

# FLIGHT SPEEDS OF BROWN PELICANS, CHIMNEY SWIFTS, AND OTHER BIRDS

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Although numerous investigators have recorded flight speeds of birds, information on the wind speed for many of the records is incomplete or unavailable. In addition, data for many species are lacking or meager. Meinertzhagen (1921, 1955) and Cooke (1933, 1937) summarized the early information on avian flight speeds. More recently, various types of radar and other equipment have made it possible to gather relatively large samples of flight speeds under a variety of environmental conditions (see, for example, Bellrose, 1967; Bruderer, 1971; Tucker and Schmidt-Koenig, 1971; Schnell, 1965, 1974; Schnell and Hellack, 1978). In this paper, we report the flight speeds of 13 species taken with the aid of a Doppler radar unit.

## METHODS

Ground speeds of birds were measured with an FTB-X(1) Doppler radar unit that was semiportable and has been described by Lanyon (1962) and Schnell (1965). Speeds of birds about 25 to 120 yds from the unit and not over 20 yds above the ground were recorded. One person sighted the unit on a bird, while another read the speed meter to the nearest 2 mph and recorded data into a tape recorder. The precision of the radar was well within these units of measure. Calibrations of the radar in the laboratory before each field season and several checks in the field against an automobile speedometer indicated that the radar maintained its accuracy (probably within 1 mph).

We recorded speeds of birds that were not perceptibly gaining or losing altitude. When a bird's flight path was not parallel to the transmitted signal, the angle between the beam and the bird's path was determined with a scale on the tripod mount of the radar unit, and the recorded ground speed was corrected appropriately. The deviant angle was never more than 20° so that differences between indicated and true ground speeds were small. Records made on windy days were divided into three groups—birds flying across, with, and into the wind. Birds flying directly with the wind or at an angle of less than 45° to this path were placed in the "with the wind" category. Those flying at an angle of less than 45° to a course directly into the wind were grouped together, and the remaining birds were considered to be flying across the wind.

Wind speeds were gauged with a hand-held Bacharach anemometer (style 3035A) about every one-half hour (or more often when winds were variable). The anemometer was held approximately 7½ ft above the ground and, thus, winds were measured at a somewhat lower altitude than that of most of the birds. However, it appeared that the wind speeds recorded were generally representative of those encountered by the birds.

Ground speeds were recorded on the following dates (in 1967) and

at the indicated localities: (1) Brown Pelican, *Pelecanus occidentalis*, 11–12 June in the vicinity of Ft. Jefferson on the Dry Tortugas, westernmost of the Florida Keys, and 30 June and 1–2 July adjacent to a pelican colony at Cape Romain, Charleston Co., South Carolina; (2) Osprey, *Pandion haliaetus*, 3, and 11–12 June at Ft. Jefferson, where the bird made short flights from a perch on one side of the fort; (3) Cattle Egret, *Bubulcus ibis*, 12 June at Ft. Jefferson, where birds flew through the courtyard and in the vicinity of the fort; (4) American Oystercatcher, *Haematopus palliatus*, 21 June near St. Petersburg Beach, Pinellas Co., Florida, and 30 June and 1 July at Cape Romain; (5) Black-necked Stilt, *Himantopus mexicanus*, 15 and 18 June in the vicinity of nests at Flamingo, Monroe Co., Florida; (6) Wilson's Plover, *Charadrius wilsonia*, 15 and 18 June at Flamingo; (7) Mourning Dove, *Zenaidura macroura*, 21 May in a residential area of Lawrence, Douglas Co., Kansas, and on 24 and 26 June near St. Petersburg Beach; (8) Chimney Swift, *Chaetura pelagica*, 20 May in an area where the birds were feeding in Kansas City, Wyandotte Co., Kansas; (9) Fish Crow, *Corvus ossifragus*, 21 June near St. Petersburg Beach; (10) American Robin, *Turdus migratorius*, 21 May in Lawrence; (11) Starling, *Sturnus vulgaris*, 21 May in Lawrence and 9 July at Rogers City, Presque Isle Co., Michigan; (12) House Sparrow, *Passer domesticus*, 21 May in Lawrence; and (13) Common Grackle, *Quiscalus quiscula*, 20 May in Kansas City and on 18 June at Flamingo.

Air speeds of birds (i.e., movement per unit time of a bird through the air) were calculated by adding or subtracting the recorded wind speed to the bird's recorded ground speed for those flying into or with the wind, respectively. Air speeds of birds in the "across the wind" category were calculated by assuming that the birds were "quartering" into the wind (see vector diagram of Schnell, 1974, for an example of this calculation).

#### RESULTS AND DISCUSSION

The calculated air speeds for the 13 species are summarized in Table 1. Also included are ranges and standard deviations, along with an indication of wind conditions at the time speeds were recorded. In general, speeds show considerable intraspecific variation. This is to be expected, given the relationship between a bird's air speed and its metabolic rate (Tucker, 1974; Greenewalt, 1975; Schnell and Hellack, 1978).

No references were found in the literature to flight speeds of Cattle Egrets, American Oystercatchers, Black-necked Stilts, Wilson's Plovers, and Fish Crows. Those for the egret are not inconsistent with records for other herons and egrets (Meinertzhagen, 1955; Tucker and Schmidt-Koenig, 1971). The American Oystercatcher speeds are similar to those found for the European Oystercatcher (*Haematopus ostralegus*) engaged in "normal cruising" (32 and 35 mph, ground speed), although somewhat lower than the 45–49 mph ground speeds recorded for the latter species moving to feeding areas (Meinertzhagen, 1955).

The speeds for Brown Pelicans were from birds flying near a colony

TABLE 1  
Air speeds (in mph) for various species of birds.

Species	Wind speed	DBRW <sup>1</sup>	Sample size	Air speed		
				mean	range	SD
Brown Pelican	5-8	Across	9	26.05	17-35	6.34
		Into	9	26.67	21-39	6.16
		With	1	27.00	—	—
	11	Across	5	27.18	22-34	4.23
		Into	1	29.00	—	—
		With	2	17.00	13-21	4.23
	14-18	Across	5	26.25	24-30	2.35
		Into	9	30.50	24-36	3.69
		With	4	25.75	18-37	9.00
Osprey	0	—	1	30.00	—	—
	7	Across	2	20.33	16-25	6.61
	13	Into	2	19.00	19	0.00
		With	1	15.00	—	—
Cattle Egret	0	—	2	21.00	20-22	1.00
	7	Across	1	30.81	—	—
		With	1	17.00	—	—
American Oystercatcher	5-8	Across	4	30.19	26-34	3.31
		Into	1	22.00	—	—
	11-12	Into	2	29.50	29-30	3.61
Black-necked Stilt	0	—	3	24.67	24-26	1.16
Wilson's Plover	0	—	3	25.33	22-28	3.06
Mourning Dove	0	—	3	36.67	34-38	2.31
	4	With	1	40.00	—	—
Chimney Swift	0	—	60	28.90	18-36	4.32
Fish Crow	6	Across	3	23.48	19-31	6.23
American Robin	0	—	5	25.20	20-32	4.82
Starling	0	—	8	23.75	16-34	6.36
House Sparrow	0	—	7	28.29	18-34	5.09
Common Grackle	0	—	7	29.71	24-34	3.15

<sup>1</sup> Direction of bird in relation to wind.

or along a beach. Some birds were gliding, while others were engaged in active flapping flight. The average speeds fall near that of 27 mph previously taken of four birds timed over a distance of eight miles in Florida (Longstreet, 1930). Oberholser (1974) indicated that flight speeds of this species varied from 14 to 35 mph. R. W. Schreiber (unpubl. data) estimated speeds of Brown Pelican flocks observed in Florida to be not more than 35-37 mph over water on calm days.

Tucker and Schmidt-Koenig (1971) recorded the air speed for a circling Osprey to vary from 9 to 16 mph. Our records for this species also indicate that its air speeds are probably characteristically rather slow, as would be expected for a relatively large bird on short flights or engaged in circling.

The relatively high air speeds that we obtained for Mourning Doves are higher than the ground speeds summarized by Meinertzhagen (1955) for doves in normal flight (26–32 mph). However, they are less than the 55 mph of a bird “chased by car” (Meinertzhagen, 1955).

Schnell (1965) recorded the speed of a Chimney Swift to vary from 15 to 21 mph when there was no wind. The speeds we obtained average higher, although do not reach those reported for the Common Swift, *Apus apus* (Meinertzhagen, 1955). We judge our records to be typical for the Chimney Swift under most conditions, although at times they undoubtedly fly faster than the maximum that we recorded (36 mph).

Our findings for American Robins are very similar to those summarized by Meinertzhagen (1955). The nine previously recorded ground speeds ranged from 17 to 32 mph.

A considerable number of Starling speeds have been obtained under a variety of conditions (Meinertzhagen, 1955). Most are higher than the air speeds we found. The birds we measured were engaged in short flights, while many of the previous records were of birds involved in longer flights (such as to a roost or on migration).

Meinertzhagen (1955) reported the ground speeds of House Sparrows to vary from 24 to 35 mph. Schnell (1965) measured the ground speeds of 84 House Sparrows flying near a barn in which they nested; these birds were somewhat shielded by the barn from the 9 to 11 mph wind. The average speed was 17.7 mph, with a range from 5 to 39 (SD = 5.25). The average speed that we found (28.29 mph) was higher and is probably more typical of the species under most conditions.

The average air speed of three Common Grackles obtained by Tucker and Schmidt-Koenig (1971) was about 39 mph, and for this species Meinertzhagen (1955) found 11 ground speeds in the literature that varied from 20 to 30 mph. Our recordings, which varied from 24 to 34 mph, thus seem to be compatible with previous findings.

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