pellets collected in 1984 in the same area contained largely herbivorous mammalian remains. Author speculates that changing agricultural practices produced an environment favoring herbivorous mammals.

Baldassarre, G. A., and E. G. Bolen. 1986. Body weight and aspects of pairing chronology of Green-winged Teal and Northern Pintails wintering on the southern high plains of Texas. Southwest. Nat. 31(3):361–366. Reports winter body weights of 4,155 teal and 380 pintails.

Baldassarre, G. A., R. J. Whyte, and E. G. Bolen. 1986. Body weight and carcass composition of non-breeding Green-winged Teal on the southern high plains of Texas. J. Wildl. Manage. 50(3):420–426. Data suggest that declines in body weights and lipid reserves are an adaptation to, rather than a consequence of, winter conditions.

Bergstrom, P. W. 1986. Daylight incubation sex roles in Wilson's Plover. Condor 88(1):113–115. Found that females have a larger share of nest attentiveness during daylight hours than males. Study was carried out at Aransas NWR and Laguna Atascosa NWR.

Braun, M. J., D. D. Braun, and S. B. Terrill. 1986. Winter records of the Golden-cheeked Warbler (*Dendroica chrysoparia*) from Mexico. Am. Birds 40(3):564–566. Reports 2 winter sight records from the state of Chiapas. There are no previous confirmed winter records north of Guatemala for this Texas breeder.

Carter, M. D. 1986. The parasitic behavior of the Bronzed Cowbird in south Texas. Condor 88(1):11–25. Found that Bronzed Cowbirds commonly parasitized 5 host species at Santa Ana NWR. Like Shiny Cowbirds, females pierce hosts' eggs and previously laid cowbird eggs.

Clapp, R. B. 1986. Great-tailed Grackle kills Barn Swallow in flight. Wilson Bull. 98(4):614–615. Incident occurred on South Padre Island, Texas.

Conner, R. N., M. E. Anderson, and J. G. Dickson. 1986. Relationships among territory size, habitat, song and nesting success of Northern Cardinals. Auk 103(1): 23–31. Data were collected from 30 territories of cardinals in eastern Texas during 3 breeding seasons.

Ehrhart, R. L., and R. N. Conner. 1986. Habitat selection by the Northern Cardinal in three eastern Texas forest stands. Southwest. Nat. 31(2):191–199. Results suggest that cardinals use vegetation in the immediate vicinity of the nest as a proximate factor for nest site selection, however, vegetation in the rest of the bird's territory can vary greatly. This allows cardinals to inhabit a wide range of habitat conditions.

Farias, J. D., and A. G. Canaris. 1986. Gastrointestinal helminths of the Mexican Duck, *Anas platyrhynchos diazi* Ridgway, from north central Mexico and southwestern United States. J. Wildl. Dis. 22(1):51–54. Found 25 species of helminths in 129 ducks; all were new host records.

Flickinger, E. L., C. A. Mitchell, and A. J. Krynitsky. 1986. Dieldrin and endrin residues in Fulvous Whistling-ducks in Texas in 1983. J. Field Ornithol. 57(2): 85–90. Found 7 out of 15 adults collected in spring contained residues of dieldrin; data suggest that these contaminated ducks were exposed to aldrin or dieldrin via illegal treatment of rice seed with aldrin.

Flickinger, E. L., C. A. Mitchell, D. H. White, and E. J. Kolbe. 1986. Bird poisoning from misuse of the carbamate Furadan in a Texas rice field. Wildl. Soc. Bull. 14(1):59–62. Chemical residues in brains and gastrointestinal tracts of a total of 106 dead birds suggest that rice seed was illegally treated with Furadan 4F by rice growers during planting.

Gayou, D. C. 1986. The social system of the Texas Green Jay. Auk 103(3): 540–547. Found that young jays from the Texas population stayed in the natal territory for one year but did not serve as helpers at the next season's nest, unlike Green Jays from South America.

Grzybowski, J. A., R. B. Clapp, and J. T. Marshall, Jr. 1986. History and current population status of the Black-capped Vireo in Oklahoma. Am. Birds 40(5):1151–1161. Contains data on Texas populations of this species.

Heins-Loy, M. 1986. Brood mortality rates of Black-bellied Whistling-ducks in south Texas. J. Field Ornithol. 57(3):233–235. Studied 10 broods with an average of 9.5 ducklings per brood, a loss of about 4 ducklings from an estimated mean clutch of 13.4 eggs/hen.

Heins-Loy, M. 1986. Fall age ratios of the Black-bellied Whistling-duck. Southwest. Nat. 31(1):107–109. Data suggest that each pair of adults successfully raised an average of 6 ducklings in 1981. Study was carried out in the coastal bend and lower Rio Grande valley areas of Texas.

Henny, C. J., and L. J. Blus. 1986. Radiotelemetry locates wintering ground of DDE-contaminated Black-crowned Night-herons. Wildl. Soc. Bull. 14(3):236–241. One bird from the contaminated Ruby Lake, Nevada colony was recovered in Hudspeth County, Texas. Data suggest that contamination occurred in southwestern USA or in the interior of Mexico.

Jackson, J. A. 1986. Biopolitics, management of federal lands, and conservation of the Red-cockaded Woodpecker. Am. Birds 40(5):1162–1168. Summarizes some of this endangered species' unique biology and problems, discusses AOU committee's findings, and provides an update on conservation efforts associated with it.

Koerth, B. H., J. L. Mutz, and J. C. Segers. 1986. Availability of bobwhite foods after burning of Pan American Balsamscale. Wildl. Soc. Bull. 14(2):146–150. Data suggest that prescribed burning in winter does not reduce total availability of foods eaten by bobwhite chicks.

Martin, R. F., M. W. Martin, and N. G. Lanier-Martin. 1986. Geographic variation in white facial markings of juvenile Cave Swallows. Southwest. Nat. 31(3):402–403. Found significantly different percentages of white feathering on

foreheads of nestling swallows from Kinney County, Texas and Uxmal, Yucatan, Mexico.

Millsap, B. A. 1986. Status of wintering Bald Eagles in the coterminous 48 states. Wildl. Soc. Bull. 14(4):433–440. Summarizes and interprets the results of the midwinter Bald Eagle survey for the period 1979–1982.

Pitts, R. M., and J. J. Scharninghausen. 1986. Use of Cliff Swallow and Barn Swallow nests by Cave Bat, *Myotis velifer,* and the Free-tailed Bat, *Tadarida brasiliensis.* Texas J. Sci. 38(3):265–266. Data suggest that the Cave Bat is a permanent though uncommon occupant of nests of both species of swallows in south-central Texas. The Free-tailed Bat occupied only Cliff Swallow nests and only as a temporary retreat.

Ploger, B. J., and D. W. Mock. 1986. Role of sibling aggression in food distribution to nestling Cattle Egrets (*Bubulcus ibis*). Auk 103(4):768–776. Found that aggression was frequent but siblicide rare in a Texas colony of Cattle Egrets.

Prasad, N. L. N. S., and F. S. Guthery. 1986. Drinking by Northern Bobwhites in Texas. Wilson Bull. 98(3):485–486. Data indicate that when preformed water is limited and higher temperatures increase the need for evaporative cooling, bobwhites drink surface water.

Prasad, N. L. N. S., and F. S. Guthery. 1986. Wildlife use of livestock water under short duration and continuous grazing. Wildl. Soc. Bull. 14(4):450–454. Found that the number of bird species visiting water facilities varied more with the type of facility (concrete trough or earthen tank) than with the type of grazing program.

Quay, W. B. 1986. Timing and location of spring sperm release in northern thrushes. Wilson Bull. 98(4):526–534. One of the three collecting sites was Galveston, Texas.

Rappole, J. H., and G. Waggerman. 1986. Calling males as an index of density for breeding White-winged Doves. Wildl. Soc. Bull. 14(2):151–155. Re-evaluates the relationship between coo-counts and nest counts; study was carried out in lower Rio Grande valley.

Sikes, P. J., and K. A. Arnold. 1986. Red imported fire ant (*Solenopsis invicta*) predation on Cliff Swallow (*Hirundo pyrrhonota*) nestlings in east-central Texas. Southwest. Nat. 31(1):105–106. Found that nesting success in swallow colonies with fire ants is only 40.5% compared to 74.9% in colonies without fire ants.

Tacha, T. C., D. E. Haley, and R. R. George. 1986. Population and harvest characteristics of Sandhill Cranes in southern Texas. J. Wildl. Manage. 50(1):80–83. Morphometric and electrophoretic data on 917 cranes suggest that sandhill cranes wintering west of Highway 16 in south Texas are part of the western subpopulation of this species.

Telfair, R. C., II, and B. C. Thompson. 1986. Nuisance heronries in Texas: characteristics and management. Federal Aid Project W-103-R, Nongame Wildlife Program, Texas Parks and Wildlife Department. Describes the characteristics of a nuisance heronry and addresses problems of prevention and control.

Whyte, R. J., G. A. Baldassarre, and E. G. Bolen. 1986. Winter conditions of Mallards on the southern high plains of Texas. J. Wildl. Manage. 50(1):52–57. Found that mallards on the southern high plains were in better overall condition than those wintering further north.

Wood, K. N., F. S. Guthery, and N. E. Koerth. 1986. Spring-summer nutrition and condition of Northern Bobwhites in south Texas. J. Wildl. Manage. 50(1): 84–88. Found that diet of female bobwhites had levels of Ca and P below those recommended for maximum egg production.

ADDENDA:

The following articles were inadvertently omitted from previous "Recent Articles about Texas Birds."

Telfair, R. C., II. 1983. Atypically colored Little Blue Heron eggs. Wilson Bull. 95(3):481–482. Two clutches out of 232 examined in Ennis County, Texas heronries had olive-buff eggs.

Telfair, R. C., II. 1984. The Cattle Egret (*Ardeola ibis = Bubulcus ibis*) in Texas. Texas J. Sci. 35(4): 303–314. Provides basic information about the Cattle Egret and attempts to dispel some common misbeliefs concerning it.

NOTES AND NEWS

NOTE.—The following people critically reviewed one or more manuscripts submitted for publication in volumes 18–20:
Stanley Archer, Keith A. Arnold, Karen L. P. Benson, Kelly Bryan, Stanley D. Casto, Ted L. Eubanks Jr., Steve Fretwell, Fred R. Gehlbach, John P. Hubbard, David G. Huffman, Howard Hunt, Jerome A. Jackson, Kenneth W. Johnson, James Kushlan, Greg W. Lasley, Kay McCracken, Ralph R. Moldenhauer, James G. Morgan, Allan J. Mueller, Robert L. Neill, Warren Pulich, Jed J. Ramsey, Steve R. Runnels, Kenneth Seyffert, Bruce C. Thompson.

ATTENTION AUTHORS.—The *Bulletin of the Texas Ornithological Society* is a semi-annual journal which publishes research reports and short communications in the field of ornithology. Articles on a wide range of subjects are accepted, including documentation of new Texas records, interpretations of laboratory and field studies, historical perspectives on Texas ornithology, and developments in theory and methodology. Although the emphasis is on Texas birds, the *Bulletin* accepts papers which advance the knowledge of birds in general. Original articles, reports and other items submitted for inclusion in the *Bulletin* should be sent to the editor, Robert Benson, Department of Engineering Technology, Texas A&M University, College Station, Texas 77843.

ABOUT THE ARTIST.—The pen and ink (inside front cover) is an original drawing by John Lower. John is originally from Pennsylvania but has lived in Texas for the past 5 years. He has a passion for raptors and has recently worked censusing raptors from the top of a mountain in Utah.

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