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DENNING HABITS OF THE STRIPED SKUNK AND THE EXPOSURE POTENTIAL FOR DISEASE

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The striped skunk (*Mephitis mephitis*), is regarded as a likely reservoir of at least three important zoonoses; rabies, leptospirosis and tularemia and is susceptible to other diseases such as Q fever and listeriosis (Verts, 1967). A determination of the potential role of the striped skunk in the maintenance and spread of disease and/or an epidemiologic analysis of any disease complex involving this species requires a detailed knowledge of the contact rate of susceptible hosts. Evidence for a high degree of intraspecific contact during the winter denning period of the striped skunk has been reported by previous workers (Seton, 1926; Allen, 1939; Verts, 1967). There is, however, very little information concerning the dynamics of denning habits of this species during other times of the year and, consequently, little information on contact rates and the resulting exposure potential for disease. This paper presents results of a study of the denning habits of the striped skunk as they relate to the potential role of the species in disease ecology.

The study was undertaken between March 1968 and April 1969 on the Cedar Creek Natural History Area in East Central Minnesota. The area is flat to gently rolling with deciduous and mixed conifer upland interspersed with abandoned fields, bogs, cattail (*Typhus latifolia*), marshes, swamps, small lakes and a creek.

Twenty-seven striped skunks were captured in live traps, transported to the laboratory and anesthetized with ether. Blood, urine and saliva samples were collected for other studies. Each animal was equipped with a collar type radio transmitter (Cochran and Lord, 1963) weighing approximately 80 g and was released at the capture site. Movements of radio-tagged skunks were monitored continuously by the automatic radio tracking system described by Cochran *et al.* (1965).

Between 15 November 1968 and 15 March 1969 the location of each radio-tagged skunk was field checked with a portable direction finding receiver at least three days per week. During the remainder of the study period I attempted to make 40-60 den checks per month.

For purpose of this paper, three types of den use contact have been defined:

1. *direct contact* when animal A dens concurrently with animal B,
2. *indirect-direct contact* between animals A and C when animal A dens with animal B which potentially becomes a carrier or serves as a vehicle and in turn dens with animal C and,
3. *indirect contact* when animal B uses a den previously used by animal A.

Each of these types of contact are of varying importance in the transmission of a particular disease. For example, it is conceivable that the three types are of equal importance in the spread of tularemia by blood sucking arthropods but, indirect contact through the use of potentially contaminated dens may be of no importance in the transmission of skunk rabies.

The frequency of each type of contact varied markedly during the 14 months of this study. Direct and indirect-direct contact through communal denning occurred only during the months October through March. In Minnesota, female striped skunks become pregnant in March, bear young in late April or early May and remain with the young until August. During this time they are intolerant of other skunks. Adult males are apparently intolerant of other adult males at all times of the year (Seton, 1926; Allen and Shapton, 1942).

Indirect contact through subsequent use of dens was also distributed unevenly through the year as a result of seasonal shifts in den type (Fig. 1). At the time of emergence from the winter den in late March or early

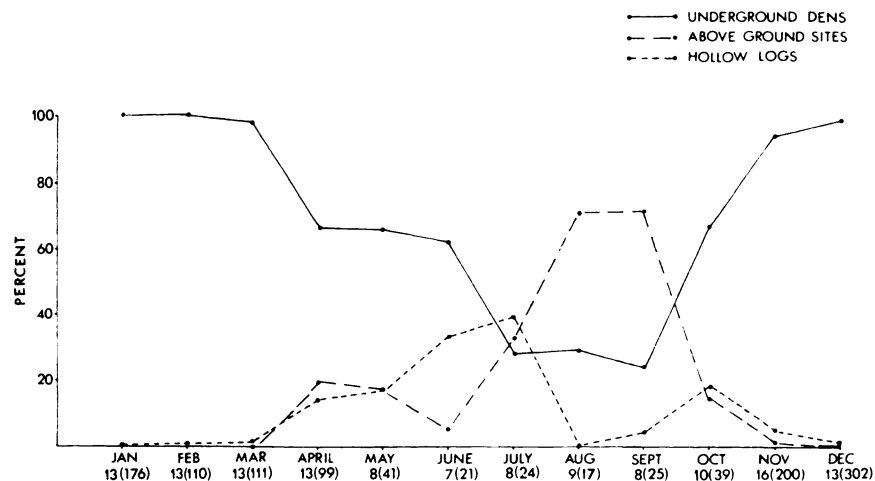


FIGURE 1. Seasonal shift in den type of the striped skunk. The number in parentheses indicates sample sizes. The number outside parentheses indicates the number of individual skunks in the sample.

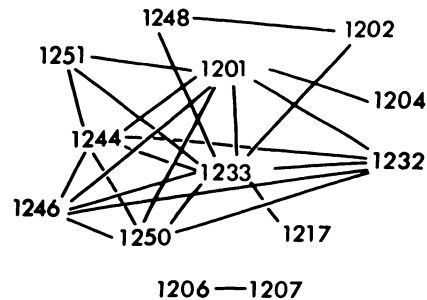


FIGURE 2. Direct contact of striped skunks through communal denning.

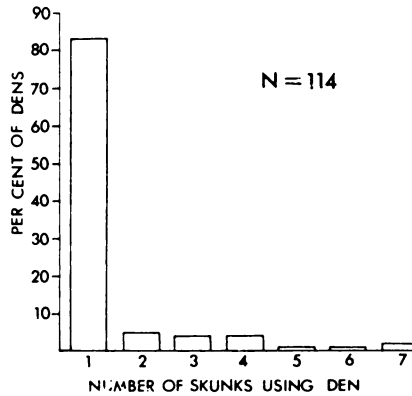


FIGURE 3. Numbers of striped skunks known to have used specific dens.

April many skunks began using hollow logs and aboveground rest sites in sedge (*Carex* sp.), at the bases of standing trees and beneath the small branches of fallen trees. Males used aboveground rest sites throughout spring, summer and early fall but females returned to underground dens during parturition and lactation. When the young began to travel with the female in late June there was a shift to aboveground rest sites in swamps and marshes. During late fall both sexes began to use underground dens more and more frequently until winter when, with one exception, underground dens were used exclusively. No aboveground rest site was reused by the same animal nor by more than one animal. This would reduce the possibility of disease transmission by arthropod vectors at den sites during the summer and early fall months.

There were 202 known instances of communal denning involving a total of 13 skunks (Fig. 2). As many as six animals (one male and five females) were located in one den but the most common number was two. Much of the communal denning occurred during the winter denning period and would seem to be of great potential importance since it is a time of severe stress. Most skunks remained in a single den for 75-100 days and many lost 55-65% of their fall weight.

Verts (1967: 37) implies that breeding takes place within the winter den and states (p. 36) that before copulation the male licks the vulva of the female. In addition, he states (p. 172) that during copulation or attempted copulation females are almost invariably bitten by males and that females often reciprocate. These activities would seem to provide an excellent opportunity for direct transmission of leptospirosis and rabies within the winter den.

Indirect contact through subsequent use of the same den was found to be minimal. Only 19 of 114 dens were known to have been used by more than one skunk (Fig. 3).

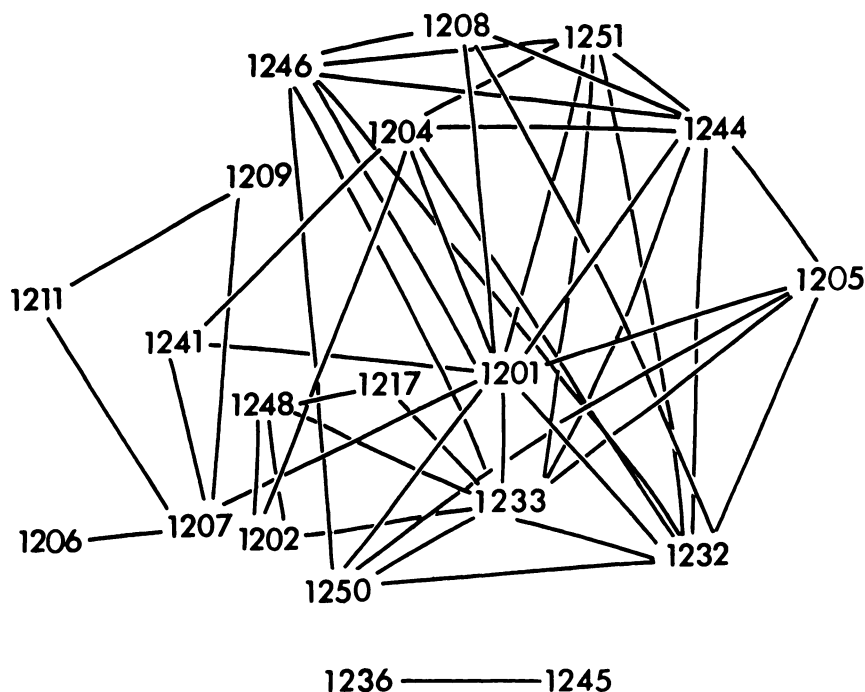


FIGURE 4. Direct, indirect-direct, and indirect contact known to have occurred between 27 radio-marked skunks.

Thus the exposure potential in all three types of denning contact is at a maximum between the months of October and April and at a minimum during the remainder of the year. However, even when this seasonal reduction is considered, there is substantial contact in a given population. Of the 27 radio marked skunks in this study, 20 had one or more of the three types of denning contact that I have described (Fig. 4). It must be emphasized that these results show, at best, the minimum contact that occurred since several nonradio-marked skunks were known to have used the area and not all skunks that were eventually radio-tagged were captured at the same time thus eliminating the possibility of observing denning contact.

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