

## Comparison of species diversity of small mammals in forest and prairie habitats

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### Abstract

This study was conducted to compare the small mammal species diversity within forest and prairie habitats. Data were collected over three days at each habitat and at four separate grid locations within those habitats. Overall, eight different species were found with *Peromyscus spp.* being the most abundant in the forest habitat and *Spermophilus tridecemlineatus* the most abundant in the prairie habitat. Seven distinct species were found in the forest habitat, whereas five distinct species were found in the prairie habitat. The data were not sufficient to conclude that the forest habitat had greater species diversity and amount of captured small mammals than the prairie habitat.

### Introduction

This project examined species diversity within two distinct habitats (forest and prairie) and four distinct locations within each. By using a series of trapping grids set up in each of these habitats, the goal was to determine which, if any, habitats had a greater biodiversity than the others and if any species seemed to prefer a particular habitat. A few species in particular should be found in only one location. *Myodes gapperi*, the red-backed vole, lives primarily in continuous forest with plenty of undergrowth; *Tamias striatus*, the eastern chipmunk, is primarily a woodland dweller and is rarely seen in grasslands, while *Spermophilus tridecemlineatus*, the thirteen-lined ground squirrel, is primarily a prairie dweller (Hazard 1982).

The habitats vary greatly in a burned prairie compared to a forest. The forest in particular has substantial amounts of cover and a great deal of resources capable of maintaining a large population of animals. The burned prairie, however, is likely to still be recovering. Kaynas et al. (2002) found that the more recently burnt a habitat is, the lower biodiversity it is likely to have. Thus our hypothesis is that the forest habitat will have a greater amount of captured small mammals as well as greater biodiversity than the prairie habitat.

## Methods

The data in this experiment were collected from four separate habitats in the forest and four separate habitats in the prairie. The grid habitats in the forest included a previously burnt forest, red pine, aspen, and bog. The forest grids were all located within Itasca State Park, Minnesota. The grid habitats in the prairie included predominately aspen, oak savannah, previously burnt grid near a road, and another burnt grid away from the road. The prairie grids were all located within the Agaissez Sand Dunes, Minnesota.

Twelve observers were split up into four teams and data were combined for analyzing the species diversity of the different habitats. Each team was in charge of two habitat grids, one in the forest and one in the prairie. The eight diversity grids consisted of a five by ten trap-station containing five rows with 11 traps in each row for a total of 55 traps per grid. Each row was set using nine Sherman traps and one randomly placed Russian shrew trap/Longworth trap combination. The five rows were spaced 10 meters apart and the 11 traps within the rows were also spaced 10 meters apart. The Sherman traps were baited with seeds and the Russian shrew trap/Longworth traps were baited with “Special Kitty” brand cat food.

The traps in the forest grids were baited in the afternoon and checked in the morning for three days. The traps in the prairie were checked/baited in the morning and checked/re-baited in the afternoons for three days. All small mammals caught were identified, marked (if applicable), and released near the point of their capture. Saliva samples were taken from each *Peromyscus spp.* in order to identify the correct species.

## Results

Fields were monitored for 1,320 trap nights (6 days, 4 grids, 55 traps per grid) and a total of 63 small mammals were trapped; of this total 36 were trapped in the forest and 27 in the

prairie (Figure 1). The number of small mammals trapped in the forest locations ranged from four in the bog grid to 14 in the burnt pine grid. The prairie locations ranged from three small mammals trapped in the burnt grid to 12 in the aspen grid (Figure 1).

In the forest, seven species were trapped, while in the prairie five species were trapped (Figure 2). Eight different species were trapped from the combined habitats. The species trapped were *Myodes gapperi*, *Peromyscus spp.*, *Tamias striatus*, *Sorex spp.*, *Zapus hudsonius*, *Microtus pennsylvanicus*, *Tamiasciurus hudsonicus*, and *Spermophilus tridecemlineatus*. The burnt pine grid in the forest habitat had the most diversity with five species and the forest aspen grid had the least with only one species trapped. The grids in the prairie had two species (burnt and oak) or three species (burnt near road and aspen). The species found in each habitat also varied within each grid (Table 1). The bog grid had one species in common with the forest grids and had two species that were not found in the other forest grids. *Peromyscus spp.* was found in all the grids except the bog. All of the prairie grids trapped *S. tridecemlineatus* except for the oak grid. The burnt (road) grid and the aspen grid in the prairie both had 3 total species, with two of them similar and one different in each.

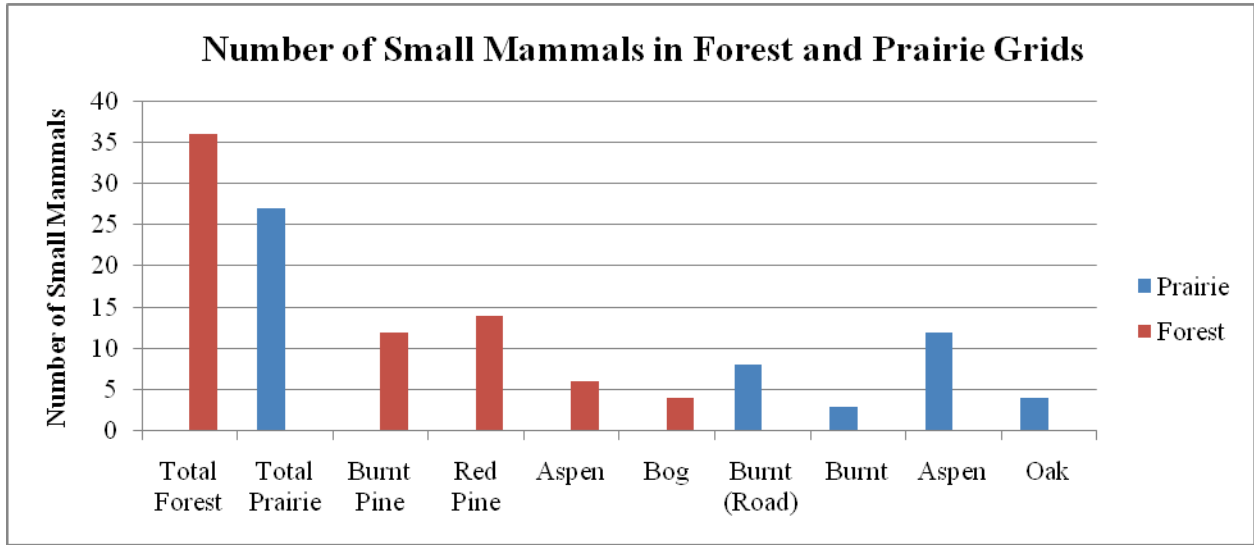
Four of the eight species were found in both the forest and prairie. However, they accounted for a different percent of the trapped species in each habitat (Table 2). The only species found exclusively in the prairie was *S. tridecemlineatus* and it accounted for 44.44 percent of the total trapped in this habitat. Species exclusive to the forest were *T. striatus*, *Sorex spp.*, and *T. hudsonicus*. They totaled 27.78 percent of the small mammals trapped in the forest (Table 1).

**Table 1.** Species found in each of the four forest habitats (Itasca State Park, Mn) and the four prairie habitats (Agaissaz Sand Dunes, MN). Data from a total of 1,320 trap nights, including 660 in the prairie and 660 in the forest, were collected in June, 2008.

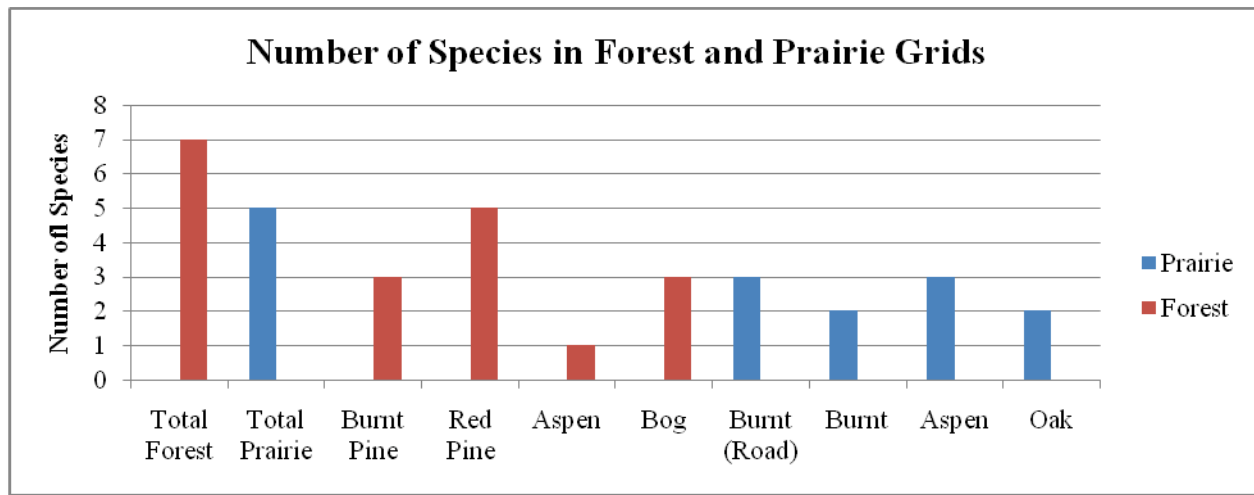
Species	Burnt Pine	Red Pine	Aspen	Bog	Burnt (Road)	Burnt	Aspen	Oak
<i>Myodes gapperi</i>	X	X		X				X
<i>Peromyscus spp.</i>	X	X	X		X	X	X	X
<i>Tamias striatus</i>	X	X						
<i>Sorex spp.</i>		X						
<i>Zapus hudsonius</i>		X					X	
<i>Microtus pennsylvanicus</i>				X	X			
<i>Tamiasciurus hudsonicus</i>				X				
<i>Spermophilus tridecemlineatus</i>					X	X	X	

**Table 2.** Percentage of each species found in a four forest habitats (Itasca State Park, Mn) and four prairie habitats (Agaissaz Sand Dunes, MN). Data from a total of 1,320 trap nights, including 660 in the prairie and 660 in the forest, were collected in June, 2008.

Species	Forest (%)	Prairie (%)
<i>Myodes gapperi</i>	27.78	11.11
<i>Peromyscus spp.</i>	33.33	37.04
<i>Tamias striatus</i>	22.22	0.00
<i>Sorex spp.</i>	2.78	0.00
<i>Zapus hudsonius</i>	5.56	3.70
<i>Microtus pennsylvanicus</i>	5.56	3.70
<i>Tamiasciurus hudsonicus</i>	2.78	0.00
<i>Spermophilus tridecemlineatus</i>	0.00	44.44



**Figure 1.** Total number of small mammals trapped in multiple different habitats in a forest area (Itasca State Park, MN) and a prairie area (Agaissiz Sand Dunes, MN). Data from a total of 1,320 trap night, including 660 in the prairie and 660 in the forest, were collected in June, 2008.



**Figure 2.** Number of species trapped in 1,320 trap nights, including 660 in the prairie and 660 in the forest. Forest habitat included four different sites in Itasca State Park, MN and the prairie habitat included four sites in Agaissiz Sand Dunes, MN.

## Discussion

The forest sites had two more species of small mammals than the prairie sites. The forest also had a higher number of small mammals captured. There was not a great enough difference between the two habitats to confirm that the forest had more diversity than the prairie. Because

the forest had three unique species, whereas the prairie only had one exclusive species, it is more likely that the forest does have a higher diversity of small mammals. This difference could be due to the forest having more coverage for protection, more resources, or more diverse areas for the small mammals to live. To be certain further testing is required.

The difference in species diversity could be attributed to the degree of grid variability between the two habitats. The forest habitat contained four very diverse grids, whereas the prairie habitat contained four grids which were relatively similar. The variability of the forest habitat likely accounted for the greater number of species between the two habitats.

*Peromyscus spp.* was found in relatively equal concentrations in every grid except the bog. However, the genus *Peromyscus* has two native species which are not easily distinguished in the field. *P. leucopus* and *P. maniculatus gracilis* are both forest dwellers, and may both be represented in the data for the forest habitat. *P. maniculatus bairdii* is a prairie dweller, and is likely the only type to be found from the prairie habitat, though this cannot be confirmed until the saliva samples have undergone an amylase test (Hazard 1982).

Although the forest habitat did have a larger number of small mammals captured and greater species diversity, our data is not conclusive enough to support our hypothesis that the forest habitat will have a greater amount of captured small mammals as well as greater biodiversity than the prairie habitat. Future studies could be run for a longer duration in hopes of getting a better estimate of the differences in species diversity within the different habitats.

## Literature Cited

Hazard, E.B. 1982. Mammals of Minnesota. 1<sup>st</sup> ed. Minneapolis: University of Minnesota P. 280p.

Kaynas, B.Y., C. Tavsanoğlu, and B. Gurkan. 2002. Species diversity of small mammals community in different stages of post-fire succession in Marmaris National Park, Turkey. Rotterdam: Millpress.