NOCTURNAL ROOSTS OF MIGRATING SHOREBIRDS

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DURING a series of studies of bird migration in central Ohio from 1952 through 1956, data were collected on shorebird behavior. One persistent feature was the stopover of shorebirds for two or more days, and the assemblage of these birds on a mud flat serving as an overnight roosting area. The data were collected at O'Shaughnessy Reservoir, which is about 15 miles north of Columbus, Ohio. The reservoir is 6.5 miles long and has a maximum width of 0.25 mile. Mud flats are exposed each fall. Because of the open nature of the area and the encircling roads, it was possible to keep track of the small groups of shorebirds in the area as they moved from mud flat to mud flat (Swinebroad, 1960). Light intensity was measured with a Weston light meter model 603, with the photocell lying face up on the mud flat. Measurements were also made of ambient temperature, surface wind direction and speed, degree of cloud cover, frontal activity, and the like, according to accepted procedures.

The small numbers of birds involved (flocks ranged in size from 2 to 20) and the ease of observation made this an ideal place to observe individual behavior. Though observations on small groups of animals are limited in application, they are of some value in building a more comprehensive picture.

The data presented here were collected in August, September, and October of 1952 and 1953 on 139 nights.

Shorebirds which migrate into the area would be noticed first at dawn. Presumably they had flown in just before dawn or alighted sometime during the night. Some of these birds were recognizable for a time because of peculiar stains. A few of these marked individuals remained in the area for at least 2 weeks, while others departed within 24 hours of their arrival. The numbers so involved, although recorded, are not important here. The birds which remained for more than one day would scatter out in small flocks along the shores of the reservoir and spend the daylight hours mostly feeding, preening, and sleeping. Near sunset, the behavior of the flocks changed. The rate of calling increased, flocks would fly up suddenly, circle the mud flat at low altitude, re-alight, and then repeat the whole performance a number of times. Interindividual distances would decrease and the rate of calling would increase. Finally the entire group would take off and fly to the mud flat where other flocks were assembling. This evening roosting flight was noted for at least one species every night when observations were made in the area. The data presented in Table 1 indicate relation of the evening flight to light intensity and time of sunset. These data represent those nights when light

TABLE 1

ROOSTING FLIGHTS IN RELATION TO LIGHT INTENSITY

Species	Date	Time of flight*	Light intensity in footcandles	Time in relation to sunset*	Degree of cloud cover‡	No. of birds
Semipalmated	6 Sept. 1952	7:18 PM	2 ft-c	+39 min	0	2
Plover	16 Sept.	6:20	100	-36	0	4
	23 Aug. 1953	7:00	100	-19	3	10
	23 Aug.	7:10	38	- 9	3	2
	24 Aug.	6:46	350	-32	0	7
Pectoral	13 Aug. 1952	7:25	25	- 8	0	8
Sandpiper	30 Aug.	5:45	60	-82	7	10
	13 Sept.	7:00	4	+ 6	0	4
	15 Sept.	6:15	250	-26	2	4
	15 Sept.	7:14	5	+33	2	5
	15 Sept.	7:17	-†	+36	2	5
	19 Sept.	6:25	250	- 9	7	4
	16 Oct.	6:21	4	+31	0	6
	20 Oct.	5:00	1,000	-45	2	15
	20 Oct.	6:08	4	+23	2	2
	21 Sept. 1953	6:55	-	+23	10	20
	21 Sept.	6:58	-	+26	10	7
	21 Sept.	6:59	-	+27	10	9
	21 Sept.	7:06	-	+34	10	2
Least and	24 Aug. 1952	7:15	5	- 2	0	20
Semipalmated	24 Aug.	7:15	5	- 2	0	2
Sandpiper	30 Aug.	6:15	100	-52	7	7
	30 Aug.	6:40	60	-27	7	4
	30 Aug.	6:50	60	-17	7	2
	6 Sept.	6:50	60	- 6	0	20
	8 Sept.	6:45	50	- 8	2	10
	8 Sept.	6:50	50	- 3	2	14
	8 Sept.	6:54	50	+ 1	2	4
	9 Sept.	7:03	20	+12	0	20
	9 Sept.	7:15	2	+26	0	18
	10 Sept.	6:49	55	0	0	4
	10 Sept.	7:15	5	+16	0	14
	12 Sept.	6:50	50	+ 4	0	2
	12 Sept.	7:17	5	+21	0	9
	22 Aug. 1953	6:30	1,000	-51	1	10
	22 Aug.	7:20	170	- 1	1	10
	22 Aug.	7:55	2	+34	1	20
	23 Aug.	7:10	48	+ 9	3	4
	24 Aug.	6:46	350	+32	0	6
	24 Aug.	7:35	5	+17	0	10
	24 Aug.	7:45	-	+24	0	10

* All local corrected to EST.

‡ In tenths of sky covered.

† Below 1 footcandle.

measurements were made on the mud flats involved. Other observations on other nights were more subjective and are not presented; nevertheless, they are in general agreement as regards time and light intensity.

Other weather variables measured showed no relation to the flight, unless they influenced light intensity, as, for example, did cloud cover, and these data are not included in Table 1.

After dark, individual shorebirds could be detected on the mud flat by picking up their eyeshine with a dim flashlight. With some practice, most of the species could be separated by eyeshine color and intensity. Species apparently remained in distinct groups, yet more or less contiguous with other species. Although measurements of interindividual distances were not feasible, the impression was that birds were rather evenly dispersed over the mud flat, and were not closer than 3 or 4 body lengths to each other. Perhaps there is a nocturnal carry-over of territorial behavior as discussed by Hamilton (1959). In a majority of the nights the birds did not move from the mud flat until some time before dawn. Twice, on nights of full moon, the birds flew to the mud flat roost, then later dispersed outward, resulting in a scatttering of flocks about the reservoir much like that of the daytime. In the morning, birds moved out from the roost at such low light intensities that it often took place before the human eye could distinguish species.

The species which demonstrated the preceding behavior were:

Semipalmated Plover (*Charadrius semipalmatus*)
Black-bellied Plover (*Squatarola squatarola*)
Spotted Sandpiper (*Actitis macularia*)
Greater Yellowlegs (*Totanus melanoleucus*)
Lesser Yellowlegs (*Totanus flavipes*)
Pectoral Sandpiper (*Erolia melanotos*)
Least Sandpiper (*Erolia minutilla*)
Stilt Sandpiper (*Micropalama himantopus*)
Semipalmated Sandpiper (*Ereunetes pusillus*)

As Least and Semipalmated Sandpipers often occurred in mixed flocks, or, where separate, showed similar responses in the evening flight, data for these species are combined.

The relation of evening roosting flights to light intensity has been reported by others for other species (for recent example see Haase, 1963). Hamilton (op. cit.) reports on evening flights of Pectoral Sandpipers at Delta, Manitoba, to a mud flat roost where other shorebirds were assembling. He noted also a relation between light intensity and the timing of the flight.

The data are advanced here largely for the purpose of speculation. They are too few and selective to merit statistical treatment. Some hypotheses may

serve as the basis for further investigations and are not proposed as conclusions.

About the same number of flights occurred before as after sunset, so that event in itself does not seem critical. Considering all species, 32 of the 41 roosting flights measured occurred at or under 100 footcandles, regardless of the other environmental variables measured. On clear evenings, for example, 15 of 18 flights started at or below 60 footcandles. Therefore, light intensity at definable low levels seems to be significant in initiating the roosting flight.

That birds respond to dawn and dusk conditions is not a novel observation. These data may have significance, nevertheless, in relating quantitative measurements to the roosting flight behavior pattern. In addition, there may be significant deviations from these data which relate to species or seasonal differences in migratory activity. On several occasions the number of birds of a species decreased sometime between dusk and the following dawn, indicating a departure from the study area. These decreases occurred after all of the species were observed to fly to the mud flat roost. Presumably the birds gathered at the mud flat and subsequently some or all flew out of the area. Unfortunately, the departures of shorebirds could be detected regularly only later in the season when other aspects of the study precluded light measurements. Whether the birds left soon after the roosting flight, or just before dawn, or during the night could not be determined. At any rate, if prior to migration there is a lowering of threshold sensitivity to certain external stimuli, then perhaps premigratory roosting flights would occur at constantly higher light intensities than at other times. This kind of deviation, or something like it, should be looked for as possible indicators of impending migration.

The appearance of a stopover time during migration which involves a nocturnal assemblage of various species at different motivational levels may introduce additional complications to the problem of the initiation of migratory flights. For example, an increase in social activity of one species preceding a migratory flight may be communicated to another in the roost and perhaps facilitate the departure of the second species.

Questions such as the foregoing are better considered by observers situated at small, isolated lakes and ponds, rather than at coastal areas or along large lakes where local movements can obscure migratory departures.

SUMMARY

During the fall of 1952 through 1956 individuals of several species of migrating shorebirds were observed to occupy overnight mud flat roosts during stopover in the study area. The timing of evening flight to the roost seemed to be influenced by light intensity. The timing of the flight might be modified by behavior preceding migration. Deviations

from the expected in the roosting flight may provide the observer with information about premigratory disposition of the flocks and alert him to a period for critical measurements.

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NEW LIFE MEMBER

Dr. Lawrence M. Bartlett, Professor of Zoology at the University of Massachusetts, is a new Life Member of The Wilson Ornithological Society. A graduate of the University of Massachusetts and holder of a Ph.D. degree from Cornell, Dr. Bartlett has been a member of the WOS since 1957. He is a member of the AOU, the Cooper Ornithological Society, American Society of Ichthyologists and Herpetologists, Northeastern Bird-banding Society (currently serving as Vice-President), and other scientific societies. Dr. Bartlett's principal ornithological interests are in anatomy and field studies, and he has published about fifteen scientific papers. His other interests include bird-banding and photography. The picture shows Dr. Bartlett with a young Cedar Waxwing, brought to his office with an injured wing.