

**Diversity Within Small Mammal Communities of Forested Sites Around Itasca State Park
and Nearby Prairie Sites**

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Abstract

Different habitats provide a variety of niches in which organisms can live. These habitats have an influence on what types of animals can be found in certain areas. The objective here is to study mammal diversity in differing habitats in and around Itasca State Park, but concentrating on differences between forest and prairie environments. Six groups of students set up a grid in one of six areas, a bog, an aspen forest, burned and unburned deciduous forest, and burned and unburned red pine forest. Fifty-five traps were set, and all mammals caught were marked and recorded. Sixty-nine mammals were caught in the prairie locations, and 114 mammals were caught in the forest locations. The prairie locations captured eight different species, while the forest locations captured six different species. Three species were common to both locations.

Introduction

The 'habitat heterogeneity hypothesis' is one of the benchmarks for ecology. It considers that complex and structurally different habitats may provide more niches and diverse ways of exploiting the environmental resources, in turn increasing species diversity. In most habitats, plant communities determine the physical structure of the location and have a considerable influence on the distributions and interactions of animal species (J. Tews et al., 2004). The objective in our study is to examine the diversity of small mammals found within various forest habitats within or near Itasca State Park and to compare and contrast those communities with various prairie sites.

Methods

The class was first split into three or four-person groups and assigned various habitat settings in or near Itasca State Park and nearby prairie sites. Each group set up a 5 x 10 trap-station grid. Each of the five columns had nine Sherman trap stations and a randomly selected station with both a Russian shrew trap and a Longworth trap. Hence, each groups used 45 Sherman traps, five Russian traps, and five Longworth traps, totaling 55 traps per site. Each Sherman trap was baited with various seeds. The Longworth and Russian traps were baited with special kitty cat food. Traps were checked for three consecutive mornings and all captured small mammals were identified, individually marked and released. The six locations visited were a bog, an aspen forest, a burned and unburned deciduous forest, and a burned and unburned red pine forest. Additional data from class outings to Bill's grid (an unburned deciduous forest), the sewage pond enclosure, a second deer enclosure, and an unburned forest near Bill's grid were used in this experiment. The prairie sites visited were the vole field, which is an old field, Frenchman's Bluff burned and unburned, Waubun wet and dry, and Rush North and South. The two Frenchman's Bluff sites were checked twice daily, once in the morning and once in the afternoon, to prevent mammals from dying in the traps. The data used in this experiment was collected from each day the class went out to check traps. Ten total days of data were used: May 29th, June 2nd, June 5th, June 9th, June 12th, June 16th, June 17th, June 19th, June 26th, and June 30th.

Results

Out of the 1,080 traps that were checked on the prairies, only 69 contained a mammal. The total frequency of mammals caught on these locations was 6.39% (Table 1). On the other

hand, 114 mammal specimens were caught out of a total of 900 traps checked in the forest environments. The total frequency of mammals caught on those locations was 12.67% (Table 1). Eight different mammal species were captured in the prairies, compared to six different species in the forests. Of the species caught, three were found in both environments: *Peromyscus*, *Blarina brevicauda*, and *Zapus hudsonius* (Figure 1). The species captured the most in the prairies was *Microtus pennsylvanicus*, being obtained 59% of the time (Figure 2), while the species caught the most in the forests was *Myodes gapperi*, which was obtained 39% of the time (Figure 3).

Discussion

It was found that more species were present in the prairie environments than the forest environments. Even though a higher number of species were captured in the forest environments, 94% of those were represented by three species (Figure 3). The three most common species were *Myodes gapperi*, *Peromyscus*, and *Tamias striatus*. On the other hand, the two most common species captured in the prairie environments, *Microtus pennsylvanicus* and *Spermophilus tridecemlineatus*, represented 88% of the specimens (Figure 2).

The two environments, however, did share similar species: *Peromyscus*, *Blarina brevicauda*, and *Zapus hudsonius*. One *Blarina brevicauda*, two *Zapus hudsonius*, and two *Peromyscus* were caught in the prairie, while one *B. brevicauda*, one *Z. hudsonius*, and 39 *Peromyscus* were captured in the forest. This shows that some mammals are able to occupy a variety of habitats. For example, *Blarina brevicauda* and *Zapus hudsonius* are found throughout Minnesota in various habitats, both wooded and grassy (Hazard, 1982). The different species of *Peromyscus*, however, are not found in a wide variety of habitats. *Peromyscus leucopus* is

generally found in wooded areas, while *Peromyscus maniculatus bairdii* is found anywhere except wooded areas (Hazard, 1982). *Peromyscus maniculatus gracilis* is mainly found in wooded areas, but can be found in open brushy areas (Hazard 1982). This suggests that the *Peromyscus* specimens captured in the wooded areas were most likely to be *P. leucopus* or possibly *P. maniculatus gracilis*, but not *P. maniculatus bairdii*.

Even though *B. brevicauda* was caught in both wooded and grassy environments, it was captured in unburned locations. This suggests that the species prefers areas where the vegetation is slightly thicker. *Z. hudsonius* was found in two different habitats, Waubun dry and burned deciduous. The two areas are similar in that they are dry areas with enough vegetation to provide cover. In general, however, the prairie environments had less bushes and trees for the mammals to hide in. As a result, the species living there relied on underground burrows and tunnels, in addition to the cover from the tall thick grass, to escape from predators. The forest environments, on the other hand, had numerous trees, bushes, and plants in which the mammals could conceal themselves. This could have led to the capture of more specimens because they are more likely to be moving above ground than the species located in the prairies.

One error in this experiment was that more individuals were living in the areas we were trapping in, but they were not going into the traps. This would have led us to believe that there was less diversity in an area. For example, on June 17th, three *M. pennsylvanicus* were observed moving through the grass in both Waubun Wet and Frenchman's Bluff Unburned. Also, a large garter snake was observed off the grid near Rush North. This predator could have been eating the specimens in the area, resulting in a lower than expected population.

Diversity within the experimental areas could be extended if given a longer timetable for the research. Also, we could concentrate on certain environments to compare the diversity

observed between similar areas, such as two prairie sites, or two wooded sites. This would allow us to observe the amount of specimens captured at each site and determine how the two similar environments may differ.

Literature Cited

Hazard, Evan B. The Mammals of Minnesota. Minneapolis: University of Minnesota Press, 1982.

Tews, J, U.Brose, V.Grimm, K. Tielborger, M.C. Witchmann, M. Schwager and F. Jeltsch 2004.
Animal species diversity driven by habitat heterogeneity/diversity: the importance of keystone structures. *Journal of Biogeography* 31:79-92

Appendix

| | PRAIRIE | Traps Checked | Frequency Caught |
|-------|---------|---------------|------------------|
| SPTR | 20 | 1080 | 0.018518519 |
| MIPE | 40 | 1080 | 0.037037037 |
| MUER | 2 | 1080 | 0.001851852 |
| MIOC | 1 | 1080 | 0.000925926 |
| SPFR | 1 | 1080 | 0.000925926 |
| BLBR | 1 | 1080 | 0.000925926 |
| PEXX | 2 | 1080 | 0.001851852 |
| ZAHU | 2 | 1080 | 0.001851852 |
| MYGA | 0 | 1080 | 0 |
| TAST | 0 | 1080 | 0 |
| TAHU | 0 | 1080 | 0 |
| Total | 69 | 1080 | 0.063888889 |

| | FOREST | Traps Checked | Frequency Caught |
|-------|--------|---------------|------------------|
| SPTR | 0 | 900 | 0 |
| MIPE | 0 | 900 | 0 |
| MUER | 0 | 900 | 0 |
| MIOC | 0 | 900 | 0 |
| SPFR | 0 | 900 | 0 |
| BLBR | 1 | 900 | 0.001111111 |
| PEXX | 39 | 900 | 0.043333333 |
| ZAHU | 1 | 900 | 0.001111111 |
| MYGA | 44 | 900 | 0.048888889 |
| TAST | 24 | 900 | 0.026666667 |
| TAHU | 5 | 900 | 0.005555556 |
| Total | 114 | 900 | 0.126666667 |

Table 1. Mammal specimens and their frequency of capture in the prairie and forest environments.

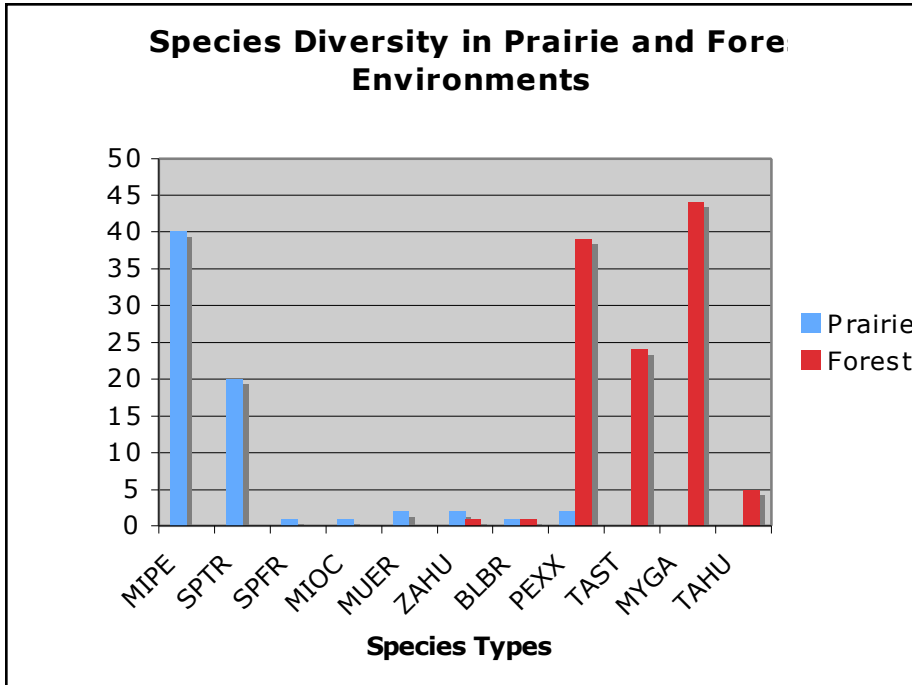


Figure 1. The total number and different types of species captured in the prairie and forest environments. *Zapus hudsonius*, *Blarina brevicauda*, and *Peromyscus* occurred in both environments.

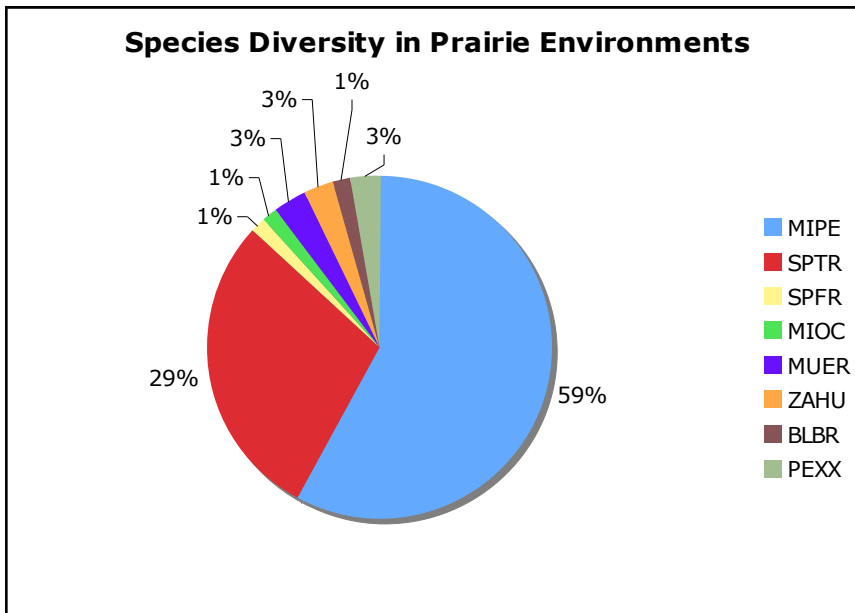


Figure 2. The percentage each mammal was caught in the prairie environments. The total number of specimens obtained was 69.

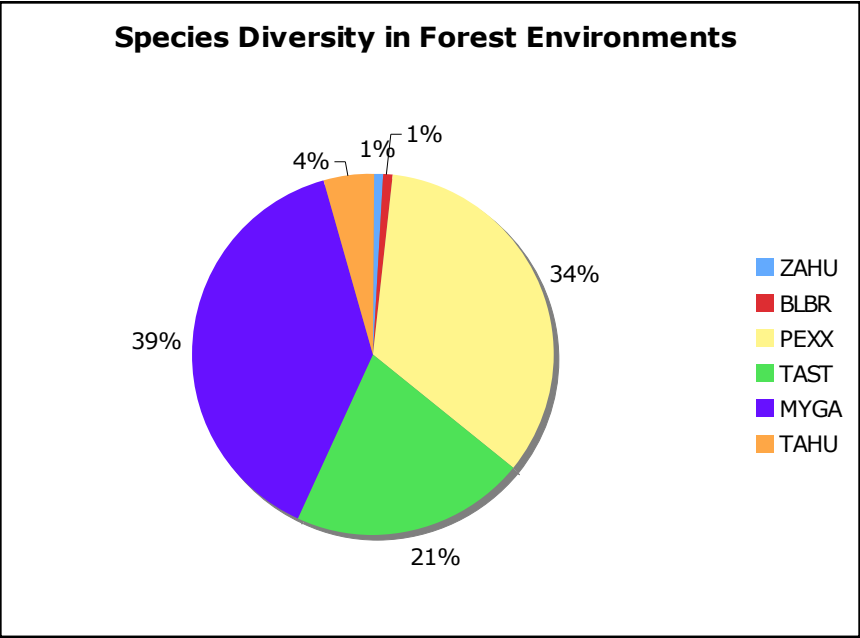


Figure 3. The percentage each mammal was caught in the forest environments. The total number of specimens obtained was 114.