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ASPECTS OF WOOD STORK NESTING ECOLOGY ON CUMBERLAND ISLAND, GEORGIA

Carol Ruckdeschel and C. Robert Shoop

The first reported Wood Stork (*Mycteria americana*) nesting in Georgia was in the Okefenokee Swamp in 1967 (Cone and Hall, 1970). Burleigh (1958), did not mention the stork nesting in Georgia. Hopkins and Humphries (1983) summarized the steadily increasing Georgia nesting records which included three inland sites in the Okefenokee swamp and Jenkins County, and sites in three coastal counties: McIntosh, Glynn and Camden. All Georgia coastal nesting records have been on the mainland. Bent (1926) included an Amelia Island, Florida, site as the breeding range, but did not give a specific location, and Clark (1978) reported nesting farther south on Merritt Island, Florida. This paper is the first report of Wood Stork nesting on a Georgia barrier island. In the years 1985 through 1987 we observed Wood Storks nesting with other colonial species on Cumberland Island, Camden County, Georgia. Semi-drought conditions prevailed on Cumberland Island during two years of our observations, and we were able to document the resulting nest successes and failures. This paper is the third in a series to define the current status of the Cumberland Island biota.

Unsuccessful stork nesting has been related primarily to reduced food supplies and loss of nesting habitat (Kushlan et al., 1975; Ogden and Patty, 1981; Hopkins and Humphries, 1983; Kushlan, 1986). Predation at wading bird heronries has been mentioned (Dusi and Dusi, 1968; Jenni, 1969; Rodgers, 1987) but apparently never regarded as a significant factor in the overall reproductive success of the Wood Stork. This paper presents observations concerning the importance of large alligators to nesting success of some colonial waterbirds on Cumberland Island. Food habits of the Wood Stork appear temporally and geographically variable. Bent (1926) reported that the stork fed mainly in freshwater but occasionally resorted to salt water mud flats and shoals. Imhof (1976) stated that storks seemed to avoid salt or brackish water in Alabama; and Ogden and Patty (1981) did not mention salt or brackish water as important feeding areas in Florida and Georgia. In the Big Cypress region of south Florida, Kahl (1964) believed all the storks fed in freshwater areas, and only for the Florida Everglades colony did he report feeding in brackish water. Further studies in the Everglades (Kushlan et al., 1975; Ogden et al., 1976) revealed storks annually fed in a succession of habitats beginning with coastal marshes.

In the coastal region of South Carolina and Georgia, Sandifer et al. (1980) reported storks fed in the salt marshes throughout the summer. We report on storks feeding in salt marshes around Cumberland Island throughout the year.

STUDY AREA

Cumberland Island is Georgia's largest (length 27 km, maximum width 5 km) and southernmost barrier island. It supports more diverse habitats than other Georgia islands, and has contained egret and ibis nesting colonies for many years (Hillestad et al., 1975). The heronries we observed were located in Heron Pond (also called Nightingale Pond) and in a small section of the Sweetwater slough complex. They were approximately 8.5 km apart and represented different types of temporary freshwater aquatic systems. Heron Pond was modified in this century by a channel cut from near the middle of the pond to the southern end to provide a more reliable source of water for duck hunting. The northeastern end was shallow. The pond was oval and approximately 2 ha with one large, dead pine tree near the center, had a muck bottom, and much open water. Water depth did not exceed 1.5 m during this study and was considerably less beneath most of the heronry. Live black gum trees (*Nyssa sylvatica*, 9-12 m), red maples (*Acer rubrum*, 12-15 m), sweetgum (*Liquidambar styraciflua*, 10-12 m), and buttonbush (*Cephalanthus occidentalis*, 2-4 m), and the dead pine in the northern end of the pond supported most of the nesting colony. Some of the trees died in 1986.

The Sweetwater complex is a series of parallel, linear sloughs separated by live oak (*Quercus virginiana*) and palmetto (*Serenoa repens*) dominated ridges, occupying an estimated 140 ha on the east side of the island. The sloughs are mostly open water during the spring, with extensive thickets of mallow (*Hibiscus moscheutos*) occurring in shallow water during mid-summer. Water depth around the heronry did not exceed 1 m in 1987 and was less under the nest trees. Nests were in live, low (2-4 m) willow trees (*Salix caroliniana*), buttonbush (2-4 m), and black gum (9-10 m) surrounded by deeper open water with a muck bottom and dense patches of pickerel weed (*Pontederia cordata*). The nesting colony occupied <1 ha.

METHODS

Observations were made at the heronry locations and marshes surrounding Cumberland Island during 1985 through 1987. In 1985 and 1987, aerial surveys were flown to check for additional nesting colonies on the island. Visits to the heronries were made irregularly, but monthly in all years, and only during daytime hours to reduce disturbance. When heavy predation was discovered at the Sweetwater site in June 1987, visits were increased to every three or four days. Particular attention was paid to water level, predation, and regurgitated food. The relative water levels of the pond and slough were judged in relation to the edge of the habitat as well as by the depth of the water. In both Heron Pond and the Sweetwater complex the topography of the bottom is highly variable. The actual water level is significant only in relation to the highest ground between the heronry trees and the adjacent dry land.

Mammalian depredations were indicated by chewed bones and fresh carcasses with missing parts. Avian predation was assumed when no bones were broken, flesh was striped leaving ligaments and tendons, and the carcass remained in the nest.

RESULTS

A summary of Wood Stork nesting and depredation is provided in Table 1. In 1985 at Heron Pond there were four active stork nests, each with two young. The water level in the pond remained relatively high all summer and we observed no predation in the heronry. At least one large alligator (>2 m) was present throughout the season. The following species, in order of abundance, also nested: Great Egret (*Casmerodius albus*), Cattle Egret (*Bubulcus ibis*), Snowy Egret (*Egretta thula*), Tricolored Heron (*Egretta tricolor*), Little Blue Heron (*Egretta caerulea*), White Ibis (*Eudocimus albus*), Black-crowned Night-Heron (*Nycticorax nycticorax*), and Anhinga (*Anhinga anhinga*). Each night an estimated 15,000 wading birds roosted around the pond (M. Hopkins, pers. comm.). Aerial surveys revealed no other egret or ibis nesting on the island that year.

Table 1. Summary of Wood Stork nesting, depredations, and relative water level at heronries on Cumberland Island, Georgia, 1985 through 1987. NA = Not applicable.

Time period	Heronry location	Nesting activity	Initial no. nests	Signs of predation	Relative water level
1985					
June	Heron Pond	yes	4	no	high
August	Heron Pond	yes	no	high	
Spring-Summer	Sweetwater	no	NA	high	
1986					
May	Heron Pond	yes	13	no	moderate
June	Heron Pond	yes	yes	low	
Spring-Summer	Sweetwater	no	NA	dry	
1987					
May	Heron Pond	yes	8	no	low
June	Heron Pond	abandoned	no	dry	
Early June	Sweetwater	yes	18	no	moderate
Late June	Sweetwater	yes	yes	low	
July	Sweetwater	abandoned	NA	dry	

The water level in Heron Pond was lower in 1986, leaving many of the trees used for nesting in 1985 on dry ground; consequently, the size and species composition of the nesting colony was reduced. Only Wood Storks, Great Egrets, Black-crowned Night-Herons, and Anhingas were observed nesting in trees in the remaining water; Snowy Egrets and Cattle Egrets also were present. At least 28 young Wood Storks were distributed among 13 nests. By June, the water had receded from many of the active nest trees and many young storks were missing. Parts of one depredated carcass were found scattered at the edge of the heronry. Most of the young had fledged by that time but continued to spend time at the nest site. Two large alligators (>2 m) were regularly seen basking, and there were fresh, large alligator tracks in the mud beneath some of the active nest trees. Ground surveys documented that the Sweetwater heronry site was dry and not in use that year.

In May of 1987, eight Wood Stork nests were attended in Heron Pond, but only one bird appeared to be brooding. The water level of the pond was low. By June the pond was dry except for the artificial canal, and the heronry had been abandoned by all storks before nesting was completed. Heron Pond remained dry for the remainder of 1987 and did not contain a heronry.

The maximum water depth was about 1 m in the Sweetwater complex in May of 1987, and in early June we observed 18 active Wood Stork nests, some with very large young. The entire heronry was not visible from any one vantage point, so the nest count may be incomplete. The number of nests of all species in the heronry was at least 150. There were no signs of predation.

By the end of June 1987, the water level had dropped about 15 cm and many of the Wood Stork nests on the periphery of the Sweetwater site were empty. The trees on the periphery were out of water and there was much sign of predation in the nests and beneath the nest trees. We found fresh and decomposing remains of 10 nestling Wood Storks, most of which had their dark primary feathers about half developed. Smaller species also were absent from the peripheral trees, but only a few of their feathers were found. Three days later, as the water level continued to drop, 6 more fresh nestling stork carcasses were found. Three days following that, another was found, making a total of 17 carcasses in all. Dozens of partially digested, regurgitated fish beneath the nests of the depredated storks were identified as *Fundulus heteroclitus*, *Leiostomus xanthurus*, *Elops saurus*, *Mugil curema*, and *Opsanus tau*. As the water level dropped, many deer (*Odocoileus virginianus*) tracks, some feral horse (*Equus caballus*) sign and a few raccoon (*Procyon lotor*) tracks were seen on the newly exposed ground in the heronry. Crushed, waist-high vegetation, well-used 60 cm wide channels through the area, and large, fresh alligator tracks throughout the heronry, documented much alligator activity although we never saw an alligator. No depredations or losses of nestlings were observed in trees that remained in the water.

By early July 1987, there was only one young stork at a nest in the Sweetwater heronry, but 10 fledglings were in oak trees on the adjacent ridge. Juveniles were not observed outside the immediate heronry prior to that time, so presumably they were young of the year. Many egrets and herons had renested and had eggs and very small young. Alligator sign was still prevalent and indicated much activity in wet areas. By the end of the month the heronry was

dry, and all eggs, nestlings and birds were gone. There had not been time for the eggs and chicks to have developed, so we suggest the heronry was abandoned.

At least two forms of predation were observed at the Sweetwater heronry as the water level fell. Carcasses of 13 large nestling Wood Storks were found on the ground, partially eaten by predators able to chew and break bones. Five carcasses found in nests revealed no broken bones, yet musculature had been stripped from the breasts, thereby implicating an avian predator. All fresh carcasses appeared to have been healthy, well-developed animals prior to death. Raccoon feces containing feathers were found around the heronry.

DISCUSSION

Although Wood Stork nesting on Cumberland Island increased from 4 nests in 1985 to at least 18 nests in 1987, the estimated success rate dropped. Nest success was related to water level beneath the heronry and dropped sharply as the water level fell. Predation associated with the dropping water level was a major factor in reduced Wood Stork nesting success. No predation or loss of nestlings was observed until a land bridge connecting the heronry site to the adjacent high ground was exposed. Following that exposure, the depredated remains of 17 large nestling storks were found. As the water level decreased so did the convenient patrol zone of the alligator, an animal intimately associated with heronries in the Coastal Plain (Giles and Childs, 1949; Hopkins, 1968). In nest trees accessible from dry ground, raccoons or other mammalian predators were able to prey upon the nestling birds with impunity. Some young storks were found dead in the nest, and the manner in which they had been eaten implied avian predation. We have documented extensive alligator predation on mammals on Cumberland Island (Shoop and Ruckdeschel, ms.), and suggest that when a nest tree was no longer under the potential protection of an alligator, i.e. not surrounded by water, the adult birds were at risk at the nest and may have abandoned the young during the night. The young storks would then have been especially vulnerable to both mammalian and avian predators.

Ogden and Nesbitt (1979) reported that all active Wood Stork nesting colonies they observed during aerial surveys between 1974 and 1976 in Florida and south Georgia were in trees over standing water or surrounded by water. Clark and Lee (1982) reported similar finds. Raccoons or other mammalian predators in these areas are at great risk entering the water since alligators are ubiquitous, well-camouflaged, ambush predators, capable of detecting water disturbances from some distance. Nestlings and food falling in the water beneath a heronry could be expected to attract alligators as well as mammalian predators, but because of the almost assured risk from alligators, mammalian predators may generally avoid heronry waters. In areas with high densities of raccoons, such as Cumberland Island, it may be essential for stork heronries to be over water. In Dade County, Florida, raccoon predation in a heronry was eliminated when tree branches touching the shore of the pond were cut back, thereby requiring raccoons to enter the water if they were to reach nest trees (J. Kushlan, pers. comm.). That mammals may comprise a considerable portion of the diet of large alligators (Wolfe et al., 1987; Shoop and Ruckdeschel, ms) supports our contention that, within their range, large alligators may control mammalian predation of waterbird colonies nesting over water. Successful Wood Stork

nesting on Cumberland Island in 1986 and 1987 clearly required that the heronries have sufficient water beneath them throughout the nesting season for large alligators to offer maximum protection from other predators. However, because most authors have failed to mention alligators in relation to heronries, or only considered them scavengers, it is difficult to evaluate the importance of the alligator to heronries elsewhere.

Following depredations in the Sweetwater heronry in June 1987, many clumps of regurgitated fish were found on the ground beneath Wood Stork nests. All the fish found were brackish or salt water species. Although the water level in the temporary ponds and sloughs was falling in June, the nesting Wood Storks apparently relied heavily on the salt marsh for food. In January 1982, one adult stork was examined and contained *Fundulus heteroclitus*, a brackish water species. Based on information on food from the heronry, and year-around observations of Wood Stork use of the adjacent salt marshes, we suggest that Wood Storks frequenting Cumberland Island may regularly feed in the salt marsh throughout the year. Although we had no measure of relative condition or developmental rates of the nestling storks, lack of food did not seem to contribute to nest failures on Cumberland Island during our observations . In 1987, both heronry sites were active at the begining of the season yet nest failures were not simultaneous at them, but were correlated with the disappearance of water beneath the nest trees. The same food resources were available to birds from each location, thus it is unlikely that inadequate food was a major factor in nestling mortality. While food resources have been considered a limiting factor in Wood Stork nesting success in southwest Florida localities (Kushlan et al., 1975; Clark, 1978; Ogden and Nesbitt, 1979), we suggest that food may be more regularly available around Cumberland Island where the twice daily, 2 m tides and vast marshes provide reliable feeding habitat.

Nesting and feeding habitat of the Wood Stork in the Southeast was probably severely reduced and modified during the early part of this century, but concomitantly there was an enormous decline in numbers of large alligators in most areas. It has been estimated that 2,500,000 alligators were killed in Florida between 1880 and 1894 (Cope, 1900) , and they continued to be heavily exploited throughout the Southeast until the 1960's. While the relationship of the alligator to Wood Stork heronries in other locations is unclear, we note that stork nesting in Georgia increased coincidently with protection afforded the alligator in the 1960's. The first reported Wood Stork nesting in Georgia occurred in 1967 (Cone and Hall, 1970), and our report is the seventh nesting location reported in Georgia since that time.

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STATUS AND DISTRIBUTION OF THE FISH CROW IN THE CAROLINAS AND GEORGIA

Douglas B. McNair

The Fish Crow (*Corvus ossifragus*) is an endemic corvid of the eastern United States; its primary range is tidewater areas of the southern United States (Bent 1946, Johnston 1961, A.O.U. 1983). In the Carolinas and Georgia, the Fish Crow has expanded inland though its precise status and distribution is poorly known (Burleigh 1958, Sprunt and Chamberlain 1970, Denton et al. 1977).

American Crows (*C. brachyrhynchos*) are sympatric with Fish Crows throughout the latter's range in the Carolinas and Georgia. Johnston (1961) discussed differences in morphology, breeding biology, distribution, habitat, and foraging behavior among these two species. Johnston formulated the hypothesis that American Crows decreased inland when agricultural areas reverted to woodlands, particularly pine woods, which permitted Fish Crows to increase from their formerly restricted range of river valleys to occupy adjacent pine woods. This hypothesis can be interpreted to also apply to American and Fish crow distribution in coastal areas.

Potter (*in* Fink 1975) and H. LeGrand, Jr. (pers. comm.) suggest that establishment of breeding Common Grackles (*Quiscalus quiscula*) in the Carolinas permitted Fish Crows to increase in numbers and expand their range in the Carolinas because of the availability and consequent predation upon grackle eggs and nestlings in areas where colonial nesting species are rare or non-existent. In addition, it has also been speculated that Blue Jay (*Cyanocitta cristata*) eggs and nestlings are heavily preyed upon by Fish Crows (LeGrand, pers. comm.).

The purpose of this paper is to document the status and distribution of the Fish Crow in the Carolinas and Georgia and to examine the validity of the hypotheses of Johnston, Potter, and LeGrand. First, I document recent Fish Crow distribution in early winter, mid-spring, and late spring to early summer using Christmas Bird Count (CBC) data from the Carolinas and Georgia, Spring Bird Count (SBC) data from the Carolinas, and Breeding Bird Survey (BBS) data from the Carolinas and Georgia, respectively. These data provide no habitat information. I have augmented these data extensively with anecdotal data, which include my field notes.

METHODS

I *a priori* included only those CBCs for analysis that had Fish Crows recorded over a minimum span of nine years and a sufficient number of party-hours because of the restricted geographical area sampled (Bock and Root 1981). I recorded raw data per count for Fish Crow as well as American Crow. I also standardized the CBC count data by dividing raw numbers by total party-hours of count effort for each species, though this technique may not be meaningful for flocking and communally roosting species such as Fish and American crows (Bock and Root 1981). I arbitrarily set a value of 0.1 as the minimum acceptable value for any calculated ratio of raw numbers divided by total party-hours for each species; I believe values less than 0.1 are unrealistic and meaningless.

This arbitrary decision may increase the number of tied ranks of the lowest possible value. However, this bias is not important in my analyses. I also computed the ratio of raw numbers of Fish Crows to American Crows, using 0.1 as the minimum acceptable value as above.

I used Spearman rank correlation analysis to test for a significant increase or decrease of Fish and American crows for each CBC circle. For raw abundance, I computed Spearman rank correlation coefficients for the raw number of Fish and American crows per year plus the range (low and high raw values) and coefficient of variation for each species. For standardized raw abundance, I followed the same procedure as above except that I used raw numbers divided by total party-hours of Fish and American crows per year. For relative abundance, I only computed values for the ratio of raw numbers of Fish Crows to American Crows per year.

My criteria for inclusion of SBCs for analysis are the same as for the CBCs. I did not standardize the SBC count data because all total party-hours of count effort for each count were not readily available. Otherwise, I followed identical procedures in my analysis except that I also included raw data of Blue Jay and Common Grackle, as well as using the ratio of raw numbers of Fish Crow to each of these two species.

I used BBS data to also examine year to year changes in relative abundance of Fish and American crow populations. Calculation of longterm means was not meaningful because of the scarcity of continuous coverage of a sufficient number of routes for each state. I calculated the geometric mean for birds per route per year as a measure of the annual rate of change (Bystrak 1981, Geissler and Noon 1981). This measure requires that ratios of successive years are restricted to routes that were run both years. I used Spearman rank correlation analysis to test for a significant increase or decrease of Fish and American crows in each state and computed values for the geometric mean per year for each species. Analyses of BBS data on both Fish and American crows are restricted to the Coastal Plain only because Fish Crows are not recorded on most routes in the Piedmont of the Carolinas and Georgia.

These rank correlation analyses are conducted because they can possibly suggest causal relationships between Fish Crow abundance and distribution and any of the three other species, i.e., Blue Jay, American Crow and Common Grackle. If the hypothesis of Johnston is correct, Fish and American crow numbers should be inversely correlated because one species is increasing at the expense of the other because of presumed changes in habitat use. If the hypothesis of Potter or LeGrand is correct, Fish Crow numbers should be positively correlated with Blue Jay and/or Common Grackle numbers because of a direct predator-prey relationship. These correlational tests are weak, no matter what the prediction, and this problem is discussed later.

RESULTS

Christmas Bird Count (CBC) Data

Twelve counts, four from each of the three states, satisfied my criteria for analysis of CBC data (Table 1). All count circles, except Eufaula N.W.R., are on the coast.

Table 1 Number of years, range of years, and range of party-hours for each of twelve CBC circlesin the Carolinas and Georgia.

CBC Name	State	Number of Years	Range of Years	Range of Party-Hours
Bodie-Pea Island	NC	17	1967-1983	47-184
Morehead City	NC	12	1972-1983	23-191
Central Beaufort Co.	NC	9a	1974-1983	30-69
Wilmington	NC	33a	1950-1983	31-125
Litchfield-Pawley's Is.	SC	13	1971-1983	26-83
McClellanville	SC	9	1975-1983	41-91
Charleston	SC	33a	1950-1983	40-85
Hilton Head Island	SC	23a	1960-1983	69-405
Harris Neck NWR	GA	13a	1970-1983	32-69
Sapelo Island	GA	21	1963-1983	30-58
Glynn County	GA	14	1970-1983	85-264
Eufaula NWR	GA-AL	11	1973-1983	35-94

a = Count was not held one year.

Rank correlation analysis for raw and standardized raw abundance gave very similar results for both Fish and American crows, so only results from analysis of raw abundance are replicated here (Tables 2, 3). Fish Crows increased in raw abundance over time to 1983 on five of twelve counts and decreased on the others. Only three increases and two decreases were significant. Unlike Fish Crows, American Crows increased on nine of twelve counts and six increases were significant. None of the decreases on the remaining three counts were significant. The range of raw abundance data for each count for each species was extremely high and the coefficient of variation (CoV) was high for both species for all count circles, with the CoV higher for Fish Crow than American Crow for two-thirds of the count circles.

The ratio of raw abundance of Fish Crow to American Crow per year was positive for only one-third of the count circles (Table 4). However, seven count circles had at least one year in which at least 1000 Fish Crows were recorded, while at least 1000 American Crows were only recorded on the Hilton Head CBC. (Counts for this CBC may be invalid because of problems in identification, the only count circle for which I included suspect data). Several coastal CBCs, such as McClellanville, Harris Neck, and Sapelo Island, have consistently low numbers of both Fish and American crows. These count circles are predominantly barrier islands and other undeveloped areas. Other count circles, such as Morehead City, Wilmington, and Glynn County have generally high numbers of Fish Crows and low numbers of American Crows. These count circles include extensive urban areas, habitats favorable to Fish Crow. The highest count of Fish Crows recorded in the Carolinas or Georgia, other than at Drum Island, Charleston (McNair in press), was 8324 birds on 17 December 1977 on the Wilmington CBC.

Table 2. Spearman rank correlation coefficients (r_s) range of raw abundance, and coefficient of variation (CoV) for Fish Crow per year for each of twelve CBC circles in the Carolinas and Georgia. Sig indicates a significant result and ns indicates a nonsignificant result.

CBC Name	R_s Value	Range of Raw Abundance	CoV
Bodie-Pea Island	+.61,sig	6-1485	174
Morehead City	−.24,ns	16-6109	248
Central Beaufort Co.	+.78,sig	11-3535	179
Wilmington	+.51,sig	4-8324	239
Litchfield-Pawley's Is.	−.62,sig	1-702	104
McClellanville	−.58,sig	1-280	148
Charleston	−.28,ns	1-1318	255
Hilton Head Island	+.24,ns	14-1971	105
Harris Neck NWR	+.51,ns	3-96	96
Sapelo Island	−.28,ns	0-330	154
Glynn County	−.24,ns	31-3850	102
Eufaula NWR	−.02,ns	0-31	92

Table 3. Spearman rank correlation coefficients (r_s) range of raw abundance, and coefficient of variation (CoV) for American Crow per year for each of twelve CBC circles in the Carolinas and Georgia. Sig indicates a significant result and ns indicates a nonsignificant result.

CBC Name	R_s Value	Range of Raw Abundance	CoV
Bodie-Pea Island	+.78,sig	6-865	206
Morehead City	+.69,sig	6-198	74
Central Beaufort Co.	+.93,sig	3-960	142
Wilmington	−.09,ns	7-773	142
Litchfield-Pawley's Is.	+.24,ns	14-291	80
McClellanville	−.07,ns	10-169	70
Charleston	+.55,sig	2-530	72
Hilton Head Island	+.55,sig	126-1743	110
Harris Neck NWR	+.03,ns	18-425	145
Sapelo Island	+.10,ns	10-60	42
Glynn County	−.06,ns	1-275	125
Eufaula NWR	−.66,sig	25-380	81

Spring Bird Count (SBC) Data

Five counts from the Carolinas satisfied my criteria for analysis of SBC data (Table 5). Three of the five count circles are on the coast.

Fish Crows increased in raw abundance over time on all five counts, with four of the increases significant including both inland counts (Table 6). Similarly, American Crows increased on four of five counts, with three increases significant including both inland counts (Table 6). The decrease on the Wilmington count was significant. The range of raw abundance data for each count for each

Table 4. Spearman rank correlation coefficients (r_s) for ratio of raw abundance of Fish Crow to American Crow per year for each of twelve CBC circles in the Carolinas and Georgia.

CBC Name	R_s Value
Bodie-Pea Island	+.22,ns
Morehead City	−.60,sig
Central Beaufort Co.	−.36,ns
Wilmington	+.53,sig
Litchfield-Pawley's Is.	−.74,sig
McClellanville	−.34,ns
Charleston	−.44,sig
Hilton Head Island	−.21,ns
Harris Neck NWR	+.48,ns
Sapelo Island	−.23,ns
Glynn County	+.03,ns
Eufaula NWR	−.52,ns

Table 5 Number and range of years for each of five SBC circles in the Carolinas.

SBC Name	State	Number of Years	Range of Years
Raleigh	NC	22	1964-1985
Southern Pines	NC	15	1971-1985
Morehead City	NC	13	1964-1976
Wilmington	NC	29	1957-1985
Charleston	SC	28	1958-1985

species was moderate and the coefficient of variation (CoV) was high for both species for all count circles. The CoV was about equally divided between the two species for the count circles.

Blue Jays increased in raw abundance over time on four of five counts; only one increase was significant, on a coastal count (Table 6). The decrease on the Wilmington Count was significant. Common Grackles increased on all five counts with two increases significant, both coastal counts (Table 6). Both the range of raw abundance data and CoV for each count for each species was high for all count circles.

The ratio of raw abundance of Fish Crow to American Crow per year was positive for four of five count circles; only the results at Wilmington was significant (Table 7) . The negative result at Southern Pines was also significant. In general, low numbers of both species of crow, especially the Fish Crow, were recorded on SBCs compared to CBCs for the three count circles on the coast. The ratio of raw abundance of Fish Crow to Blue Jay per year was positive for all five count circles, with two results significant (Table 7). The ratio of raw abundance of Fish Crow to Common Grackle per year was positive for but two of five count circles; none of the results were significant (Table 7).

Table 6. Spearman rank correlation coefficients (r_s), range of raw abundance, and coefficient of variation (CoV) for Fish Crow, American Crow, Blue Jay and Common Grackle per year for each of five SBC circles in the Carolinas. Sig indicates a significant result and ns indicates a nonsignificant result.

SBC Name	R_s Value	Range of Raw Abundance	Cov
	Fish Crow		
Raleigh	+.84,sig	1-59	66
Southern Pines	+.78,sig	3-39	50
Morehead City	+.53,ns	4-116	80
Wilmington	+.52,sig	26-190	54
Charleston	+.64,sig	2-106	76
	American Crow		
Raleigh	+.73,sig	27-234	49
Southern Pines	+.92,sig	0-87	111
Morehead City	+.31,ns	12-76	64
Wilmington	−.43,sig	15-152	63
Charleston	+.47,sig	13-154	54
	Blue Jay		
Raleigh	+.10,ns	113-334	27
Southern Pines	+.36,ns	22-187	68
Morehead City	+.74,sig	8-79	57
Wilmington	−.50,sig	74-450	55
Charleston	+.15,ns	20-333	96
	Common Grackle		
Raleigh	+.27,ns	38-807	48
Southern Pines	+.44,ns	55-196	35
Morehead City	+.47,ns	36-436	66
Wilmington	+.71,sig	21-448	67
Charleston	+.87,sig	10-291	80

Breeding Bird Survey (BBS) Data

In South Carolina, American Crows were recorded on every route in the Coastal Plain while Fish Crows were not recorded on three routes. Every route mean for American Crow was greater than for the Fish Crow (N = 11) routes. Overall route means for routes from which both Fish and American crows were recorded were 5 and 27 birds, respectively (includes data from the Piedmont but this does not change the route means very much). Overall, neither species of crow shows a tendency to increase or decrease on routes with time (1966-1984).

Qualitative results from Georgia and North Carolina are similar to those from South Carolina. Not all routes were run by the same observer each year in each state. Almost all routes run every year were labeled as run by a competent observer.

Table 7. Spearman rank correlation coefficients (r_s) for ratio of raw abundance of Fish Crow to American Crow, Fish Crow to Blue Jay, and Fish Crow to Common Grackle per year for each of five SBC circles in the Carolinas. Sig indicates a significant result and ns indicates a nonsignificant result.

SBC Name	R_s Value
Fish Crow to American Crow	
Raleigh	+.37,ns
Southern Pines	−.91,sig
Morehead City	+.40,ns
Wilmington	+.70,sig
Charleston	+.34,ns
Fish Crow to Blue Jay	
Raleigh	+.50,sig
Southern Pines	+.30,ns
Morehead City	+.26,ns
Wilmington	+.80,sig
Charleston	+.35,ns
Fish Crow to Common Grackle	
Raleigh	−.33,ns
Southern Pines	+.41,ns
Morehead City	+.17,ns
Wilmington	−.27,ns
Charleston	−.35,ns

These preliminary results generally do not agree with published or unpublished data of the last twenty years from any of the three states (reviewed hereafter). Almost all sources state Fish Crows are more frequent and numerous than American Crows in late spring and early summer in the Coastal Plain. In fact, BBS data show that American Crows are approximately of equal abundance in both the Coastal Plain and the Piedmont which is also highly unlikely. Undoubtedly, many observers are reliable and correctly identified the two species of crows. However, some observers apparently misidentified crows which is suggested by shifts in abundance on a given route from year to year. Overall, I must reject the BBS data for these two species because I believe the data are unreliable, and consequently do not analyze the data by the procedures stated in the methods section.

Anecdotal Data

I give detailed field data for the Fish Crow for different localities throughout their range in each state because our knowledge of Fish Crow status and distribution over time is fragmented.

Georgia - Few records for the Fish Crow in the Piedmont exist. Johnston (1961) saw Fish Crows along the shores of Lake Sinclair in Baldwin County. The first record for Athens, Clarke County, occurred 10 April 1947 (Tramer 1968a). There are three subsequent records on single dates in spring 1968, 1984, and 1985, all of no more than two birds (Tramer 1968b); Amer. Birds 38:1010; Amer. Birds 39:286), and one summer record of two birds on 7 July 1986 (pers. obsv.). In 1984, one bird was seen near Wilmington, Wilkes County, on 17 June (Amer. Birds 38:1010), and four birds were at Lake Oconee about 50 km below Athens, on 2 September (Oriole 49:83). The first confirmed record in the Atlanta area was one Fish Crow on 9 November 1985 in Clayton County (Amer. Birds 40:99). The only other record from the Piedmont of Georgia was two birds on the Callaway Gardens 1970-1971 CBC in Harris County. Thus, all Piedmont records have occurred since 1947.

In the Coastal Plain, Fish Crows occurred as far inland as the Fall Line by the 1930s and 1940s, the earliest period there are reliable records (Burleigh 1958). The majority of Fish Crows were recorded on or near river valleys and lakes where they were uncommon and local (Murphey 1937, Burleigh 1958). Fish Crows have increased in range and abundance in the Coastal Plain since, e.g., in Bibb, Screven, Richmond, Laurens, Tifton and Grady counties, and Eufaula N.W.R. (Johnston 1961, Hamilton 1964, Hopkins 1975, Stoddard 1978, Ortego et al. 1979, Patterson and Patterson 1979 and others).

Fish Crows in the Coastal Plain have also been reported as late as early winter since 1966. Two birds were first seen at Augusta, Richmond County, on 26 December 1966. Fish Crows have been seen on over a third of Augusta CBCs since, usually four birds or less, with a maximum of 94 on 29 December 1973. Below Augusta, Fish Crows are established as permanent residents in Screven County though this is questionable in mid-winter because specific records are not cited (Hamilton 1964). In Laurens County, Patterson and Patterson (1979) suggested the Fish Crow was regularly present in winter. However, this statement is unsupported by CBC data which documents a very infrequent early winter occurrence. The same pattern is shown on Columbus CBCs.

In southwest Georgia, Fish Crows have been seen on about one-half of Albany CBCs since birds were first seen in early winter 1973-1974. At Eufaula N.W.R., Ortego et al. (1979) stated the Fish Crow was least common in winter though a permanent resident, a statement supported by CBC data. On the Florida state line in Thomas County, Crawford and Dozier (1973) stated Fish Crows were present in mid-winter. Fish Crows have been seen on almost every Thomasville CBC since 1968, usually five birds or less, with a maximum of 43 on the 1975-1976 CBC. In contiguous Grady County, Stoddard (1978) stated Fish Crows were largely absent for about two months in early and mid-winter.

Actual cited records of Fish Crows in mid-winter are scarce. Stoddard (1978) recorded two birds on 22 January 1958, one bird on 28 January 1942, and several birds on 16 February 1944, all in Grady County. Further north at Columbus, one individual was seen on 24 January 1969 (Amer. Birds 23:467) and another on 21 February 1976 at nearby Lake Oliver (Oriole 41:41).

In the Coastal Plain away from the immediate coast, Fish Crows begin migration the last week of February and the first week of March, in Grady County (Stoddard 1978), in Dublin, and at Augusta (op. cit.).

Post breeding counts of Fish Crows are scarce. Three hundred plus were feeding in a pasture by a levee at Augusta on 24 August 1951 (Aud. Field Notes 6:12). Eighty-eight birds were seen migrating SE from the same city on 31 October 1948 (Aud. Field Notes 3:11) and 65 were seen at Columbus on 28 October 1972 (Amer. Birds 27:43). The vast majority of Fish Crows leave inland Georgia by late October to mid-November.

From about April through October, Fish Crows are more common than American Crows in Grady, Richmond, and Screven counties and at Eufaula N.W.R. (Hamilton 1964, Fink 1975, Stoddard 1978, Ortego et al. 1979). Patterson and Patterson (1979) believed the American Crow was more common than Fish Crow in Laurens County, which is documented on their BBS route which primarily covers timberland and farm habitats (T. Patterson, pers. comm.). However, Patterson (pers. comm.) found that Fish Crows greatly outnumbered American Crows by spring and summer 1986 in Laurens County overall. Crawford and Dozier (1973) stated that American Crows outnumbered Fish Crows in Thomas County.

South Carolina - At the northwestern extremity of their range in the Piedmont, the first record for the Clemson area was one Fish Crow on 5 May 1973 (Chat 37:88). Subsequent reports in the Clemson area show a pattern of range expansion and increase in numbers similar to several localities in North Carolina, e.g., Raleigh. First, spring and summer reports increase (Chat 38:80,98; Chat 43:100; Amer. Birds 35:931; Amer. Birds 36:285; Chat 48:24; LeGrand, unpubl.; McNair, unpubl.). Second, fall counts increase as summer birds establish residency (Chat 45:52; McNair, unpubl.). Third, breeding is confirmed (McNair 1984). Fourth, winter reports increase but winter residency is rarely established (Chat 44:66; Chat 45:82; Chat 46:91; Chat 48:81).

Records of Fish Crows in the Clemson area are concentrated around lakes Hartwell and Keowee and nearby residential areas. The high spring count is 21 on 17 April 1984 (McNair, unpubl.), the high fall count is 30 on 30 November 1980 near Townville (Chat 45:52), and the high winter count is 4 on 6 February 1982 near Townville (Amer. Birds 36:285). Breeding was proven at Clemson in 1984 (McNair 1984), suspected as early as 1979 and almost certainly occurred by 1982 (Chat 43:100; McNair, unpubl.). Fish Crows were on territory as far north as Newry on Lake Keowee in 1984 and 1985, above Clemson (McNair, unpubl.). A pair had built a complete nest at Newry on 21 April 1986, but abandoned the nest by 26 April for unknown reasons (pers. obsv.). However, several pairs did breed on an island in Lake Keowee, above Seneca, in April and May 1986 (pers. obsv.). Further north, three Fish Crows were on territory in late April 1986 at Cherokee Park, Keowee Center, on Lake Keowee in Six Mile, but did not breed. I also have non-breeding records of Fish Crows on Lake Keowee in Six Mile. Most notable are records at my former home, three km from the lake, of a flock of 13 on 21 April 1983 (unpubl.), and a single individual on 5 December 1983 (Chat 48:81).

Below Clemson along the Savannah River, Fish Crows have been seen frequently at Clark Hill Reservoir since it was built (Denton *in* Fink 1975, Amer. Birds 31:165). Elsewhere in the Piedmont, a nest was purportedly found on 1 April at Rocky Creek near Greenwood in 1925 by W.H. Hahn, Jr. (Pickens 1927, 1936), but no other details are available and I am skeptical of the record. Sprunt and Chamberlain (1970) state that this nest was collected but its whereabouts, if it exists, are unknown (S. Miller and W. Post, pers. comm.). Otherwise, the earliest published information on Fish Crow from the Greenwood area other than Picken's (1927) statement that it was somewhat rare in the lower Piedmont, occurred in 1976 and 1977 (Amer. Birds 31:165,988). At Lake Murray above Columbia, my highest counts were of different flocks of 47 and 40 birds in

Lexington County on 5 August 1979. East of Columbia, on Lake Wateree and the Wateree River above Lugoff, I had 10+ Fish Crows on 30 June 1979. Further north along the same river, a few Fish Crows were found the summer of 1983 at Rock Hill and Catawba (Chat 48:24).

On the Fall Line, in the Aiken-Augusta region, Fish Crows were uncommon along the river bottoms of the Savannah River and its tributaries from 1900 to 1937 from spring through early fall (Murphey 1937). Norris (1963) later found Fish Crows common in the same habitat, primarily floodplain forests and Carolina Bays, and distributed throughout more xeric habitats of the Savannah River Plant area as well. The most notable count for the region was a roost of 2870 at Langley, Aiken County, on 23 September 1961 (Post 1961). In Columbia, Fish Crows were considered noteworthy on the 23 April 1977 SBC (Chat 41:89). However, 1000+ were present below Columbia near the sewage treatment plant by 12 August 1979 (Chat 44:50). The first early winter records from Columbia were 4 on the 1979-1980 CBC and Fish Crows have been seen on several subsequent CBCs at Columbia, with a maximum of 10 on the 1980-1981 CBC. A record of one Fish Crow seen on the Eastover 1963 SBC in southeast Richland County, though without details, is probably correct (Chat 26:49).

My data, dating from 1979, indicate the Fish Crow is widespread in the Coastal Plain to the Fall Line, common or abundant at most localities. The Fish Crow is especially abundant around lakes Marion and Moultrie, where day-counts from mid-March through July typically range from 75 to 400 birds. Earlier, Sprunt and Chamberlain (1970) stated Fish Crows were fairly common around lakes Marion and Moultrie. At nearby Orangeburg, I saw about 100 Fish Crows on 18 June 1985. In Sumter County and the upper Pee Dee region of the Coastal Plain, typical day-counts from mid-March through July range from 15 to 60 birds. In the Sandhills of east-central South Carolina, typical day-counts during the same period range from a few to over 30 birds.

Inland, migrant Fish Crows usually arrive at lakes Marion and Moultrie by mid-to-late February with a rapid increase thereafter, and arrive at localities on the Fall Line by the first or second week of March (op. cit., pers. obsv.). For the last several years, Fish Crows have arrived at numerous inland localities near or on the Fall Line by mid-February, earlier than previously thought (Chat 48:81, pers. obsv.). Thus, a record of one Fish Crow on 22 February 1958 at the SRP area (Norris 1963), while unusual then, is not considered unusual today.

Fish Crows form large post-breeding roosts by August and September (Post 1961, 1967; pers. obsv.). Migration begins as early as September and continues into early to mid-November, later than previously thought (Norris 1963, Aud. Field Notes 19:26; pers. obsv., and others). Most migrant flocks I have seen in the Coastal Plain have flown SE, individual flocks ranging in size from 20 to 150 birds.

Winter records of Fish Crows inland are scarce and some have been previously reviewed. One Fish Crow on 30 January 1957 at the SRP area is still unusual (Norris 1963). From one to fifteen Fish Crows were reported on five Aiken CBCs from 1927 to 1932 (Bird Lore). No details were published and Fish Crows were not reported in early winter by Norris (1963) or at Augusta, Georgia, until 1966. Therefore, I consider Fish Crow data on these Aiken CBCs unreliable. Likewise, Fish Crows were reported in early winter on seven CBCs at Santee

N.W.R. from 1952 to 1961, with counts ranging from 2 to 255 birds. Fish Crows have not been seen on subsequent very recent CBCs at Santee N.W.R., despite their increased abundance in the Coastal Plain, nor have I recorded them there or at other localities on lakes Marion and Moultrie in early-to-mid winter. While a few birds may be plausible on these early Santee N.W.R. counts, I do not believe these counts are reliable. A single flock of 26 was seen along or near the Pee Dee River at the Woodstone Hunting Club near Mars Bluff, Florence County, on 21 December 1935 by H.L. Harllee (Bird Lore 38:60). I consider this record reliable despite problems with several other species on this count.

On the coast, data on migrant Fish Crows are scarce and I have numbers since 1979 only from fall. From October through November, Fish Crows migrate along the immediate coast and inland in tidewater areas, usually in flocks of moderate size, typically ranging from a few birds to 200. Fish Crows frequently migrate along coastal highway 17, where I saw my largest flock in active migration, 8000 birds on John's Island on 17 November 1985, thirteen km west of Charleston. Bent (1946) saw "thousands" of Fish Crows fly past North Island, Georgetown County, and was unsure whether he observed active migration or a local movement of birds. The former alternative is more likely though Fish Crows may form large flocks during pre-roosting and roost movements, as observed by Post (1961, 1967) in Aiken County, myself in Richland County, and Post and I in Charleston County. Roosting behavior and the massive fall roost at Drum Island in the Cooper River at Charleston are briefly described elsewhere (McNair in press).

By mid-March or April, Fish Crows are numerous throughout the Coastal Plain and greatly outnumber American Crows from then until at least September inland and October on the coast. During this approximate six-month period, I have never had more than 20 American Crows per day-count anywhere; presumably these crows are local birds. Ratios of Fish Crows to American Crows are typically (2:1, low) 5:1 to 60:1 to undefined, i.e., no American Crows recorded.

North Carolina - Single Fish Crows were first reported in the southwestern Piedmont at the very edge of their range on Charlotte SBCs of 1964 and 1965. These reports do not have details. The first accepted record occurred on the 1966 SBC when 9 were at the city dump, and Fish Crows have been seen infrequently in spring at Charlotte subsequently. Several Fish Crows were present at Lake Wylie near Charlotte in April 1982 and are now regular at this locality in spring (H. LeGrand, Jr., pers. comm.). Fish Crows were also seen in Winston Salem in 1966 though not thereafter (Chat 31:23), once at High Point in 1983 (Chat 48:24), and at Greensboro in 1985 (Amer. Birds 39:286), all of the birds in spring or summer.

Closer to the Fall Line in south-central North Carolina, 2 Fish Crows were reported on the Stanly County 1976 SBC on 15 May (Chat 40:81). In the Piedmont of Stanly, Montgomery, Anson, and Richmond counties, I have recorded Fish Crows from March to September since 1979, primarily along the Pee Dee River, at lakes, and over ponds. The usual number recorded is 2-4 birds, with a maximum of 10+ along the Pee Dee River below the Pee Dee N.W.R. on 16 August 1979.

Fish Crows are also established in the north-central Piedmont, in Wake County, where they were first seen in 1962 and breeding confirmed in April 1972 at Raleigh (Chat 26:49; Hader 1969; Chat 36:114). Fish Crows are numerous spring through fall, usually present from mid-March through November. The highest count in Wake County is 110 at Lake Wheeler, early November 1976 (Amer. Birds 31:165). Impressive for early winter were 47 at Raleigh on 21 December 1968 (Aud. Field Notes 23:467). Otherwise in early winter, Fish Crows have been recorded several times on Raleigh CBCs since 1977-1978, with a maximum count of two. Fish Crows are scarce in mid-winter in Wake County with but two records, one on 26 January 1980 (Chat 43:72), and a "large flock" at Raleigh on 30 January 1984 (Chat 48:81). Fish Crows on 16 February 1979 at Raleigh were early arrivals (Chat 43:72), though crows have begun arriving from mid-to-late February at Raleigh the last several years (H. LeGrand, pers. comm.).

The Fish Crow is still uncommon in the north-central Piedmont other than in Wake County. At Durham, two Fish Crows were seen on the 1974 SBC on 28 April, but this report is unaccompanied by details (Chat 38:59). The first accepted record did not occur until spring 1979, and breeding was suspected in 1982 when an individual carried a stick in its bill on 13 June (Chat 43:100; Chat 46:24; Chat 47:31). At nearby Chapel Hill, a few Fish Crows were seen from April to July 1980 but no breeding evidence was detected (Chat 44:116); Amer. Birds 34:887). All birds in Durham or Chapel Hill occurred in wooded residential areas and no more than four were seen in a day. Several Fish Crows have also been present at Lake Gaston in June the last several years (H. LeGrand, Jr., pers. comm.).

Fish Crows are considerably more common on the Fall Line and in the upper Coastal Plain at Roanoke Rapids than at Piedmont localities. It is unclear when Fish Crows established themselves at Roanoke Rapids. Breeding was confirmed on 13 June 1979 when adults fed a juvenile in a residential area; an adult of another pair carried a large stick in early June (Chat 42:18). The first winter record for the Roanoke Rapids area, at Occoneechee Neck, was one on 1 January 1973 (Chat 37:17). Fish Crows have been seen on several CBCs subsequently, with a maximum of 12 on the 1978-1979 CBC. The latest early winter record is of two birds at Jackson, near Roanoke Rapids, on 4 January 1984 (Chat 48:81). The highest count in summer in the Roanoke Rapids area, at Ringwood, was 71 on 23 July 1977 (Chat 42:18). The highest number in fall was a flock of 178, staging for migration, on 18 October 1973 at Roanoke Rapids Lake in Halifax County (Chat 37:32). Exceptional were 200+, 19 January 1986, in central Halifax County, with smaller numbers present throughout the remainder of January and February until spring migration began (Amer. Birds 40:271).

Carter (1971) stated the Fish Crow was common from March to October in the North Carolina Sandhills, but that its exact status was uncertain because the first definite record did not occur until 15 May 1970 when two birds were collected. The latest fall record of Fish Crow was one individual at Fayetteville on 18 December 1982 (Chat 47:80). The highest counts for the Sandhills were 500 near Fayetteville on 10 October 1982 and 165 migrating SE from Hamlet, Richmond County, on 23 November 1979 (Chat 47:54; Chat 44:50).

Other than my record from Hamlet, I have additional details on occurrence of the Fish Crow in the North Carolina Sandhills at Richmond County, at its county seat of Rockingham, on the Fall Line. In 1979, I observed Fish Crows from 18 May to 22 November, counts ranging from one to 90+ birds daily (3 July), with four day-counts of twenty or more birds. Three of these day-counts recorded Fish Crows at the Richmond County landfill (in the Sandhills five km southeast of Rockingham) with a high count of 70+ on 3 July; the remaining count, of a flock of 20 birds, flew over my home in Rockingham on 19 July. On 29 March 1980, I saw 68+ Fish Crows in Rockingham, 53 of these at the landfill. In 1981, I observed Fish Crows from 8 May to 11 October, counts ranging from one to 20 birds. Fish Crows were seen more frequently in 1981 than in 1979 (12 of 13 day-counts compared to 10 of 13 day-counts), but the maximum daily highs were lower because the Richmond County landfill had been renovated and almost no garbage remained exposed in a large open pit. By 1984, this landfill was closed and a new one opened in the Piedmont, six km north of Rockingham. Fish Crows have not been seen here and maximum counts in Richmond County from 1982-1985, based on limited data, were the same as in 1981, i.e., 15-20 birds per day-count.

In 1981 and 1985, Fish Crows left Richmond County by the second and third weeks of October. A flock of 20 migrated S-SW from Rockingham on 11 October 1981. In 1979, Fish Crows did not leave Richmond County until 23 November. Other than the flock in Hamlet, a flock of 25 Fish Crows at the Richmond County landfill on 22 November was not seen thereafter.

In other inland areas of the Coastal Plain, Wetmore (1941) recorded Fish Crows at swamps near Roseboro, Sampson County, on 24 April and 2 May 1939. The first published record for Rocky Mount were two birds on the 1966 SBC (Chat 30:79) and Fish Crows were common by 1975 (Fink 1975). Representative May through July numbers in 1979 and 1981 for Scotland, Robeson, Bladen, and Columbus counties are 25-75 birds per day-count (pers. obsv.). In southern Bertie County, clearly notable was an early winter record on 26 December 1979 of 500+ in two flocks (Amer. Birds 34:264).

On the coast, I recorded 200-500 birds per day-count on 13-15 June 1979 on the Outer Banks, from Okracoke Island to the Pea-Bodie Island area. The only direct count of migration is from fall at Fort Fisher, below Wilmington, where Davis and Parnell (1983) documented a significant increase of Fish Crows in September and October over numbers seen in August, followed by an even greater increase in November when the study was terminated.

In general, Fish Crows are more common than American Crows in the Coastal Plain today (Fink 1975, pers. obsv.), though Smithwick stated American Crows were more common in Bertie County, in the lower Coastal Plain, 90-100 years ago (Chat 16:93-96). Unfortunately, no other reliable historical information exists.

In the North Carolina Sandhills in Richmond County and on the Fall Line at Rockingham, Fish Crows are more common than American Crows, even away from residential habitats. In 1979, on 13 day-counts from May to November, I recorded American Crows on twelve of them and Fish Crows on ten. However, Fish Crows were usually recorded in greater numbers per day-count but the disparity was not that great. A count of 20 American Crows and only 1 Fish Crow on 23 May 1979 in the Sandhills G.M.A. near Hoffman is unusual. In

1981, on 13 day-counts from May to October, I recorded American Crows on only seven of them and Fish Crows on twelve. Fish Crows were more numerous than American Crows on all but one count, usually by a ratio of 2:1 to 6:1. My data after 1981 are limited but suggest Fish Crows have increased even more. These results agree with Clark and Potter (1982) who stated Fish Crows were more common than American Crows in Hoke County in the Sandhills.

Habitat. - All sources agree that the tidewater areas of the coast are the primary range of the Fish Crow, with crows first increasing inland along rivers, lakes, and ponds where they feed, both in the Coastal Plain and Piedmont (Murphey 1937, Burleigh 1958, Johnston 1961, Post 1961, Norris 1963, Sprunt and Chamberlain 1970, Fink 1975, Denton et al. 1977, Stoddard 1978). Johnston (1961), Norris (1963), and Stoddard (1978) were the first individuals to describe habitat use in the Coastal Plain away from water, in pine forests, old fields, and pecan and mulberry orchards of Georgia, and in pine forests and old fields of South Carolina. Stoddard (1978) noted a decline in Fish Crows in southwest Georgia when mulberry orchards vanished. Fink (1975) and LeGrand *in* Fink and observers of many other reports given here found Fish Crows most frequently in wooded residential areas. In the North Carolina Sandhills in Hoke County, Clark and Potter (1982) found Fish Crows in three habitats: longleaf pine (*Pinus palustris*) and turkey oak (*Quercus laevis*) forest, loblolly pine (*P. taeda*) plantations, and creek-bottom hardwoods. American Crows were found in fields and along roadsides. Clearly then, evidence dating fairly recently indicates that Fish Crows have expanded their range into many types of upland habitats in the Coastal Plain and even the Piedmont, and are no longer restricted to habitats along river systems.

I have general information on habitat distribution of Fish Crows in South Carolina and south-central North Carolina from 1979 to early 1986 based on a total of at least 80 day-counts. My observations in the Piedmont of these two states indicate that Fish Crows prefer habitats along rivers, lakes, and ponds, and wooded residential areas, which agree with comments made by others (op. cit.). First and subsequent sight records at all Piedmont localities given here were in these habitats, for example. LeGrand's remark that Fish Crows are found infrequently around lakes and ponds in Wake County must be a local situation (Chat 46:91). I have observed Fish Crows regularly in pastures and fields in the Clemson area and elsewhere in the Piedmont, though use of agricultural habitats are infrequent compared to the aforementioned habitats. Meanley (1981) stated Fish Crows breeding in the Shenandoah Valley of Virginia foraged in pastures and hayfields.

My observations in the Coastal Plain indicate that Fish Crows occur in many habitats other than those just mentioned, particularly open woodlands, e.g., xeric longleaf pine forest in the Sandhills where Fish Crows are now common. Fish Crows are also frequent in flooded and barren fields and arable where I have seen them feeding on invertebrates and ripening corn, for example. In general, however, the largest flocks as previously described herein occur around river systems and residential areas.

American Crows in the Coastal Plain occur primarily in large agricultural fields with adjacent woodlands or in closed forest. Stoddard (1978) stated that numbers of American Crows increased with an increase of corn production in

larger pastures. In the Sandhills, a prime habitat is closed loblolly pine plantations, and not open longleaf pine forests. Similarly, American Crows are present in closed hardwood or mixed forest, including wetland habitats, but are scarce in more open wetland habitats where Fish Crows may be common. American Crows are absent or scarce in residential areas and open woodlands during the time of year Fish Crows are present. Either species may occur along river systems and at farms. Fish Crows frequently outnumber American Crows on uncultivated and undeveloped barrier islands (Johnston 1961).

Foraging Behavior. - Fish Crows are omnivores, like all crows of the genus *Corvus*, and their diet may be composed of eggs and nestlings of herons and other colonial nesting birds, rallids, as well as passerines and other species, small rodents, fish, invertebrates, garbage, road kills, fruit, seeds, and other foods (Bent 1946, Simpson 1952, Fink 1975, Post 1981, pers. obsv.). Other than preying upon the contents of nests of coastal heronries (Bent 1946; Shields and Parnell 1986; W. Post, pers. comm.), the only inland study of foraging Fish Crows documented that one pair breeding in a residential habitat brought garbage to its nestlings (McNair 1984).

Johnston (1961) and Robbins et al. (1966) state both species of crows may occasionally occur and feed together. LeGrand (Chat 46:91) once saw several Fish Crows with flocks of American Crows in fields and pastures in the Clemson area in winter when no other Fish Crows were present. I have occasionally seen the two species in the same habitat but have never seen them feeding together. I have only witnessed agonistic encounters in which each species was vocally aggressive and maintained their distance from the other.

DISCUSSION

The major results from this paper are: 1. Fish Crows have increased inland in the Carolinas and Georgia, especially within the last twenty years, and are now present throughout the Coastal Plain of these three states and locally in the Piedmont; 2. Fish Crows have expanded their known breeding range; 3. Fish Crows arrive earlier in spring and depart later in fall, about 2-4 weeks on average, compared to about twenty years ago; 4. Fish Crows are still scarce or absent in mid-winter at most inland winter localities; some migrants may still be present in December; 5. Fish Crows now use many more habitats inland than previously; 6. Fish Crows may be present inland in winter in only three habitats, i.e., along river systems, within towns or cities, or at dumps outside these two habitats; and 7. Fish Crows outnumber American Crows in the Coastal Plain from approximately March to September, this phenomena having clearly occurred within the last 10-15 years.

The anecdotal data was far more valuable than the three types of census data in reaching the above conclusions, primarily because of the lack of habitat information for any of the census data and at least some habitat information in the anecdotal data. Undoubtedly, the limited number of precise counts for the census data prevented a more meaningful analysis and assessment of distributional and abundance problems for the two species of crows (Bock and Root 1981), but I believe the lack of habitat information was a more important deficiency in this study. My day-count data from South Carolina and south-central North Carolina, for example, provided more information on changes

of Fish Crow distribution and abundance than the other census data. The unreliability of the BBS data for the two species of crows is particularly unfortunate. Zaletel and Dinsmore (1985) stated BBS data were unreliable for meadowlarks (*Sturnella* sp.) in Iowa.

In general, the CBC results indicate that Fish Crows were not detected to decrease or increase while American Crows did increase, though Fish Crows were recorded more frequently in greater numbers than American Crows. The CoV values suggest that both Fish and American crows may still be migrating in early winter on the coast. American Crows are very common winter residents inland at this season. Fish Crows are scarce inland in early winter though late migrants may still be present in December. Thus, almost all migration of Fish Crows at this season would involve coastal movements. Anecdotal data on coastal migration during winter was very scant and it is not possible to make an independent assessment of the CBC data.

In general, Fish and American crows, Blue Jay, and Common Grackle increased within roughly the last twenty years on the five SBCs selected in the Carolinas. Fish Crow numbers compared to the other three species varied in their relative abundance. Overall, I find the results from SBCs difficult to interpret. Lack of standardized raw abundance data may be a problem. Lack of habitat data and need for more precise census data on SBCs are more important. For example, the increase of Fish Crows on the Southern Pines SBC was significant, as expected, yet Fish Crows decreased relative to American Crows on this count, an unexpected result for which I can provide no explanation other than my caveat above. SBC data do clearly show that Fish Crows have finished their northward migration on the coast by the time these censuses are conducted.

Johnston's hypothesis offers a limited explanation of why Fish Crows have increased in distribution and abundance; however, Johnston failed to make a distinction between open and closed forests. Fish Crows favor the former and American Crows the latter. Thus, when agricultural areas revert to woodlands, especially pine or mixed woods, habitat occupancy of the forest by either species of crow is likely to be a function of tree stand density, the size of nearby agricultural lands, and undoubtedly other features. American Crows breed in closed forest, may forage there or in adjacent agricultural areas, and fly through the woods while foraging or to reach their nest sites, while Fish Crows breed in open forests, may forage there or away from them, and fly over the woods while foraging or to reach their nest sites (Bent 1946, Johnston 1961, Meanley 1981, McNair 1984). The ancestral habitats of Fish Crows are riverine or broken forests in tidewater areas of the coast and use of these habitats has probably preadapted Fish Crows to use open upland forests or orchards. This pre-adaptation to open forests probably allowed Fish Crows to rapidly expand into residential areas from the 1960s on. This expansion was not predicted by Johnston. Fish Crows are tamer than American Crows and are much more tolerant of disturbance near their nests. These characteristics would also facilitate colonization of residential areas by Fish Crows.

In the Piedmont, Fish Crows are still primarily restricted to river valleys, lakeshores, and adjacent riverine habitats and residential areas. Fish Crows are widespread in agricultural areas in the Coastal Plain where they are more numerous than American Crow, contrary to the prediction of Johnston. Fish

Crows are generally scarce from agricultural habitats in the Piedmont, even where pine or mixed forests are open, which would favor Fish Crow occurrence. Factors other than habitat are undoubtedly important in determining Fish Crow status in the Piedmont.

The hypotheses of Potter and LeGrand, that Blue Jays and Common Grackles provide necessary prey for Fish Crows to survive and reproduce, are not supported or refuted by analyses of SBC data, though Fish Crows on the Raleigh SBC have decreased relative to Common Grackles since 1964 (Tables 5,7) *contra* Potter (*in* Fink 1975). Fish Crows are omnivores and opportunistic feeders, even in residential habitats where jays and grackles are common, and where crows may feed on garbage or in nearby fields (McNair 1984, op. cit.). Aggressive behavior of Fish Crows toward jays and grackles may be frequent, but both these latter two species may frequently try and pillage Fish Crow nests of their eggs. Agonistic interactions among Fish Crows and other passerines such as Northern Mockingbird (*Mimus polyglottos*) and Red-winged Blackbird (*Agelaius phoeniceus*) may also be intense (pers. obsv.). Fish Crows may also forage and provision their young in habitats where jays and grackles may be scarce or absent, e.g., xeric longleaf pine forest. The hypothesis of selective predation by Fish Crows on nests of jays and grackles during the breeding season is unsupported.

ACKNOWLEDGMENTS

I thank S. Droege of the United States Fish and Wildlife Service for providing me BBS data from the Carolinas and Georgia and for answering my questions. I also thank J. Carter III, R. Hader, J. Harrison, K. Kosh, and F. Needham for providing me SBC data from their respective areas in the Carolinas. I thank C.E. Bock, H. LeGrand Jr., T. Patterson, and W. Post for constructive criticism. Records in Briefs for the Files of The Chat, In the Field of The Oriole, and regional summaries of Bird Lore, Audubon Field Notes and American Birds are not referenced below.

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303 Robinson Street, Rockingham, NC 28379.

GENERAL NOTES

GREATER WHITE-FRONTED GEESE IN THOMAS COUNTY, GEORGIA - On 5 January 1986, Beth Crawford and I saw 2 Greater White-fronted Geese (*Anser albifrons*) in Thomas County, Georgia. The geese were in a wet meadow we scanned while conducting the Christmas Bird Count for Thomasville, Georgia. The geese were in an area of somewhat high grass (one foot or so) when we first saw them at a distance of about 100 m. Through 8X binoculars we could clearly see the birds' pink bills, white facial patches, and white side stripes. The high grass made seeing the black belly bars difficult, but occasionally we could. The orange feet were always hidden by the grass.

Later that morning, we photographed the birds and the slides were submitted for documentation with the Christmas Bird Count forms. Wilson Baker and Todd Engstrom verified the sighting later that day, and Leon Neel did also on a later date. The birds stayed in the meadow until at least 11 January 1986 when they were last seen.

I questioned the owners of the property and neighbors about the possibility of escaped domestic geese, but no one there kept geese or knew anyone nearby who did. The owners said they frequently saw various species of dabbling ducks in the sloughs of the meadow and were not surprised by the presence of wild geese. Heavy rainstorms on the night of 4-5 January might have caused the geese to land; the Thomasville Christmas Count also recorded 5 Greater Yellowlegs (*Tringa melanoleuca*) on 5 January 1986.

Robert L. Crawford, 208 Junius St., Thomasville, GA 31792.

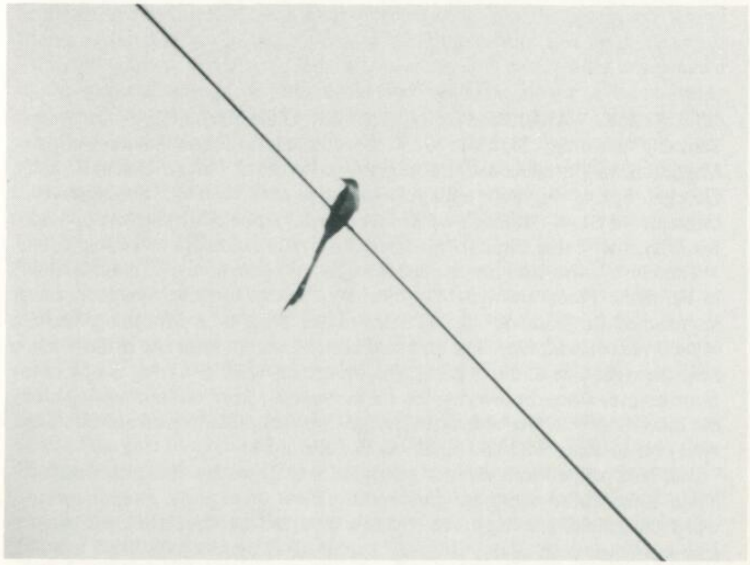
BIZARRE NOCTURNAL BEHAVIOR OF RED-HEADED WOODPECKER - On the night of 20 June 1987 at 2350 an adult Red-headed Woodpecker (*Melanerpes erythrocephalus*) exhibited ten minutes of behavior which, in a human, would have been termed hysterical. The incident occurred at the observer's home in a suburban woodlot in Dekalb County, Georgia. While I was sitting in the dimly lit house, the woodpecker suddenly landed against a screen door leading out to a lighted deck. The bird hung against the screen door for perhaps half a minute and then flew to a nearby window. It fluttered fruitlessly against this window for several minutes. I opened the vent slightly, briefly touched the bird, but it continued its fluttering, ignoring me. I then went out on the deck, to the side and rear of the bird, upon which it flew off into the dark. It soon returned and continued its fluttering against the window for another seven or eight minutes. The episode ended when I turned on a stronger light and again approached the window, whereupon the bird flew away. As additional background, it should be added that Red-headed Woodpeckers were at this time nesting in a snag 20 m from this house. Territorial rivals were occasionally present in the area also. The young in the nest were judged to be on the point of fledging.

This woodpecker's nocturnal behavior seems at first glance entirely abnormal for this or any other species. Do reports exist of similar fits in other birds? Can any known causes be assigned?

Anselm Atkins, 2525 McKinnon Drive, Decatur, GA 30030.

SCISSOR-TAILED FLYCATCHER AT DARIEN, GEORGIA - During the early afternoon of 9 June 1986 I was driving on US 17 from Darien to Brunswick, Glynn county, Georgia. I had just crossed the South Altamaha Bridge and was approaching the intersection of GA 99 when I noticed a bird with a very long tail perched on a telephone wire. I was able to stop and get a good look at the bird with my binoculars. It was about the size of a Northern Mockingbird (*Mimus polyglottos*) with the same general light grayish color. This bird, however, had a broad flycatcher-type bill and had a very worn tail about 1.5 times the length of the bird's body. I quickly took 2 exposures of the bird with my camera (one of which is reproduced here) before a loud clap of thunder caused the bird to fly. After this the bird was lost from view. From what I had seen, I knew that the bird was a Scissor-tailed Flycatcher (*Tyrannus forficatus*) based on my previous experiences with the species in Texas.

Lydia Thompson, P. O. Box 3151, Jekyll Island, Georgia 31520.



Scissor-tailed Flycatcher at Darien, GA - 9 June 1986. Photo by Lydia Thompson.

BLUE JAY IMITATES OSPREY - In the south it is common to hear the Blue Jay (*Cyanocitta cristata*) imitate the "key-eer" call of the Red-shouldered Hawk (*Buteo lineatus*). On Cedar Key Island, Florida, this observer heard a Blue Jay perform an excellent imitation of an Osprey (*Pandion haliaetus*). Cedar Key is a small fishing resort island off northwest Florida and numerous Ospreys nest there.

On 1 April 1987 I was watching two occupied Osprey nests in the public cemetery. Ospreys were calling both from the nest and from flight overhead with their usual whistled call. Hearing yet another one in a thick grove of conifers nearby, I walked toward the sound. No Osprey was there, only a Blue Jay. As it moved, the sound went with it. The perfection of its imitation can be judged by the fact I had just heard real Osprey calls with which to compare it and yet had been completely fooled.

Anselm Atkins, 2525 McKinnon Drive, Decatur, GA 30030.

MOURNING WARBLER FOUND IN THE ATLANTA AREA - On a warm Saturday morning, 18 May 1985, the Atlanta Audubon Society's Spring Migration walk produced a rare migrant in Fernbank Forest, Dekalb County, Georgia. Spring migration that year had been off somewhat; the numbers of migrants were low. Although we had recorded 20 species of warblers up to this Saturday, they came through the forest mostly individually or two at a time.

Therefore it was with low expectations that we entered the "Forest Garden" in Fernbank Forest on that May morning. To my surprise, however, as we approached the bamboo stands, I heard the song of a Mourning Warbler (*Oporornis philadelphia*). The bird sang about six times from low in the bamboo near the right side of the garden. The Mourning Warbler's song is one of my favorites ever since discovering the southernmost record of their nesting along the Blue Ridge Parkway at Jenkins Bridge Overlook, (8.2 miles from Cherokee, N.C.) on 16 June 1983 and again on 14 June 1984.

The bird popped into view as I pished for it. I got my binoculars on it for about 10 seconds, noting its gray hood, yellow underparts, lack of eyering, wingbars, and tail markings. The bird flew off to the left, deeper into the bamboo and was never seen again, although I tried for it again on 19 May.

This was the first record of a Mourning Warbler in Fernbank Forest and the sixth record for the Atlanta area. Previous records for Mourning Warblers in the Atlanta area include 23 May 1931, 17 May 1956, 25 October 1970, 15 May 1977, and 14 May 1978.

Georgann Schmalz, Fernbank Science Center, 156 Heaton Park Dr., N.E., Atlanta, GA 30307.

OBSERVATIONS OF GRASSHOPPER SPARROWS NESTING IN CLARKE COUNTY - During the month of July 1987, observations were made of two pairs of Grasshopper Sparrows (*Ammodramus savannarum*) nesting in a grassy second year oldfield. The field, which was larger than 25 ha, was approximately 14 airline km southeast of Athens, Clarke Co., Georgia. I spent up to seven hours in the field on two days a week during July and August while conducting a study for Dr. H.R. Pulliam. Grasshopper Sparrows were heard regularly during this period, and there were at least two singing males within sight of the study location which was less than one ha in size.

The first pair was noticed during early July while I was walking in the southern half of the field. The parents were seen feeding four fledglings that perched on grass stalks. No detailed notes were taken on these birds.

The second pair was found nesting within the study site. The nest was discovered at the base of a Broomsedge (*Andropogon* sp.) grass clump in a sparsely vegetated area. It was near the east edge of the field and was located and identified by watching the bird leave the nest as it flushed. When this occurred, the bird would run a short distance away from the nest before taking flight. At the date of discovery (13 July 1987) there were four eggs. The eggs were dull white with scattered light brown spots. The nest, which was situated on the northeast edge of the clump, was lined with fine grass and had an inside diameter of approximately 8.5 cm after fledging had occurred. These observations are consistent with the desciption of Grasshopper Sparrow nests given by H. Harrison in *A Field Guide to Bird's Nests* (Houghton Mifflin Company, Boston, MA. 1975). The nest was located approximately nine m to the west of a fence row and deciduous woods and three m to the east of denser grass covering the rest of the field. A dirt track for vehicles lay between the nest and the fence row. The nest was exposed in that the only immediate cover was the grass clump, but it was concealed by bent grasses. The nest was observed on five additional dates when the field study brought me to the location. On 14 July the nest was unchanged, but on the 20th there were three hatchlings and one egg. By the 22nd all four eggs had hatched and on the 23rd the condition was the same.

On the morning of 28 July, using the car as a blind, I made observations and notes of the parents feeding the young from 0700 to 0800 with 10X25 binoculars. During this time the parents made six visits to the nest. Both parents brought food, and each would leave with a fecal sac. The parents foraged in the field and flew to within one to five m of the nest above the vegetation. Here they stopped on conspicuous perches (e.g. Pokeweed, *Phytolacca americana*), directing their attention toward the nest. From this distance they would drop to the ground and approach the rest of the way on foot. There was considerable calling (soft chirps or peeps) from the parents during this time. This method of feeding is very similar to behavior reported by Thomas Patterson in 1984 (*Oriole* 49:76-78). The young were quite mobile by this date and would leave the nest when the parent was less than .5 m away to take the food. The parent would continue to the nest and pick up a fecal sac. When the parent left, it typically flew from the nest toward the woods and would release the sac in flight. I was unable to identify the food items brought by the parents, but all appeared to be insect matter. The parents were in the vicinity of the nest with food more times than I saw them feed the young. It appeared as if they may have eaten

some food items themselves, or that I missed their approach to the nest. I considered the possibility that my car was disturbing them, but I had not parked the car closer to the nest than on previous dates. This was approximately 10 m to the northeast on the dirt track. Before leaving the field at 1300 on 28 July, I noted all four young still in the nest. They had well developed wings and body feathers. I returned around 1700 on the same day with the intent of banding the young birds, but they had fledged. It was possible that they were force fledged, as a partner in research had seen two dogs in the area during the afternoon, but I did not note any disturbance to the nest. I did not see or hear any Grasshopper Sparrows near the nest at that time.

These observations were made while conducting research under the NSF grant BSR-8415770 to Dr. H.R. Pulliam.

David P. Young, Jr., Department of Zoology, University of Georgia, Athens, GA 30602. (current address: Savannah River Ecology Laboratory, Drawer E, Aiken, SC 29802).

NOTICE

Copies of the Proceedings of the Third Southeastern Nongame and Endangered Wildlife Symposium are now available. This meeting was held in August 1987 at Athens, Georgia and included more than 30 presentations by noted authorities from throughout the Southeast and beyond. To receive your copy of this 253 page document, send $10 to Georgia Department of Natural Resources, c/o Mr. Ron Odum, Route 2, Box 119A, Social Circle, Georgia 30279. Make your check payable to Planning Committee, 3rd Nongame Wildlife Symposium.

FROM THE FIELD

December 1986 - May 1987

Although we have a good long newsworthy report, there were surprisingly few true rarities seen during the period. Probably the rarest bird was the Say's Phoebe that remained around Dublin for a number of observers to add it to their state and perhaps life list. Just slightly less rare were sightings of American White Pelicans, an inland nesting record for the Bald Eagle, a wintering Western Kingbird, Tree Swallows nesting in Atlanta, a Mourning Warbler near Atlanta, a couple Dickcissel reports and a good sprinkling of winter finches.

Once again the report is dominated by sightings from Atlanta, Augusta, Macon and a few from the coastal areas. We need more reports from several sections of the state. Bird populations along the Georgia coastal areas are so poorly understood that it is almost virgin territory. The same could be said for the southwestern quadrant of Georgia. Other than some work published from Eufaula NWR the area is largely undocumented. This should be considered a great challenge to Georgia birders which needs to be documented in The Oriole.

Abbreviations used include: AS - Audubon Society, CBC - Christmas Bird Count, CCWTP - Clayton County Water Treatment Plant about 20 miles S of Atlanta, CRNRA - Chattahoochee River National Recreation Area about 10 miles N of Atlanta, MBBT - Merry Brothers Brick and Tile Company ponds at Augusta, MIA - Macon Industrial Area, NWR - National Wildlife Refuge, PCL - Peachtree City Lake about 20 miles SW of Atlanta, RCWMA - Rum Creek Wildlife Management Area near Forsyth, and SCSP - Sweetwater Creek State Park about 20 miles W of Atlanta.

RED-THROATED LOON - A good coastal count was 200 at Tybee Island on 30 Jan by Dave Sibley. Rare inland in the spring was a single bird at Toccoa on 4 May as noted by Robin Carter and Dennis Forsythe.

COMMON LOON - One at MBBT on 23-24 Jan. by Anne and Vernon Waters was a rare mid-winter record for the Augusta area.

PIED-BILLED GREBE - Most likely a late migrant, one individual was seen by Terry and Peggy Moore in north Fulton County on 24 May.

HORNED GREBE - A good count of 100+ was noted on 28 Feb. in the intracoastal waterway during the Atlanta AS whale-watching trip near Jekyll Island. Of note elsewhere were single birds at MBBT on 19 Feb. (Anne Waters) and another in northeast Laurens County on 31 March (Tom Patterson). Just a few spring records exist for Laurens County.

NORTHERN GANNET - A group of 150+, mostly adults, was observed on 28 Feb. during the previously mentioned whale-watching trip.

AMERICAN WHITE PELICAN - Although rare in Georgia, three birds were sighted this period. The first one was noted on 2 Jan. from the ferry to Sapelo Island by Jack Cooper, Clarence Belger and others. The second was at the MIA in Macon from 10 to 27 March according to Ty Ivey, and the last one was at Ft. Pulaski on 22 March as reported by Raymond Powers.

DOUBLE-CRESTED CORMORANT - Continuing to increase inland, the species had the following high counts: 17 at MBBT on 23 Jan. (Anne and Vernon Waters), up to 50 in the Lake Juliette area near Forsyth during March and April (Terry Johnson) and about 80 at the MIA in late March/early April (Ty Ivey).

ANHINGA - Of interest was a female which spent the winter at MBBT according to Anne and Vernon Waters. Another bird was outside Dublin on 10 Jan. as reported by Paul Raney and Nell Kirkland.

AMERICAN BITTERN - In Augusta, a single bird spent the winter at the MBBT and another was noted off the levee on 25-26 April (Anne Waters). Single birdsT were also seen in northwest Oconee County on 23 Jan. (Paul Sykes) and in northeast Laurens County on 2 May (Tom Patterson).

GREAT BLUE HERON (white morph) - Rare and early, a single bird was reported from Jekyll Island from 30 March to 8 April by Emmy Minor.

GREAT EGRET - Late migrants for the Piedmont area were noted near Griffin on 6 Dec. (Patrick Brisse, Hugh Garrett, Terry Moore) and during the 22 Dec. Piedmont NWR CBC (*fide* Terry Johnson).

SNOWY EGRET - Always a rare find in the Piedmont in the spring, one bird was sighted by John Paget at Commerce Lake on 25 May.

CATTLE EGRET - Dec. and Jan. records came from Ben Hill, Decatur and Seminole counties with a high count of 15 birds on 16 Jan. at Fitzgerald (Bob Humphries, Milton Hopkins and Paul Raney). An early bird was noted by Ty Ivey at the MIA on 15 Feb. and according to Anne and Vernon Waters and Clarence Belger the rookery in Augusta had over 850 nests on 23 May.

GREEN-BACKED HERON - One bird sighted by David Brown and Kris Poulsen during the Marietta CBC on 28 Dec. was a rare winter find for the Atlanta area.

GLOSSY IBIS - Emily Parker and Marian Hancock reported 50 birds from Darien as early as 14 March. That appears to be an early date for such a large number but little is documented on this specie's coastal migration patterns.

TUNDRA SWAN - June and Oscar Kiplinger reported one bird flying above Peachtree City Lake in Fayette County on 12 Dec. (*fide* Chris Lambrecht).

SNOW GOOSE - The species was reported more often than usual this period. Arthur Green had one in Hiawassee from 14 Dec. to 8 Jan.; Paul Raney had 14 in Decatur County on 13 Dec.; John Paget had 2 on Lake Lanier that remained through 10 Jan.; Terry and Mike Chapman had 1 at the Plant Scherer pond on 1 March; and Tom Patterson reported the last 2 blue morphs from Laurens County on 2 and 8 March.

AMERICAN BLACK DUCK - In the Atlanta area, the high count was 16 birds noted at Shamrock Lake near CCWTP on 31 Jan. by Patrick Brisse. In Augusta, where the species is declining, 2 birds on 27 Dec. was the only record according to Clarence Belger.

BLUE-WINGED TEAL - Nanette Johnson mentioned a single bird at the Chattahoochee Nature Center on 29 Jan. for a rare Atlanta winter record.

NORTHERN SHOVELER - The species was reported more often than usual in the Atlanta area *fide* Terry Moore. Of note was a late individual at Lake Juliette, Monroe County, on 3 May by Terry Johnson.

REDHEAD - Rare in the Augusta area, six birds were reported by Anne Waters during the winter. In the piedmont, a bird at Lake Lanier by John Paget on 15-19 April was late.

LESSER SCAUP - A flock of 103 individuals at SCSP on 8 April was a high count for the Atlanta area (Paul Raney).

SURF SCOTER - Patrick Brisse, Hugh Garrett and Terry Moore sighted a bird at Shamrock Lake on 6 Dec. for the fourth Atlanta record.

COMMON GOLDENEYE - A few inland reports were received. One was at Twin Lakes in south Fulton County and 3 were at Shamrock Lake on 6 Dec. (Patrick Brisse, Hugh Garrett and Terry Moore). Another was at SCSP on 9 Jan. (Edward Paxton). Terry Johnson reported 2 more from the RCWMA near Forsyth on 27 Jan.

BUFFLEHEAD - A good inland count was 125 at Callaway Gardens on 3 April (Luann Craighton). Terry and Peggy Moore reported a late migrant from PCL on 23 May; the bird was last noted on 6 June by Patrick Brisse.

HOODED MERGANSER - A count of 205 during the Marietta CBC on 28 Dec. was quite high for the Atlanta area. A male at MBBT on 29 May was quite late according to Anne Waters. Although breeding is a possibility, it was not confirmed.

RED-BREASTED MERGANSER - Terry Johnson mentioned two very late females from the Plant Scherer ash pond on 27 May.

RUDDY DUCK - Anne Waters is finding the species difficult to locate in the winter in the Augusta area.

TURKEY VULTURE - Jerry and Marie Amerson located a roost near Swainsboro of over 350 birds in early March.

OSPREY - More reports than usual were received. Winter inland sightings came from MBBT on 6 Dec. and 2 Jan. (Anne and Vernon Waters) and Dublin on 10 Jan. (Hugh Garret and others). During the spring over a dozen records were received from Augusta, Macon, Columbus and Atlanta and the species was again found nesting at the RCWMA.

AMERICAN SWALLOW-TAILED KITE - Early birds were noted by Jim and Joyce Harrison near Skidaway Island on 23 March and by Frank McCamey at the Okefenokee Swamp on 29 March.

MISSISSIPPI KITE - The species was back at Macon by 23 April and 27 April (Ty Ivey and others) and in Augusta by 25 April (Anne Waters).

BALD EAGLE - According to Terry Johnson, one of just a few recent inland nestings involved an active nest at the RCWMA but strong winds brought down the nest between 16 and 19 Jan. The birds must still be staying in the area as at least seven sightings were reported from that area during the spring. Elsewhere, sightings were too numerous to mention except for a record of an adult on 5 Jan. near Woodstock, in Cherokee County, by Peggy Moore. The species is quite rare in the Atlanta area.

RED-TAILED HAWK - Anne and Vernon Waters reported a hawk of the Krider's type from Augusta on 6 April.

GOLDEN EAGLE - Two immatures were sighted this season. The first one was seen by Eddie and Nina Arnold on 6 Jan. at the Piedmont NWR. It was also seen by the refuge staff. The second was spotted by Jack Cooper on 4 April on the Oconee Reservoir off I-20 between Atlanta and Augusta.

MERLIN - Lydia Thompson reported six individuals between Jekyll Island and Darien on 4 April.

KING RAIL - Rarely reported from the Atlanta area anymore, one was seen at the Chattahoochee Nature Center on 10 Jan. by Jay Stolar.

COMMON MOORHEN - Unusual for the Augusta area was a bird seen by Clarence Belger on 26 April at MBBT.

AMERICAN COOT - About 350 birds were sighted by Luann Craighton on 3 April on Robin Lake at Callaway Gardens, a rather high count for the gardens.

SANDHILL CRANE - The last southbound birds were seen from Lake Tobesofkee near Macon on 7 Dec. by Ken and Arlene Clark (280 birds) and from north Fulton County on 13 Dec. by Peggy and Terry Moore. The first northbound birds were 25 seen in northwest Atlanta on 19 Feb. by Nancy Iha. It was a good migration in general. The high count around Macon was 600+ on 3 March during a 2 hour period according to Ken and Arlene Clark. Around Atlanta, Terry Moore reported a migration from 1-15 March with a peak of 600 also on 3 March. Around Dalton, Harriett DiGioia saw over 1000 birds on 3 March in Murray and Whitfield counties. Vernon Gordon mentioned an additional 400 on 6 March from Whitfield County. Of note were 32 grounded in Laurens County on 10 March as reported by Tom Patterson.

BLACK-BELLIED PLOVER - The only inland sighting came from northeast Laurens County on 24 May (Tom Patterson).

LESSER GOLDEN-PLOVER - Outstanding for the Atlanta area were the 42 birds found by Hugh Garrett at the Dekalb Airport on 3 April. Elsewhere, Don and Joyce Duncan mentioned 3 from Kathleen on 11 April, Ty Ivey 16 from Macon on 11 April and Tom Patterson 3 from Laurens County on 18 April.

PIPING PLOVER - Lydia Thompson reported up to 19 birds at Jekyll Island during the month of March.

BLACK-NECKED STILT - Lorraine Dusenbury noted the first arrival at Jekyll Island on 28 March.

AMERICAN AVOCET - Lydia Thompson sighted 50+ on the Jekyll Island Causeway on 26 March.

GREATER YELLOWLEGS - Inland, a couple late birds were reported from MBBT on 6 Dec. by Anne Waters and from Plant Scherer near Forsyth on 7 Dec. by Terry Johnson.

LESSER YELLOWLEGS - An early spring arrival was at the CCWTP on 22 Feb. (Patrick Brisse).

WILLET - Rare inland in the spring were 2 birds seen at Plant Scherer's ash pond on 3 May (Terry Johnson and others).

SPOTTED SANDPIPER - The species was found wintering in Atlanta and Augusta according to Terry Moore and Anne Waters.

UPLAND SANDPIPER - Small numbers were noted in Laurens County on 29 March and 18 April by Tom Patterson; in Kathleen on 11 April by Don and Joyce Duncan; and in Houston County on 17 April by Eddie and Nina Arnold. The specie's absence from the Atlanta area was noteworthy.

WHIMBREL - Rare in mid-winter were 3 birds on Cumberland Island on 3 Jan. (Anne Wyatt and Edward Paxton).

MARBLED GODWIT - Still rare to uncommon in the winter, one bird was seen on Cumberland Island on 3 Jan. by Anne Wyatt and Edward Paxton.

LEAST SANDPIPER - This winter large numbers were reported inland. Was it a sign of an early migration? Tom Patterson mentioned 75 to 100 birds in Laurens County on 31 Jan. and 8 Feb.; Anne Waters sighted 49 on 17 Jan. and 35 on 13 Feb. from MBBT; and Ty Ivey had 18 on 18 Feb. from the MIA.

WHITE-RUMPED SANDPIPER - The lone bird sighted at the CCWTP on 3 May by Patrick Brisse and Paul Raney was the only report for the period.

PECTORAL SANDPIPER - A late bird was still near Lake Lanier on 4 Dec. according to John Paget.

DUNLIN - John Paget mentioned a bird on 6 March from Forsyth County. This was most likely the same bird he reported from the area in January. Elsewhere inland the species was reported from the MIA on 5 and 11 April (Ty Ivey and others).

STILT SANDPIPER - Rare inland in the spring, a bird was sighted on 12 April near Pendergrass by John Paget and Jack Carusos.

COMMON SNIPE - The 200+ seen by Anne Waters off the levee in Augusta on 7 March was a rather high count.

POMARINE JAEGER - The Atlanta AS whale-watching trip off Jekyll Island on 28 Feb. found one Pomarine Jaeger 10 miles offshore (*fide* Terry Moore). The same day three Parsitic Jaegers were also sighted.

LAUGHING GULL - Always a good bird inland, three were noted on 4 and 5 April at the MIA by Ty Ivey, Jerry and Marie Amerson.

BONAPARTE'S GULL - According to Terry Moore, the species was more common this winter than usual in the Atlanta area. The high spring count there was eight birds at SCSP on 10 April (Dennie and Pam McClure). Along the coast 250+ were seen on 28 Feb. during the Atlanta AS whale watching trip off Jekyll Island. A few other winter reports came from MBBT on 23 Jan. (Anne Waters) and from the Plant Scherer ash pond on 18 Feb. (Terry Johnson).

RING-BILLED GULL - Large numbers were noted around Atlanta on 25 Dec. when Paul Raney saw 273 at Morgan Falls and on 29 Jan. when Hugh Garrett saw 200+ over Murphy Candler Lake in north Atlanta.

CASPIAN TERN - Several individuals were sighted at the RCWMA in Monroe County on 4 April and 3 May (Terry Johnson and others).

FORSTER'S TERN - Single birds were reported inland from the RCWMA on 1 March by Terry Johnson and Mike Chapman and from SCSP on 2 May by Paul Raney.

COMMON GROUND-DOVE - Unusual that far inland were 2 birds found by Terry Johnson on 22 May near Barnesville.

SHORT-EARED OWL - Don and Joyce Duncan reported the species from its now regular wintering area near Desoto; one was seen on 14 Dec. and 2 on 26 Dec. Is there any other place around Georgia where this species is a regular visitor?

CHUCK-WILL'S-WIDOW - Relatively early was a calling bird heard by Lydia Thompson near Darien on 12 March.

CHIMNEY SWIFT - The first birds were seen as early as 12 March in Augusta according to Clarence Belger.

HUMMINGBIRD (sp.) - In Columbus, starting on 8 Jan., a lone bird was often observed in Mrs. Frances Coulter's yard and Jim Shirah saw another one there on 28 Jan. These are firsts for the Columbus area (*fide* Sam Pate). As you have probably noticed, we tend not to assign this type of sighting to a particular species. This is for two reasons. First of all, it is becoming very apparent that winter hummingbird identification is extremely tricky to say the least and second, our reports are seldom accompanied by any amount of details regarding the sighting.

WESTERN KINGBIRD - One lingerer spent the whole winter at Sapelo Island after being discovered by Tom Patterson and others during the Sapelo CBC on 2 Jan.

PURPLE MARTIN - As usual the first arrivals came as early as 7 Feb. near Lake Tobesofkee (Ken and Arlene Clark) and 12 Feb. near Kathleen (Don and Joyce Duncan).

SAY'S PHOEBE - A bird in northeast Laurens County from 27 Dec. through 8 Feb. provides only the 3rd record for Georgia (Tom Patterson). The bird was seen by many observers from around the state during its stay.

TREE SWALLOW - A first for the Atlanta area was the nesting of two Tree Swallows at the CCWTP starting in May (Patrick Brisse and others).

FISH CROW - The species is still being reported from the piedmont in increasing numbers since a few records were received from Atlanta, Gainesville and Forsyth County.

BLUE-GRAY GNATCATCHER - Late birds were reported from Macon on 8 Dec. by Maurice Crenshaw and 5 birds at Augusta on 27 Dec. by Anne Waters and Christine Huzella. The last record seems noteworthy as it was quite late in the season for that high a count. Single birds were sighted on 5 Dec. at Pendergrass (John Paget) and again on 10 Jan. (Greg Valpey) and in Atlanta on 21 Dec. (Craig Hill). Another bird at the MIA on 15 Feb. by Ty Ivey could have been an early migrant.

SOLITARY VIREO - Unusual for Atlanta was the nest found on Kennesaw Mountain on 18 April by Chris Geller. Photos were taken later by Paul Raney.

PHILADELPHIA VIREO - A very early individual was seen by Jerry and Marie Amerson at the Ocmulgee National Monument in Macon on 12 April.

TENNESSEE WARBLER - Anne Waters reported a very early Tennessee from Augusta on 4 April.

NASHVILLE WARBLER - Even earlier for this species was a bird in Augusta on the same day, 4 April, again seen by Anne Waters.

NORTHERN PARULA - Clarence Belger observed a male on Sapelo Island on 3 Jan. for a rather rare mid-winter record.

YELLOW-THROATED WARBLER - Unusual for Laurens County was a bird seen coming to Tom Patterson's feeder from December through spring.

PRAIRIE WARBLER - Although rare in winter in the coastal plain, one on 11-14 Dec. at Lake Seminole is worth mentioning (Paul Raney). In the piedmont, another bird sighted by Craig Faanes and Mark Oberle during the Peachtree City CBC on 20 Dec. was most unusual and a first for the Atlanta area.

BLACKPOLL WARBLER - Although not the earliest record ever, a male at MBBT on 4 April by Anne Waters is worth noting.

CERULEAN WARBLER - Terry Moore received only three reports this season from 16 April through 3 May for the Atlanta area. This is a rather low number compared to previous seasons.

NORTHERN WATERTHRUSH - A single bird seen during the Atlanta AS migration walk along the Chattahoochee River on 29 March was early for that area (*fide* Terry Moore).

CONNECTICUT WARBLER - Mark Oberle sent in the only report of the season from the CRNRA in Atlanta on 14 May.

MOURNING WARBLER - A bird found by Jerry Brunner in Cherokee County on 9 May provided only the seventh record for the Atlanta area.

WILSON'S WARBLER - Rare in the winter, especially in the piedmont area, was a bird seen by John Paget in Forsyth County on 10 and 17 Jan.

SUMMER TANAGER - Dave Sibley heard a bird of this species on St. Catherine's Island on 1 Feb. for either a wintering record or a very early arrival.

BLUE GROSBEAK - Tom Patterson and Jack Cooper mentioned one bird from Sapelo Island on 2 Jan. for what appears to be Georgia's fourth winter record.

DICKCISSEL - Always worth mentioning were single birds in Augusta on 26 April (Clarence Belger and many others) and another at Montezuma, Macon County, on 3 May (Dennie and Pam McClure).

CLAY-COLORED SPARROW - A singing bird near Birdsville on 9-10 April provided only the second spring record for Georgia (Dave Sibley).

LARK SPARROW - A rare migrant in the spring, one was sighted by John Paget on 13 April at Pendergrass.

WHITE-CROWNED SPARROW - Robin Carter and Dennis Forsythe reported two late birds from Augusta on 5 May.

BOBOLINK - A good count for the Atlanta area was 100+ seen at the CCWTP on 3 May by Patrick Brisse and Paul Raney.

BREWER'S BLACKBIRD - One bird in Augusta on 4 April by Anne Waters was the only spring record received.

NORTHERN ORIOLE - Of note was a bird coming to Terry Johnson's feeder near Forsyth on 22-28 Jan. In Macon, the species was nesting again in Central City Park as many observers saw the nests as early as 3 May (Ocmulgee AS).

PINE SISKIN - The species was common this winter and into late spring in many areas around the state. The latest birds were reported from College Park on 10 May by Dennie and Pam McClure.

EVENING GROSBEAK - This species also had a good winter in some locations around the state as 100+ were seen for a month during Feb. near Stone Mountain (Patrick Brisse) and 40+ were seen in Augusta in April (Steven Guy). The species was also reported in small numbers from the Macon and Columbus areas.

Patrick Brisse, 4960 Gatehouse Way, Stone Mountain, GA 30088.

FINANCIAL REPORT

The following income and expense information has been provided by the Treasurer:

Balance as of 1 October 1986		$27,954.84
Sources of Funds		
Dues	$3,745.00	
Life Membership	1,250.00	
Interest	1,691.08	
Sales	2,726.63	
Meetings	4,299.50	
Other	11.00	
Total	13,723.21	
Uses of Funds		
Oriole (2)	1,833.12	
Goshawk (3)	511.02	
Postage	514.23	
Meetings	5,762.00	
Checklist publication	4,116.68	
Oriole covers	2,428.00	
Anniversary booklet	1,182.80	
Other	1,714.86	
Total	18,062.71	
Decrease in Funds		4,339.50
Balance as of 30 September 1987		$23,615.34

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