

EFFECTS OF HUMAN POPULATED AREAS ON RODENT AND BIRD ACTIVITY

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ABSTRACT

This study investigates the influence of human-populated areas on the observed levels of presence of two common wildlife groups: rodents and birds. Observations were conducted across two different sites varying in levels of human activity. *Sciurus carolinensis* (Eastern Gray Squirrel) and *Turdus migratorius* (American Robin) were the main focal species of our survey, although other species were also recorded if seen. We hypothesized that rodent activity should be greater in areas with dense foliage and less human disturbance, while bird activity should be less impacted or even increase in urban settings due to adaptation to human environments. Standard visual scans were performed across 200-foot segments in selected sites, and sightings were recorded and compared. However, due to visual difficulties in dense foliage and weather conditions, we were unable to collect useful data from one of the sites. We were able to obtain some supplemental data that shows behavioral differences between the sites. We changed our hypothesis to test if there is a relation between *Sciurus carolinensis* and *Turdus migratorius*. We found that there is no correlation between the two.

Keywords: birds, human populated areas, rodents, Sciurus carolinensis, Turdus migratorius, woodland

INTRODUCTION

Urbanization continues to reshape natural landscapes, resulting in fragmented habitats and altered ecological interactions. One consequence of increasing human development is its impact on local wildlife communities, particularly species that are sensitive to habitat changes or human disturbances. Rodents and birds are two taxa commonly used as ecological indicators due to their abundance, mobility, and responsiveness to environmental change. As green spaces are replaced by buildings, roads, and recreational infrastructure, animals may be forced to adapt, relocate, or risk decline.

Rodents, such as *Sciurus carolinensis* (Eastern Gray Squirrel), tend to rely heavily on vegetative cover and stable food sources, which may be disrupted in more populated, human-modified areas or may work to their benefits as humans leave food lying around (Nichols 1958. Bowers and Breland 1996). Birds, such as *Turdus migratorius* (American

Robin), exhibit a broader range of behavioral plasticity, sometimes even thriving in urban settings due to access to food and nesting areas (Desgranges et al. 1995; Reale and Blair 2005). By comparing activity levels of these animals in both densely human-populated and secluded woodland environments, we aimed to assess how human presence influences wildlife visibility and behavior. We hypothesized that areas of denser foliage and less human activity should have more observable rodents than areas with more human activity while there should be no differences between sites for birds.

METHODS AND MATERIALS

Sites where the study was conducted include the main campus walkway of Juniata College in Huntingdon PA and the Peace Chapel in Huntingdon PA during the span of three to four weeks, at different times of day, and in different weather conditions

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(Figure 1). The main walkway, from Moore St. to Ellis Hall, is a hub of human activity as students walk to and from buildings and nearby residents walk around for recreation. In contrast, the Peace Chapel is less populated as there is less urbanization around and it is more secluded in the woodlands. Although there are rocky or cut grass walkways people can use to get around, it is uncommon to see large numbers of people. The Peace Chapel site is the first 200 ft from the entrance of the trail (Figure 2). To conduct our study, we used simple observational methods to gather data. For example, we would walk down the main stretch (walkway) of campus and take note of any species we could physically see, a scan of each area for 200ft. There was no other equipment needed or used.

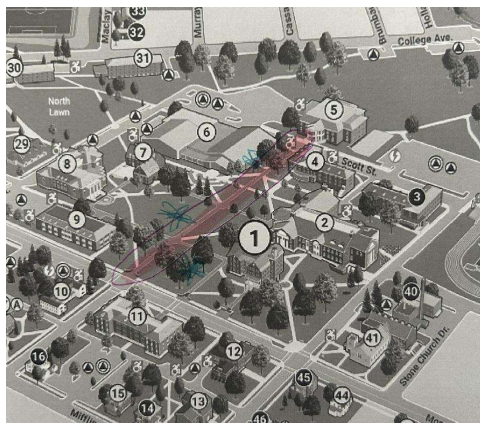


Figure 1. Above is a map of Juniata College main campus. The highlighted and circled area is where the data was collected; and the triangles indicate where most of the species were seen each time.

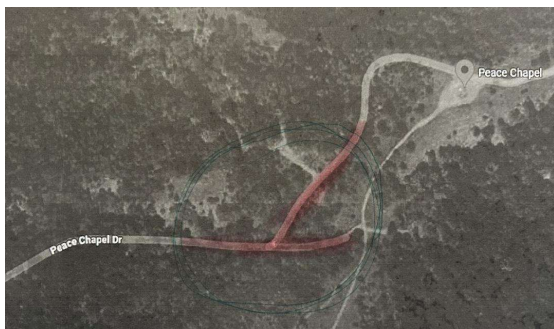


Figure 2. Above is a Google Maps image of Peace Chapel, where the highlighted and circled area is where the data was observed.

RESULTS

The data that we collected are limited due to varying weather conditions, functional limitations with resources for collection, and time constraints. It is also of note that there is supplemental evidence that species that we have not seen in our exact study have been seen in the nearby area. For example, all visits to the sites showed no signs of chipmunks. For example, chipmunks are known to live in the area, specifically outside Tussey and Terrance on the Juniata College campus.

Histograms of our squirrel data show that they are non-parametric, whereas our robin dataset is right skewed parametric. The means are 1.417 for the squirrels and 2.33 for the robins, meaning that on an average walk down the main walkway of Juniata campus it is expected to see one squirrel and 2 robins.

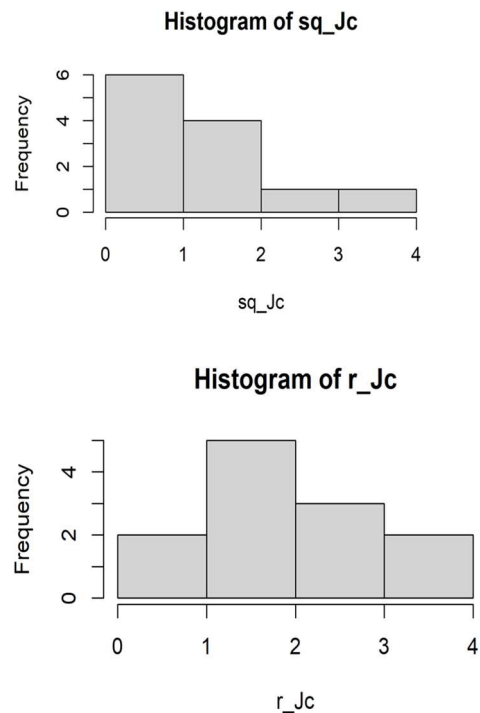


Figure 3. Above are histograms of Squirrels(sq) and Robins(r) on Juniata College campus (Jc). Both groups are nonparametric and define the hypothesis test to be conducted.

```
> summary(sq_Jc)
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
0.000  0.000  1.500  1.417  2.000  4.000
> summary(r_Jc)
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
0.000  2.000  2.000  2.333  3.000  4.000
```

Figure 4. Summaries of the squirrel dataset(sq) and robin dataset (r) collected on the Juniata College Campus. The summary includes the minimum, 1st quartile, median, mean, 3rd quartile, and the maximum.

All other species and sites other than squirrels and robins on the Juniata campus do not have usable data for hypothesis testing. To see if there is a correlation between populations of squirrels and robins we ran a Chi-square test for independence, which had a p-value of 0.1824, meaning that we fail to reject the null hypothesis. This means that there is no concrete evidence to say if populations of squirrels and robins are related.

Pearson's Chi-squared test

```
data: contingency_table
X-squared = 20.9, df = 16, p-value = 0.1824
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Figure 5. Results from the Chi square test for independence between Squirrels and Robins on the Juniata College campus.

Secondary observational data was also observed that is of note. The behavior of rabbits at both sites appeared to be different, though this was not statistically tested. Rabbits on the Juniata College campus are primarily nocturnal with it almost impossible to see them during the daytime. Although rabbits are readily spotted at the Peace Chapel during the daytime, observations were not made at night but there appears to be a difference in the observed behavior that would warrant further research. Site-specific approach distances may also be of interest. On the Juniata College campus it was possible to get within 2 feet of a rabbit, whereas at the Peace Chapel it was impossible to get any closer to a rabbit than 3 yards. By contrast, within the Juniata College campus, we were able to get within 2 to 3 inches of a squirrel.

The types of species observed also differed between our two study sites. On the Juniata College campus there are many small mammals and common backyard birds (robins, sparrows, and starlings), whereas at the Peace Chapel there were more songbirds.

DISCUSSION

Overall, there is much research still needed on how human populations can affect the behavior and populations of wildlife. We found that there is no significant correlation between the abundance of squirrels and robins on the Juniata College Campus. From our data we found that on an average walk down the survey site you would see a squirrel and two robins. We observed behavioral differences that could mean that current surveys for animal populations in areas of high human traffic could be flawed. Understanding more on how humans can affect the behavior of wildlife can not only help aid in conservation but could also build a deeper understanding of how behaviors form and evolve. Specifically looking at the distance that a human can get to a variety of differing species on Juniata College campus and Peace Chapel would be a good extension of the research that has been conducted for this paper. More research also needs to be done into the ecosystem and populations of species. The ecological impact of humans on common species is not widely studied, a significant gap in scientific knowledge.

LITERATURE CITED

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