

SMALL MAMMAL OCCURRENCE IN SOUTH DAKOTA SHELTERBELTS AND MOVEMENTS OF *Peromyscus maniculatus*¹

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ABSTRACT

Deer mice (*Peromyscus maniculatus*) were captured more frequently than other small mammal species in a mature shelterbelt in Brookings County, South Dakota. White footed mice (*Peromyscus leucopus*), short tailed shrews (*Blarina brevicauda*), meadow voles (*Microtus pennsylvanicus*), masked shrews (*Sorex cinereus*), house mice (*Mus musculus*), and meadow jumping mice (*Zapus hudsonicus*), were also captured.

Deer mice move significantly more ($P \leq 0.05$) in green ash (*Fraxinus pennsylvanicus*) and hackberry (*Celtis occidentalis*) than in other tree species. Arboreal movement occurred significantly more ($P \leq 0.05$) below 123 cm than at tracking stations above 123 cm. Average home range size was 0.06 hectares.

INTRODUCTION

Distribution of mammals in South Dakota is poorly documented except for several geographic areas including Harding County (Anderson and Jones 1971, Schitoskey 1980), Clay County (Findley 1956), LaCreek National Wildlife Refuge (Wilhelm et al. 1981), Bennett County (Jones et al. 1978), and the Black Hills (Turner 1974). Little information exists on small mammals of eastern South Dakota except for isolated habitats such as wetlands (Lindell 1971, Searls 1974).

Numerous accounts of movements by deer mice (*Peromyscus maniculatus*) are reported in the literature (Rosenzweig et al. 1975, Meserve 1976, 1977, and Holbrook 1979 for example). Information is lacking on movements of deer mice in shelterbelts or their preferences for certain taxa of plants in those shelterbelts.

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The purpose of this study was to gather information about small mammal ecology of shelterbelts. The objectives were to document the small mammal species utilizing shelterbelts and to study the movement of deer mice on the ground or in tree species.

METHODS

Eight shelterbelts 4 to 10 years old and 8 shelterbelts at least 20 years old were randomly selected in a 4 township area in western Brookings County to trap small mammals. A mature shelterbelt was used to examine the movements of deer mice. Primary woody species occurring in those shelterbelts were green ash, Siberian elm (*Ulmus pumila*), and tatarian honeysuckle (*Lonicera tatarica*). Understories consisted of brome grass (*Bromus* spp.) and seedlings of dominant tree species.

Small mammals were trapped in October and November 1980 and 1981. A grid with 125 traps (115 museum special and 10 rat traps) was located 18 meters from the end of each belt. Traps were baited with oats and peanut butter and placed at 7 m intervals. Areas were trapped for 3 consecutive nights and specimens collected were identified in the laboratory.

Deer mice for the movement study were live trapped the first 10 nights of each month from April through October at each intersection of a 10 x 10 grid with lines spaced at 7.5 m (Otis et al. 1978). Six columns of traps were placed inside the shelterbelt and 2 columns in each cornfield adjacent to the shelterbelt. Captured animals were toe clipped to identify the tracks of individual animals following procedures developed by Justice (1961). No more than 2 toes were clipped on the left rear foot from each animal.

Movements of deer mice were monitored by recording tracks of marked animals on smoked paper at tracking stations (Justice 1961, Sheppe and Carnes 1965). Tracking stations were open-ended milk cartons with sheets of 8.9 cm x 17.8 cm kymograph paper. The kymograph paper was covered with benzene and natural gas smoke and attached to mat board.

Tracking stations were placed in 5 plant species, tatarian honeysuckle, green ash, hackberry, Siberian elm, and ponderosa pine (*Pinus ponderosa*). Four tracking stations were placed at ground level and in tree branches at 61, 123, 183, and 244 cm above ground on each intersection of the 10 x 10 grid. Papers were collected every other day during a 10-day tracking period, 5 days after the study area had been live trapped.

Estimates of home range size were based upon a technique described by Jennerich and Turner (1969) using the determinant of the covariance matrix of capture points. Chi-square goodness

of fit tests (Steel and Torrie 1980) were used to determine differences in movement by deer mice among the 5 tree species and at the different height levels in each tree species.

RESULTS AND DISCUSSION

Deer mice were the most common small mammals captured in the shelterbelts studied. One hundred eighteen deer mice were captured in 1980 and 338 deer mice were captured in 1981 (Table 1). Other mammals captured were white footed mice (*Peromyscus leucopus*), short tailed shrews (*Blarina brevicauda*), meadow voles (*Microtus pennsylvanicus*), masked shrews (*Sorex cinereus*), house mice (*Mus musculus*), and meadow jumping mice (*Zapus hudsonicus*). Deer mice are common throughout South Dakota (Choate and Jones 1981) and have been reported in wetlands (Searls 1974), native prairie (Schitoskey 1980), and coniferous forest (Turner 1974).

Fifty-one deer mice were captured for the movement study and identified by toe-clipping. Tracks of these 51 mice were found on 813 boards during the 7 month study period. Tracks indicated that deer mice moved up to heights of 245 cm (Table 2). Significantly more ($P < 0.05$) tracks occurred at elevations below 123 cm than at higher elevations (Table 2). Other studies have found deer mice to be good climbers (Rosenzweig et al. 1975, Meserve 1977, Holbrook 1979).

Deer mice used the 5 tree or shrub species studied for arboreal movements during July, August, and September (Table 3). They moved significantly less ($P \leq 0.05$) in pine than other trees during August and September. They moved significantly more ($P \leq 0.05$) in green ash than in hackberry in September (Table 3). The mice also moved more in green ash and hackberry than in the other tree species during September.

Rodents climb trees for many reasons. Meserve (1977) stated that behavioral patterns including exploration, escape from predators, foraging, and social interaction explained part of their movements. Taylor and McCarley (1963), Layne (1970), Matson (1974), and Holbrook (1979), thought that competition between species was important in partitioning movements.

Holbrook (1979) found that cricetids did not prefer to move in a specific taxon of tree or shrub. She stated that most of the arboreal movement occurred on logs and small shrubs. McCloskey (1975) and Meserve (1977) found that branch height, angle, and diameter were related to climbing behavior. Meserve (1976, 1977) found that arboreal movement was related to the use of fruits and foliage in certain bushes. We found 6 deer mice nests in hackberry trees, 2 nests in pine, and 1 nest in honeysuckle. All nests

TABLE 1
Species and Number of Small Mammals Captured in Shelterbelts During October and November
In Brookings County, South Dakota

Species	Captured in 1980		Captured in 1981	
	Number of animals	Captures/trap night	Number of animals	Captures/trap night
Deer mice (<i>Peromyscus maniculatus</i>)	118	0.039	338	0.056
White footed mice (<i>Peromyscus leucopus</i>)	22	0.003
Short tailed shrew (<i>Blarina brevicauda</i>)	16	0.005	18	0.003
Meadow vole (<i>Microtus pennsylvanicus</i>)	15	0.003
Masked shrew (<i>Sorex cinereus</i>)	4	0.001	10	0.002
House mice (<i>Mus musculus</i>)	1	...	7	0.001
Meadow jumping mouse (<i>Zapus hudsonicus</i>)	1	...	2	...
Total	140		412	

TABLE 2

Number of Boards Tracked by Deer Mice During July, August, and September, 1981,
In a Mature Shelterbelt in Brookings County, South Dakota

Height at which boards were tracked	Number of boards with tracks from deer mice		
	July	August	September
Ground	84 ^a	58 ^a	48 ^a
61 cm	59 ^b	75 ^a	41 ^a
123 cm	42 ^b	43 ^a	28 ^b
184 cm	18 ^c	34 ^b	26 ^c
245 cm	12 ^c	25 ^b	17 ^c
Total	215	235	160

^{a,b,c}Indicates that those numbers in each column with the same letter are not significantly different ($P \geq 0.05$) and those with different letters are significantly different ($P \leq 0.05$).

TABLE 3

Number of Deer Mice Tracks on Boards During July, August, September, 1981,
In a Mature Shelterbelt in Brookings County, South Dakota

Tree combinations	Number of boards tracked by deer mice		
	July	August	September
Green ash vs hackberry	63 vs 56	76 vs 65	60 vs 37*
Green ash, hackberry vs elm	119 vs 43	140 vs 48	97 vs 28*
Green ash, hackberry, elm vs honeysuckle	162 vs 24	188 vs 24	125 vs 22
Green ash, hackberry, elm, honeysuckle vs pine	186 vs 29	202 vs 23*	147 vs 13*

*Indicates a significant difference ($P \leq 0.05$) within months, using Chi-square goodness of fit test, in movement of deer mice between tree combinations listed.

were found at the highest tracking station. Stah (1980) observed that deer mice and white footed mice nested as high as possible under experimental conditions. Nicholson (1941) found that white footed mice preferred nest boxes in trees compared to boxes on the ground.

Surface area of home ranges of the 5 mice studied varied from 0.04 hectares to 0.08 hectares with a mean of 0.06 hectares. Sizes of home range observed were comparable to other studies in a transition zone forest (Storer et al. 1944) and a beech-maple forest (Blair 1942).

CONCLUSIONS

Deer mice were the most common small mammal in shelter-belts. The rodents exhibited arboreal movements which were most pronounced in the lower elevations of trees. Deer mice preferred to move in green ash and hackberry while avoiding movement in pine. Home range of the deer mice varied from 0.04 hectares to 0.08 hectares.

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