

FORAGING BEHAVIOR AND LENGTH OF DISPERSAL FLIGHTS OF COMMUNALLY ROOSTING STARLINGS

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Starlings (*Sturnus vulgaris*) regularly gather in various parts of the United States to roost in association with congregations of various bird species, chiefly icterids. Soon after daybreak the birds in these roosting congregations disperse in various directions, often to relatively long distances from the core area. With food hunting being the most obvious activity of these birds during the day, the dispersal flight can be seen, at least partly, as a food-hunting effort.

Peanuts are grown in the area surrounding some of the blackbird-Starling winter roosting sites in North Carolina. These are mechanically harvested, with varying numbers left on the ground in the harvesting process. Most of the peanuts left are available as fall and winter food for wildlife, these peanuts being one of the foods sought by Starlings. This study involved monitoring the availability of peanuts in the area surrounding a blackbird-Starling roosting site at Scotland Neck, North Carolina, during the fall and winter of 1971-72 and relating the dispersal behavior of Starlings to the availability of peanuts. Also, I made an effort to procure information as to other possible influences than food hunting on the choices of foraging places by different Starlings in their dispersal flights. As part of this effort, I made observations throughout the year on Starlings nesting and foraging near my home in Oxford, Granville County, North Carolina. This paper is a partial product of a broad study of the ecology and behavior of blackbird-Starling flocks made during 1969-77.

METHODS

Chiefly by following the foraging birds with an automobile and by watching the feeding activities of flocks, I gathered information on the foods and feeding habits of Starlings in the peanut growing area of North Carolina. To determine the rate at which peanuts lost in the harvesting process were used, I made estimates three times during the winter of 1971-72 of the numbers of peanuts remaining on the ground in peanut fields at different distances from the blackbird-Starling roosting site at Scotland Neck. In making these estimates, a sampling frame was thrown when walking at random across the fields without looking ahead to where the frame was to be thrown. The number of peanuts inside the frame was then counted. An analysis of variance of the number of peanuts per frame throw was conducted, using the method of fitting constants described by Steel and Torrie (1960). Use of this procedure was considered necessary because of the disproportionality of numbers of observations in the Distance \times Date cells. The disproportionality resulted from application of farm practices to some fields between sampling dates, the peanuts being artificially removed from the surface of the ground in some fields and not in others as the fall and winter passed.

TABLE 1

Numbers of peanuts per square meter at different distances from the Scotland Neck roosting site during the winter of 1971-72.

Sampling dates	0-15 km		15-30 km		30-45 km	
	No. fields sampled	Average no. peanuts/m ²	No. fields sampled	Average no. peanuts/m ²	No. fields sampled	Average no. peanuts/m ²
7 November 1971	24	22.6	19	21.5	21	23.7
20 December 1971	17	19.4	16	17.2	18	20.4
26 January 1972	15	14.0	14	12.9	16	16.1

RESULTS

Because of heavy and prolonged precipitation during the 1971 peanut harvesting season, unusually large numbers of peanuts were left on the ground and became readily available to the birds. Statistical tests of counts of the numbers of peanuts on the ground at different distances from the roosting site at different times of the fall and winter of 1971-72 showed these peanuts to be used at about the same rate different distances from the roosting site (Table 1). Indeed, many peanuts remained in the spring of 1972 on the ground in a field immediately beside the woodland which had contained the winter roosting congregation of several million blackbirds and Starlings. The birds clearly flew over abundant food supplies to go to more distant areas for their foraging. Field observations indicated that peanuts were one of the foods used by these birds, including Starlings.

With the birds daily flying over abundant and readily available food supplies to feed on similar food at more distant sites, it is obvious that influences additional to availability of food affected their choices of feeding places. One of these influences was the tendency of adult Starlings to return from their roosting sites to feed throughout the year near their nesting sites. Starlings returning to their nesting sites from roosting sites of large congregations were recognized at the roosting site by their flying into all compass directions. By following these Starlings or waiting for them at nesting sites, we found them, even in the winter, going from communal roosting sites to earlier nesting sites. That the Starlings present during the winter at earlier nesting sites were at least sometimes the same birds nesting there was shown by my capturing a female Starling (No. 782-19049), in the backyard of my home in Oxford, North Carolina, on 11 January 1974 following her banding there when feeding young in a nest on 31 May 1973. Even when roosting elsewhere in large communal gatherings, adult Starlings often foraged throughout the year near their nesting sites.

DISCUSSION

Ward and Zahavi (1973) suggested that communally roosting birds in general use their roosting assemblages as "information centres" for aid

in finding food. Birds less successful in finding food one day followed more successful birds the next day from their roosting site. Also, based on counts of Starlings made at different distances from roosting sites, Hamilton et al. (1967) developed the hypothesis that, "The major factor favoring increase in the dispersal distance [of Starlings] from the core is depletion of nearby [food] resources and the relaxation of resource exploitation at increased distances from it." Both the proposal by Ward and Zahavi and that by Hamilton and his associates are based on the assumption that birds use the food most readily available to them. However, with my observations showing Starlings flying over abundant and readily available food supplies to go to more distant foraging areas, dispersal patterns of these birds are shown to result from influences additional to food hunting. The tendency of adult Starlings to return to forage near their nesting sites, even during the winter, is one of these additional influences. In observations on Red-winged Blackbirds (*Agelaius phoeniceus*), Meanley (1965) also noted that these birds often made flights to distant foraging areas when food was similarly available nearer their roosting sites. Some influence other than returning to forage near their nesting sites may be operating with the Red-winged Blackbirds.

SUMMARY

Although Starlings were seen eating peanuts, they flew from a roosting site to distant foraging areas when abundant supplies of peanuts were equally available immediately beside the roosting site. Adult Starlings showed a tendency, even in the winter, to go from their roosting sites to forage near their nesting sites. The daily pattern of dispersal of Starlings from the roosting sites of congregations thus results from influences additional to food hunting.

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LITERATURE CITED

- HAMILTON, W. J., III, W. M. GILBERT, F. H. HEPPNER, AND R. J. PLANCK. 1967. Starling roost dispersal and a hypothetical mechanism regulating rhythmical animal movement to and from dispersal centers. *Ecology*, **48**: 825-833.
- MEANLEY, B. 1965. The roosting behavior of the Red-winged Blackbird in the southern United States. *Wilson Bull.*, **77**: 217-228.
- STEEL, R. G. D., AND J. H. TORRIE. 1960. Principles and Procedures of Statistics with Special Reference to the Biological Sciences. New York, McGraw-Hill Book Co.
- WARD, P., AND A. ZAHAVI. 1973. The importance of certain assemblages of birds as "information centres" for food-finding. *Ibis*, **115**: 517-534.

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