Bulletin of the TEXAS ORNITHOLOGICAL SOCIETY

VOLUME 12
NUMBER 2

NOVEMBER–DECEMBER 1979


Larry Haines

BULLETIN OF THE

TEXAS ORNITHOLOGICAL SOCIETY

Vol. 12 November–December 1979 No. 2

Contents

Trends in Christmas Bird Counts on Bolivar Peninsula, Texas Between 1964–1973

B. J. Lee[1] and Brian W. Cain[2]

[1]Medical Physiology, Texas A&M University, College Station, Texas 77843
[2]Patuxent Wildlife Research Center, Laurel, Maryland 20715

According to Raynor (1975) little use has been made of the Christmas Bird Count (CBC) data that has been compiled for over 75 years. He presented methods for evaluating and analyzing CBC data taken from counts that have been maintained for quality (i.e. number in party, party hours, area covered, etc. kept constant). Such counts are however an exception so the need still persists to analyze the CBC data to determine if trends in certain habitats or large areas can be determined.

Arbib (1967) developed a strong argument to support the need for analysis of CBC data that will provide meaningful generalities, long term trends, evolving relationships in bird populations, and possible effects that urban or industrial developments may have had on once magnificent birding areas. Hickey (1955) did not argue convincingly, as suggested by Stahlecker (1975), that the CBC data are of no scientific value. Morrison and Slack (1977) provided an excellent example of how the CBC data can be incorporated into the status of a bird population. We suggest that there is a rewarding and educational experience for those who take time to look at these easily accessible data and use the analytical techniques presented by Morrison and Slack (1977). If one considers the extensive CBC data derived from Texas each year, the fact that Texas often has the largest number of bird species recorded, and the recent population growth in Texas, the need to analyze CBC data and look at trends in the Texas avifauna in certain areas is obvious.

Methods

We used the Cox and Stuart (1955) test for trend, a variation of the sign test (Conover 1971) that can be used to test trends in a series or ordinal measurements. The assumptions necessary for the sign test (Conover 1971:121) are met if these data for the 1964–1968 and 1969–1973 years are compared for either an increase in numbers, decrease in numbers or a tie (i.e. the numbers did not change). Bock and Smith (1971) used the Mann-Whitney U test which, according to Ullman (1972), is quite useful where samples are taken from a population not believed to be normally distributed. If this is so the U statistic measures the randomness between the two samples.

The Cox and Stuart test for trend is a weaker statistic than the U statistic. Thus if a trend is noted the level of significance to support the notion that the trend is real could be tested with a stronger statistic such as the U. In our presentation the nth and (n + 5)th years are paired such that the 1964 count is paired with the 1969 count, the 1965 count with the 1970 count, etc., up to a total of five pairings. A plus (+) pair results if the (n + 5)th year count is larger than the nth

Table 1. Birds showing an upward trend in the CBC, Bolivar Peninsula.

Species (common name)	Residency*	Species (common name)	Residency
1. Pied-billed Grebe	PR	26. Lesser Yellowlegs	WR
2. Olivaceous Cormorant	PR	27. Least Sandpiper	WR
3. Great Blue Heron	PR	28. Dunlin	WR
4. Great Egret	PR	29. Short-billed Dowitcher	WR
5. Snowy Egret	PR	30. Long-billed Dowitcher	WR
6. Cattle Egret	PR	31. American Avocet	WR
7. Louisiana Heron	PR	32. Ring-billed Gull	WR
8. White Ibis	PR	33. Gull-billed Tern	WR
9. Roseate Spoonbill	SR	34. Royal Tern	PR
10. Snow Goose	WR	35. Caspian Tern	PR
11. Snow Goose (Blue)	WR	36. Belted Kingfisher	PR
12. Gadwall	WR	37. Brown Creeper	WR
13. Pintail	WR	38. Gray Catbird	WR
14. Green-winged Teal	WR	39. Short-billed Marsh Wren	WR
15. Cinnamon Teal	M	40. Brown Thrasher	PR
16. American Wigeon	WR	41. Robin	WR
17. Shoveler	WR	42. Blue-gray Gnatcatcher	PR
18. Red-breasted Merganser	WR	43. Golden-crowned Kinglet	WR
19. Turkey Vulture	PR	44. Cedar Waxwing	WR
20. Red-tailed Hawk	PR	45. Loggerhead Shrike	PR
21. Black-bellied Plover	WR	46. White-eyed Vireo	PR
22. Piping Plover	WR	47. Orange-crowned Warbler	WR
23. Common Snipe	WR	48. Yellow-rumped Warbler	WR
24. Willet	PR	49. American Goldfinch	WR
25. Greater Yellowlegs	WR	50. White-crowned Sparrow	WR

* Residency taken from Robbins et al. (1966) and TOS Bird Records Committee (1974). PR = permanent resident; SR = summer resident; WR = winter resident; M = fall & spring migrant; V = visitor.

year count. A minus (−) pair results if the (n + 5)th year count is smaller than the nth year count.

The decision for an upward trend is four or five pluses and a downward trend is four or five minuses. We cannot set a 5% level of significance because the expected distribution of signs is the expansion of $(p + q)^5$, for 5 years, where the chance of an increase (p) or decrease (q) are equal, thus $p = q = 0.5$. The expected value of four pluses or four minus signs is 5/32 which is 15%. In other words, the chance of four pluses or four minuses is 15% by chance alone and may not indicate a trend.

A mixture of pluses and minuses (i.e. 2:3 or 3:2) indicates a stable population. More than one tie of zeros (no birds counted) means infrequent species and thus cannot be tested. The same test was used on the total number of species each year to determine a trend in species abundance. An "importance" index is calculated on the frequency (percentage of years observed) times (×) the total number of individuals for that species seen between 1964–1973.

We used the data collected from Bolivar Peninsula because of our interest in this region (Lee 1976) and because the yearly winter weather conditions along the Texas coast are generally quite similar. Morrison and Slack (1977) showed that bird counts (non-normalized data) for the Olivaceous Cormorant (*Phalacrocorax olivaceus*) showed the same trends regardless of six normalization procedures (party hours, number in a party, etc.) used for comparison.

Table 2. Birds showing a stable population in the CBC, Bolivar Peninsula.

Species (common name)	Residency	Species (common name)	Residency
1. Eared Grebe	WR	36. Mourning Dove	PR
2. White Pelican	WR	37. Barn Owl	PR
3. Little Blue Heron	PR	38. Short-eared Owl	WR
4. Black-crowned Night Heron	PR	39. Burrowing Owl	WR
5. Yellow-crowned Night Heron	PR	40. Common Flicker	WR
6. American Bittern	WR	41. Red-bellied Woodpecker	PR
7. White-faced Ibis	PR	42. Yellow-bellied Sapsucker	WR
8. Canada Goose	WR	43. Eastern Phoebe	PR
9. White-fronted Goose	WR	44. Tree Swallow	WR
10. Ross' Goose	V	45. Blue Jay	PR
11. Mallard	WR	46. House Wren	WR
12. Mottled Duck	PR	47. Long-billed Marsh Wren	PR
13. Blue-winged Teal	WR	48. Winter Wren	WR
14. Canvasback	WR	49. Carolina Wren	PR
15. Marsh Hawk	WR	50. Mockingbird	PR
16. Bobwhite	PR	51. Hermit Thrush	WR
17. Virginia Rail	WR	52. Ruby-crowned Kinglet	WR
18. Clapper Rail	PR	53. Sprague's Pipit	WR
19. King Rail	PR	54. Solitary Vireo	WR
20. Common Gallinule	PR	55. Black-and-white Warbler	WR
21. American Coot	PR	56. Yellowthroat	PR
22. Semipalmated Plover	WR	57. House Sparrow	PR
23. Snowy Plover	WR	58. Eastern Meadowlark	PR
24. Killdeer	PR	59. Red-winged Blackbird	PR
25. American Woodcock	PR	60. Brewer's Blackbird	WR
26. Long-billed Curlew	WR	61. Boat-tailed Grackle	PR
27. Spotted Sandpiper	WR	62. Common Grackle	PR
28. Semipalmated Sandpiper	WR	63. Cardinal	PR
29. Western Sandpiper	WR	64. Rufous-sided Towhee	WR
30. Sanderling	WR	65. Savannah Sparrow	WR
31. Herring Gull	WR	66. Sharp-tailed Sparrow	WR
32. Laughing Gull	PR	67. Seaside Sparrow	PR
33. Forster's Tern	WR	68. White-throated Sparrow	WR
34. Common Tern	M	69. Lincoln's Sparrow	WR
35. Black Skimmer	PR	70. Swamp Sparrow	WR

Results and Discussion

The occurrence of 210 species was recorded during the 10-year interval (1964–1973) with 50 species showing an upward trend in the CBC (Table 1). The Roseate Spoonbill (*Ajaia ajaja*) was the only summer resident to show an upward trend in the winter counts. This species was not recorded during the winter counts until 1967 on the Bolivar Peninsula. The Cinnamon Teal (*Anas cyanoptera*) was the only migrant species that showed an upward trend. This species normally winters south of the United States. The remaining 48 species include 19 permanent resident and 29 winter resident birds. Thirty-four species in Table 1 are normally associated with estuarine habitats.

Eight species showed a downward trend (Lesser Scaup, American Kestrel, Marbled Godwit, Bonaparte's Gull, Horned Lark, Water Pipit, Starling, Brown-headed Cowbird) and three of these are associated with estuarine habitats. It may be that the effects of dredging in Galveston and East Bays and the other land use changes during the decade considered here, may be partially mitigated by the increased acreage of marsh habitat being established through subsidence (Pilgrim 1975).

Table 3. Ten-year trend in total species and total individuals.

	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Total species	110	117	136	120	142	139	132	142	128	151
Total individuals	6,678	7,611	33,085	20,930	33,368	37,570	37,360	102,293	92,520	56,830

Seventy species (33 percent of the 210 species recorded) have maintained stable populations over this period (Table 2). Two are summer residents, 29 are permanent residents and 37 are winter residents. Thirty-three (47 percent) of the species that have maintained stable populations are associated with estuarine habitats (Table 2). It appears that 67 species (74 percent) of the 92 recorded, which are associated with estuaries, either showed an increase in their population or maintained a stable population. Only three percent of the estuarine bird species showed a decline. The remaining 23 percent of the 92 species were reported too infrequently to consider whether or not a trend existed.

The Cox and Stuart test for trend showed a significant trend in the total number of species observed each year and also in the total number of birds seen each year (Table 3). It may be argued that better censuses may be responsible for this increase in total birds and total species composition. We do not believe that these increases noted by this data summation (Table 3) can be explained totally by "better counts" on successive years. Bolivar Peninsula is not a large area and visibility is fairly unobstructed over the coastline and in the marsh habitats during the winter months. Morrison and Slack (1977) showed convincing evidence that trends for a conspicuous species were not affected by normalized data and that the effect of varying weather over a long period of time was not significantly correlated to the trends. We suspect that these increases may be related to the increase of trees and shrubs that have been planted in association with the urban development on Bolivar Peninsula and the subsidence of that area which would increase the marsh habitat.

The influx of wintering waterfowl is evident from a comparison of the importance value of the birds counted on Bolivar Peninsula (Table 4). Of the top 10 most important species only three (American Coot, Red-winged Blackbird and Eastern Meadowlark) are not waterfowl. This also supports our idea that marsh habitat may be on the increase in that area.

Table 4. Importance values for the 10 most important species.

Common name	Residency	Importance value*
Snow Goose	WR	187,278
Pintail	WR	74,341
Green-winged Teal	WR	43,531
Shoveler	WR	18,923
American Wigeon	WR	13,273
Red-winged Blackbird	PR	12,745
Gadwall	WR	7,480
American Coot	PR	5,562
Canada Goose	WR	4,056
Eastern Meadowlark	PR	3,326

* Refer to methods for calculation.

Acknowledgment

We thank R. Douglas Slack and Keith A. Arnold for their reviews of the manuscript and their useful comments. This paper also benefited from the comments of two anonymous reviewers, especially the statistical considerations, and we are grateful to these two people.

Literature Cited

Arbib, R. S., Jr. 1967. Considering the christmas census. Audubon Field Notes 21:39–42.

Bock, C. E., and R. B. Smith. 1971. An analysis of Colorado christmas counts. Amer. Birds 25:945–947.

Conover, W. J. 1971. Practical nonparametric statistics. John Wiley & Sons, Inc., New York 462 p.

Cox, D. R., and A. Stuart. 1955. Some quick tests for trend in location and dispersion. Biometrika 42:80–94.

Hickey, J. J. 1955. Letter to the editor. Wilson Bull. 67:144–145.

Lee, B. J. 1976. Vertebrate survey of a dredge spoil salt marsh. M.S. Thesis, Texas A&M Univ. College Station 58 p.

Morrison, M. L., and R. D. Slack. 1977. Population trends and status of the Olivaceous Cormorant. Amer. Birds 31:954–959.

Pilgrim, L. (ed.). 1975. Race against subsidence. Texas Water Resources 1:5 p. Texas Water Resources Inst. College Station.

Raynor, G. S. 1975. Techniques for evaluating and analyzing christmas bird count data. Amer. Birds 29:626–633.

Robbins, C. S., B. Bruun, H. S. Zim, and A. Singer. 1966. A guide to field identification: birds of North America. Golden Press, New York 340 p.

Stahlecker, D. W. 1975. Trends in wintering diurnal raptor population from central Colorado christmas bird counts. Amer. Birds 29:936–940.

Texas Ornithological Society Bird Records Committee. 1974. Check-list of the Birds of Texas. Texas Ornithological Society, Waco, Texas 118 p.

Ullman, N. R. 1972. Statistics an applied approach. Xerox College Publishing, Lexington 608 p.

The Cormorants of Texas

Article by Michael L. Morrison,[1] Drawing by Dana Gardner

Western Foundation of Vertebrate Zoology,
1100 Glendon Ave., Los Angeles, California 90024

"Distinguishing Olivaceous from Double-crested Cormorant when the two are not together is one of the *real problems* of Texas field ornithology." This quote, taken from Peterson (1969, *A Field Guide to the Birds of Texas,* Houghton Mifflin Co., Boston), best describes the basis for this paper. It would be difficult to begin a field investigation if the observer was unable to distinguish the species under study—this holds for weekend birder and professional alike. And that has been a perennial problem with cormorants in Texas. For example, one of the major Olivaceous Cormorant (*Phalacrocorax olivaceus*) colonies in Texas—Sidney Island in Sabine Lake, Orange County—was first mistakenly identified as a Double-crested Cormorant (*P. auritus*) colony (Mitchell 1978, pp. 6–16 *in* Proc. 4th Annual Texas Fish-eating Bird Conf., Texas Parks Wildl. Dept. Rep. 7000-26). This paper will try to solve some of the problems of field identification of these two cormorants in Texas.

The seasonal status and distribution of both cormorants has been thoroughly described by Oberholser (1974, *The Bird Life of Texas,* Univ. Texas Press, Austin), and will only be summarized here. In general, the olivaceous is the most likely cormorant to be seen during breeding season. The Texas population of this species is essentially non-migratory, although post-breeding wanderings along the coast are common. In contrast, double-crests are more common during winter (Nov. to March) than the Olivaceous Cormorant (Morrison and Slack 1977, Am. Birds 31:954–959). Most breeding records of double-crests are in dispute, due in large part to the identification problem. According to Oberholser (op. cit.), double-crests last bred in Texas in the late 1930's. However, Mitchell (op. cit.) listed three breeding colonies of this species in Texas during 1973 and 1974, and Holm et al. (1978, Bull. Texas Ornithol. Soc. 11:50–51) reported a small colony nesting on the southern end of the Toledo Bend Reservoir during 1974 and 1977. In most cases, breeding cormorants are "probably" olivaceous, while wintering cormorants could be either species. The species often occur together during winter (Morrison and Slack op. cit.).

Peterson (1961, *A Field Guide to Western Birds,* Houghton Mifflin Co., Boston) stated that the best way to distinguish these cormorants was by the relative feather shape of the back and scapulars, those of olivaceous being more pointed. However, this characteristic is difficult to see even when the birds are in hand. I feel that relative body size and the shape and color of the gular (throat) pouch, as discussed below, are more reliable field characteristics.

Body size.—The Olivaceous Cormorant is smaller than the Double-crested Cormorant in body (24″ vs. 29″) and wing (40″ vs. 50″) length, and weight (3 lbs vs.

[1] Present address: Dept. Fisheries and Wildlife, Oregon State Univ., Corvallis, Oregon 97331.

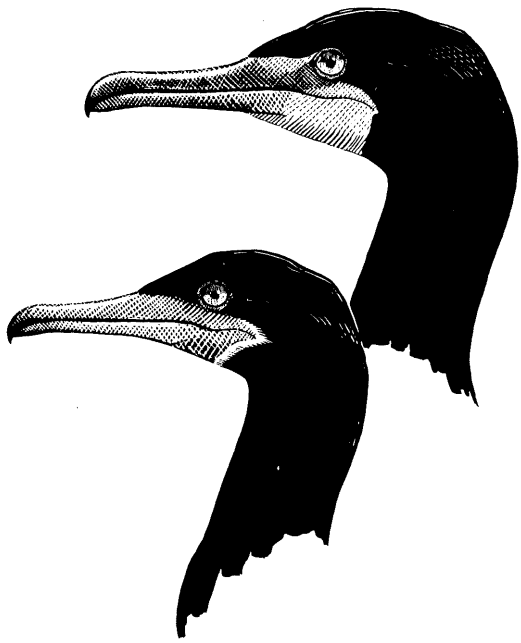


Fig. 1. Comparison of Double-crested (upper) and Olivaceous (lower) cormorants. Drawing by Dana Gardner.

5 lbs). As other birds are usually in association with these cormorants, the two need not be together to use size as an identification key. For example, the olivaceous is comparable in size to the Mallard (*Anas platyrhynchos*), Pintail (*A. acuta*), Louisiana Heron (*Hydranassa tricolor*), Royal Tern (*Sterna maxima*), Snowy Egret (*Egretta thula*), and in wing length to the Laughing Gull (*Larus atricilla*). The double-crest is comparable in size to the Anhinga (*Anhinga anhinga*), Roseate Spoonbill (*Ajaia ajaja*), Great Egret (*Casmerodius albus*), and in wing length to the Herring Gull (*Larus argentatus*) and Caspian Tern (*Sterna caspia*).

Gular pouch.—The size, shape, and color of the gular pouch differs markedly between species. As shown in Fig. 1, the shape of the pouch in Olivaceous Cormorants resembles a sideways "V." It is small and pale in color. Proportionally, the pouch is less than one-half the size of the remainder of the head. The white border behind the pouch varies among individuals and is visible only at close range. It does, however, serve to outline the size and shape of the pouch. In Double-crested Cormorants, the pouch is much larger and rounds-out as it extends under the throat rather than forming a "V." In addition, the color is bright orange-yellow. Proportionally, the pouch is about as large as the remainder of the head.

In both species, the sub-adult plumage is dull brownish with underparts varying from brownish to whitish. All other body features resemble the adults.

In summary, the general body size (both in absolute bulk and in comparison to other species) and the differences in the gular pouch should allow correct identification of cormorants in Texas—until a third species pays Texas a visit.

I wish to thank L. F. Kiff and R. A. Cobb for reviewing the manuscript, and Sherry Morrison for preparation of several drafts. Specimens in the Western Foundation of Vertebrate Zoology collection were used in preparing the drawing.

Successful Breeding of Lucy's Warbler in Texas

Tony Gallucci[1]

Department of Biology, Sul Ross State University and the
Chihuahuan Desert Research Institute, Alpine, Texas 79830

Lucy's Warblers (*Vermivora luciae*) have been noted few times in Texas (outside the El Paso area) prior to 1978. Oberholser (1974), and the checklist of the Texas Ornithological Society (1974) describe the species as rare to casual from El Paso (El Paso County) east to Big Bend National Park (Brewster County). Wauer (1973a, 1973b) and the Texas Ornithological Society Check-list (1974) consider the bird a rare summer resident near El Paso, although to my knowledge, the bird has never been known to breed in Texas in that area. The El Paso County field checklist (Hunt and White 1973) lists no summer or breeding records and includes the species only as a rare migrant. Steve West (pers. comm.) informs me that the birds known to nest "near" El Paso (see Wauer 1973a, 1973b) occur at Radium Hot Springs in New Mexico. This opinion was independently confirmed by Kevin Zimmer (pers. comm.), who has birded extensively in the floodplain of El Paso County. He failed to note nesting Lucy's Warblers there.

Outside of rare or casual occurrences in the El Paso area, there appear to be only eight published observations of this bird from Texas prior to 1977 (Table 1). Two of these records are from outside Trans-Pecos Texas (Oberholser 1974). The first, an observation reported by Connie Hagar at Corsicana, Navarro County, 21–22 May 1929 and the second, a sighting by Mr. and Mrs. J. B. Strickling at Freeport, Brazoria County, 27 December 1964, were both likely vagrants. The Freeport record is interesting in that it represents the only record for Texas during the winter. There are no fall records for Texas east of El Paso, although the bird breeds northward in New Mexico and might be reasonably expected as a migrant from that area.

The first Trans-Pecos record (excluding the El Paso area) is also a probable first breeding record, albeit an unsuccessful one as far as Lucy's Warbler is concerned. Mr. and Mrs. D. T. Johnson sighted an adult feeding a young cowbird at Sierra Blanca, Hudspeth County, on 8 June 1958 (Oberholser 1974). Subsequently Wauer (1973a, 1973b) detailed several records from Big Bend National Park including at least three singing males (Table 1). He predicted future nesting or, at least, discovery of nesting Lucy's Warblers in the Big Bend area. This prediction was based on similarity between riparian habitat in the park and vicinity, and habitat in Arizona and New Mexico where Lucy's Warblers are known to nest (Wauer 1973a, 1973b).

James H. Yantis (in Williams 1977) found a singing male Lucy's Warbler in the floodplain of Presidio County on 10 June 1977. During the spring and summer of 1977 Ron W. Engel-Wilson and a support crew of researchers conducted studies

[1] Present address: Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Texas 77843.

Table 1. Records of Lucy's Warbler (outside El Paso area) prior to 1978.

Dates	Observers	Location	Number of birds
21–22 May 1929	Connie Hagar	Navarro County, Corsicana	1
8 June 1958	Mr. and Mrs. D. T. Johnson	Hudspeth County, Sierra Blanca	1 adult feeding cowbird
27 December 1964	Mr. and Mrs. J. B. Strickling	Brazoria County, Freeport	1
8 April 1970	Roland H. Wauer and Norberto Ortega	Brewster County, Rio Grande Village	1 singing male
17 April 1970	Roland H. Wauer	Brewster County, Boquillas	1 singing male (collected)
3 May 1970	Roland H. Wauer	Brewster County, Rio Grande Village	2
4 April 1972	Roland H. Wauer	Brewster County, Rio Grande Village	1 singing male
23 April 1972	Roland H. Wauer	Brewster County, Rio Grande Village	1 singing male
10 June 1977	James H. Yantis	Presidio County	1 singing male
April–June 1977	Ron Engel-Wilson	Presidio County, near Candelaria	many sightings

in the floodplain of Presidio County for the International Boundary and Water Commission. In the course of running nest transects, they encountered large numbers of Lucy's Warblers. The birds were most common (156 birds per 100 hectares) in migration in thorny-shrub canyons and Screwbean Mesquite (*Prosopis pubescens*) from April through June or July. Densities were fairly high in Salt-cedar (*Tamarix* sp.) stands during migration and decreased during the breeding period. Based on counts of singing males, they estimated the summer density of Lucy's Warblers in the Presidio County floodplain to approximate 90 birds per 100 hectares in thorny-shrub and mesquite. They found no positive evidence of nesting (Engel-Wilson, pers. comm., 1978).

In 1978 I assumed responsibility for Engel-Wilson's transects to gather information on nesting White-winged Doves (*Zenaida asiatica grandis*). All of the transects I utilized were in the immediate vicinity of Candelaria, Presidio County, Texas in Salt-cedar stands. On my first trip of the nesting season, 21 April 1978, I noted a single Lucy's Warbler, a singing male. Numbers of the birds increased with succeeding visits and peaked in mid-May (Table 2). On 20 May 1978, while on a Texas Ornithological Society field trip to see Lucy's Warblers, Kevin and Barry Zimmer, Ed Kutac, Andrew Stewart and I observed an adult Lucy's Warbler feeding two fledgling Lucy's Warblers in one transect area. Later, in another transect area, we observed two more adults each feeding two fledgling warblers (also in Williams 1978). No young cowbirds were seen. These sightings represent the first positive evidence of successful breeding of these warblers in Texas. Of six birds seen 15 June 1978, only one was singing. No birds were seen after 23 June (Table 2).

Continued White-winged Dove work in 1979 allowed further observations of Lucy's Warblers. Despite earlier visits, the first 1979 date for Lucy's Warbler near Candelaria was 22 April. The first date of observation in 1978 was 21 April

Table 2. Records of Lucy's Warbler near Candelaria, Texas 1978–1979.

Date	# Singing males	# Non-singing birds	# Fledglings
21 April 1978	1	0	0
22 April 1978	0	2	0
5 May 1978	0	0	0
6 May 1978	3	3	0
11 May 1978	7	3	0
20 May 1978	8	5	6
28 May 1978	3	0	0
4 June 1978	4	0	0
8 June 1978	5	1	2
15 June 1978	1	5	0
No Lucy's Warblers were seen on 10 trips from 23 June to August.			
8 April 1979	0	0	0
15 April 1979	0	0	0
22 April 1979	2	0	0
5 May 1979	6	0	0
15 May 1979	6	3	0
21 May 1979	10	2	2
31 May 1979	6	3	0
8 June 1979	5	1	0
14 June 1979	8	10	1 (+ one cowbird)
No Lucy's Warblers were seen on four trips from 28 June to 18 July.			

Total visits 33.
Total visits with sightings 16.
Total sightings 127.

but this was the first trip of the season. Engel-Wilson and Ohmart (1978) record Lucy's Warblers arriving in April, but gave no specific dates. In 1979, fledgling birds were first noted on 21 May, comparable with the first 1978 fledgling date of 20 May. On 21 May 1979 Kelly B. Bryan obtained recordings of a singing male. The tape has been deposited in the Texas Bird Song Library at Sam Houston State University (Huntsville). The only other fledgling noted during 1979 was one being fed by an adult on 14 June. The adult bird was also tending a young cowbird on an adjacent limb. Both the warbler fledgling and the cowbird were collected (Sul Ross State University, Vertebrate Collection #1050, 1051) and constitute the first documentation of nesting by Lucy's Warbler in Texas. The Lucy's Warbler (#1050) is only the second Texas specimen (Table 1; Wauer 1973a, 1973b). No nest was found in the area despite intensive search. During the summer of 1979 I searched a number of areas from Redford, Presidio County to Esperanza, El Paso County but failed to turn up any Lucy's Warblers outside of an eight-mile radius of Candelaria.

Lucy's Warblers nest mainly in forks, cracks and cavities of riparian trees, occasionally also in Saguaro (*Carnegeia gigantea*), in the Lower Sonoran Zone of southwestern desert regions. Nesting occurs, although less frequently, in the Upper Sonoran and Transition Zones. Trees frequently selected for nesting include mesquites (*Prosopis* spp.), cottonwoods (*Populus* spp.), and willows (*Salix* spp.) (Bent 1953).

Although a few cottonwoods and willows are present at the transect sites, the floodplain and dry streambed of the Rio Grande is dominated by the introduced

Salt-cedar. The floodplain vegetation is bordered by Screwbean Mesquite on the calcareous hillocks and dense stands of Screwbean Mesquite and other shrubby legumes in canyons (Engel-Wilson and Ohmart 1978).

All cavities discovered in a search of the transect areas were occupied by Ladder-backed Woodpeckers (*Picoides scalaris*). Furthermore, all other potential nest sites were in Salt-cedar and were of the fork or crack type. Bent (1953) mentioned use of loose bark as a canopy for nesting birds and also their use of Verdin (*Auriparus flaviceps*) nests. In the transect area I studied, very few of the trees had deciduous bark, and what little bark material was produced was washed away by frequent summer floods and windstorms; sufficient reason for Lucy's Warblers not to nest under loose bark. All Verdin nests in the transect areas apparently housed only Verdins. The use of Salt-cedar as a nest tree for Lucy's Warbler has not been documented in Arizona, where seemingly the only major data gathering on this species has taken place. Nevertheless, it has only been sparingly studied there (Phillips et al. 1964). Although Engel-Wilson and Ohmart (1978) determined that the highest summer densities are in thorny-shrub, this conclusion may be an artifact of their vegetation classification system. My data indicated that the birds were less common in thorny-shrub *per se* than in monotypic Salt-cedar stands. They seemed to be most common overall in Screwbean/Salt-cedar edge. This was probably where the bulk of the breeding activity took place. Findings of large numbers of Lucy's Warblers (including all fledglings to date) in Salt-cedar suggest that the birds used this dense cover for escaping summer heat. The mean high temperature for June 1978 at Candelaria was 42°C. Nesting in Screwbean Mesquite edge thus allowed use of Salt-cedar for shade with little energy expenditure for movement from the nesting area. Presumably, mesquite provided adequate nest sites for the birds which seemed to be excluded from cavities in the Salt-cedar community by Ladder-backed Woodpeckers. Since Lucy's Warblers are insect gleaners, Salt-cedar may also provide an efficient foraging ground, attested to by the abundance of mosquitoes there (Gallucci 1978, see Bent 1953).

Oberholser (1974) says three to six eggs, and usually four, are normal clutch sizes for Lucy's Warbler. There is no information available on mean success rates for this species, but rates of 50% are not considered unusual for small passerines (Nice 1957). In marginal range, as these warblers seem to be at Candelaria, success rates might be expected to be considerably lower than the mean rate. Of the six fledgling groups seen at Candelaria during 1978 and 1979 (see Table 2) the mean is only slightly below (46%) an expected value of 50%.

Extreme dates in Arizona are 10 March and 5 October, with most records for breeding, and migration in breeding areas confined to a span between 8 April and 10 August. I banded an immature bird in the Chiricahua Mountains of southeastern Arizona on 22 July 1979. These data indicate that breeding is more prolonged in areas of main breeding activity. Breeding in habitats at the margins of a species range may be reflected in a shorter duration of breeding time rather than as reduced success. Migrants away from the breeding grounds in Arizona have been noted from 18 June to 31 July (Phillips et al. 1964). The early migration date away from the breeding grounds in Arizona compares favorably with departure from the breeding grounds in Texas (late June) as do the arrival dates on the breeding grounds (mid-April).

Despite marginal range and habitat and my additional search, I concur with Wauer (1973a) that the bird may nest undiscovered in other remote thickets along the Rio Grande. Further, I consider this discovery an addition to our knowledge of area avifauna rather than a recent Lucy's Warbler phenomenon. Indeed, the native cottonwood-willow habitat destroyed about the turn of the century was probably more suitable for nesting by Lucy's Warbler than the present Salt-cedar stands.

Four species of the ecologically diverse genus *Vermivora* are now known to nest in Texas. All nest only in the Trans-Pecos and are at extremes of their range. The Colima Warbler (*Vermivora crissalis*) reaches its northern limit in the oak and Ponderosa Pine (*Pinus ponderosa*) shaded canyons of the Chisos Mountains in Brewster County; the Virginia's Warbler (*V. virginiae*) reaches its southeastern limit on the dry scrub slopes of the Guadalupe Mountains (Culberson County) and the Orange-crowned Warbler (*V. celata*) does likewise in the high coniferous forests of the same range (Oberholser 1974, Texas Ornithological Society 1974); the Lucy's Warbler reaches its eastern limit in the Rio Grande floodplain of Presidio County.

I would like to thank Dr. James F. Scudday, Laura Key and an anonymous reviewer for critically reviewing drafts of this manuscript. These data were collected while the author was engaged in research on White-winged Doves in the Trans-Pecos of Texas. Funds for that project were provided by a grant from the Accelerated Research Program (Contract #14-16-008-2096) to Scudday. This is Contribution No. 48 of the Chihuahuan Desert Research Institute.

Literature Cited

Bent, A. C. 1953. Life histories of North American Wood Warblers. U.S. Natl. Mus. Bull. 203:129–134.

Engel-Wilson, R. W., and R. D. Ohmart. 1978. Assessment of vegetation and terrestrial vertebrates along the Rio Grande between Fort Quitman, Texas and Haciendita, Texas. Report prepared for the International Boundary and Water Commission. Arizona State Univ.

Gallucci, T. 1978. The biological and taxonomic status of the White-winged Doves of the Big Bend of Texas. Unpubl. M.S. Thesis, Sul Ross State Univ., Alpine, Texas, pp. 202.

Hunt, W. H., and G. O. White. 1973. Birds of El Paso County, Texas field checklist, 5th ed. El Paso-Trans Pecos Audubon Society, El Paso.

Nice, M. M. 1957. Nesting success in altricial birds. Auk 74:305–321.

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

Phillips, A. R., J. Marshall, and G. Monson. 1964. The birds of Arizona. Univ. Arizona Press, Tucson, pp. 148–149.

Texas Ornithological Society. 1974. Check-list of the birds of Texas (K. A. Arnold and E. A. Kutac, eds.). Texas Ornithological Society, p. 81.

Wauer, R. H. 1973a. Birds of Big Bend National Park and Vicinity. Univ. Texas Press, Austin, p. 156.

———. 1973b. Status of certain Parulids of west Texas. Southwest. Nat. 18:105–110.

Williams, F. 1977. Southern Great Plains. Amer. Birds 31:1157.

———. 1978. Southern Great Plains. Amer. Birds 32:1027.

The Effect of Grazing on Nesting Marshbird Habitat at the Welder Wildlife Refuge, San Patricio County, Texas[1]

Richard J. Whyte and Brian W. Cain

Department of Wildlife & Fisheries Sciences, Texas A&M University,
College Station, Texas 77843, and
Patuxent Wildlife Research Center, Laurel, Maryland 20811

The impact of livestock grazing on pond shoreline vegetation has been realized for many years (Bue et al. 1952, Keith 1961, Kirsch 1969, and Mundinger 1976). However, subsequent effects on marshbird nesting habitat remains controversial. Cattle trampling of dense phragmites (*Phragmites* spp.), bulrush (*Scirpus* spp.), and cattail (*Typha* spp.) marshes opened loafing spaces along marsh edges, creating a necessary component for duck nesting habitat in the Delta Marsh, Manitoba (Sowls 1978). Keith (1961) also reported an increase in Mallard (*Anas platyrhynchos*) and Lesser Scaup (*Aytha affinis*) nesting in southeastern Alberta following the removal of dense cattail around prairie potholes by cattle.

Kirsch (1969) viewed grazing of shoreline vegetation as harmful to waterfowl nesting success in North Dakota. Stocking rates greater than 7.6 ha/AUM (animal unit month) destroyed all shoreline vegetation of ponds but 10.8 ha/AUM allowed a grassy shoreline to develop and allowed waterfowl nesting (Bue et al. 1952). Mack (1977) also recognized the detrimental effects of continuous grazing on nest cover and suggested deferred grazing would allow waterfowl production. Rest-rotational grazing was recommended as an alternative to fencing as a method to protect waterfowl nesting habitat during critical periods along grazed shorelines (Gjersing 1975 and Mundinger 1976).

Most studies on grazing and nest cover have focused on dry land vegetation adjacent to the water's edge (Kirsch 1969, Gjersing 1975, and Mundinger 1976), and few have mentioned grazing effects on emergent pond vegetation (Keith 1961 and Sowls 1978). The objective of this study was to determine the effects of grazing on nesting habitat of marshbirds in south Texas.

Study Area

This study was conducted on the Rob and Bessie Welder Wildlife Refuge near Sinton (San Patricio County), Texas. Two man-made impoundments, Rincon and Paloma tanks, were fenced in 1957 and have since expanded beyond the original fence. Consequently a section of the shoreline has remained ungrazed for 20 years. About 80 percent of the shoreline at Rincon Tank was grazed and 50 percent of Paloma Tank shoreline was grazed during this study.

Rincon Tank (1.74 ha surface water) and Paloma Tank (1.02 ha surface water) were located on clay soils within a 4-pasture, deferred rotation grazing system. Rincon was grazed at a stocking rate of 3.6 and 3.8 ha/AUM in 1977 and 1978,

[1] Welder Wildlife Contribution No. 244.

Table 1. A comparison of marshbird nests between ungrazed and grazed shorelines at Rincon and Paloma tanks, 1977–1978.

Tank / Species	1977		1978	
	Ungrazed	Grazed	Ungrazed	Grazed
Rincon				
Fulvous Whistling Duck	2	0	0	0
Purple Gallinule	1	0	0	0
Common Gallinule	4	1	1	0
Total	7	1	1	0
Paloma				
Purple Gallinule	1	0	1	0
Common Gallinule	1	0	1	0
American Coot	1	0	0	0
Total	3	0	2	0

respectively. Paloma was grazed at a stocking rate of 3.4 to 3.8 and 3.8 ha/AUM in 1977 and 1978, respectively.

The emergent pond vegetation at both tanks was dominated by smartweed (*Persicaria hyderopiperoides*), longtom (*Paspalum lividum*), knotgrass (*P. distichum*) and cyperus (*Cyperus digitatus*). Burhead (*Echinodorus cordifolius*) was also abundant at Rincon Tank.

Methods

Nest searches were conducted in June and July of 1977 and 1978. Nests were located visually while wading among the emergent vegetation at both tanks. Plants were identified according to Jones (1975).

The emergent pond vegetation was sampled in June and July in 1977 for both tanks, in June 1978 for Paloma Tank, and in July 1978 for Rincon Tank. Consequently vegetation sampling coincided with the breeding of marshbirds at both tanks. Ten transects perpendicular to the shoreline were randomly selected on the ungrazed and grazed shoreline of each tank. Foliar cover was estimated using an inclined 10-point frame, and height of vegetation (cm) was recorded at 1 m intervals along each transect.

Chi-square was used to test ($P \leq 0.01$) the effects of grazing on nest cover availability. Analyses of variance were conducted and Duncan's Multiple Range Test used to separate mean vegetation heights at $P \leq 0.05$ (Steele and Torrie 1960). Statistical tests were not applied to marshbird nest distribution because of the high number of samples required to characterize the frequency distribution.

Results and Discussion

Grazing had a marked effect on the distribution of marshbird nests at Rincon and Paloma tanks in the breeding seasons of 1977 and 1978. Four species of birds nested on the shorelines of both tanks and only one nest out of 14 was located on a grazed shoreline (Table 1). Cattle apparently influenced nest distribution by trampling and feeding on emergent pond vegetation, and by disturbing nesting pairs. Two Fulvous Whistling Duck (*Dendrocygna bicolor*) nests at Rincon Tank in 1977 occurred in thick mats of longtom over standing water. Cottam and Gla-

Fig. 1. Common Gallinule nest in longtom and smartweed on an ungrazed section of Paloma Tank, San Patricio County, Texas.

zener (1959) reported Fulvous Whistling Duck nests in dense stands of longtom, cutgrass (*Leersia* spp.), aster (*Aster spinosus*), cattail and burhead on the lakes of the Welder Refuge.

Three Common Gallinule (*Gallinula chloropus*) nests on Rincon Tank in 1977 and 1978 occurred in smartweed, 2 in longtom and 1 in cyperus. Common Gallinules nested twice on Paloma Tank in 1977 and 1978 using longtom and smartweed (Fig. 1) for nest cover on each occasion. Reagan (1977) found that Common Gallinules nest primarily in paspalum (*Paspalum* spp.) and panicum (*Panicum* spp.) grasses on Welder Wildlife Refuge lakes and sometimes in cattail and bulrush. Cottom and Glazener (1959) reported Common Gallinules nesting in smartweed and aster when available on the same lakes.

Table 2. Percentage foliar cover based on number of hits with a 10-point frame pin of the cover types at Rincon and Paloma tanks in relation to grazing, 1977–1978.

Tank	1977		1978	
Cover type[1]	Ungrazed	Grazed	Ungrazed	Grazed
Rincon				
Nesting	39	47	65	36
Non-nesting	61	53	35	64
Paloma				
Nesting	33	18	66	30
Non-nesting	67	82	34	70

[1] Cover type. Nesting cover = longtom, smartweed, cyperus. Non-nesting cover = all other emergent plants plus open water.

Table 3. Mean height of emergent pond vegetation (cm) at Rincon and Paloma tanks in relation to grazing, 1977–1978.

	1977		1978	
Tank	Ungrazed	Grazed	Ungrazed	Grazed
Rincon	42 b	42 b	60 c	31 a
Paloma	32 a	36 a	56 b	30 a

Means in the same row followed by the same letter are not significantly ($P > 0.05$) different.

A pair of Purple Gallinules (*Porphyrula martinica*) nested in longtom around Rincon Tank in 1977. On Paloma Tank a pair of Purple Gallinules nested in smartweed in 1977 and another pair nested in longtom in 1978. Reagan (1977) has pointed out that common and purple gallinules occur sympatrically in south Texas and exhibit some resource partitioning during the breeding season. Purple Gallinules nest in more dense vegetation and at higher elevations within the vegetation than Common Gallinules (Cottom and Glazener 1959, and Reagan 1977).

A single American Coot (*Fulica americana*) nest was found in smartweed on Paloma Tank in 1977. American Coots typically attach their floating nests to aster and smartweed on south Texas ponds and lakes (Cottam and Glazener 1959).

Nest cover at Rincon and Paloma tanks in 1977 and 1978 was comprised of longtom, smartweed and cyperus. Nest cover data were combined because each nesting species, with the possible exception of the Fulvous Whistling Duck, apparently would nest in any of the three nest cover types. Grazing significantly (Chi-square = 51.2, $P < .01$) reduced nest cover availability at Rincon Tank in 1978 (Table 2). However, there was no decrease in nest cover availability in 1977. Although adequate nest cover was available at Rincon Tank in 1977, only one of eight nests, belonging to a pair of Common Gallinules and built in smartweed, was placed on the grazed shoreline (Table 1). Cattle were present at Rincon Tank throughout the 1977 breeding season indicating their presence at the shoreline was adequate influence to reduce nesting attempts on the grazed shoreline. Cattle significantly reduced nest cover availability at Paloma Tank in 1977 (Chi-square = 81.10, $P < .01$) and 1978 (Chi-square = 214.49, $P < .01$). Cattle were absent from the Paloma shoreline for 42 days during the 1977 breeding season (June 13 to July 25). Removal of nesting cover (Table 2) by previous grazing restricted the birds to nesting in the emergents (area protected from grazing).

There was a marked difference between the prevailing water levels of the 1977 and 1978 breeding seasons. The emergent vegetation of the 1977 breeding season for both tanks was the result of high rainfall during the 1976 winter months (Cain et al. 1977). Therefore, pond emergents had optimum growing conditions over a prolonged period which allowed dense stands of nest cover and a higher species diversity of the emergent vegetation. Non-cover plant species that contributed to this effect in 1977 included water primrose (*Ludwigia peploides*), burhead, cyperus (*Cyperus articulatus*) and spike-rush (*Eleocharis macrostachya*). A general lack of rainfall between the 1977 and 1978 breeding seasons (Drawe, unpublished data) caused the diverse stands of emergent vegetation to disappear from both tanks. Sudden rains in June 1978 flooded the zone of smartweed, longtom and cyperus, allowing marshbirds to nest in these more permanent emergent species.

Height of the emergent vegetation was significantly reduced by grazing at Rincon and Paloma tanks in 1978 (Table 3). In 1977 the emergent vegetation on the grazed and ungrazed shoreline was slightly higher at each tank than that recorded in 1978. Thus cattle had a greater effect on the height of less dense stands than on more dense stands of emergent vegetation. This would restrict nesting attempts by Purple Gallinules, which require the nest be built in the upper parts of the emergent vegetation (Cottam and Glazener 1959, and Reagan 1977).

Cattle trample all emergent species while watering at stock ponds and thus reduce vegetation height and foliar cover. However, not all emergent species are palatable to cattle. While Durham and Kothmann (1977) found cattle intensively graze longtom in south Texas, Neeley (1967) considered smartweed to be unpalatable to cattle. It has not been reported if cyperus is palatable to cattle.

Acknowledgments

The authors wish to acknowledge the generous financial support of the Rob and Bessie Welder Wildlife Foundation, Sinton, Texas. Drs. Nova J. Silvy and C. J. Scifres provided editorial assistance and to them we are grateful. Patty McDonald and Becky Wieland typed the manuscript.

Literature Cited

Bue, I. G., L. Blankenship, and W. H. Marshall. 1952. The relationship of grazing practices to waterfowl breeding populations and production on stock ponds in western South Dakota. Trans. N. Am. Wildl. Conf. 17:396–414.

Cain, B. W., R. J. Whyte, and P. Micks. 1977. Southern nesting record of the American woodcock. Bull. Texas Ornith. Soc. 10(2):46.

Cottam, C., and W. C. Glazener. 1959. Late nesting of waterbirds in south Texas. Trans. N. Am. Wildl. Conf. 24:382–395.

Durham, A. J., and M. M. Kothmann. 1977. Forage availability and cattle diets on the Texas coastal prairie. J. Range Manage. 30(2):103–106.

Gjersing, F. M. 1975. Waterfowl production in relation to rest-rotation grazing. J. Range Manage. 28(1):37–42.

Jones, F. B. 1975. Flora of the Texas coastal bend. Welder Wildl. Found. Mission Press, Corpus Christi. 262 pp.

Keith, L. B. 1961. A study of waterfowl ecology on small impoundments in southeastern Alberta. Wildl. Monogr. 6. 88 pp.

Kirsch, L. M. 1969. Waterfowl production in relation to grazing. J. Wildl. Manage. 33(4):821–828.

Mack, G. D. 1977. Factors affecting waterfowl brood use of stock ponds in South Dakota. M.S. Thesis. South Dakota State Univ., Brookings. 50 pp.

Mundinger, J. G. 1976. Waterfowl response to rest-rotation grazing. J. Wildl. Manage. 40(1):60–68.

Neeley, W. M. 1967. Planting, disking, mowing and grazing. Proc. of the Marsh and Estuary Manage. Symposium: 212–221.

Reagan, W. W. 1977. Resource partitioning in the North American gallinules in southern Texas. M.S. Thesis, Utah State Univ., Logan. 72 pp.

Sowls, L. K. 1978. Prairie ducks. A study of their behaviour, ecology and management. Stackpole Co., Harrisburg, Penn. 193 pp.

Steele, R. G. D., and J. H. Torrie. 1960. Principles and procedures of statistics. McGraw-Hill Book Co. Inc., New York. 481 pp.

Recent Articles About Texas Birds

Alan D. Mitchnick

Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Texas 77843

- 1977 -

Alford, J. R., III, and E. G. Bolen. 1977. Differential responses of male and female pintail ducks to decoys. J. Wildl. Manage. 41:657–661. The flocks that responded to the decoys had a greater proportion of males compared to the total population.

Arnold, K. A., and L. J. Folse, Jr. 1977. Movements of the Great-tailed Grackle in Texas. Wilson Bull. 89:602–608. Banding studies demonstrate southward shifts in blackbird populations of the Bryan-College Station area in midwinter with replacement by populations from the north.

Bolen, E. G., and R. E. McCamant. 1977. Mortality rates for Black-bellied Whistling Ducks. Bird-banding 48:350–353. An annual mortality rate of 46–52 percent was determined.

Box, E. D., and D. W. Duszynski. 1977. Survey for *Sarcocystis* in the Brown-headed Cowbird (*Molothrus ater*): A comparison of macroscopic, microscopic and digestion techniques. J. Wildl. Dis. 13:356–359. About 30 percent of the cowbirds sampled in Houston showed positive results.

Broderson, D., A. G. Canaris, and J. R. Bristol. 1977. Parasites of waterfowl from southwest Texas: II. The Shoveler, *Anas clypeata*. J. Wildl. Dis. 13:435–439. Geographic distribution of parasites in fall and spring migrants were compared.

Brown, C. R. 1977. A record of intraspecific injury in the Purple Martin. Bird-banding 48:272. Incident illustrates that Purple Martins can inflict significant injury during intense intraspecific confrontations.

Burger, J., and L. M. Miller. 1977. Colony and nest site selection in White-faced and Glossy Ibises. Auk 94:664–676. The White-faced Ibis was studied on Danger Island, Aransas Pass, Texas.

Christensen, Z. D., and D. B. Pence. 1977. Helminths of the Plains Chachalaca, *Ortalis vetula mccalli,* from the south Rio Grande Valley. J. Parasitol. 63:830.

Cornelius, S. E. 1977. Food and resource utilization by wintering Redheads on lower Laguna Madre. J. Wildl. Manage. 41:374–385. Redheads consumed 4 percent of the fall standing crop and accounted for 21 percent of the winter decrease in shoalgrass biomass.

McCamant, R. E., and E. G. Bolen. 1977. Response of incubating Black-bellied Whistling-ducks to loss of mates. Wilson Bull. 89:621. Loafing whistling-ducks do not take over incubation if males do not join them.

Morrison, M. L., and R. D. Slack. 1977. Population trends and status of the Olivaceous Cormorant. Am. Birds 31:954–959. Audubon Christmas Bird Count

data was found to be extremely useful in identifying populations trends in cormorants.

Morrison, M. L., and R. D. Slack. 1977. The role of flock feeding in Olivaceous Cormorants. Bird-banding 48:277–279. Cormorants which feed in flocks are apparently more efficient than solitary feeders.

Quinton, D. A., and A. K. Montei. 1977. Preliminary study of the diet of Rio Grande Turkeys in north central Texas. Southwest Nat. 22:550–553. Hen and tom turkey food sources were compared.

Roth, R. 1977. The composition of four bird communities in south Texas brush-grasslands. Condor 79:417–425. Species richness was quite similar, but total population density, individual species abundance, and species composition differed greatly among the areas.

- 1978 -

Arnold, K. A. 1978. A Jabiru (*Jabiru mycteria*) specimen from Texas. Auk 95:611–615. Author believes that it is highly probable that immature Jabirus mixed with flocks of Wood Stocks and moved north into Texas and Oklahoma in post-breeding dispersal.

Arnold, K. A., and D. J. Jirovec. 1978. Arrivals and departures of wintering Common Snipe in central Brazos Valley of Texas. N. A. Bird Bander 3:45–47. The first heavy fall flights usually occurred during the first two weeks of October and spring movements usually began during the second and third weeks of March.

Bennett, J. W., and E. G. Bolen. 1978. Stress response in wintering Green-winged Teal. J. Wildl. Manage. 42:81–86. Stress levels were determined by measuring a Condition Index and determining blood glucose, urea nitrogen, and uric acid concentrations.

Bolen, E. G. 1978. Long-distance displacement of two Southern Barn Owls. Bird-banding 49:78–79. A 7-year old bird was recovered 984 km from banding site and another bird was recovered 248 km from banding site.

Bolen, E. G., and M. K. Rylander. 1978. Feeding adaptations in the Lesser Snow Goose (*Anser caerulescens*). Southwest Nat. 23:158–160. They concluded that grubbers (Snow Goose) differ from grazers (Canada Goose) by exhibiting stouter maxillary and mandibular serrations, but differ very little from other grazers (White-footed Goose).

Brown, C. R. 1978. Double-broodedness in Purple Martins in Texas. Wilson Bull. 90:239–247. The author suggests that second broods may occur in the southern U.S. whenever large numbers of martins are present at the colonies later than usual.

Brown, C. R. 1978. On early arrival of Purple Martins. Bird-banding 49:130–133. Martins may arrive early to compete with House Sparrows and Starlings as opposed to intraspecific competition.

Brown, C. R. 1978. Sexual chase in Purple Martins. Auk 95:588–590. Pair chases and rape chases are compared and interpreted.

Delnicki, D. 1978. Second occurrence and first successful nesting record of the Hook-billed Kite in the United States. Auk 95:427. Two pairs of adults were observed on Santa Ana Natural Wildlife Refuge.

Folse, L. J., Jr., and K. A. Arnold. 1978. Population ecology of Roadrunners

(*Geococcyx californianus*) in south Texas. Southwest Nat. 23:1–27. Territories, reproductive success, mortality, predation, and nestling growth were studied.

Renwald, J. D., H. A. Wright, and J. T. Flinders. 1978. Effect of prescribed fire on Bobwhite quail habitat in the Rolling Plains of Texas. J. Range Manage. 31:65–69. When burning large pastures, at least 10 honey mesquite and 4 large lotebushes per hectare should be saved to provide adequate cover for quail.

White, D. H., and D. James. 1978. Differential use of fresh water environments by wintering waterfowl of coastal Texas. Wilson Bull. 90:99–111. Certain niche characteristics and environmental relationships of waterfowl were determined by use of multivariate statistical analysis of 20 environmental factors.

Wilson, N., and G. V. Oliver, Jr. 1978. Noteworthy records of two ectoparasites (Cimididae and Hippoboscidae) from the Turkey Vulture in Texas. Southwest Nat. 23:305–307.

Wolf, D. E. 1978. First record of an Aztec Thrush in the United States. Am. Birds 32:156–157. An immature individual was sited near Boot Spring in the Chisos Mountains of Big Bend National Park.

(Editor's note) Further papers from 1978 and 1979 will appear in Vol. 13.

GENERAL NOTES

A Nesting Record for Mississippi Kites in Ft. Bend County, Texas

Holly H. Hobart and Debbie DeKeyzer

Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Texas 77843, and
5606 Benning, Houston, Texas 77096

There is only one breeding record for the Mississippi Kite (*Ictinia misisippiensis*) in southeastern Texas (Parker and Ogden 1979, American Birds 33:119–129). They report summer residency with breeding likely in Polk and Ft. Bend counties. The following account reports some details of the occurrence of Mississippi Kites, and the successful fledging of young at kite nests in Ft. Bend County, Texas during 1977 and 1978, with repeated nesting in 1979.

Large numbers of Mississippi Kites were observed soaring and feeding over Richmond, Texas during the spring and summer of 1975 and 1977. As many as 20 individuals representing different age classes could be accounted for at one time. The numbers of kites decreased during the summer and increased again in late summer. Groups of birds were sighted soaring just above large pecan trees (*Carya illinoensis*) in the town of Richmond and above the trees along the Brazos River.

On 27 May 1977 Mississippi Kites were seen soaring and feeding near highway US 59 and the Brazos River. An individual bird was seen carrying an unidentifiable object that was not a food item. This bird flew to a pecan tree; less than 5 seconds later it flew from the tree without the object. Later another adult kite was seen in the area carrying vegetation in its talons.

On 29 May we revisited the area. Again an adult kite was observed flying into and out of a large pecan tree, leaving an object in the tree. A nest, with an adult sitting on it, was subsequently located in this tree (Site 1). The nest, 13.5 m high, was in the smaller branches near the edge of the canopy. An attempt to climb the tree to view the nest contents was unsuccessful. An adult kite and an immature-plumaged kite were perched in a neighboring large tree with many dead branches. They exhibited little fear, leaving almost reluctantly upon our approach.

The following day, 30 May, a second Mississippi Kite nest was found in the vicinity (Site 2). The nest was also in the edge of the canopy of a pecan tree. Several visits were made to the area during the summer, and by early August, both nests had fledged 2 birds each.

The next year on 23 May 1978, an adult kite was spotted sitting in the large "perch tree." Investigation of Site 1 revealed the birds were using the same nest. Site 2 was checked, but no nest was found. However, a single kite was perched

Fig. 1. Young Mississippi Kite (*Ictinia misisippiensis*) about 21 days old, Ft. Bend County, Texas, 18 July 1978. Photo by Debbie DeKeyzer.

near this site. Soon it was joined by a second adult, and copulation was observed. A week later, a pair of birds was working on a nest at Site 2 in a tree adjacent to the nest tree used in 1977. As before, the kites selected a spot in the smaller branches of a pecan tree for their nest. As of 6 June both nests were occupied, with fresh greenery being delivered to one.

During the next 2 weeks, severe thunderstorms passed through the area. On 18 June the Site 2 nest was found destroyed, and no kites were in attendance. Pieces of bluish-white eggshell were found on the ground beneath the destroyed nest. The other nest had weathered the storms, and a kite was still on the nest.

On 30 June no adult kite was on the Site 1 nest. However, when the nest tree was approached, an adult flew from an adjacent tree and began calling. When the observer withdrew, 2 adult kites began soaring over the nest site, and one kite eventually flew into the nest.

Two weeks later, on 15 July, a visit to the nest provoked more calling by an adult perched nearby. This time 2 hatchlings—with downy white heads, dark wings and back, patches of chestnut color on the breast, and tail feathers about an inch long—were sitting on the edge of the nest. Three days later the young birds were banded and photographed (Fig. 1). At the time of banding, the young were about 21 days old. Greenery from the nest was black willow (*Salix nigra*).

On 25 July a climb to the nest prompted a flight by one of the young. The other young bird was perched on the other side of the nest tree and did not fly. On 9 August, the young birds were perched in the "perch tree" a short distance from the nest tree.

In 1979 2 active nests were located in the same area during 2 visits in late June and early July. The Site 1 nest was being used for the third season; the other nest was near Site 2, the location of the destroyed nest in 1978. No other visits to the area were made during the summer of 1979, therefore, no information as to the success of nesting is available.

Notes on Nesting Behavior in the Tufted Titmouse

Raymond W. Neck

6803 Esther, Austin, Texas 78752

The Tufted Titmouse, *Parus bicolor bicolor* (L.), ranges from the eastern United States westward to central Texas. Observations of a nest site of the Tufted Titmouse from 1969 to 1971 yielded data worthy of note. Initial observations were made on 26 April 1969 in a residential area of central Austin, Travis County, Texas. Vegetation was mostly pecan, *Carya illinoensis* (Wang.) K. Koch, and plateau live oak, *Quercus fusiformis* Small, with ground cover of St. Augustine grass, *Stenotaphrum secundatum* (Walt.) Küntze. Other plants present were Chinese privet, *Ligustrum sinense* Lour; heavenly bamboo, *Nandina domestica* Thumb.; and coronavine, *Antigonon leptopus* Hook. & Arn.

A pair of Tufted Titmice constructed a nest in a 2.4 m length of vertical pipe which was 10 cm in diameter. The nest was constructed on piles of leaves and sticks which had accumulated in the pipe and was within 24 to 30 cm of the top of the pipe. Nesting of this species in pipes has been reported previously (Dickey in Bent 1946:395; Sutton 1967:388).

Natural nesting sites of titmice include old woodpecker nesting holes and other tree cavities (Harris 1919) which normally are more protected from rainfall than the vertical pipe nest. The pipe was only partially protected from direct rainfall, but was generally hollow below the nest as the nesting material rested on leaves piled upon a bolt through the pipe (used to hold fencing wire). Utilization of such anthropogenic nesting sites would appear to be crucial to this opportunistic species in urban areas; the limiting factor of population density of the Plain Titmouse, *Parus inornatus,* appears to be cavities available for nesting sites (Dixon 1949).

Both members of this pair brought food directly to the young. Previous reports have indicated that both sexes feed the young (Bent 1946:399; Laskey 1957) or that the male brings most of the food (Cairns 1889). As one parent returned to the nest area, it would alight on a pecan branch about 1 m from the top of the pipe and initiate a series of notes. The attentive bird (on the nest inside the pipe) would then suddenly appear on the rim of the pipe and immediately fly off. Almost simultaneously, the non-attentive bird would fly to the rim of the pipe and drop down to the nest. At this time calling of the young could be easily heard. The second bird, upon returning to the nest area, would alight on the nearby branch, whereupon the same nest relief ceremony would be repeated. Several such exchanges could be observed in a short time period. Foraging trip times varied (as short as about 1 min), apparently reflecting variability in locating and capturing suitable insect prey. Such a synchronization pattern of the comings and goings of these two birds would appear to be the most efficient method of alternating feeding parents considering the restricted access to the nest provided by the pipe diameter. Similar feeding synchronization is probably as efficient in a tree cavity, but I found no reference to such behavior in the literature.

Tufted Titmice are known to nest in the same general area through several seasons (van Tyne 1948). Nesting occurred in Spring 1970 in Austin in the same pipe (identity of the 1969 and 1970 birds could not be established). On 19 March 1971, 2 Tufted Titmice were seen investigating the same vicinity and the pipe in particular. The pair was driven off by a Blue Jay, *Cyanocitta cristata cristata* (L.). Bent (1946:400) reported that the Tufted Titmouse "seems to be the dominant character [on the feeding shelf]; only the Blue Jay refuses to make way for him." No nesting occurred in the pipe in 1971. Before the 1972 season arrived, the pipe had been removed.

Literature Cited

Bent, A. C. 1946. Life histories of North American jays, crows and titmice. Bull. U.S. Nat. Mus. 191.

Cairns, J. S. 1889. The summer birds of Buncombe County, North Carolina. Ornithal. and Ool. 14:17–23.

Dixon, K. L. 1949. Behavior of the Plain Titmouse. Condor 51:110–136.

Harris, H. 1919. Birds of the Kansas City region. Trans. Acad. Sci. St. Louis 18:213–387.

Laskey, A. R. 1957. Some Tufted Titmouse life history. Bird-Banding 28:135–145.

Sutton, G. M. 1967. Oklahoma Birds. U. Okla. Press, Norman. 674 pp.
van Tyne, J. 1948. Home range and duration of family ties in the Tufted Titmouse. Wilson Bull. 60:121.

Additional Records of Small Subspecies of Canada Geese in Texas

Keith A. Arnold

Department of Wildlife and Fisheries Sciences,
Texas A&M University, College Station, Texas 77843

On 12 January 1969 Mr. Sam Destefano, a Texas Parks and Wildlife Department Game Warden, confiscated 7 Canada Geese (*Branta canadensis*) illegally shot by a hunter at the same locality in Waller Co., Texas. All of these geese were relatively small, with four being exceptionally so. These birds were preserved as complete or partial study skins and entered into the Texas Cooperative Wildlife Collections, Texas A&M University. Recently, I attempted to make subspecific determinations on these 7 specimens, plus 2 others (1 each from Irion and Waller counties) which appeared to be of the "small" races. Lacking proper comparative material, I sent these 9 specimens to Dr. John Aldrich at the National Museum of Natural History. Dr. Aldrich (in litt.) identified the 9 specimens as 4 *B. c. hutchinsii,* 4 *B. c. taverneri* and 1 *B. c. parvipes,* ". . . on the basis of the enclosed measurements together with plumage color as far as it was discernable from the material submitted."

The status of *parvipes* and *taverneri* is poorly known for Texas. Oberholser (1974, *The Bird Life of Texas,* Vol. 1, Univ. Texas Press, Austin) listed 7 specimens of *parvipes* from 3 coastal counties (Chambers, Kleberg, and San Patricio) and commented on a number of band returns from Wilbarger and Randall counties in northern Texas. He listed 3 specimens of *taverneri,* 1 from Aransas county and 2 from Kleberg county. All specimens of *hutchinsii* (listed as a separate species by Oberholser, op. cit.) were from coastal prairie counties. The 9 specimens reported here are important in documenting a more widespread distribution of the 3 subspecies in Texas (Table 1). Furthermore, the presence of all 3 forms in the 7 birds shot at the same time by one hunter in one feeding aggregation (Waller county) suggests commonality of roosting and/or flocking.

The specimen of *taverneri* (Table 1) from Irion Co. represents the first record for this subspecies outside of the "coastal prairie." This subspecies, described by Delacour (1951, Amer. Mus. Novitates, no. 1537), was not recognized by the A.O.U. (1957, Check-list of North American birds, 5th ed., Lord Baltimore Press, Inc., Baltimore, MD) and was not included by TOS Bird Records Committee (1974, *Check-list of the Birds of Texas,* Texas Ornithological Society). More recently, Bellrose (1976, *Ducks, Geese and Swans of North America.*

Table 1. Selected measurements for 9 specimens of Canada Geese.

	TCWC No.	Age/Sex		County	Wing*	Tail*	Culmen*	Tarsus*
B. c. hutchinsii	8068	Ad	F	Waller	347	114	31	64
	8069	Ad	F	Waller	339	114	30	61
	8330	Ad	U	Waller	371	—	31	—
	8270	Im	M	Wharton	367	108	35	75
B. c. taverneri	8070	Ad	F	Waller	369	128	36	70
	8328	Im	F	Waller	380	—	36	70
	8329	Im	U	Waller	393	—	35	75
	10295	Im	U	Irion	365	—	36	68
B. c. parvipes	8327	Im	F	Waller	398	—	40	75

* Measurements in mm.

Stackpole Books, Harrisburg, PA.) accepted 11 described races, including *taverneri*. He commented that ". . . the existing racial classification leaves much to be desired, because many birds fail to fit the "pigeonholes" designed by their describers."

I thank Drs. James Dixon and Nova Silvy for commenting on this manuscript and Dr. Aldrich for his identifications.

Recent Texas County Records

Recent numbers of the *Bulletin of the Texas Ornithological Society* have featured additions to county records given in Oberholser (1974). These additions (Barr et al. 1975, Bryan and Moldenhauer 1977, Dowler et al. 1978, Gallucci and Scudday 1978, and Gallucci 1979) include specimens housed in various systematic collections as well as photographs on file in the Texas Photo-Record File (housed at Texas A&M University). Only those specimens or photographs for which no county record was noted in Oberholser (1974) were included.

As our knowledge of the Texas avifauna grows, records of specimens, photographs, and/or tape recordings will accumulate which can further update the species distribution maps given in Oberholser (1974). In order to facilitate the widest dissemination, the November-December number of the *Bulletin of the Texas Ornithological Society* will feature these updates to Oberholser (including subsequently published records) as a short report. In this "Recent Texas County Records" section individuals can report additions of specimens, photographs, or tape recordings on an annual basis. The format for submissions of these new county records, as shown in the first listings given below, include: scientific name, common name, county, date, specimen number (photograph and/or tape recording number), and initials of individual submitting record. Scientific and common names will follow the American Ornithologists' Union Check-list of North American Birds (1957) and supplements. In order to meet publication deadlines for the

November-December number, all submissions to "New Texas County Records" should be sent to the editor by Sept. 1. The editor hopes that these reports will provide a rapid and efficient mechanism for those interested in the Texas avifauna to keep abreast of advances in our knowledge.

The "Recent Texas County Records" section will not preclude articles on additions from systematic collections which heretofore have not been treated separately. Further, this section will not take the place of articles or notes on species significant range extensions, unusual seasonal occurrences, breeding documentation, or other reports of biological significance.

Literature Cited

American Ornithologists' Union. 1957. Check-list of North American birds. 5th Ed. Lord Baltimore Press, Baltimore, MD.

Barr, A. L., K. A. Arnold, and S. F. Holm. 1975. A listing of county records for specimens in the Texas Cooperative wildlife collection not reported in Oberholser's "Bird Life of Texas." Bull. Texas Ornith. Soc. 8:8–10.

Bryan, K. B., and R. R. Moldenhauer. 1977. Additional Walker County records to Oberholser's "The Bird Life of Texas." Bull. Texas Ornith. Soc. 10:36–38.

Dowler, R. C., D. K. Dean, T. E. Herman, and A. C. Simon. 1978. County records in Texas for birds housed in the Museum, Texas Tech University. Bull. Texas Ornith. Soc. 11:12–16.

Gallucci, T. 1979. County records for bird specimens in the collection of the Museum of Arid Land Biology (University of Texas at El Paso) and two other west Texas collections. Bull. Texas Ornith. Soc. 12:26–27.

———, and J. F. Scudday. 1978. County records for bird specimens in the Sul Ross State University collection not reported in Oberholser's "The Bird Life of Texas." Bull. Texas Ornith. Soc. 11:10–11.

Oberholser, H. C. 1974. The Bird Life of Texas (E. B. Kincaid, Jr., Ed.). Univ. Texas Press, Austin.

COUNTY RECORDS

SPECIES	COUNTY	DATE		
Anser c. caerulescens Blue Goose	Freestone	11/15/77	TCWC#10575	KAA
Aythya affinis Lesser Scaup	Webb	01/79	TCWC#10599	KAA
Aythya affinis Lesser Scaup	Fayette	01/29/79	TCWC#10724	KAA
Bucephala albeola Bufflehead	Lamar	12/24/78	TCWC#10668	KAA
Buteo lineatus Red-shouldered Hawk	Zapata	01/79	SRVC#953	TG
Buteo p. platypterus Broad-winged Hawk	Montgomery	04/22/79	TCWC#10670	KAA
Aquila chrysaetos canadensis Golden Eagle	Milam	11/78	TCWC#10576	KAA
Circus cyaneus hudsonicus Marsh Hawk	Dowley	03/11/79	TCWC#10659	KAA
Meleagris gallopava Turkey	Terrell	25/11/79	SRVC#1010	JFS
Sterna caspia Caspian Tern	Polk	12/78	SRVC#984	TG
Columba f. flavirostris Red-billed Pigeon	Webb	01/3/79	TCWC#10601	KAA
Tyto alba pratincola Barn Owl	Carson	03/11/79	TCWC#10660	KAA
Tyto alba pratincola (SKEL) Barn Owl	Parmer	04/20/78	TCWC#10656	KAA
Otus asio Screech Owl	Haskell	02/16/72	TCWC#9086	KAA
Otus asio (WINGS) Screech Owl	Brown	03/79	SRVC#1075	TG
Strix varia georgica Barred Owl	Sabine	03/31/79	TCWC#10738	KAA
Strix varia Barred Owl	Polk	09/73	TCWC#10581	KAA
Asio f. flammeus Short-eared Owl	Swisher	11/23/78	TCWC#10583	KAA
Aegolius acadicus (WINGS) Saw-whet Owl	Randall	05/6/79	TCWC#10662	KAA
Chordeiles acutipinnis Lesser Nighthawk	Hays	07/28/75	TCWC#9946	KAA
Empidonax (minimus) Least Flycatcher	Midland	05/13/78	TCWC#10646	KAA
Petrochelidon pyrrhonota Cliff Swallow	Gray	07/16/78	TCWC#10587	KAA

Parus bicolor atricristatus Tufted Titmouse	Webb	01/4/79	TCWC#10621	KAA
Parus bicolor atricristatus Tufted Titmouse	Zapata	01/8/79	TCWC#10622	KAA
Toxostoma longirostra sennetti Long-billed Thrasher	Goliad	05/27/77	TCWC#10520	KAA
Anthus spinoletta (WINGS) Water Pipit	Polk	12/78		TG
Vermivora virginiae Virginia's Warbler	Randall	08/26/78	TCWC#10664	KAA
Coccothraustes vespertinus Evening Grosbeak	Walker	03/5/78	TCWC#10645	KAA
Carpodacus p. purpureus Purple Finch	Ellis	01/20/78	TCWC#10464	KAA
Ammodramus savannarum Grasshopper Sparrow	Zapata	11/11/78	TCWC#10570	KAA

TCWC = Texas Cooperative Wildlife Collections, Texas A&M University.
SRVC = Sul Ross State University Vertebrate Collections.
KAA = Keith A. Arnold, TG = Tony Gallucci, JFS = James F. Scudday.

NOTES AND NEWS

ABOUT THE ARTIST.—The illustration of an aroused Belted Kingfisher (inside front cover) is an original pencil drawing by Larry Haines. Larry grew up in Harlingen, Texas where he received his earliest artistic training. Since then Larry has worked as a commercial artist and recently received a fine arts degree from the University of Houston. Larry's wildlife art was recently featured by a one man show at The Chickadee in Houston. His work concentrates on paintings and drawings of Texas wildlife. Larry and his wife, Mollie, reside in Houston. His studio is located at 7623 Mosewood, Houston, Texas 77040.

EDITORIAL ASSISTANCE.—The editor wishes to thank George A. Newman, Terry Maxwell, Michael Passmore, Keith A. Arnold, Holly Hobart, Scott Lutz, Tony Gallucci, Ralph Moldenhauer, Warren Pulich, Bruce Thompson and Gene W. Blacklock for reviewing manuscripts submitted to the *Bulletin* for publication in 1979. I am grateful to Judy Frank and Dianne Wauters for typing portions of the final copy for Volume 12. Keith Arnold, Alan Mitchnick and Holly Hobart provided invaluable editorial assistance for Volume 12 of the *Bulletin of the Texas Ornithological Society*.

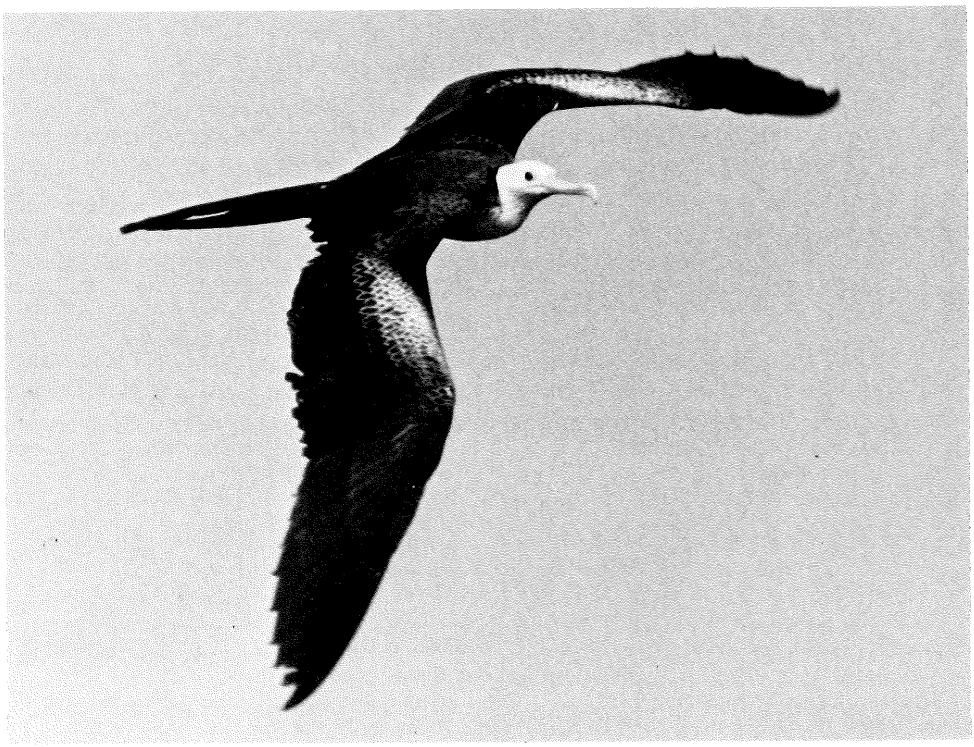
RECENT TEXAS COUNTY RECORDS.—Submission of new, substantiated Texas county bird records should be sent to the *Bulletin* editor prior to September 1 of each calendar year. Format and description of this new feature can be found on page 55 of this issue.

The *Bulletin* and *Newsletter* of the *Texas Ornithological Society* are issued to all members not in arrears for dues. Membership in the *Texas Ornithological Society* is open to all persons interested in observation, study, and conservation of birds in Texas. Membership dues are $3.00 per year (student), $5.00 per year (active), $10.00 per year (sustaining), $100.00 paid once, or in $25.00 annual payments over a period not to exceed four years (life). Inquiries regarding membership should be addressed to Ms. Elaine Robinson at *TOS*, P.O. Box 19581, Houston, Texas 77024. Original articles, reports and other items submitted for inclusion in the *Bulletin of the Texas Ornithological Society* should be sent to the editor, R. Douglas Slack, Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Texas 77843.

Printed at Allen Press, Inc., Lawrence, Kansas 66044

BULLETIN
OF THE
TEXAS ORNITHOLOGICAL SOCIETY

R. DOUGLAS SLACK, Editor
Department of Wildlife and Fisheries Sciences
Texas A&M University
College Station, Texas 77843



Magnificent Frigatebird (*Fregata magnificens*) from West Galveston Bay, Galveston Co., June 1979. Photograph by Ted L. Eubanks, Jr.