AUTUMN HAWK MIGRATIONS AT FORT JOHNSON, CHARLESTON, S.C.

PETE LAURIE, JOHN W. McCORD, and NAN C. JENKINS

The fall migration of raptors on the East Coast of North America is well documented from New England to Virginia (Heintzelman 1975). At several points such as Hawk Mountain, Pennsylvania, and Cape May, New Jersey, numerous observers have for years recorded detailed accounts of passing migrants. Migrating raptors generally follow either mountain ridges or coast lines, and peak flights generally are preceded by the passage of a cold front (Broun 1951).

South of Virginia only a few scattered observations have been recorded (Simpson 1954, Crossan and Stevenson 1956, Carter 1973, Lee and Lee 1978). Neither Wayne (1910) nor Sprunt and Chamberlain (1970) mention this phenomenon. Preliminary efforts to monitor hawk migrants along the South Carolina coast were undertaken by Laurie in the fall of 1979 at Fort Johnson on the southern edge of Charleston Harbor. During the fall of 1980, the study was continued on a broader and more refined basis.

METHODS AND MATERIALS

Fort Johnson is situated on the point of a short peninsula extending northeast from James Island, Charleston County, into Charleston Harbor (Fig. 1). The count site is 2.7 km inland from the Atlantic Ocean on the landward edge of a wide strip of *Spartina* saltmarsh. Observations were made from the top of a spoil dike approximately 3 m above the surrounding terrain. This site provided an unrestricted view of about 180° across the harbor and the surrounding marsh.

Hawk migrations were monitored at Fort Johnson from 3 September to 6 November 1980. Counts were made on an hourly basis by three observers equipped with 7X binoculars. Occasionally less than three observers were available during count periods. Most counts were conducted from 1100 to 1200 or from 1200 to 1300 EST. Wind direction and speed were approximated, and percent of cloud cover was estimated.

Data were recorded according to criteria developed in the newsletter of the Hawk Migration Association of North America (1978). All raptors were counted provided they demonstrated an obvious north-to-south movement. Occasionally Ospreys and more often Marsh Hawks were observed circling in a small area, showing no directed southerly movement. Although these birds may well have been migrants that temporarily paused to feed, they were considered to be local birds and were not counted. Ospreys breed along the South Carolina coast but are rare in winter, whereas Marsh Hawks are common during the winter but are not known to breed in the state (Potter et al. 1980).

RESULTS

A total of 1764 raptors representing 11 species were recorded during 71.6 hours of observation (Table 1). In 1979, 310 raptors were seen at the same count site from 23 September to 11 October during 18 hours of field work. An average of 24.6 hawks per observation hour was recorded in 1980. The highest hourly count was 306 raptors at midday 6 October. This corresponds to the highest hourly count of 60 raptors on the same date in 1979.

The Sharp-shinned Hawk was the predominant species noted during the 1980 count period, and it accounted for 47% of the total hawks recorded. American Kestrels,

TABLE 1. Number of hawks per month observed at Fort Johnson during 1980.

Species	*Sept.*	*Oct.*	*Nov.*	*Total*	*Percent of Total Hawks*
Turkey Vulture	5	174	0	179	10.1%
Unidentified Accipiter	4	0	0	4	0.2%
Sharp-shinned Hawk	56	763	12	831	47.1%
Cooper's Hawk	13	12	0	25	1.4%
Unidentified Buteo	6	9	2	17	1.0%
Red-tailed Hawk	5	7	0	12	0.7%
Red-shouldered Hawk	4	5	0	9	0.5%
Bald Eagle	1	5	1	7	0.4%
Marsh Hawk	67	82	8	157	8.9%
Osprey	119	74	1	194	11.0%
Unidentified Falcon	3	3	2	8	0.4%
Peregrine Falcon	5	7	0	12	0.7%
Merlin	3	3	0	6	0.3%
American Kestrel	138	157	5	300	17.0%
Unidentified Raptor	0	0	3	3	0.2%
Total	429	1301	34	1764	—

Ospreys, Turkey Vultures, and Marsh Hawks followed in decreasing order of abundance and accounted for an additional 47% of the count. The remaining 6% of the total count was composed of six species and four categories of unidentified raptors (Table 1).

Flight Behavior and Movements

Migrant raptors generally were first seen over the harbor approaching the count site from the northeast (Fig. 1). In many cases migrants passed almost directly overheard with the majority at an altitude between 50 m and the upper limit of unaided sight. Height and direction of flight varied somewhat with wind direction and speed. With light or variable wind, birds of all species moved in tight circles with distinct progress to the southwest. On stronger winds raptors generally exhibited directed flight with little wing movement. On a few occasions with strong westerly winds, raptors were seen flying just above the water. This low flight was also noted occasionally in 1979.

During times of concentrated flights, migrants often formed small, unorganized groups of 5 to 10 birds, not always of the same species. In between such groups, we saw individual birds, apparently migrating indpendently. Only Turkey Vultures appeared to migrate in concentrated groups of 10 or more birds.

The direction of flight and the position of the main flight path suggest that the observed raptors were following either the tree line on the landward side of the saltmarsh strip or were following the barrier island string and were deflected by the southwest hook of Sullivans Island (see Fig. 1). Most raptors are reluctant to cross open water (Heintzelman 1975) and apparently seek the shortest routes across the harbor, which

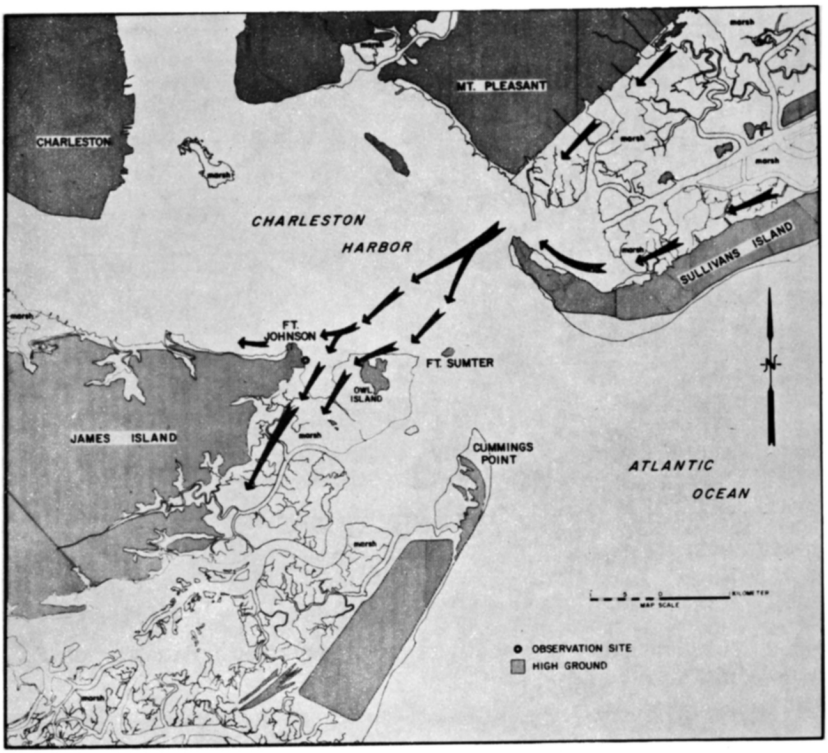

Fig. 1. Map of Fort Johnson observation site and surrounding area of Charleston County, S.C., indicating general direction of hawk flight.

would be to Fort Johnson or to Owl Island where they normally could be seen and identified from the Fort Johnson observation site.

Turkey Vultures and Sharp-shinned Hawks exhibited the most concentrated movements whereas Marsh Hawks, Ospreys, and American Kestrels were more evenly distributed over the length of the count period (Fig. 2).

Weather

Peak raptor flights closely correlate with the passage of cold fronts (Fig. 3). Good flights usually followed 2 days after a cold front passed through the mid-Atlantic states. The effect of cold fronts on raptor migration is well documented from many areas. The scarcity of raptors observed in early and mid-September 1980 is probably due in part to a complete lack of cold fronts passing through the mid-Atlantic area during that period.

Peak flights also correlate with northerly winds (Fig. 4), which generally accompany cold fronts in the study area. Northerly winds may serve to concentrate raptor flights within view of the Fort Johnson count site.

Time of Day

The majority of counts were made at midday because observers were normally available at that time. Several counts that began at midmorning produced few birds until 1000 or 1030. Late afternoon counts (1700 to 1900) also were unproductive even on days

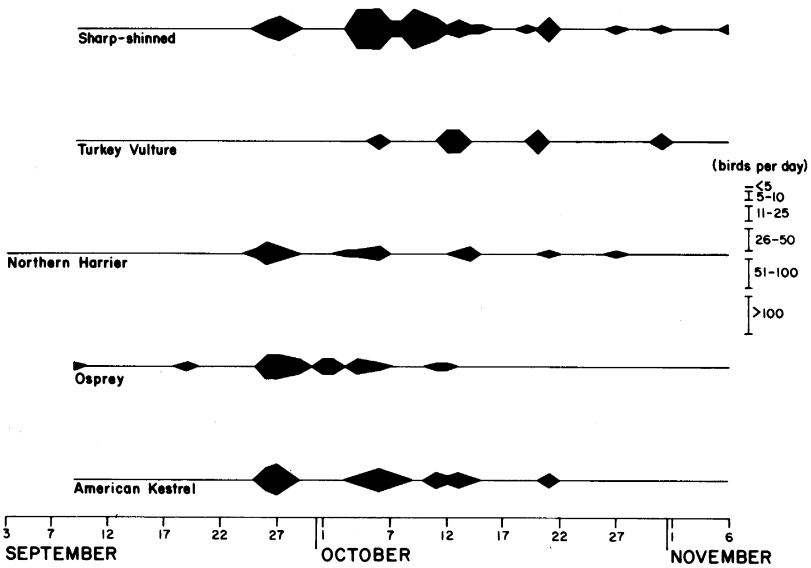

Fig. 2. Temporal migration periods for raptors observed at Fort Johnson, S.C., during 1980.

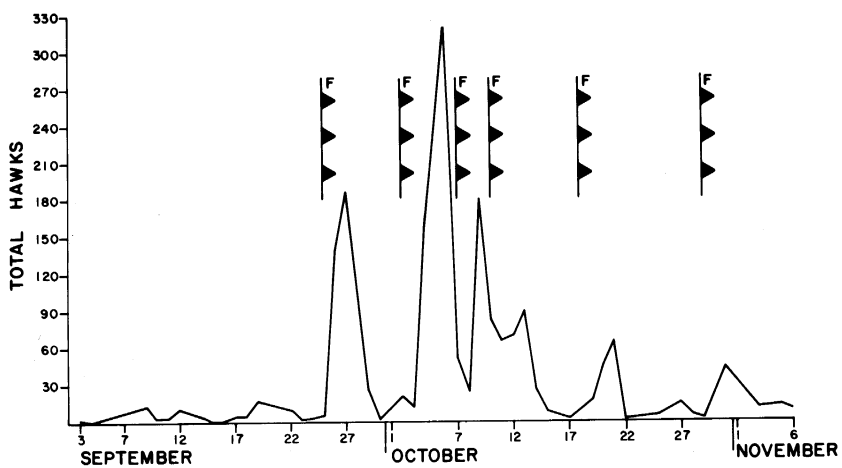

Fig. 3. Total hawks observed per day at Fort Johnson, S.C., in 1980, showing the time of passage of cold fronts through the mid-Atlantic region.

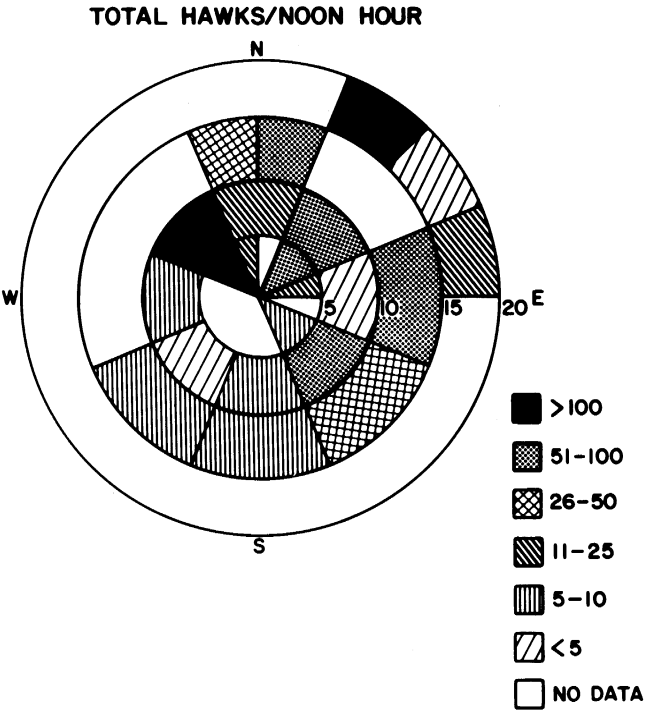

Fig. 4. Correlation of raptor migration with wind direction and speed at Fort Johnson, S.C., in 1980.

that produced good flights at midday. Numerous observers at sites that regularly conduct all-day counts have noted a "noon lull," a period at midday when the number of raptors observed temporarily declines (Heintzelman 1975). Because of the time frame of counts at Fort Johnson, it was impossible to record a noon lull, although on two occasions when counts continued beyond 1300 a sharp drop in sightings was noted.

Feeding Behavior

Migrating raptors are not often seen feeding during the day (Heintzelman 1975), but flying birds with full crops are occasionally noted. Most birds seen at Fort Johnson during the 1980 count were flying at considerable height and showed no signs of hunting, nor were any birds observed with full crops. On one occasion, a Sharp-shinned Hawk caught a small bird in heavy brush directly behind the observation site. On another occasion a Sharp-shinned Hawk approached the site about 3 m above the water and with legs extended made an unsuccessful pass at an unseen bird in low brush in front of the observation post. Both instances occurred at midday. About 1500, another Sharp-shinned Hawk was seen within 100 m of the observation site, flying at treetop level and carrying a small bird it may have caught on the Fort Johnson side of the harbor.

Marsh Hawks commonly hunted over the marshes near Owl Island, but these birds were treated as locals and were not counted. On several occasions Ospreys appeared high on the northeast horizon, paused briefly to catch fish in the harbor, and then continued on a direct southwesterly course.

LITERATURE CITED

Brown, M. 1951. Hawks and weather. Atlantic Naturalist 6:105-112.

Carter, J.H., III. 1973. Osprey migration at Wrightsville Beach, N.C. Chat 38:39.

Crossan, D.F., and R.A. Stevenson Jr. 1956. Hawk migrations along the middle eastern Seaborad, Delaware to North Carolina. Chat 20:2.

Heintzelman, D.S. 1975. Autumn Hawk Flights—the Migrations in Eastern North America. Rutgers Univ. Press, New Brunswick, N.J.

Lee, D., and B. Lee. 1978. Observations of the autumn hawk migrations along N.C. Outer Banks. ASB Bull. 25:53.

Newsletter of Hawk Migration Association of North America. 1978. IV:2.

Potter, E.F., J.F. Parnell, and R.P. Teulings. 1980. Birds of the Carolinas. Univ. N.C. Press, Chapel Hill.

Simpson, T.W. 1954. The status of migratory hawks in the Carolinas. Chat 18:15.

Sprunt, A., Jr., and E.B. Chamberlain. 1970. South Carolina Bird Life. Revised edition, with supplement. Univ. S.C. Press, Columbia.

Wayne, A.T. 1910. Birds of South Carolina. Contr. Chas. Mus. I.

612 Flint Street, Charleston, S.C. 29412; 107-G Ashley Avenue, Charleston, S.C. 29401; and 1216 Oldwanus Drive, Mount Pleasant, S.C. 29464. 26 April 1981.