McVaugh, W. 1975. The development of four North American herons. II. Living Bird 14:163–183.

Palmer, R. S. 1962. Handbook of North American birds. Vol. 1. Yale Univ. Press, New Haven, Connecticut.

Parnell, J. F. and R. F. Soots, Jr. 1979. Atlas of colonial waterbirds of North Carolina estuaries. UNC at Wilmington Contribution in Marine Science, No. 894:54–56.

Price, H. F. 1946. Food of a Yellow-crowned Night-Heron. Auk 63:441.

Ralph, C. J. and C. L. Ralph. 1958. Notes on the nesting of egrets near San Rafael, California. Condor 60:70–71.

Sutton, G. M. 1967. Oklahoma birds. Univ. Oklahoma Press, Norman, Oklahoma.

Watts, B. D. 1988. Foraging implications of food usage patterns in Yellow-crowned Night-Herons. Condor 90:860–865.

———. 1989. Nest-site characteristics of Yellow-crowned Night-Herons in Virginia. Condor 91:979–983.

Wayne, A. T. 1906. A contribution to the ornithology of South Carolina, chiefly the coast region. Auk 23:56–57.

Wischusen, E. W. 1979. The nesting success and structure of a Yellow-crowned Night-Heron colony in Alabama. Col. Waterbirds 3:85–86.

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Wilson Bull., 103(3), 1991, pp. 491–493

Migration of Sharp-shinned Hawks in the Dry Tortugas, Florida.—It is a long-held notion that many species of raptors (Falconiformes) avoid crossing large bodies of water during their biannual migrations (Allen and Peterson 1936, Haugh and Cade 1966, Heintzelman 1986). Recently, however, some species have been found to make long water crossings during migration (MacRae 1985). Kerlinger (1985) suggested that species involved in over-water flights are those with high aspect ratio wings that decrease the cost of powered flight. Species that lack the desired aspect ratio for sustaining flapping flight seem reluctant to undertake long-distance water crossings (Kerlinger 1989). Indeed, one of these species, the Sharp-shinned Hawk (*Accipiter striatus*), seldom undertakes water crossings of >125 km and apparently avoided crossing water when lateral winds were strong and chances of seaward displacement were high (Kerlinger 1989). Large numbers of Sharp-shinned Hawks are observed every fall in the Florida Keys where minor water crossings are routine (e.g., Atherton and Atherton 1988). Although a northeasterly reverse migration has been described from the Keys (Darrow 1983), many birds traverse >100 km of ocean to reach the Dry Tortugas where they can be quite common (W. G. Mattox, pers. comm.). No information, however, has been gathered concerning the flight orientation of these migrants after reaching the Tortugas. Three possibilities exist: (1) they continue on a southerly or southwesterly direction across the Gulf of Mexico, (2) they reverse direction and head easterly back toward the Keys, or (3) they reorient in a northwesterly direction toward Louisiana and Texas. I undertook this study to determine the directional orientation and behavior of Sharp-shinned Hawks confronted by the open waters of the Gulf of Mexico at the Dry Tortugas.

The Dry Tortugas, 117 km west of Key West (24°38′N, 82°52′W), form the western

terminus of the Florida Keys. The Marquesas Keys, 83 km to the east, are the nearest point of land. Cuba lies 150 km to the south and the Yucatan Peninsula lies 560 km to the southwest. The islands, ranging from a small, shifting sandbar to the remains of Fort Jefferson on 2.6 ha Garden Key, are administered by the National Park Service. Observations were made on Garden Key from 5 October to 7 October 1988. The ramparts of Fort Jefferson allowed for 5 km visibility in all directions. Five 1-h sampling periods were selected randomly from periods starting at 09:00 h and ending at 17:00 h. Observations were made by scanning 360° from the fort's ramparts with a 10× binocular. Species, age, and time of each passing hawk were recorded. I also recorded the approaching direction of the bird and the direction the bird was heading after passing the fort. Birds were followed for 0.5 km as they passed the fort. Flight behavior was recorded as flapping, flap-gliding, or static soaring, and the altitude of flight was assessed according to the Hawk Migration Association of North America's guidelines (HMANA no date). Wind speed, determined by wind gauge, and wind direction were recorded at the start of the hour. Opportunistic observations of over-water flight behavior were also collected.

Six species of hawks (N = 136) were recorded on Garden Key. Sharp-shinned Hawks dominated the observations (75%). Of these, 98% (N = 101) were immatures. Additional species encountered on the Tortugas included American Kestrels (*Falco sparverius,* 12%), Peregrine Falcons (*F. peregrinus,* 7%), Merlins (*F. columbarius,* 4%), Northern Harriers (*Circus cyaneus,* 1%), and Broad-winged Hawks (*Buteo platypterus,* 1%). The rate of passage of all species averaged 25 birds/h; Sharp-shinned Hawks averaged 19 birds/h. Wind speeds, ranging from eight to 24 km/h, were rather invariant, and wind direction was consistently from the northeast. All Sharp-shinned Hawks employed a flap-flap-glide method of flight. Temporarily abandoning powered flight when encountering the fort, hawks briefly soared in updrafts caused by the 16 m high walls. Most individuals migrated at altitudes between five and 30 m. Few Sharp-shinned Hawks reoriented northward or reversed their migration to the east. The majority (86%, N = 101) of sharp-shins pursued a westerly route, mainly at a heading of 270°. Birds not heading west were generally flying eastward (14%, N = 101), retracing their trip down the keys. Not once did a bird reorient northwesterly toward the Louisiana or Texas coast. Passage rate of Sharp-shinned Hawks significantly declined throughout the day (Kendall's concordance test; $r_k = 0.80$, $P = 0.042$, N = 5). Additionally, a significantly higher proportion of Sharp-shinned Hawks headed west in the morning than in the afternoon (large sample z-test for proportions; $z = 4.03$, $P \leq 0.0001$, N = 97). In contrast, falcons did not head west significantly more often in the morning than in the afternoon (large sample z-test for proportions; $z = 1.23$, $P \geq 0.183$, N = 26).

My results suggest that Sharp-shinned Hawks are deliberately initiating an over-water flight across the Gulf of Mexico. No birds reoriented and few reversed migration. Because birds arrived at the Tortugas on northeasterly winds, they were not the product of northwesterly wind displacement as were water crossing sharp-shins on the Atlantic coast (Kerlinger 1989). If sharp-shins decide to cross the Gulf of Mexico directly to Central America, the shortest distance lies between the Tortugas and the Yucatan peninsula. Although flying due west (270°), northeasterly winds would make the realized track of birds more southwesterly and deliver them on the Yucatan peninsula. Traveling at ≥11 mps (Kerlinger 1989), sharp-shins would need 14 h to accomplish this crossing. Initiating an over-water flight early in the day might maximize the success of an over-water flight. Attempting a flight on a day with tail winds, which maximizes flight distance (Kerlinger 1989), and incorporating an energy-saving flap-glide style of flight instead of flapping style of flight might also help ensure success. This contrasts to falcons whose increased powered flight efficiency may enable them to be less selective in choosing departure times and, as do peregrine falcons, even engage in nocturnal migration. After leaving the Tortugas, Sharp-shinned Hawks might shorten the

over-water flight by adjusting their heading toward Cuba. Island-hopping to Cuba would reduce length of the water crossing by 50% of the direct over-water flight distance to the Yucatan peninsula. However, migrant sharp-shins are only rarely recorded in Cuba (Palmer 1988).

Acknowledgments.—Thanks to C. Bocetti, E. Campbell, S. Earnst, and R. Dettmers for providing positive criticism. J. Bart also added helpful advice. C. Blem, P. Kerlinger and an anonymous reviewer provided helpful comments on the manuscript. I particularly extend appreciation to my wife, Sarah, who tolerated my data collection on our honeymoon.

LITERATURE CITED

ALLEN, R. P. AND R. T. PETERSON. 1936. The hawk migrations at Cape May Point, New Jersey. Auk 53:393–404.

ATHERTON, L. AND B. ATHERTON. 1988. Florida Region. Am. Birds 42:61.

DARROW, H. N. 1983. Late fall movements of turkey vultures and hawks in the Florida Keys. Florida Fld. Nat. 11:35–39.

HMANA. (No date.) Instructions for daily report forms. Hawk Migration Association of North America.

HAUGH, J. R. AND T. J. CADE. 1966. The spring hawk migration around the southeastern shore of Lake Ontario. Wilson Bull. 78:88–110.

HEINTZELMAN, D. S. 1986. The migrations of hawks. Indiana Univ. Press, Bloomington, Indiana.

KERLINGER, P. 1985. Water-crossing behavior of raptors during migration. Wilson Bull. 97:109–113.

———. 1989. Flight strategies of migrating hawks. Univ. of Chicago Press, Chicago, Illinois.

MACRAE, D. 1985. Over-water migration of raptors: A review of the literature. Pp. 75–98 *in* Proceedings of Hawk Migration Conference IV (M. Harwood, ed.). Hawk Migration Association of North America.

PALMER, R. S. 1988. Handbook of North American birds. Vol. 4. Yale University Press, New Haven, Connecticut.

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Wilson Bull., 103(3), 1991, pp. 493–497

Bird species on St. Andrew and Old Providence Islands, West Caribbean.—The Islands of St. Andrew and Old Providence (as called by their inhabitants), or San Andrés and Providencia as called by Colombia which governs them), lie in the SW Caribbean about 200 km east of Nicaragua, comparatively isolated from the rest of the West Indies. These oceanic islands have a resident bird fauna of 16 species, mainly of West Indian affinities (Bond 1950, 1988). The two islands are separated by about 100 km, and many of the birds resident on both are represented by different subspecies on each (Bond 1950).

Old Providence is about 8 × 5 km, with a 1-km diameter islet, St. Catherine (Santa Catalina), off its northern end. It is volcanic, with steep hills, several rising to between 350 and 400 m. The coast is mainly rocky with small sandy beaches, many backed by dry mangrove woodland, which merges with dry thorn woodland as the land rises. Much of the