Food Habits of the Northern Saw-whet Owl in Central Iowa: Effects of Roost Location

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During the period 1979-89, 900 northern saw-whet owl (Aegolius acadicus) pellets with identifiable remains of prey were collected at 18 central Iowa locations. Peromyscus were the most frequent prey consumed, comprising 81.2% of all prey items. Other prey species were voles (Microtus), western harvest mice (Reithrodontomys megalotis), shrews (Blarina brevicauda, Sorex cinereus, and Cryptotis parvus), and a single unidentified bird. Peromyscus comprised the largest proportion of pellets from different successional stages. There were significant differences for four prey groups (Peromyscus, Microtus, Reithrodontomys, and shrews) among years. Peromyscus and R. megalotis showed significant differences among locations. Microtus and shrews were variable in the diet and showed no consistent patterns.

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Sample sizes ranged from no pellets in 1980 to 745 pellets in 1988. We collected 1,520 pellets, but only 900 (59.2%) had identifiable prey remains. *Peromyscus* were the principle prey taken by northern saw-whet owls. *Peromyscus* accounted for 81.2% of the identifiable prey items. Voles (*Microtus*), western harvest mice (*Reithrodontomys megalotis*), house mice (*Mus musculus*), and shrews (*Blarina brevicauda, Cryptotis parva*, and *Sorex cinereus*) comprised most remaining identifiable prey items. Only one pellet contained any bird remains. In the 900 pellets with identifiable remains, there was a mean of 1.1 (range 1.0-3.0) identifiable prey items per pellet.

**Successional Stage Comparison**

Pellets were collected from roots in early successional (n = 382) and late successional (n = 518) stages. There was significant variation among years for all prey groups tested; *Peromyscus* (F = 4.50, d.f. = 9, 860, P = 0.0001), *Microtus* (F = 3.27, d.f. = 9, 860, P = 0.0006), *Reithrodontomys* (F = 3.65, d.f. = 9, 860, P = 0.0002), and shrews (F = 4.49, d.f. = 9, 860, P = 0.0001) (Fig. 1). However, although variable, the proportion of *Peromyscus* remained dominant over the 10-year period. The proportion of *Microtus* appeared to peak in 1983. *Reithrodontomys* and shrews were each represented in the diet in only 7 of 11 years. Although the ANOVA revealed significant variation, yearly proportions of *Reithrodontomys* and shrews in the diet were always small (*Reithrodontomys*: $\bar{x} = 5.4\% \pm 1.7\ SE$, shrews: $\bar{x} = 4.7\% \pm 1.9 SE$). *Peromyscus* (F = 16.16, d.f. = 1, 860, P = 0.0001), *Reithrodontomys* (F = 9.69, d.f. = 1, 860, P = 0.0019), and shrews (F = 10.46, d.f. = 1, 860, P = 0.0015) varied significantly between different successional stages (Fig. 2). There were also some significant interactions among years and habitat. *Microtus* (F = 3.18, d.f. = 6, 860, P = 0.0043) and shrews (F = 4.58, d.f. = 6, 860, P = 0.0001) varied significantly between successional stages within years. Within successional stages, both *Peromyscus* (F = 2.15, d.f. = 15, 860, P = 0.0068) and *Reithrodontomys* (F = 4.00, d.f. = 15, 860, P = 0.0001) varied significantly among locations. *Microtus* was most variable of all prey, significantly different among years within locations and successional stages (F = 2.99, d.f. = 8, 860, P = 0.0026) (Fig. 1).

**DISCUSSION**

Most studies of the food habits of northern saw-whet owls have noted that *Peromyscus* is the most frequent prey item consumed, and our findings are similar. Most *Peromyscus* we found were probably *P. leucopus* based on the wooded habitat (Schwartz and Schwartz 1981), but P. maniculatus was probably also represented in our samples. The large proportion of *Peromyscus* in each sample probably reflects the abundance of this genus in central Iowa. Differences in the number of *Microtus* and shrews consumed could be explained by the variable nature of their populations. The cyclic nature of vole populations is well-known (Schwartz and Schwartz 1981). Shrews, particularly *Blarina*, also tend to be periodically more abundant (Schwartz and Schwartz 1981). Such fluctuations in abundance could have influenced the year-to-year variation in the number consumed by northern saw-whet owls. The low representation of *Microtus* in our samples may also be due to the larger size of members of this genus, possibly making it harder for northern saw-whet owls to capture and ingest them.

Other food habits analyses of northern saw-whet owls (Scott 1938; Weller et al. 1963; Boula 1982; Grove 1985) have noted significant amounts of avian remains. Only one bird remain was found in this central Iowa sample. McCabe (1972) noted that northern saw-whet owl pellets contained an average of two prey items. Weller et al. (1963) found an average of 1.6 prey items per pellet. The 1.1 prey items per pellet in our study is much lower than these studies, probably because only skulls were used to identify prey items. However, Collins (1963) noted that northern saw-whet owls in captivity never consumed a whole prey item at once; a single prey item was usually regurgitated in two pellets.
Peromyscus are probably abundant in both early and late successional habitats, although we did not have data on population levels. Reithrodontomys and shrews probably frequent early successional habitats because of their preference for grassy areas and a thick understorey layer (Schwartz and Schwartz 1981). Smaller proportions of Reithrodontomys may be the result of its restricted habitat requirements and consequent scarcity near many roost locations. Both Reithrodontomys and shrews prefer habitats near water (Schwartz and Schwartz 1981). Microtus should also be more frequently abundant in early successional habitats, but differences in consumption were not evident in our results.

Tests using roost location as a variable should be interpreted cautiously since sample sizes often were small. Also, variability in the specific habitat at each roost location, such as understorey or proximity to water, probably influenced our results. Both Peromyscus and Reithrodontomys varied significantly by roost locations within successional stages. These results are not surprising since vegetation characteristics within each successional stage varied among roost locations. Only Microtus showed significant differences among years within roost locations and successional stages, possibly due to population fluctuations or small sample sizes for some years.

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