

# **Comparison of Small Mammal Communities within Forested and Prairie Habitats**

Holly Sigler, Danielle Grunzke, Andrew Rehmann

## **Introduction**

Habitat plays a large part in small mammal diversity in any given area. Each species may be habitat selective for many different reasons, some of which are food type or supply, water levels or availability, temperature, and shelter. Each species varies in selectivity which leads to widely varying species diversity in different habitat types. In particular we wanted to look at the variation between the species found in a forested habitat versus a prairie habitat. Previous research would indicate larger species diversity to be found in the forested habitats (Dueser and Shugart 1978). In addition we are also interested in the difference in species diversity between burned and unburned sites of otherwise similar habitat. It has been shown that burned sites will typically yield larger species diversity (Krefting and Ahlgren 1974).

Over the course of two weeks we collected specimen data through live-trapping at six forest sites and six prairie sites. The forest sites consisted of varying forest type throughout Itasca State Park in Park Rapids, MN; burned deciduous, unburned deciduous, burned red pine, unburned red pine, aspen, and bog. Two prairie sites were in the Coburn state wildlife management area, two were burned sites in the Rush Lake state wildlife management area, and two sites were on private property in Waubun, MN. One Waubun site was of dry soil type and the other Waubun site was of a wet habitat type.

## **Methods**

At each site we set up a four by ten trap-station grid using Sherman traps, for a total of 40

Sherman traps per site. Each trap point was approximately ten meters apart, for a total grid size of 40 by 100 meters. Eight Longworth traps were additionally set at each site, with two randomly placed along each of the four Sherman grid lines. The Sherman traps were baited with a small handful of a sunflower and oat mix, while the Longworths were baited with a spoonful of wet cat food. Each site was checked for three consecutive mornings, for a total of 144 trap nights per site.

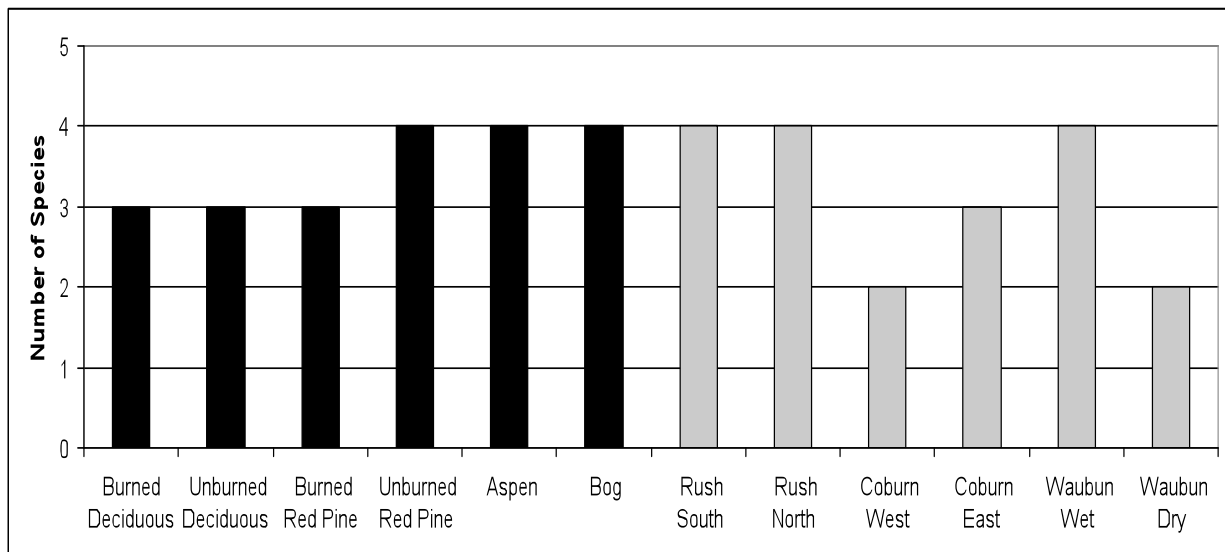
Each captured animal was identified, sexed and weighted. Tail, hind foot, and ear measurements were taken on *Peromyscus spp.* as well as saliva samples in order to determine if each was a deer mouse (*P. leucopus*) or a white-footed mouse (*P. maniculatus*). Marking by toe clipping was done on the first two trap mornings on the deer mouse, white-footed mouse, red-backed vole (*Myodes gapperi*), meadow vole (*Microtus pennsylvanicus*), and meadow jumping mouse (*Zapus hudsonius*). Toe clipping was done only for these smaller mammals due to the possible effects it could have on the larger mammal's survival. After all data was collected, the specimens were released at the trap point where they had been caught.

## **Results**

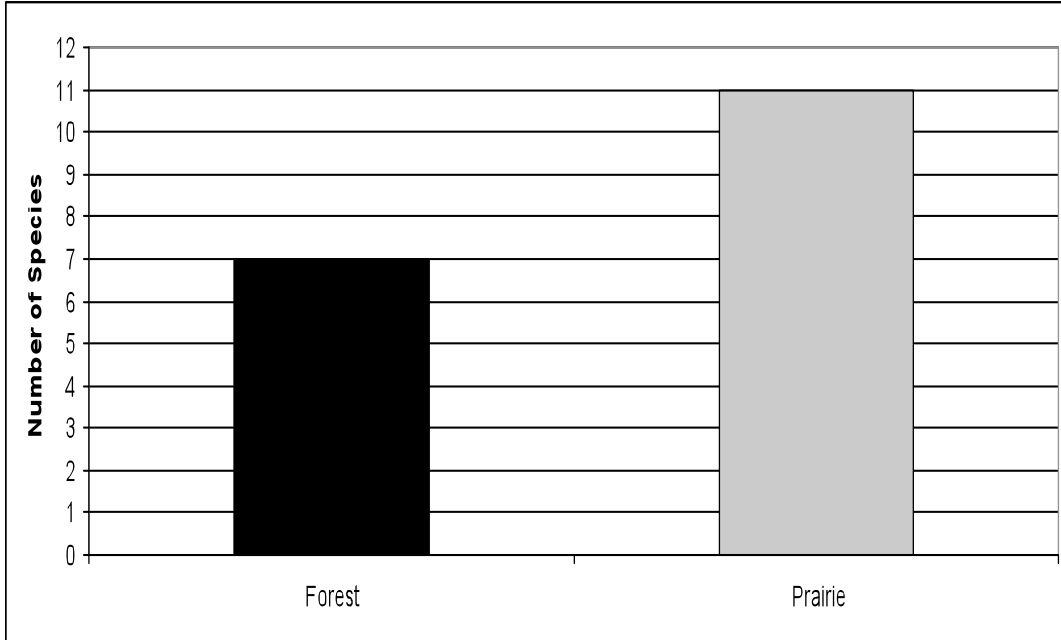
At the burned deciduous site we captured 36 small mammals and 40 at the unburned deciduous site. The burned red pine had a total of 37 captures and the unburned red pine contained 48 captures. The bog and the aspen plots produced 11 captures each, with a southern flying squirrel (*Glaucomys volans*) caught on the aspen plot and a red squirrel (*Tamiascurus hudsonicus*) caught in the bog plot. At the Waubun wet prairie site we captured four individuals, including a star-nosed mole (*Condylura cristata*) and a short-tailed weasel (*Mustela erminea*). The Waubun dry location produced six individuals. The Coburn West and East sites contained

four and five captures respectively. A northern short-tailed shrew (*Blarina brevicauda*) was captured on the Coburn West site and a prairie shrew (*Sorex haydeni*) on the Coburn East site. Within the burned Rush North and South sites, we captured 10 and 14 specimens. In total, we captured six species at the forested sites and 11 species on the prairie. The species found within the forests plots in order of most abundant were the *Peromyscus spp.*, the red-backed vole, eastern chipmunk (*Tamias striatus*), meadow vole, red squirrel, southern flying squirrel, and northern short-tailed shrew. While in contrast the species on the prairie sites in order of most abundant were the meadow vole, meadow jumping mouse, thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), *Peromyscus spp.*, prairie vole (*Microtus ochrogaster*), northern short-tailed shrew, prairie shrew, and star-nosed mole. Overall, we found a wider range of species diversity on the prairie sites (Figure 1) (Figure 2). While we captured more individual mammals at the forest sites (Figure 3) (Figure 4).

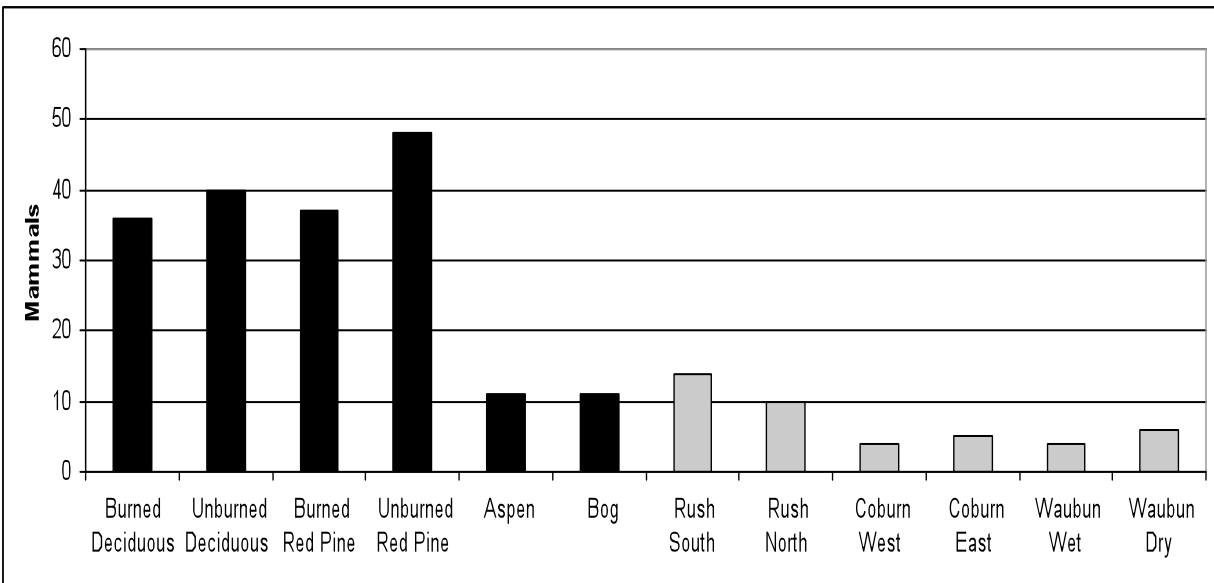
**Figure 1.** Total number of different species captured from each of the 12 plots of varying habitat type in the surrounding area and within Itasca State Park, Minnesota. Black bars are forest habitats and gray bars are prairie habitats.



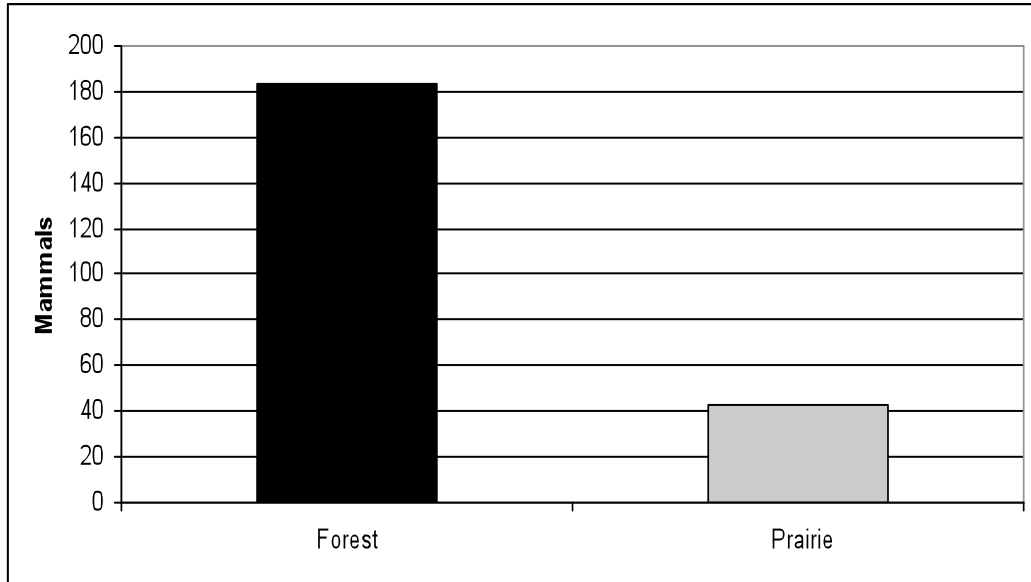
**Figure 2.** Total number of different species captured in forest versus prairie habitat type in the surrounding area and within Itasca State Park, Minnesota.



**Figure 3.** The total number of individual mammals got on each of the 12 plots of varying habitat type in the surrounding area and within Itasca State Park, Minnesota. Black bars are forest habitats and gray bars are prairie habitats.



**Figure 4.** The total number of individual mammals captured in forest versus prairie habitat type in the surrounding area and within Itasca State Park, Minnesota.



## Discussion

Between the prairie and the forested areas, one of the most common species found between the two were deer or white footed mouse. At the prairie, we identified the *Peromyscus* spp. to be the prairie deer mouse (*P.m. bairdii*) whereas in the forested areas, we were unable to accurately identify the white-footed mouse from the deer mouse. In addition to the mice, the meadow vole, was also found at all of the prairie sites and found once at the bog. Other than these two species, there were no other commonalities between the species found in the forest and the prairie.

The differences in species diversity may be attributed to the variation in amount of sunlight, rain and vegetation that each site receives. We found that the forested sites around the park had less species diversity than the prairie sites which seems against our intuition and

previous studies in the area (Blake et. Al 2008). This variation could be accounted for drastic change in habitat. The prairie can have drastic changes in weather from one day to the next whereas in a forested area, the foliage coverage can keep a more stable temperature throughout the day and can reduce the amount of sunlight that is able to reach the forest floor. Also, the forest may provide the small mammals with superior coverage for hiding, allowing them to escape predation better (Korbmacher 2008). Fire can also play a large role in species diversity, but contrary to our prediction and previous studies we found no distinct variation between our burned and unburned plots of forest habitat. The prairie habitat did fall in line with our hypothesis and the recently burned Rush plots yielded more species and more individual mammals in comparison to our unburned Coburn plots. This is thought to be due to the removal of dense under story and the seed dispersal caused by fire (Krefting and Ahlgren 1974).

Our data shows some clear trends, but many of our findings contrast with previous studies. The small scale of our experiments leaves us with inconclusive results overall and it is clear that more research could be done. Repetitions of this small scale experiment could lead to more definitive findings.

#### Literature Cited

- Blake, A., L. Shaughnessy, and D. Strelow. 2008. Abundance and diversity of small mammals found in forest habitat compared with prairie habitat. University of Minnesota, Itasca Biological Station. IBS # 2533.
- Dueser, R. D. and H. H. Shugart Jr. 1978. Microhabitats in a forest-floor small mammal fauna. *Ecology* 59:89-98.
- Korbmacher, M. 2008. Small mammal diversity: around Itasca State Park and Agaissez prairie habitats. University of Minnesota, Itasca Biological Station. IBS # 2520.
- Krefting, L. W. and C. E. Ahlgren. 1974. Small mammals and vegetation changes after fire in a mixed conifer-hardwood forest. *Ecology* 55:1391-1398.