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AUTUMNAL MIGRATION OF THE GRAY CATBIRD THROUGH COASTAL ALABAMA

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Abstract.—Gray Catbirds (*Dumetella carolinensis*) appear not to use the Fort Morgan peninsula as a departure point for a trans-Gulf migration. Most individuals (75%) take an eastward, overland route along the Gulf coastal region of Alabama. No significant difference in weight occurred between catbirds netted on the Alabama coast and those collected at an inland site in north Florida. In addition, few Alabama or north Florida birds had sufficient fat reserves to complete an over-water flight to Latin America.

MIGRACIÓN OTOÑAL DE *DUMETELLA CAROLINENSIS* A TRÁVES DE LA COSTA DE ALABAMA

Sinopsis.—Individuos de *Dumetella carolinensis* no parecen estar utilizando la península de Fort Morgan como punto de partida de sus migraciones a tráves del Golfo. La mayoría de los individuos (75%) toman una ruta más al este a lo largo de la región costera del Golfo de Alabama. No se encontró diferencia significativa en peso de individuos capturados en la costa de Alabama y otros capturados en una localidad no costera del norte de Florida. Ademas, muy pocos individuos de los capturados en las localidades de Alabama y Florida, tenían las suficientes reservas de grasa para completar el viaje sobre agua hasta alcanzar la América Latina.

Migrant passerines normally cross the Gulf of Mexico during autumn (Able 1972, Buskirk 1980, Paynter 1953, Siebenaler 1954). The extent to which various trans-Gulf routes are used, the principal direction of movement, the species involved, and the particular departure points for migrants moving through the northeastern Gulf region are unknown, however. In this paper, migratory route selection by Gray Catbirds (*Dumetella carolinensis*) is examined. This is the first banding study designed specifically to investigate directional movements of birds during migration as a means of assessing the extent to which various migratory pathways are used.

STUDY SITE AND METHODS

The study site was located within the Bon Secour National Wildlife Refuge, in Baldwin Co., Alabama, on Fort Morgan peninsula (Fig. 1). The peninsula represents the last stopover for birds attempting a direct trans-Gulf migration flight. Individuals not attempting a trans-Gulf migration continue eastward to Florida or westward to Mississippi. The peninsula's unique position and physiographic characteristics make it an ideal location on which to conduct a route selection study.

A line of 13 black-nylon mist nets was positioned in a north–south direction (end to end) across part of the peninsula. Nets were operated during the fall migratory season of 20 Aug.–30 Oct. 1987, and during

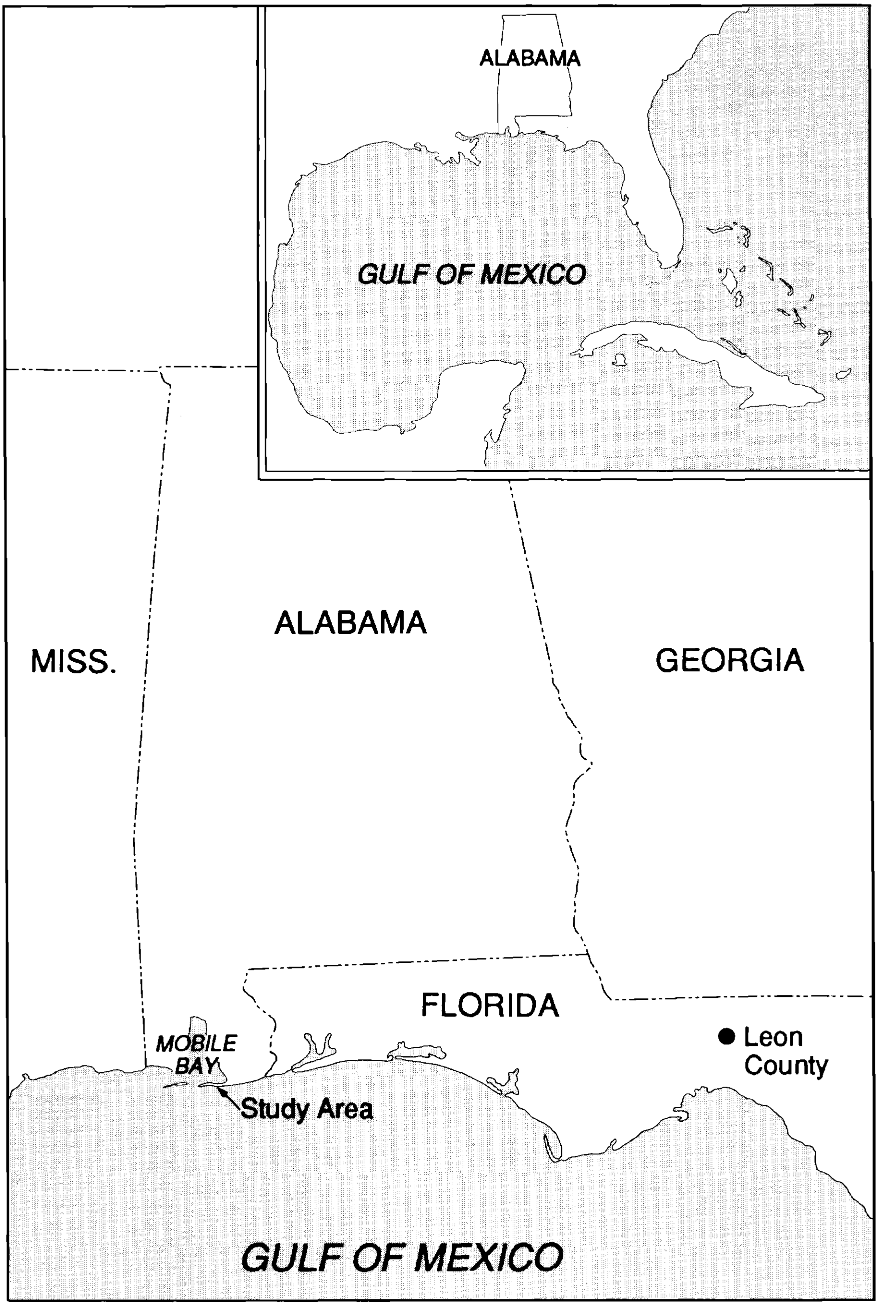

FIGURE 1. Location of study area in relation to the Gulf of Mexico.

winter and spring on 19 Feb.–10 May 1988. Each net was 2.3 m × 13.8 m, 36 mm mesh size, and nets were separated by space to allow passage between net poles for retrieval purposes. East–west movements could be ascertained simply by recording the side from which each bird entered a given net.

During autumn, nets were opened daily at sunrise (approx. 0600 hours EST) and closed from 1200 until 1430 hours. Nets were reopened at 1445 hours and were closed at sunset (approx. 1830 hours). Nets were not operated during periods of rain.

Captured birds were identified, banded with USFWS numbered leg-bands, and weighed to the nearest gram. Standard wing length was measured to the nearest mm along the folded but unpressed wing, and direction of entry into the nets was recorded. Age of birds was determined using plumage characteristics whenever possible, and birds were released immediately following processing.

Data on catbirds collected between 1960 and 1964 from tower kills (D. T. Rogers, Jr., unpubl. data) at the WCTV tower located in Leon Co., Florida, near Tallahassee (Fig. 1), are included for comparison of age ratios, weight, and flight ranges. Chi-squared goodness-of-fit tests were used for directional data analyses. Weight data were analyzed using Student's *t*-tests because sample sizes were large, variances of groups compared were homogeneous (Hartley's F_{max}-test), and data appeared to be normally distributed when graphically examined (Sokal and Rohlf 1981).

RESULTS

Gray Catbirds are common migrants along the Alabama Gulf coast during spring and late fall. In October, as many as 725 catbirds have been reported at Dauphin Island in a single day, and 154 were banded in the Fort Morgan/Gulf Shores area during a 6-d period in 1964 (Imhof 1976). During our fall study period, catbird migration was at times so heavy that many were killed by colliding with cars or windows of houses along the Gulf Shores Parkway. Though catbirds are known to winter commonly in Baldwin Co., Alabama (Imhof 1976), none were captured or observed in the study area during the winter research period. In addition, during the autumn, only six catbirds were recaptured more than 24 h after being banded. On these bases, catbirds captured during the fall in the study area are believed to be in the process of migrating.

During the spring, the Gray Catbird was the second most frequently captured species with 44 individuals representing almost 10% of total spring captures. Numbers of eastbound catbirds in spring did not differ from numbers of westbound birds ($P > 0.2$), and there was no significant difference in weight between eastbound and westbound groups ($P > 0.2$; $\bar{x} = 33.7$ and 34.7, respectively). As no readily discernable spring directional patterns were observed, only fall results are considered further. The lack of directional pattern in spring is important, however, because it contrasts sharply with that observed in fall, and because it shows that net placement did not create a sampling bias by "forcing" birds into one side of the nets.

The Gray Catbird was the most frequently netted species in autumn. During this period, 281 catbirds, representing 46% of the individuals of all species, were captured. Of all Gray Catbirds netted in the fall during the Bon Secour study, 209 (75%) were eastbound, whereas only 71 (25%) were headed west. Percentages differ significantly ($P < 0.001$) from a 50/50, east–west ratio that would be expected if no preferred directional movement were exhibited by the species. There was no significant difference in age composition ($P > 0.2$) or weight ($P > 0.2$) between the eastbound and westbound groups in the fall ($\bar{x} = 37.1$ and 36.9, respectively). Therefore, an eastward route along the Gulf coastal region of Alabama toward Florida appears to be a major migratory pathway during autumn for the majority of catbirds moving through the Fort Morgan Peninsula.

DISCUSSION

Weight is an important factor in determining the flight-range capability of migrants and therefore reveals information on possible migration routes (Rogers et al. 1982). To reach wintering areas in Latin America via a Gulf crossing originating from the Fort Morgan Peninsula, a nonstop flight of at least 1000 km is required. Of 266 Fort Morgan catbirds for which weight was recorded, only 33 (12.4%) were estimated to have sufficient fat reserves to complete a 1000 km trip on the basis of formulae used by Pennycuick (1969, 1975) or Odum et al. (1961). Further, none of these birds would have been capable of completing such a flight based on the formulae used by Tucker (1971, 1973) because a live weight of approximately 44 g would be required for a 1000 km flight (Table 1). From these results, it seems unlikely that Fort Morgan Peninsula is an important departure point for trans-Gulf flight by catbirds.

Data from 90 tower-killed birds (D. T. Rogers, Jr., unpubl. data) indicate that North Florida is also not a major trans-Gulf launching area for the Gray Catbird. Weight data from migrants collected in Leon Co., Florida, do not differ significantly from those collected at the Alabama site ($P > 0.2$; $\bar{x} = 37.2$ and 37.1, respectively). In fact, only 13 of the tower-killed individuals (14.3%) had enough stored fats to complete a 1000-km nonstop flight based on Pennycuick's (1969) formulae, which provide the most liberal flight-range results. Marsh (1983) sampled catbirds in Gainesville, Florida, and also found that only 13% carried sufficient fat reserves on the basis of the Pennycuick formulae.

Theoretical flight formulae may underestimate the flight capabilities of migrants in at least two important ways. First, formulae do not consider favorable winds, which are often associated with mass migratory movements (Marsh 1983). Catbirds are known to migrate mainly in calm weather, however (Baird et al. 1959, Baird and Nisbet 1960). Therefore, flight estimates are probably more realistic for catbirds than for other passerine migrants. Second, catbirds may be able to fly for some distance

TABLE 1. Estimated flight ranges for the Gray Catbird.[1]

	Live weight (g)			
	32	35	41	44
Tucker's estimate[2] (km)	20.49	305.84	778.07	976.98
Pennycuick's estimate[3] (km)	27.50	402.29	987.32	1220.00
Odum's estimate[4] (km)	25.94	382.63	980.59	1246.51

[1] Based on a fat-free weight of 31.80 g (after Rogers and Odum 1966).
[2] Based on formulae of Tucker (1971, 1973).
[3] Based on formulae of Pennycuick (1969).
[4] Based on formulae of Odum et al. (1961).

by using energy obtained by catabolization of muscle tissue. In fact, Rogers and Odum (1966) found that mean live weight of postmigrant catbirds netted in Panama was below mean fat-free weight of tower-killed catbirds in Florida.

Although the actual percentage of catbirds capable of making a trans-Gulf trip may be somewhat higher than predicted on the basis of the above formulae, it is still reasonable to assume that most birds will either not complete or not attempt an overwater flight. Instead, most birds will either overwinter in Florida or continue to move through the Florida Peninsula enroute to Cuba or other Caribbean Islands.

Data from other Gulf-coastal locations support the notion that large numbers of migrants detour around the Gulf in fall. Data from radar studies conducted by Able (1972) show that total migration volume is greatest on nights when weather conditions are favorable for fall migration, either trans- or circum-Gulf. On favorable nights, large numbers of migrants took a circum-Gulf route along the Louisiana–Texas coast. Lowery and Newman (1966) also found that the vast majority of migrants followed the shoreline in coastal Texas. In addition, they reported that in the central region of Florida, the vast majority of fall migrants paralleled the slant of the peninsula. In one location, Pensacola, Florida, 58% of migrant birds observed were travelling on a seaward course. In this case, however, trans-Gulf activity co-occurred with the passage of a cold front and winds of the type that catbirds are thought to avoid.

Patterns of migration in southern Florida appear to be entirely different. Williams et al. (1977a,b) found that virtually all migrants leaving Miami between 29 Sep. and 12 Oct. were headed seaward to the southeast. Seasonal timing of this massive overwater movement corresponds with observations by Buskirk (1968) for catbird arrival on the northern coast of the Yucatan Peninsula. Able (1972) also theorized that the birds observed by Buskirk (1968) may have departed from Florida or Cuba, where weather conditions are often favorable for trans-Gulf flights.

A flight from south Florida to neotropical wintering areas would also be less stressful for migrants from the standpoint of distance. A trip from south Florida to the Yucatan Peninsula is at least 200 km shorter than one from either the Fort Morgan Peninsula or the panhandle region of Florida, and a flight from south Florida to Cuba would involve a distance of only 200 km. As catbirds captured on the Fort Morgan Peninsula and in the Tallahassee, Florida, region lack sufficient fat reserves to complete trans-Gulf flights, a more likely trans-Gulf launching area is South Florida where winds are favorable for such flights, and travel distance is much shorter.

There is the possibility that catbirds captured at the Bon Secour site are underweight or immature birds that are simply dropping out of a trans-Gulf migration; in fact 88.6% of 245 catbirds on which age was determined were immature. This percentage is typical of immature birds found at coastal locations during fall migration (Ralph 1971, 1975, 1978, 1981). It still seems reasonable to assume, however, that catbirds captured are not merely migration drop-outs for the following reasons. (1) There is no significant difference in age ratios or weights between the east and west moving groups at the Bon Secour site. (2) There is no significant difference between weights of migrants at the Bon Secour site and tower-killed migrants collected in Leon Co. even though the Florida site is inland and has a low percentage (42.6%) of immature birds ($n = 94$). (3) There is no significant difference in weights between mature and immature birds at either site. (4) If birds were simply dropping out of migration, random movement of birds would be expected and this was not the case.

In addition, Baird and Nisbet (1960) hypothesized that the Gray Catbird not only has a true coastal migration route but also is specially adapted to such a route because it avoids flying in NW winds. They also hypothesize that high percentages of immature catbirds are captured at coastal locations because they lack navigational experience of adults and thus drift beyond the coast while migrating. If correct, their hypotheses suggest that catbirds captured at the Bon Secour site were wind-drifted birds that had returned to the coast in order to resume their normal migration pattern. If this is the case, directional data from the present study again provide evidence that this pattern is an easterly overland route through the Alabama Gulf-coastal region for the majority of Gray Catbirds.

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