# WINTER ROOSTS OF MARSH HAWKS AND SHORT-EARED OWLS IN CENTRAL MISSOURI

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THE GROUND ROOSTING HABIT of the Marsh Hawk (*Circus hudsonius*) and the Short-eared Owl (*Asio flammeus*) has been reported by numerous authors. A few have noted large winter concentrations in areas where small mammals were abundant. Stoddard (1931:209–210) stated that Marsh Hawks commonly roosted on the ground in Florida in two's and three's but were sometimes found in groups numbering 30 during periods of abundance of the cotton rat (*Sigmodon hispidus*). Snyder and Hope (1938) and Kirkpatrick and Conaway (1947) reported groups of up to 13 Short-eared Owls in Ontario and Indiana, respectively, in years of high levels in meadow mouse (*Microtus* spp.) populations.

We found a similar response to high mouse populations in central Missouri. In mid-February, 1952, eight Marsh Hawks were observed hunting over a field in the upland prairie region 12 miles east of Columbia. Later observations revealed a large number of Marsh Hawks and Short-eared Owls feeding and roosting there. Signs of great numbers of *Microtus ochrogaster* were evident; above-ground nests, runways, and dead mice were abundant. Reports by local farmers also gave evidence that the *Microtus* population was unusually high during the winter of 1951-1952.

Four adjoining fields were frequented by the birds. All were predominantly wheat stubble fields overgrown with common ragweed (*Ambrosia artemisaefolia*) to a height of two to three feet. Most of the fields were damp, a few having standing water in furrows and ditches. The four fields were within an area of less than one-half square mile. An intensive search of over five square miles revealed no other roosts.

By placing several observers at the edge of each field, an attempt was made to count the Marsh Hawks as they left the roosts in the morning. Counts of as many as 66 hawks were made during mid-March. Since not all took flight and there was some difficulty in counting, it was estimated that 80 to 90 hawks were roosting in these fields. Although both sexes were present, sex ratios could not be obtained because of the similarity of the plumage color of females and juvenile and second-winter males. Short-eared Owls were counted by flushing them from roosts during the day, 13 being the greatest number seen in one day.

## ROOSTING BEHAVIOR

Hawks were not abundant in the roosting area during the day. Toward evening, they moved to the roosting fields from all directions, hunting as

they came. After hunting over the roosting areas, they finally dropped to the ground and remained there for the night. Hawks went to roost from five to 25 minutes after sunset. Their manner of settling into the roosts made the hawks and the roost inconspicuous; no great number of hawks was in view at one time. Roosting sites were on dry mounds, as shown by fecal droppings and groups of pellets. From the abundance of pellets at some roosting sites, it was inferred that hawks often returned to the same place nightly or that the site was preferred and used by many individuals.

In the morning, Marsh Hawks left the roost more gradually than they settled down in the evening, but when doing so, arose and departed in a straight line of flight. Some hawks were observed taking flight as much as 45 minutes after the departure of the first bird from the roost at about 10 minutes before sunrise. A few were flushed even later in the morning. Hawks were often observed preening on the ground on bright mornings. Rarely did they hunt over the roosting area in the morning, possibly because of the activity pattern of their prey. Calhoun (1945) and Fisher (1944. Unpublished data, Master's Thesis, University of Missouri) agree that while the major activity of *Microtus ochrogaster* comes several hours after sunset, there is a lesser peak of activity at sunset and a decrease in activity at sunrise. As shown by field sign and pellet analysis, *Microtus ochrogaster* was the dominant small mammal in the area and its diel activity rhythm probably affected the behavior of the hawks.

Local farmers reported that the hawks had been in the area since about late October. They remained until late March when they presumably migrated. No mass exodus was noted, but rather, a gradual diminution of their numbers. The Short-eared Owls were not observed after mid-March.

As shown by field sign, mouse populations in 1953 were very low in comparison with those in 1952. Only 13 hawks were seen. These were roosting in a field of a type similar to and four miles from the area used in the previous year. Although no satisfactory measurement of the mouse population was obtained, our observations seem to agree with those of Stoddard, who found that the abundance of Marsh Hawks was an index to the size of the rodent population. Further explanation for the shortage of hawks in 1953 may have been the mild winter which allowed them to winter farther north. None was observed in 1954 or 1955 but the severe drought conditions probably depressed the *Microtus* population.

## Food Habits

Thousands of hawk pellets were found in 1952 but only 118 could be located in 1953. Two hundred of the pellets collected in 1952 and all those found in 1953 were analyzed. Leroy J. Korschgen, Food Habits Biologist,

of the Missouri Conservation Commission, gave valuable advice and assistance in the analysis of the pellets. The data for the two years are shown in Table 1. Because Marsh Hawk pellets contain little bone, they reflect the prey species taken but not the numbers (Errington, 1930). Therefore, only the frequency of occurrence of each prey species in the total number of pellets for each year is presented. Although *Microtus* was the major food taken during both seasons, there was an obvious decrease in the frequency during 1953. No detailed evaluation of this decrease can be made because of the absence of mouse population data. A comparative study of fluctuations in mouse populations and changes in the frequency of occurrence of mouse remains in hawk or owl pellets might be used to establish a simple technique for measuring mouse populations by analysis of pellets. Although other microtines made up only a small part of the prey, it is interesting, although not statistically significant, that the frequency of occurrence of southern bog lemmings (*Synaptomys*) decreased slightly in 1953. Blair (1948) found that *Microtus* and *Synaptomys* populations fluctuated synchronously in southern Michigan. Of significance is the increased predation on birds and other mammals resulting from the scarcity of mice. Although Marsh Hawks frequented the roosting areas and booming grounds of Prairie Chickens (*Tympanuchus cupido*), there was no evidence that chickens were preyed upon. The only game bird found was one Bobwhite Quail (*Colinus virginianus*). The remains of most songbirds could not be identified.

TABLE 1

FREQUENCY OF OCCURRENCE OF PREY SPECIES IN MARSH HAWK PELLETS

| Prey Species | 200 Pellets, 1952 | 118 Pellets, 1953 |
|---|---|---|
| *Microtus ochrogaster* | 95.0 | 74.6 |
| *Synaptomys cooperi* | 8.5 | 7.6 |
| *Sylvilagus floridanus* | 7.0 | 16.1 |
| Unclassified birds | 4.5 | 27.1 |
| *Peromyscus* spp. | 3.0 | 4.2 |
| Unidentified snake | 0.0 | 0.8 |

During 1952, as many as 13 Short-eared Owls utilized roosting areas near those of the Marsh Hawk sites. Owls showed a preference for areas with dense cover of panic-grass (*Panicum dichotomiflorum*) and poverty grass (*Aristida* sp.) less than one foot high. Their roosts were on drier sites than those of Marsh Hawks and commonly in a form in a tuft of grass. Feces, pellets, and feathers were found in these forms. In one such area, owls and hawks roosted together in a stubble field which contained a late summer's growth of panic-grass. Pellets of the two species could be distinguished by

associated feathers and by fecal remains: the feces of Short-eared Owls were black and string-like and those of Marsh Hawks were green and pellet-like. In addition, pellets found in forms and with an abundance of bone protruding from the hair were those of owls. Marsh Hawk pellets rarely contained more than a few teeth and jawbones enclosed in hair or feathers.

Data from 184 owl pellets are presented in Table 2 and demonstrate the availability of *Microtus* as food. The frequency of occurrence of *Microtus* in the diet of hawks and owls was similar but owls took fewer *Synaptomys*, deer mice (*Peromyscus*), and birds, and no rabbits.

TABLE 2

FREQUENCY OF OCCURENCE OF PREY SPECIES IN 184 SHORT-EARED OWL PELLETS COLLECTED IN 1952

| | |
|---|---|
| *Microtus ochrogaster* | 95.7 |
| *Synaptomys cooperi* | 3.3 |
| Unclassified birds | 2.7 |
| *Peromyscus* spp. | 1.1 |
| Grasshopper | 0.5 |

During the course of the 1952 observations, five dead Marsh Hawks were found in one roosting area. At the site of one, killed after a light snow, the lack of mammal tracks led to the conclusion that a Horned Owl (*Bubo virginianus*) was responsible for the predation. A Horned Owl roost on a deserted farm site 200 yards from the scene of the kill was examined. Among the 27 owl pellets collected, 25 contained mice, one contained chicken feathers, and one contained the upper mandible and some wing bones of a Marsh Hawk. This unusual and interesting prey of the Horned Owl presents further evidence of the importance of availability in predator food selection.

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