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COMPARISON OF WILDLIFE VISITS TO WOODED AND EDGE HABITATS ALONG WARM SPRING

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ABSTRACT

With rising human population, natural areas previously unaffected by the presence of humans are now being fragmented at an increasing rate. This, in turn, exposes animal species to forest edges more frequently. Two plots, one wooded and one affected by edge were observed for footprints along Warm Spring for differences in frequency and species. It was hypothesized that the frequency of visits would be significantly greater in the wooded plot than the edge affected plot. Observations of print type were made daily in each plot for a period of 12 days to allow data to be analyzed both qualitatively and quantitatively. These data were then analyzed for significant differences using a Chi Square test. Our null hypothesis was not rejected, indicating no significant difference in frequency of tracks between plots.

Keywords: eastern deciduous forest, edge effect, print analysis, species diversity, Warm Spring

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INTRODUCTION

Edge habitats are found where two habitats meet creating a mixed array of vegetation characteristic of both habitats. Research has shown that the edge effect, often created by human disturbance, attracts a variety of animals to an area. This is attributed to an increase in foliage as sunlight penetration to the forest floor increases at these edges due to fragmentation by humans. At forest edges with increased sunlight, understory plant species are able to survive and flourish, creating new habitat and food for many animals living there (Summers et al., 2000). This, in turn, suggests that a higher species diversity and richness of animals may be found living in edge habitats. Many animals, including wild turkey, white-tailed deer, chipmunk, fox, are thought to prefer edge habitats due to the abundance and variety of food (Gustafson et al, 1994). While edge habitat may increase species diversity or abundance, edge habitat is also prone to an increased level of disturbance due to its close proximity to human activity and development. If human activity is high at these edges a decrease in abundance and diversity may also be seen.

In order to assess the effects of edge and disturbance in a Pennsylvanian eastern deciduous forest, our study was designed to compare, both qualitatively and quantitatively, the species diversity between two sites along Warm Spring in Huntingdon, Pennsylvania. We hypothesized that there should be a greater diversity and frequency of animal prints in the forest edge site as compared to the wooded site.

FIELD SITE

The goal of this study was to correlate changing land use with differences in the behavior of local wildlife. For these reasons, a study site was chosen that has been used by both animals and humans. Warm Spring begins approximately 75m from Cold Springs Road and is adjacent to a wooded area and a residential and commercial building (Nature's Answer). This area was thought to be ideal for examination of animal behavior and how it is influenced by interaction with humans. Our two study plots were chosen with the expectation that a large diversity of animals would traverse the bank when drinking from the stream; each 2m x 1m plot was situated immediately adjacent to the stream. The first site is located approximately 30m away from the building, and frequently traveled road near the spring opening. This area is considered to be edge habitat for the purposes of our study. The second site is more secluded, approximately 150m downstream. This closed site is not directly impacted by the presence of humans and will be referred to as the wooded site. At both locations, skunk cabbage is abundant near the water, but the wooded site was more densely forested with Eastern Hemlock and deciduous trees and shrubs. The bank opposite the open site was a large mowed area in which the home, store and road were within clear visual range.

Figure 1. Raccoon prints in the forest edge plot.

METHODS AND MATERIALS

The 2m x 1m study plots directly bordered the spring bank along the bank, with the 2m edge touching the water. They were initially cleared of vegetation using a rake and a shovel. The soil surface was then smoothed using water to create a surface suitable for print analysis. Prints were identified to species daily for 7d during the first study period, with 4d of additional observation following a week later (see Table 1 for dates). We visited the study sites between 1 and 4 PM for print observation during the study period. Any prints found were identified and recorded. Following observations, we again smoothed the study plot using a flat shovel to insure accurate observations the following day. Additional information collected daily included incidental observations (scat, sightings, etc.), approximate temperature and weather observations and time of day.

RESULTS

A smaller number of print occurrences were collected than hoped. For this reason, statistical analysis could not be preformed for each animal species. Therefore, we grouped the species into sub categories for statistical analysis. We considered chipmunk, squirrel, opossum, and skunk species to be small mammals, while white-tailed deer were considered large mammals. Turkeys were considered separately.

Table 1. Observed conditions of the edge and wooded sites

		PRINT OBSERVATIONS	
DAY (beginning Wednesday, March 24, 2004)	**DAYTIME WEATHER**	**WOODED**	**EDGE**
March 24	overcast, 50°	white-tailed deer; gray squirrel	white-tailed deer; raccoon
March 25	overcast, 50°	white-tailed deer	white-tailed deer; eastern chipmunk; striped skunk
March 26	clear, 60°	gray squirrel	striped skunk
March 28	warm & overcast, 70°	none	opossum; gray squirrel
March 29	overcast, 38°	wild turkey; white-tailed deer; striped skunk	striped skunk; white-tailed deer
March 30	sunny & cool, 58°	opossum; gray squirrel; wild turkey	white-tailed deer; wild turkey
April 6	sunny & clear, 50°	white-tailed deer; wild turkey sighting	white-tailed deer
April 7	sunny & clear, 65°	none	none
April 8	rainy, 42°	white-tailed deer	white-tailed deer; raccoon
April 9	overcast, 58°	wild turkey; white-tailed deer; gray squirrel	white-tailed deer
April 10	sunny, 60°	white-tailed deer	striped skunk; white-tailed deer
April 11	rainy & cool, 42°	white-tailed deer; striped skunk	white-tailed deer; eastern chipmunk; striped skunk

Table 2. Frequency of species at the wooded and edge sites

	WOODED	EDGE
eastern chipmunk	0	2
grey squirrel	4	1
opossum	1	1
raccoon	0	2
striped skunk	2	4
white-tailed deer	8	9
wild turkey	4	1

Table 3. Frequency of large mammals and small mammals witnessed in the wooded and edge sites

	Wooded	Edge	Total
Small Mammals	7	10	17
Large Mammals	8	9	17
Total	15	19	34

A Chi^2 Test for independence was performed on the data to test for a significant relationship between the frequency of small mammals and the frequency of large mammals at the large and small plots (see Table 3). The null hypothesis, which states that there should be no preference by the large or small mammals for wooded or forest edge plots, was not rejected (Chi-Sq = 0.119, df = 1, P = 0.730).

DISCUSSION

The distribution of wildlife populations between the two sites can be related to habitat quality and make up. Habitat quality for wildlife population is related to the arrangement of various habitat elements (Gustafson et al, 1994). At Warm Springs such elements include the presence of a road, store and home, as well as the vegetation and soil conditions present in the area of each site. Our failure to reject the null hypothesis indicates no significant preference for either the wooded or the edge sites in both the small and large mammal groups—this is inconsistent with research that indicates a preference for edge habitat (Dale et al. 2000, Malanson et al. 1999).

Deer were the most abundant species at each site. While deer have a preference towards edge habitat because of increased variety of vegetation, it seemed natural that a greater number of sightings of deer would be at the open site affected by edge. However, as Table II indicates, there were 8 deer present in the wooded site, and 9 deer in edge. Deer appeared to show little preference. This could possibly be attributed to the wooded site being within close enough vicinity to the road to be impacted by edge effect. Biological usages of habitat could also effect this distribution of deer. Biological habitat refers to the use of a particular habitat to derive benefit for a specific biological function. One very key biological function is lactation; water is used to derive benefit for lactation (Stocker et al, 1977). The spring season and increase in fawn population could be related to the high doe demand for water which could eliminate the preference of one site over another. This explanation can be supported by the high abundance of fawn footprints that were observed at both sites.

By night, raccoons are active during all weather conditions particularly in the spring. During the beginning of March, the animals remain denned up. They emerge from their dens with bodily water contents far below normal (Stuewer, 1943). The renewal of regular feeding begins in late March, when our study began. At that time, highly nutritive food, such as acorns, is utilized by the raccoon so that they can store a surplus of fat for the next winter (Stuewer, 1943).

There were two occurrences of raccoon prints at the edge-affected site, but none in the wooded site. This can be explained by their extraordinarily varied diet and their tendency to scavenge for easily accessible food. When necessary, raccoons will make the best of a less palatable food, but when a variety is available they are prone to make a choice of preferred items (Stuewer, 1943). Outdoor garbage disposal fallen bird seed from feeders nearby may have attracted these animals.

The eastern striped skunk is also a hibernating animal that breeds for a three to five week period in late February and March. At the beginning of our study, the skunks were probably at peak breeding time and also foraging for nutrition-rich foods which would make them extra active (Bailey, 1971). Morris (1979) found that the eastern chipmunk, also a seasonal hibernator, preferred habitats with only a few small trees, which would lead us to believe that they would be more prevalent in the edge plot. We found only two prints at the edge plot and none at the wooded plot, thus making any firm conclusions impossible.

Wild turkeys need a mix of forest and pastureland to provide food and the most favorable breeding conditions. Open or developed habitats, like the road, house and store have been known to cause an obstacle for turkey to move between forests, although their optimal habitat is half forest and half shrub or cropland (Gustafson, 1994). We expected turkey to visit the edge plot more frequently due to this fact, yet four wild turkey were observed in the wooded plot compared to one in the edge. Once again, the wooded as well as the edge plot are in close vicinity to the road and thus both may be influenced by an edge effect.

There are many aspects of our study that may have contributed to the lack of statistical significance of our results. These include time constraints on length of data collection, limited geographic scope and small number of study plots. These factors together gave rise to a data set hardly large enough to merit statistical analysis. In the case of future research, we would make the following recommendations.

The first recommendation is to extend the period of data collection. A period that is longer than two weeks is essential to obtaining a large enough number of data points to establish correlation or significance. A four to six week period of data collection placed slightly later in the season (March/April) might witness an increase in animal activity such that variation between plots and large and small mammals would be more clearly assessed. The second recommendation is to increase the number of plots, and expand the geographical scope of the data collection. While two plots, one wooded and one edge, provided a preliminary look at possible preferences for habitat between large and small mammals, a much larger scope of study is needed to adequately assess difference. For future research, we suggest the expansion of study plots to include four more plots of each type (edge and wooded) at Warm Spring. In addition, the study could be expanded to include several similar spring environments to account for possible variation in other factors influencing behavior at one individual spring.

Additional sources of error are both human and environmental. Possible errors in print identification and/or missing of small or undetectable prints completely may have skewed study results. Weather patterns influenced the conditions of prints; on rainy days prints may have been washed out completely, and on sunny warm days, study plots may have dried to the extent that no imprints were formed.

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