Northern Harrier Predation on Greater Prairie Chickens in Southwest Missouri

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Although habitat preferences of the Northern Harrier (*Circus cyaneus*) and the Greater Prairie Chicken (*Tympanuchus cupido*) are quite similar (Berger et al. 1963), harriers are rarely reported to prey upon these galliformes (Yeatter 1943; Schwartz 1945; Grange 1948; Weller et al. 1955; Ammann 1957; Berger et al. 1963). Other similar-sized avian prey such as Ring-necked Pheasant (*Phasianus colchicus*), Sharp-tailed Grouse (*T. phasianellus*), American Bittern (*Botaurus lentiginosus*), ducks and the Domestic Chicken (*Gallus* spp.) are, however, not infrequently taken (Fisher 1893; Peabody 1900; Errington and Breckenridge 1936; Bent 1937; Brown and Amadon 1968) although usually as juveniles (Peabody *op. cit.*; Saunders 1913;Randall 1940; Hecht 1951).

This note reports harrier predation on adult and young Greater Prairie Chickens in the tall-grass prairie region of southwest Missouri during spring and summer 1984. The study area of 850 ha consisted of Prairie State Park and surrounding private lands. Prairie State Park is 1 mi southwest of Liberal, Missouri, in Barton County. Vegetation consists of bluestem grasses (*Andropogon* spp.), Indian grass (*Sorghastrum nutans*) and other native grasses and forbs, as well as invading cool season grasses such as fescue (*Festuca* sp.). Old and reclaimed strip mines and deciduous woody growth are scattered throughout the area. Neighboring lands are mostly crops and fescue (Larson 1982).

A total of 325 h were spent observing harriers and prairie chickens from 7 April - 7 August 1984. Using techniques described by Hamerstrom (1969), I found 7 harrier nests (density of 1 pair/121 ha) clumped in 3 loose aggregations in undisturbed grasslands.

Approximately 150 prairie chickens were concentrated around 4 booming grounds on the study area during early spring (April-May) and later scattered throughout the area during nesting (May-July). At least 2 prairie chicken nests were located within 200 m of 2 harrier nests.

Visits to Northern Harrier nests during the nestling stage were made to collect prey remains and/or pellets. I calculated frequency of occurrence of prey types from fresh pellets and identified prey remains. Percent composition of each prey species was calculated from the number of each type divided by the total. Percent biomass was estimated by weights given in Schwartz and Schwartz (1959), Terres (1980) and Steenhof (1983).

Analysis of food items revealed a catholic diet (Table 1). The diet of nesting Northern Harriers in other regions has been of a similar euryphagus composition (Randal *op. cit.*; Hecht *op. cit*, Craighead and Craighead 1956; Brown and Amadon 1968; Smith

Table 1. Prey of nesting Northern Harriers at Prairie State Park in southwest Missouri, 1984.

PREY	FREQUENCY OF OCCURRENCE	% COMPOSITION	AVERAGE WEIGHT (G)	ESTIMATED % BIOMASS
BIRDS				
Greater Prairie Chicken (*Tympanuchus cupido*)	8	6.6	624	22.6
Adults	3		908	12.3
Juveniles	5		454	10.3
Mourning Dove (*Zenaida macroura*)	3	2.5	134	1.8
Eastern Meadowlark (*Sturnella magna*)	6	4.9	95	2.6
Common Grackle (*Quiscalus quiscala*)	2	1.6	112	1.0
Red-winged Blackbird (*Agelaius phoeniceus*)	6	4.9	50	1.4
Brown-headed Cowbird (*Molothrus ater*)	3	2.5	41	0.5
Unidentified passerines	11	9.0	75	3.7
Total birds	39	32.0		33.6

(Table 1 continued)

(Continuation of Table 1)

MAMMALS				
Prairie vole (*Microtus ochrogaster*)	24	20.0	8	4.1
Fulvous harvest mouse (*Reithrodontomys fulvescens*)	6	4.9	21	0.5
Deer Mouse (*Peromyscus maniculatus*)	2	1.6	20	0.2
Cotton rat (*Sigmodon hispidus*)	1	0.8	120	0.5
Eastern wood rat (*Neotoma floridana*)	1	0.8	255	1.2
Unidentified rodents	7	5.8	30	0.9
Eastern cottontail (*Sylvilagus floridanus*)	9	7.4	1200	49.0
Total mammals	50	41.3		56.4
REPTILES				
Plains garter snake (*Thamnophis radix*)	1	0.8	109	0.5
Unidentified snakes	11	9.1	190	9.5
Total reptiles	12	9.9		10.0
INSECTS				
Coleopterans	12	9.9	0.5	tr[1]
Orthopterans	8	6.6	1	tr
Total insects	20	16.5		tr
TOTAL PREY ITEMS	121	100.0		100.0

[1]tr = trace.

and Murphy 1973; Snyder and Wiley 1976). A total of 7 prairie chicken remains were collected from the 2 harrier nests closest to prairie chicken nests. Of these 7 remains, 5 represented half-grown juveniles and 2 represented adults.

An eighth prairie chicken was captured by an adult female harrier on 25 July at 0700 H. The hawk hovered briefly 4 m above a dense stand of bluestem grasses and fescue, before diving into the vegetation. After waiting about 10 min, I approached the site and the hawk flushed when I was about 20 m away. I discovered a dead adult female prairie chicken that was partly deplumed and still warm. I was unable to find a prairie chicken nest in the immediate vicinity, but numerous droppings and matted vegetation (form) indicated that the prairie chicken had been on its roost. I left the site and watched from a distance of ca 300 m until the harrier returned to her kill after nearly 20 min. Berger et al. (1963) observed prairie chickens being captured by raptors (including 1 female Northern Harrier) early in the morning. Campbell (1950) reported an unsuccessful capture attempt of a Lesser Prairie Chicken (*T. pallidicinctus*) during evening hours. Poor light during early morning and late evening hours may make approaching raptors more difficult for prairie chickens (or other quarry) to spot (Berger et al. 1963).

All prairie chicken prey was brought to harrier nests during the last half of the nestling stage. During this time female harriers spent as much time hunting for their young as did males. It is probable that the larger females (50% heavier than adult males) caught the adult prairie chickens (Berger et al. 1963). I observed several adult male harriers feeding on mammalian prey among

displaying prairie chickens at booming grounds just prior to the nesting season. The prairie chickens seemed oblivious of these male harriers. Female harriers, however, usually evoked a response from prairie chickens, ranging from a brief squat to an all out flush. Berger et al. (1963) reported that over a 4-year sample of harrier-prairie chicken reactions, prairie chickens flushed nearly 70% of the times female harriers approached, but only 30% of the times males approached. Of the 33 times that prairie chickens completely ignored approaching harriers, 94% were male hawks and 6% were females. Female Hen Harriers (*C. c. cyaneus*) take significantly more Red Grouse (*Lagopus lagopus*) and other gamebirds than do males (Marquiss 1980).

I have found no evidence of Northern Harriers preying on Greater Prairie Chickens during winter or on booming grounds in early spring. However, prairie chickens did comprise a significant proportion of Northern Harrier diets (22.6% biomass; Table 1) during the nesting season when female and juvenile prairie chickens in close proximity to harrier nests may be more vulnerable to raptor predation.

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