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UNDESCRIBED BOWING DISPLAY IN THE COOPER'S HAWK<sup>1</sup>

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*Key words:* Cooper's Hawk; *Accipiter cooperii*; bowing display; nest building.

As part of a 10-year study of the nesting ecology of Cooper's Hawks (*Accipiter cooperii*) in Wisconsin, we obtained data on pre-incubation behavior of 47 mated pairs during 1986-89. Here we describe an unreported Bowing display, seen 10 times among nine birds during the pre-laying period, and discuss its function.

All displays were seen in Waukesha County, southeastern Wisconsin (42°53'N, 88°29'W) (Rosenfeld 1990). All observations save one occurred at dawn,

when Cooper's Hawks typically begin daily nest building activities.

On nine occasions immediately following the appearance of a mated pair at the nest site at dawn, we saw a bowing display in eight marked males and one female. The display never exceeded 60 sec and in no case did both members of the pair exhibit the behavior simultaneously. Displaying birds assumed a horizontal standing position from which "bursts" of quick bowing movements (3-10) occurred; each bow was interrupted by very short (<1 sec) pauses with the forebody at the horizontal plane (Fig. 1). The legs did not bend noticeably during bows and thus only the upper body tipped downward. Wings and tail were not spread and the tail moved up only as the head and chest were lowered (Fig. 1). In at least one male, the tail undercoverts were spread. Two males were silent; six males gave several *kik* calls during this behavior. At other

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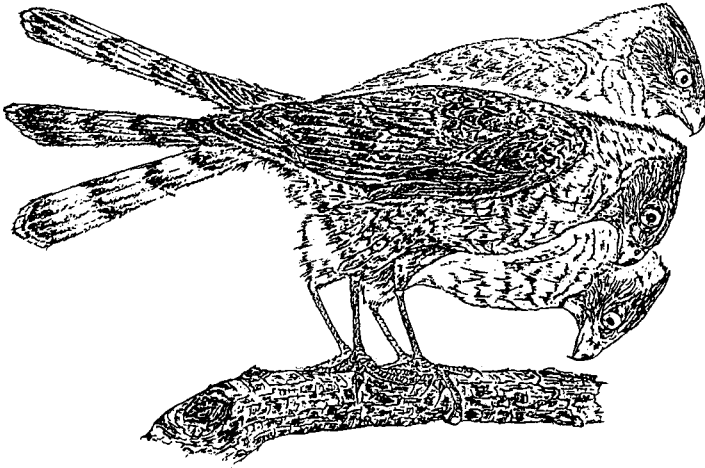


FIGURE 1. Bowing display.

times, males use this note to “announce” their arrival at the nesting area with prey (Meng 1988). Both sexes commonly give this same vocalization at dawn in the pre-incubation period (pers. obs.) and we believe it serves primarily to signal a bird’s location. During one display that was seen more clearly than the others, a male appeared to tuck his head toward his chest while bowing the forebody (the head was thus below the “normal” plane of the body) and he uttered *kik* calls only between bows, when the body was horizontal. The single female seen bowing gave a single *kik* at the beginning of display. Male-to-female distances during this behavior ranged from 1 to 41 m ( $\bar{x}$  = 22 m).

All bowing displays occurred just prior to nest building, and except for a single afternoon instance, bowing occurred only in the morning—the time of peak daily building (Rosenfield 1990). Bowing might function as demonstrative nest-building that signals a bird’s readiness to engage in actual building. Cooper’s Hawks build nests by shoving twigs into the structure, repeatedly grabbing the sticks at different points along their length and pushing them into the existing base. Such repeated grabbing results in body and head movements similar to those seen in bowing. Bowing behavior was seen mainly in males, the sex that does most of the building (Rosenfield 1990).

Many bird species have incorporated some elements of nest building behavior into courtship activities. This ranges from “symbolic” holding of nest materials in the beak during courtship displays to males’ construction of entire nests used to attract females (Collias and Collias 1984). The male Green-backed Heron (*Butorides striatus*) attracts the attention of other herons with loud calls and a *Snop* display in which he extends his neck forward and down and snaps his mandibles together to produce an audible click. The display resembles movements of nest-building, and Meyerriecks (1960) considered it to be ritualized twig-grasping. Van Tets (1965) suggested that courtship bowing displays

in Pelecaniformes probably evolved from nest-building movements.

Bowing displays have been reported in many avian orders, including Falconiformes (Sherrod et al. 1981, Cade 1982), and may have evolved for different reasons in different orders and species. Sherrod (pers. comm.) believes that male raptors bow to convey their “submissiveness” to their larger, dominant mates when the birds are perched close to each other. This explanation is not incompatible with ours. Bowing as symbolic nest building by male Cooper’s Hawks could also function as or extend the function of “appeasement.”

It is possible that the bowing display in Cooper’s Hawks occurs more frequently during pair formation or in new pairs, as in other species (Green-backed Heron [*B. s. sundevalli*], Kushlan 1983; Ring Dove [*Streptopelia risoria*], Erickson and Morris 1972; Peregrine Falcon [*Falco peregrinus*], Sherrod, pers. comm.). Of the 10 times we observed this behavior, seven were early in the pre-incubation stage (from 31 to 21 days before the first eggs were laid in these pairs). The other three occasions were about two weeks before eggs were laid. At least five of the 10 pairs in which bowing was seen included a new mate.

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## THE DIET OF PEREGRINE FALCONS IN RANKIN INLET, NORTHWEST TERRITORIES: AN UNUSUALLY HIGH PROPORTION OF MAMMALIAN PREY<sup>1</sup>

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Throughout their virtually world-wide range, Peregrine Falcons (*Falco peregrinus*) rely almost completely on the aerial capture of other birds (Cade 1960, Radcliffe 1980). Moreover, the Peregrine's reliance on a wide range of stable avian prey populations is believed to be responsible for the great stability of their breeding density and reproductive output (Newton 1979, Radcliffe 1980).

In our study area near Rankin Inlet, Northwest Territories, Canada, however, Peregrine Falcons are not very stable in either breeding density or reproductive output. The number of successful pairs rose from a three-year mean of 13 to 21 and production of fledglings nearly doubled in conjunction with a 1985 peak in microtine rodent density (Court et al. 1988a, 1988b). The authors speculated that the microtine increase provided an abundant food resource that the Peregrine Falcons exploited to their reproductive advantage. A subjective appraisal of prey use during the microtine peak year indicated that both microtine rodents and arctic ground squirrels were being eaten (Court et al. 1988a).

We wanted to determine if mammals were a normal prey species for the Rankin Inlet Peregrine Falcon population. Therefore, in this paper, we quantitatively describe the diet of Peregrine Falcons of Rankin Inlet during two years of non-peak microtine abundance.

### METHODS

The study area surrounds the Inuit hamlet of Rankin Inlet (Keewatin Region, Northwest Territories, Canada) on the northwest coast of Hudson Bay. The area is tundra interspersed with rocky outcrops that form the cliffs used for nesting. July mean high and low temperatures are 13.1°C and 4.5°C. Peregrine Falcons arrive in late May and leave again in late September or early October. Laying is usually in the first 10 days of June, eggs hatch in mid-July, and young fledge from mid to late August. A complete description of the study area and the natural history of the population has been given elsewhere (Court et al. 1988a, 1988b).

During the nestling period, we collected pellets (the regurgitated, indigestible body parts of prey) and prey remains once each week from three nests in 1986, and from five nests in 1987. We made collections every three days from an additional two nests in 1986. We removed all prey remains prior to the first collection, and after each subsequent collection to prevent counting prey individuals twice.

Analysis of remains was similar to methods used by Mollhagen et al. (1972). We examined remains and dissected pellets from each collection, and recorded the number of each kind of identifiable body part. The minimum number of animals was equal to the greatest number of identical bones per taxon. If no countable items were found from a species, then we counted one individual for finding the hair or body feathers. Juvenile plumages enabled us to distinguish between age classes of most passerines and shorebirds.

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