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## Habitat Used by Shrews in Southeastern Montana

### Abstract

Dwarf shrews (*Sorex nanus*), masked shrews (*Sorex cinereus*), and merriam shrews (*Sorex merriami*) were most abundant in riparian and sagebrush-grass habitat types in southeastern Montana. Litter cover was greater in areas occupied by shrews than in areas without shrews. Microhabitat humidity, as related to litter cover and vegetation structure, appears to affect shrew distribution in southeastern Montana.

### Introduction

Shrew (Soricidae) habitat quality has been based on the numbers of shrews caught within a particular vegetation type (Buckner 1964, Spencer and Pettus 1966, Long 1972, Wrigley *et al.* 1979). Most authors have described shrew occurrences without quantifying the vegetation. Quantitative vegetation information would be valuable for recognizing shrew habitats which could become endangered from surface mining or livestock grazing in southeastern Montana.

This paper presents information on shrews captured in southeastern Montana and quantification of the vegetation around those capture points. We assumed that capture sites were representative of habitats occupied by shrews in the study area.

### Study Area and Methods

The study area was west of Alzada, Carter County, Montana, along the northern edge of the Black Hills. Elevations ranged from 1036 to 1128 m. A sagebrush-grass vegetation type occupied 74 percent of the study area. The most abundant plants were big sagebrush (*Artemisia tridentata*) and buffalograss (*Buchloe dactyloides*). Riparian areas, primarily wooded stream bottoms, encompassed 14 percent of the area. Major plants, there, were boxelder maple (*Acer negundo*) and snowberry (*Symphoricarpos* spp.).

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A pine forest type covered 8 percent of the area consisting of ponderosa pine (*Pinus ponderosa*) and western wheatgrass (*Agropyron smithii*).

Four sites of both the sagebrush-grass and riparian types were selected for study. Two sites of the pine type were examined.

Twenty pitfall traps were placed at 10 m intervals along a transect at each site. Pitfall traps were made by sinking a number 10 metal food can flush with ground level. A small board was placed over the top for cover, leaving space underneath for animals to enter. Five meters away, and parallel to the pitfall trap line, a series of 20 Sherman live traps were placed at 10 m intervals. Trap lines were sampled for three consecutive nights each month, April through October, during 1979 and 1980.

Vegetation characteristics, where trap lines were established, were estimated during summers 1979 and 1980. Percent canopy cover, by species, was determined by methods outlined by Daubenmire (1959). In each area, three parallel 50 m line transects were established approximately 30.5 m apart. Canopy cover was estimated in 50 quadrats (2 x 5 dm) spaced at 1 m intervals along each transect. Correlation analysis was used to relate shrew and vegetation abundance.

### Results and Discussion

All shrews were captured in pitfall traps. During the first year of study, dwarf shrews (*Sorex nanus*) were most abundant and were captured in sagebrush-grass and riparian habitats (Table 1). Masked shrews (*S. cinereus*) were present only in riparian areas.

TABLE 1. Number of shrews captured, by species and habitat type, during two years of study in southeastern Montana.

Species	Riparian		Sagebrush		Total
	1979	1980	1979	1980	
<i>Sorex cinereus</i>	2	8	1	0	11
<i>S. nanus</i>	4	2	2	0	8
<i>S. merriami</i>	0	0	1	0	1
Total	16		4		

TABLE 2. Mean ( $\pm$  SE) percent canopy cover<sup>1</sup> of bare ground, litter, and major plant categories in habitat types where shrews were captured and not captured in southeastern Montana.

Categories	Shrews		No shrews	
	Riparian	Sagebrush	Sagebrush	Pine
Bare ground	8 $\pm$ 1	22 $\pm$ 2	20 $\pm$ 2	12 $\pm$ 2
Litter	30 $\pm$ 3	25 $\pm$ 4	15 $\pm$ 1	46 $\pm$ 6
Grasses and Carices	39 $\pm$ 14	35 $\pm$ 13	45 $\pm$ 10	22 $\pm$ 4
Forbs	9 $\pm$ 4	5 $\pm$ 3	4 $\pm$ 1	5 $\pm$ 2
Shrubs	18 $\pm$ 6	3 $\pm$ 1	13 $\pm$ 2	2 $\pm$ 1
Total Cover	64 $\pm$ 5	49 $\pm$ 4	64 $\pm$ 2	37 $\pm$ 8

<sup>1</sup>Two-dimensional cover values.

Merriam shrews (*S. merriami*) were the least abundant and were captured only in sagebrush-grass type. Masked shrews were most abundant during the second year of study. Both masked and dwarf shrews were found only in riparian habitat. No Merriam shrews were captured during the second year of study. Habitat relations of Merriam shrews were not analyzed because of limited sample size. A total capture of 20 shrews

with an effort equal to 14,400 trap nights indicated that shrews are relatively rare in southeastern Montana. All captured shrews were cataloged and deposited in the United States Fish and Wildlife Service Museum, Fort Collins, Colorado.

Generally, riparian habitat occupied by shrews was higher in total cover and shrub cover than sagebrush-grass areas with shrews, and pine forest areas. Riparian habitat with shrews and sagebrush-grass areas without shrews were equal in all categories except litter, which was greater in riparian habitat. Litter was also higher in sagebrush-grass areas with shrews than in sagebrush-grass areas without shrews. Cover of big sagebrush was greater in sagebrush-grass areas without shrews than with shrews. Forb and grass cover was similar in all habitat types (Table 2).

Dwarf shrews were significantly associated with coverage of common dandelion (*Taraxicum officinale*), common timothy (*Phleum pratense*), rose (*Rosa* spp.), and macoun wildrye (*Elymus macouni*) (Table 3). All of these plants are abundant adjacent

TABLE 3. Correlations among shrew abundance and plant species cover.

Plant species	<i>Sorex nanus</i>	<i>Sorex cinereus</i>
<i>Bromus japonicus</i>	0.151	0.242
<i>Taraxacum officinale</i>	0.737*	0.091
<i>Opuntia polyacantha</i>	0.072	0.299
<i>Parmelia chlorachora</i>	0.104	0.433
<i>Phleum pratense</i>	0.716*	0.089
<i>Rosa</i> spp.	0.718*	0.157
<i>Elymus macouni</i>	0.717*	0.095
<i>Fraxinus pennsylvanicus</i>	0.633*	0.180

\*P < 0.05.

to streams. Masked shrew abundance was not significantly correlated with any measured plant species.

Litter cover (dead plant parts) appears to be the important habitat component. In sagebrush-grass areas, transects where shrews were caught possessed more litter than those without shrews. Litter cover was also abundant in riparian habitat. Litter in the pine forest type was relatively less moist than that found in riparian or sagebrush-grass types. Black and Hooven (1974) noted that shrews left areas where wildfire had burnt off litter.

The results of this study show that shrews in southeastern Montana are most abundant in riparian habitat, but may also occupy drier sites such as sagebrush-grass areas. Wrigley *et al.* (1979) drew the same general conclusion about shrews in Manitoba.

Shrews were captured in sagebrush-grass areas during 1979 only. In 1980 shrews were captured only in the riparian type. These observations support conclusions (Wrigley *et al.* 1979, Hoffman and Owen 1980) that several species are tolerant of different habitat conditions. Rodent populations on the study area were relatively higher in 1979 than in 1980. Intra- and interspecific competition for food and space with shrews and rodents may have had an effect on shrew distribution during 1979.

Wrigley *et al.* (1979) stated that vegetation type and cover were important to shrews through the maintenance of moisture levels in microhabitats. Our results show that wetter habitats support more shrews in southeastern Montana. Litter cover was greater in riparian and sagebrush-grass areas, where shrews were most abundant. Litter

cover helps to conserve soil moisture and provides a relatively moist microhabitat. The conservation of soil moisture provides more water for plant growth. As plants respire, relative humidity levels increase near the ground surface. The presence of vegetation reduces ground desiccation by disrupting air currents, blocking sun radiation, and stabilizing temperatures. Tree and shrub canopy is more effective at reducing desiccation than are shrubs alone. Plant species diversity may not be as important to shrews as the vegetative structure and litter type, as well as litter cover, provided by certain habitat types. Humidity levels in microhabitats may also play a role in shrew distribution.

Shrews were not captured in Sherman live traps during this study. The success of pitfall traps in capturing shrews may be related to the fact that insects become trapped in them. The occurrence of natural prey in pitfall traps makes these devices attractive foraging areas for shrews.

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