J. Field Ornithol., 53(4):403–406

NOCTURNAL ACTIVITY OF GREAT BLUE HERONS IN A NORTH FLORIDA SALT MARSH

By Barbara B. Black and Michael W. Collopy

Members of the family Ardeidae are known to partition food resources by using diverse feeding behaviors (Meyerriecks 1962, Jenni 1969, Kushlan 1978), by using different microhabitats (Jenni 1969, Willard 1977, Murdich 1978), and by feeding at different times (Kushlan 1978). The 2 former strategies of resource partitioning used by North American wading birds have been studied and reviewed (Kushlan 1978), while the temporal component has received little study. For example, the nocturnal feeding habits of Great Blue Herons (*Ardea herodias*) have been mentioned by several authors (Willard 1975, Bayer 1978, Kushlan 1978, Pratt 1980), but the extent and nature of this activity have not been documented. In this paper we present evidence that the nocturnal component of Great Blue Heron feeding is important and should be considered in studying the temporal partitioning of resources by ardeids.

STUDY AREA AND METHODS

From September 1980 through January 1981, a light intensifier scope (Smith-Wesson, Model No. MK-303A) was used to watch the nocturnal activity of Great Blue Herons in the tidal-flats surrounding Cedar Key, Florida. Nine nights were selected such that 3 low tides occurred in each of the following time periods: 1900–2200, 2300–0200, and 0300–0600. During each time period, 30-min observations were conducted from 4 different locations. During each observation period the activity (feeding, present-not feeding, or absent) of longest duration was recorded. A total of 54 observation periods or 27 h of nocturnal observation were conducted. Diurnal observations also were made at low tides in 2 locations during the periods 0700–1000, 1100–1400, and 1500–1800 by randomly assigning twenty-five 30-min observation periods.

Two additional species, Black-crowned Night Herons (*Nycticorax nycticorax*) and Black Skimmers (*Rynchops niger*), were observed feeding nocturnally in the tidal-flats. Data on the activity of these species were collected and included in the analysis for comparison with the activities of Great Blue Herons.

RESULTS AND DISCUSSION

Great Blue Herons were present in 61% (33 of 54) of the nocturnal observation periods, and feeding activity predominated in 79% (26 of 33) of those periods. Diurnally, the herons were present in 56% (14 of 25) of the observation periods and foraged in 86% (12 of 14) of those periods. Great Blue Herons appeared to be active equally throughout the diel cycle; diurnal versus nocturnal comparisons showed no signif-

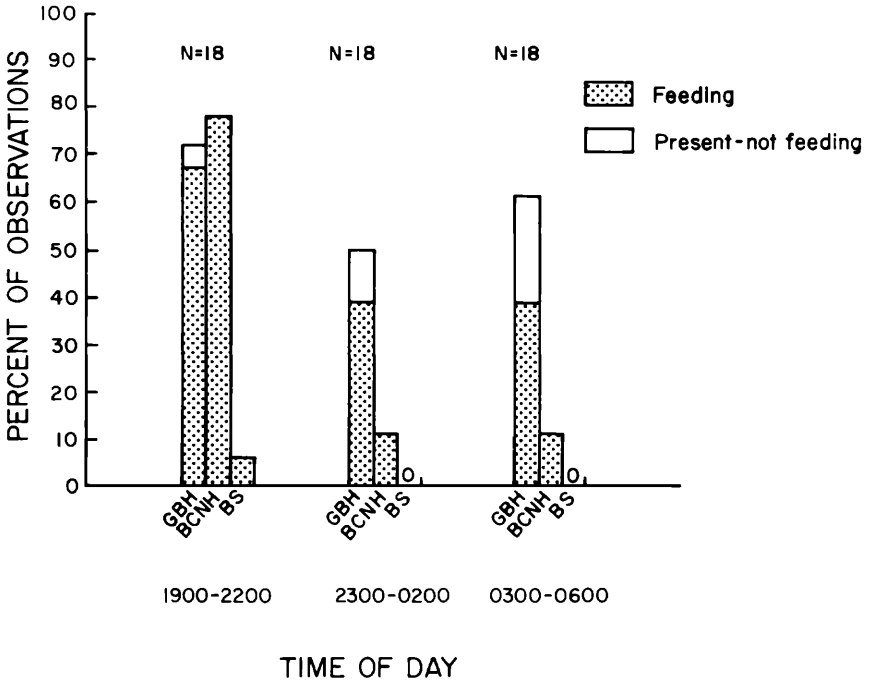

FIGURE 1. Percent of observations in which Great Blue Herons (GBH), Black-crowned Night Herons (BCNH), and Black Skimmers (BS) were feeding or present-not feeding in the periods 1900–2200, 2300–0200, and 0300–0600.

icant differences either in percent of time herons were present ($\chi^2 = .22, P > .60$) or percent of time they spent foraging ($\chi^2 = .39, P > .50$). Thus, nocturnal foraging appeared to be an important component in the feeding regime of at least part of the local population.

The Black-crowned Night Heron was the species seen feeding most frequently at low tides in the early evening, followed by the Great Blue Heron and the Black Skimmer (Fig. 1). All species fed more frequently during early-evening low tides than at low tides near midnight or in the early morning. Typically the marine avian community at Cedar Key spent diurnal hours in sheltered areas close to the major keys or the mainland, and flew offshore at dusk to remote islands and reefs where they remained until morning (Black 1981). If low tide occurred late in the day or early in the evening, Great Blue Herons, Black-crowned Night Herons, and Black Skimmers remained in the tidal-flats and fed after dark. However, when low tide occurred later at night, Great Blue Herons fed significantly more frequently than the other species ($\chi^2 = 5.56, P < .05$); during late-night low tides, Black-crowned Night Herons seldom fed and Black Skimmers did not feed at all. Overall, Great Blue

Herons fed more frequently at nocturnal low tides than any other avian species.

During 21% (7 of 33) of the nocturnal observation periods in which they were present, Great Blue Herons were not foraging, but spent time in comfort activities (i.e., preening, loafing) and/or in intraspecific interactions. Great Blue Herons drove conspecifics from hunting sites on 7 occasions but also fed within 10 m of conspecifics twice. Some areas appeared to be defended while others were not. Great Blue Herons were present without conspecifics in 88% (29 of 33) of the observation periods in which they were observed.

Interspecific aggression between Great Blue Herons and Black-crowned Night Herons was noted twice, though both fed concurrently in 37% (20 of 54) of the observation periods. Black Skimmers fed in the largest groups ($\bar{x}$ = 5, range 1–10, n = 5 obs.), whereas Black-crowned Night Herons usually fed alone ($\bar{x}$= 1.46, range 1–5, n = 41 obs.), as did Great Blue Herons ($\bar{x}$ = 1.12, range 1–2, n = 33 obs.).

Although types of foraging behavior and success rates were not quantified in this study, the hunting methods noted were "stand and wait" and "wade/walk slowly" (Meyerriecks 1962, Kushlan 1976). Assuming Great Blue Herons fed visually, they could and did catch prey on moonless nights when light levels, although low, were still adequate for short distance vision. The method of feeding appeared to depend less on the amount of light and more on water movement. Herons appeared to "stand and wait" in shallow water or at the water's edge in areas with moving currents. In areas where the birds fed in still-water eddies, "wade/walk slowly" seemed to be the predominant feeding method. Differences in feeding methods also may reflect site differences in prey species: herons have been reported to "stand and wait" among actively moving prey and to "wade/walk slowly" to catch more sedentary, bottom-dwelling species (Willard 1975).

ACKNOWLEDGMENTS

This study was conducted concurrently with a study of Black Skimmer feeding ecology supported by the U.S. Fish and Wildlife Service, Contract No. 14-16-0009-79-063. We thank J. Cox, L. Cooley, B. Progulske, and D. Black for field help and are especially grateful to Richard W. Gregory, Leader—Florida Cooperative Unit for Fish and Wildlife Research, for assistance throughout the project. Thanks also go to L. Harris and W. Marion for reviewing this manuscript. This paper is contribution 3523 of the Journal Series, Florida Agricultural Experiment Station, Gainesville, Florida 32611.

LITERATURE CITED

BAYER, R. D. 1978. Aspects of an Oregon estuarine Great Blue Heron population. Pp 213–217, *in* A. Sprunt, IV, J. C. Ogden, and S. Winckler (eds.). Wading Birds, Res. Rep. 7. Natl. Audubon Soc., New York.

BLACK, B. B. 1981. Winter feeding ecology of Black Skimmers on the Florida Gulf coast. M.S. thesis, Univ. of Florida, Gainesville.

JENNI, D. A. 1969. A study of the ecology of four species of herons during the breeding season at Lake Alice, Alachua County, Florida. Ecol. Monogr. 39:245–270.

KUSHLAN, J. A. 1976. Feeding behavior of North American herons. Auk 93:86–94.

———. 1978. Feeding ecology of wading birds. Pp 249–297, *in* A. Sprunt IV, J. C. Ogden, and S. Winckler (eds.). Wading Birds, Res. Rep. 7. Natl. Audubon Soc., New York.

MEYERRIECKS, A. J. 1962. Diversity typifies heron feeding. Nat. Hist. 71:48–59.

MURDICH, W. H. 1978. The feeding ecology of five species of herons in a north-central Florida marsh. M.S. thesis, Univ. of Florida, Gainesville.

PRATT, H. M. 1980. Directions and timing of Great Blue Heron foraging flights from a California colony: implications for social facilitation of food finding. Wilson Bull. 92:489–496.

WILLARD, D. E. 1975. The feeding behavior and ecology of five species of herons at the Brigantine National Wildlife Refuge, New Jersey. Ph.D. thesis, Princeton Univ., Princeton, New Jersey.

———. 1977. The feeding ecology and behavior of five species of herons in southeastern New Jersey. Condor 79:462–470.

School of Forest Resources and Conservation, Cooperative Fish and Wildlife Research Unit, University of Florida, Gainesville, Florida 32611 and School of Forest Resources and Conservation, University of Florida, Gainesville, Florida 32611. Received 5 Dec. 1981; accepted 25 May 1982.