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RH: Musser and Zopfi • Selective Feeding Habits Among Small Mammals

### **Selective Feeding Habits of Small Mammals in Schmeekle Reserve**

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**ABSTRACT** Foraging areas for small mammals are essential as well as food types. Areas with more cover like blow down sites provide better hiding places to avoid predation compared to undisturbed areas. Food content is important as well, some provide better energy content or better protein. We recorded absence and presence of small mammals that were in caught in traps in undisturbed area and disturbed areas. We also recorded whether the animals captured were in a trap with peanut butter or tuna bait. We used a paired t-test to compare capture rates of disturbed sites and undisturbed sites. We also used the paired t-test to compare capture baits in peanut butter and tuna baited traps. Capture rates were higher in disturbed areas in the two sites of the Chilla Woodlot ( $df=167$ ,  $P=0.0036$ ) and Berard Oaks Savanna ( $df=155$ ,  $P < 0.0001$ ). Capture rates between peanut butter and tuna baited traps were not significantly different ( $df=323$ ,  $P=0.3540$ ). When sampling population sizes for small mammals, researchers should consider ground cover.

**KEYWORDS** small mammals, blow down sites, Schmeekle Reserve, paired t-test, peanut butter, and tuna.

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## **Introduction:**

The study we conducted deals with the selective feeding habits of small mammals in Schmeekle Reserve. It also focused on capture frequency between two blow down sites from storms as well as two adjacent undisturbed areas within the reserve. Because of the extensive damage from past summer storms, we hoped to identify if the small mammal's community was affected. We could contribute knowledge regarding bait to use to capture more small mammals as well as what cover areas help capture more small mammals, these data would benefit in researchers sampling population sizes of different small mammals because without a proper sample size you get an inadequate picture of the population which leads to misinterpretation of the biodiversity of the system. Woodman et al. (1996) stated that it is critical to mammalian diversity to sample communities at various sites accurately.

Eccard et al. (2008) studied the effects of predation on foraging behaviors of voles (*Microtus spp.*) and they confirmed that local cover influences foraging decisions in relative safety from avian predation. One of the purposes of this project is to add insight as to whether blow down sites have better coverage for the small mammals to forage compared to undisturbed sites. Ecker et al. (2002) found a higher species richness among three vole species (*Clethrionomys glareolus*, *Clethrionomys rufocanus* and *Microtus agrestis*) in younger forest age classes (0-5 years) than compared with mature forests. This could be due to the fact that younger forests have more extensive ground cover than more mature stands; blow down sites can be compared to younger forest stands as having a large amount of ground coverage.

Another purpose of this study is to provide more data to support the premise that certain mammals will choose a food source with higher energy (peanut butter) over one that has lower energy (tuna). Lewis et al. (2001) found that in the lab and field, white-footed mice (*Peromyscus leucopus*) selected high-energy food. Also Oswald et al. (1994) found that the type of bait used in trapping small mammals had significant effects on the number of individuals captured for 4 of the 5 species in their study. The species that were affected by the bait type were short-tailed shrew (*Blarina brevicauda*), western harvest mice (*Reithrodontomys megalotis*), deer mice (*Peromyscus maniculatus*), and meadow voles (*Microtus pennsylvanicus*); white-footed mice (*Peromyscus leucopus*) seemed unaffected.

We hypothesized that small mammals will be caught more often with bait with high energy content than bait with low energy content, and that small mammals will be caught more often in the blow down sites that provide more cover versus undisturbed sites that provide less cover from predators in Schmeekle Reserve.

## Methods:

Our study area for this research was in the northeast corner of Schmeekle Reserve in Stevens Point, WI. This is a highly vegetated area with good ground cover as well as oak (*Quercus spp.*) and pine (*Pinus spp.*) forest. Some of these areas in the reserve have become blow down sites due to storms where trees have fallen and the terrain has been altered. Many different bird species, small mammals and larger mammals such as deer are found here. The average climate of the area is 2.2-13.2 degrees Celsius with an average monthly precipitation of 5.87 cm during the time of our study, which was the month of October. The focus of the study was small mammals such as voles, shrews, chipmunks, mice, and squirrels. In the study area we focused on trapping in the blow down sites as well as areas of the forest that are undisturbed.

We used 24 Sherman traps in this study. The traps were set up in a grid system with 4 rows 6.07 meters apart with 3 trap sites in each row that were 6.07 meters apart, the trap sites contained a pair of Sherman traps approximately 15 cm apart, the distances were measured by a tape measure. Each trap was marked with blue flagging tape numbered 1 through 24 in a snake formation. For each pair of traps one was baited with one spoonful of peanut butter and the other one spoonful of tuna at the back of each trap along with 3 cotton balls to insulate them. The way we decided which trap got peanut butter or tuna was by flipping a coin, we got heads so we started the first trap with peanut butter and alternated between that and tuna.

This grid was placed in a site where half of the grid was in an undisturbed area and the other half was in a blow down site. The sites themselves were determined by positioning ourselves in the northeast corner and using the second hand of a watch to pick the direction to head in, we took 20 paces in that direction and placed our first trap, marked number 1. The actual distance was adjusted a little in order to ensure that we could fit the grid in half undisturbed area and half disturbed area. The traps were checked twice a day that spanned a week for each area (Chilla Woodlot and Berard Oaks Savanna). The first week was conducted in the Chilla Woodlot and the second week we moved the grid to Berard Oaks Savanna.

The traps were checked early in the morning at 07:00 and right before sundown around 17:30. The data were recorded by marking on a table whether a small mammal was present or absent, we also recorded the temperature, wind speed, and precipitation for each day and made any other notes regarding if empty traps were sprung and such. The data were compiled at the end of the study. We conducted a paired t-test of the mean capture rate of small mammals in the undisturbed area versus the disturbed area for the Chilla Woodlot and Berard Oaks Savanna. Another paired t-test was conducted for the overall mean capture rate of small mammals in peanut butter versus tuna baited Sherman traps.

## Results:

**Table 1: Paired-t test of Mean Capture Rate of Small Mammals in the Undisturbed area Vs. Disturbed area in Chilla Woodlot (graphpad 2011).**

Group	Undisturbed	Disturbed		
Mean	0.01	0.07		
SD	0.08	0.25		
SEM	0.01	0.02		
N	168	168		
df = 167	P = 0.0036			
<b>Total PB</b>	0	<b>Total PB</b>	2	
<b>TotalTuna</b>	1	<b>TotalTuna</b>	8	

Mean capture rate was significantly higher in the disturbed area than the undisturbed area of the Chilla Woodlot (df: 167, P=0.0036). The mean of undisturbed minus disturbed equals -0.06. The 95% confidence interval of this difference is -0.10 to -0.02. Small mammals were found in traps baited with tuna 82% of the time. Least chipmunks (*Neotamius minimus*) were 64% of the captures, red-backed voles (*Myodes gapperi*) and deer mice (*Peromyscus*) were both 18% of the captures.

**Table 2: Paired-t test of Mean Capture Rate of Small Mammals in the Undisturbed area Vs. Disturbed area in Berard Oaks Savanna (graphpad 2011).**

Group	Undisturbed	Disturbed		
Mean	0.01	0.13		
SD	0.11	0.34		
SEM	0.01	0.03		
N	156	156		
df = 155	P < 0.0001			
<b>Total PB</b>	2	<b>Total PB</b>	15	
<b>TotalTuna</b>	0	<b>TotalTuna</b>	5	

Mean capture rate was significantly higher in the disturbed area than the undisturbed area of the Berard Oaks Savanna (df: 155; P: < 0.0001). The mean of undisturbed minus disturbed equals -0.12. The 95% confidence interval of this difference is -0.017 to -0.06. 77% of captures were in traps that contained peanut butter. 59% of captures were deer mice (*Peromyscus*) and 41% were red-backed voles (*Myodes gapperi*).

**Table 3: Paired t-test of Mean Capture Rate of Small Mammals in Peanut Butter or Tuna Baited Sherman Traps (graphpad 2011).**

Group	Peanut Butter	Tuna
Mean	0.06	0.04
SD	0.24	0.20
SEM	0.01	0.01
N	324	324
df = 323	P = 0.3540	
	<b>19</b>	<b>14</b>

Mean capture rate was not significantly related to the type of bait used (df: 323; P: 0.354). The mean of peanut butter minus tuna equals 0.02. The 95% confidence interval of this difference is -0.02 to 0.05.

### **Discussion:**

For both study sites, the disturbed area had a significantly higher mean capture rate than the undisturbed areas. Small mammals were caught 30 times in the disturbed areas where only 3 were captured in the undisturbed areas. Disturbed habitats had significantly higher trap success for red-backed voles and woodland jumping mice (Kaminski et al. 2007). The blow down sites provided more downed woody debris for the small mammals to nest in as well as create runways to hide from predators while foraging. It is clear that many species use coarse woody debris (CWD) as a habitat element within their home range. There are several key attributes of CWD that influence its value to mammals: piece size and decay stage, areal cover, and the successional stage in which it occurs (Zabel and Anthony 2003).

For both study sites, there was no significant difference in bait preference. Looking at table 3, the mean capture rate for both peanut butter and tuna were very similar. Woodman et al. (1996), used two types of bait in a neotropical study of small mammals; suet bait (finely ground beef suet, ground raisins, rolled oats, millet, grain sorghum, cracked corn, vanilla) and peanut-butter bait (locally purchased peanut butter and rolled oats). It was found that the type of bait had little impact on the trapping results.

Timing of the year may also have been a factor in bait selection, because we conducted this study in late October of 2011. Temperatures ranged from -5°C to 15°C (23°F to 59°F), such a large difference in temperature could have been a factor for small mammals in choosing a higher energy food (peanut butter) or a low energy food (tuna). During the first week in the Chilla Woodlot, small mammals seemed to prefer tuna. During the second week in the Berard Oaks Savanna, small mammals

seemed to prefer peanut butter. Further research needs to be conducted on temperature and weather conditions having an effect on bait preference.

Other things to note with this study, if a trap was sprung with no small mammal inside (i.e. back door open, front door shut, or trap flipped) we counted it as an absent. Also on the last day of trapping in the Berard Oaks Savanna, every single trap was sprung in some way, all baits were eaten and no cotton balls were missing. Upon review of claw marks, teeth marks and having seen a family of raccoons around this area, we have concluded it was these bandits that interrupted our study. However these results did not seem to bias our study in anyway because we still managed to capture one deer mouse during that time which was average for a trapping period.

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### **Literature Cited:**

Eccard, J.A., J. Pusenius, J. Sundell, S. Halle, and H. Ylonen. 2008. Foraging patterns of voles heterogeneous avian and mustelid predation risk. *Oecologia* 157: 725-734.

Ecke, F., O. Lofgren, and D. Sorlin. 2002. Population dynamics of small mammals in relation to forest age and structural habitat factors in northern Sweden. *Journal of Applied Ecology* 39:781-792

Graphpad Software, Inc. copyright 2002-2005. T test calculator.  
<<http://www.graphpad.com/quickcalcs/ttest1.cfm?Format=C>> Accessed December 9, 2011.

Kaminski, J.A., Davis, M.L., Kelly, M., Keyser, P.D., 2007. Disturbance effects on small mammal species in a managed Appalachian Forest. *American Midland Naturalist* 157: 385-397

Lewis, C.E., T.W. Clark, and T.L. Derting. 2001. Food selection by the white-footed mouse (*Peromyscus leucopus*) on the basis of energy and protein counts. *Canadian Journal of Zoology* 79:562-68

Oswald, C.D. and L.D. Flake. 1994. Bait formulation effectiveness in live-trapping small mammals in eastern South Dakota. *Proceeding of the South Dakota Academy of Science* 73:101-108

Woodman, N., R. M. Timm, N. A. Slade and T. J. Doonan. 1996. Comparison of traps and baits for censusing small mammals in Neotropical lowlands. *Journal of Wildlife Mammalogy*. 77: 274-281.

Zabel, C. J., R. G. Anthony, editors. 2003. *Mammal community dynamics- management and conservation in the coniferous forests of western North America*. First edition. University Press, Cambridge, United Kingdom.