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Scavenging Rates Highest at Windowed Compared to Windowless Sites at Millikin University in Decatur, Illinois

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ABSTRACT

The number of bird-window collisions is estimated to be between 100 million-1 billion per year. One reason for the wide estimate in the number of collisions is that scavengers tend to find carcasses before they are found. We examined whether bird-window collisions influence foraging patterns by comparing scavenging rates at windowed sites compared to windowless walls. The study was conducted at Millikin University in Decatur, Illinois from Fall 2007 to Fall 2008. Six, 40-day trials were conducted in which 20 grams of chicken breast was placed at 16 sites (8 windowed and 8 windowless sites), and the status of the chicken was monitored every 12 hours. Scavenging rates were faster at windowed sites 0 m from windows compared to windowed sites 10 m from windows and locations 0 and 10 m from windowless walls. Scavenging rates also varied by season with faster rates in the spring and summer months compared to the fall and winter. While scavenging rates were faster at windowed sites 0 m from windows, seasonal scavenging patterns did not correspond with the seasonal distribution of bird-window collisions. Thus, faster scavenging rates in the spring and summer are most likely a result of an increase in the number and kinds of scavengers present.

INTRODUCTION

On average, 1-10 birds die in bird-window collisions per building per year (Klem 1990). Bird-window collisions occur because birds do not recognize glass as a barrier reflecting habitat or birds attempt to fly through two parallel panes of clear glass (Klem 1989). The large range in the estimated number of collisions may partially be a result of a lack of reliable estimates of search efficiency and scavenging rates (e.g., Osborn et al. 2000). Bird-window collisions can be difficult to detect as the coloration of bird carcasses is often cryptic. Scavengers may take carcasses before they can be discovered. Scavengers may remove 10-50% of carcasses after one day (Kostecke et al. 2001).

While the average number of bird-window collisions is 1-10 birds per building per year (Klem 1990), the frequency of collisions is not equally distributed throughout the year. At Millikin University in Decatur, Illinois, 69% of bird-window collisions occur during three months (May, September, and October), corresponding with the peak of spring and fall bird migration (Horn unpubl. data). Moreover, common fatalities at windows, such as

warblers and doves, range from 20 – 130 grams and are large prey items relative to other available food sources. Thus, for scavengers whose home range contains a high density of windowed structures, it may be energetically rewarding to forage closer to buildings during peak bird migration to take advantage of a seasonal influx of larger prey items.

We examined whether scavenger foraging patterns were influenced by bird-window collisions. Specifically, we determined whether the scavenging rate was different at windowed sites compared to non-windowed sites (e.g., Klem et al. 2004). We also examined how scavenging rates changed by season. We predicted that windowed sites would have faster scavenging rates because scavengers may find more profitable prey in the form of carcasses from bird-window collisions.

METHODS

The study was conducted on the Millikin University campus in Decatur, Illinois from Fall 2007-Fall 2008. During the study, six, 40-day trials were performed. The six trials were conducted Oct. 9–Nov. 17, 2007 (Fall 2007), Feb. 3-Mar. 14, 2008 (Winter 2008), Mar. 27-May 7 (Spring 2008), May 20-June 30 (Summer 1 2008), July 13-Aug. 23 (Summer 2 2008), and Sept. 3-Oct. 15 (Fall 2008). During each trial, we used 8 windowed sites and 8 non-windowed sites. The sites were located at 9 academic buildings with similar architecture and levels of human activity, and each building had 1 or 2 sites. The area occupied by the buildings fit within the home range of most mammalian scavengers.

At each of the 16 sites, 20 grams of uncooked chicken was placed in one of two locations: 0 m from the building or 10 m from the building. Twenty grams of chicken was selected to approximate the weight of a migrating warbler. Most bird carcasses are found within 1 m of a window (Horn pers. obs.). Thus, scavengers should not be searching for carcasses 10 m from windows. Each day, chicken was placed at 4 of 32 locations, and its fate was monitored every 12 hours for 48 hours after which it was removed. During each 12-hour check, if the chicken was no longer present or was at least 50% missing, it was considered to be scavenged. Over an eight-day period, all 32 locations had chicken, and over a 40-day period, each location had chicken five times. The order of chicken placement was random, and was the same each trial.

95% confidence intervals of the number of hours until chicken was scavenged were calculated for windowed sites 0 and 10 m from buildings and windowless walls 0 and 10 m from buildings for each season and for all seasons combined. In addition, confidence intervals were calculated for all locations combined for each season. Non-overlapping confidence intervals were considered statistically significant.

RESULTS

We found that scavenging rates were faster at windowed sites 0 m from buildings compared to windowed sites 10 m from buildings and windowless walls (Fig. 1). The mean scavenging rates were 34.4 hours at locations 0 m from windows, 39.5 hours 10 m from windows, 37.9 hours 0 m from windowless walls, and 38.5 hours 10 m from windowless walls. Scavenging rates differed by season with scavenging rates fastest in spring and summer, and slowest in fall and winter (Fig. 2). Scavenging rates ranged from 32.5 hours

in late Summer 2008 to 45.3 hours in Fall 2008. Differences in seasonal scavenging rates resulted in two general patterns. In the fall and winter months, we observed faster scavenging rates at windowed sites 0 m from buildings compared to windowless walls (Fig. 3), whereas in spring and summer, there were no differences in scavenging rates among locations (Fig. 4).

DISCUSSION

In general, scavengers removed chicken from windowed sites 0 m from buildings at a faster rate than windowed sites 10 m from buildings and non-windowed locations. Thus, scavengers may be actively searching along windowed walls for carcasses. Klem et al. (2004) found that bait at windowed sites was removed while bait at windowless walls was not. In addition, they found that scavengers returned to locations where food was previously found.

We found that scavenging rates were faster in the warmer months compared to the colder months. This relationship has varied among studies. DeVault and Rhodes (2002) found that vertebrate scavenging was faster as air temperature increased, while DeVault et al. (2004) found slower scavenging rates by vertebrates during warmer periods. DeVault et al. (2004) suggested that the discrepancy in results between these two studies was due to seasonal temperature differences.

Seasonal changes in scavenging rates may be a result of changes in the abundance and composition of scavengers. The domestic cat (*Felis catus*), eastern fox squirrel (*Sciurus niger*), and insects were among the scavengers observed between Fall 2007-Fall 2008 at Millikin University. The domestic cat was spotted on several occasions. Nutter et al. (2004) found there were more pregnant cats in March-May. An increased number of cats in the spring and summer months may have resulted in faster scavenging rates. In addition, arthropods and bacteria are more abundant and decompose carcasses more quickly in the summer months (DeVault et al. 2004).

While scavenging rates were faster 0 m from windows, scavenging rates did not correspond with peak times for bird-window collisions. Bird-window collisions at Millikin University are most likely to occur during spring and fall migration (Horn unpubl. data), while differences in scavenging rates between windowed and windowless sites are most likely to be detected in fall and winter. This suggests that faster scavenging rates in spring and summer are more likely a result of an increased number of scavengers (DeVault et al. 2004). The greater number of scavengers may search larger areas during warmer months, and in turn, reduce the influence the presence of windows has on scavenging rates.

While groundskeepers were informed of our bird-window collision studies, it is possible that some chicken was removed by groundskeepers. However, given the location of the chicken, it was more likely that chicken was taken from locations 10 m from buildings (which would be near sidewalks and parking lots) compared to 0 m from buildings (which were grassed). Thus, any effect that groundskeepers had would make it more difficult to detect the differences we observed. Future studies should examine the composition of scavengers on the Millikin University campus and the role of domesticated (e.g., dogs and cats) versus wild animals on scavenging rates.

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Figure 1. Cumulative results of scavenging rates comparing windowed sites and windowless walls at locations 0 and 10 m from buildings. Scavenging rates were faster at windowed sites 0 m from the building compared to the other three locations.

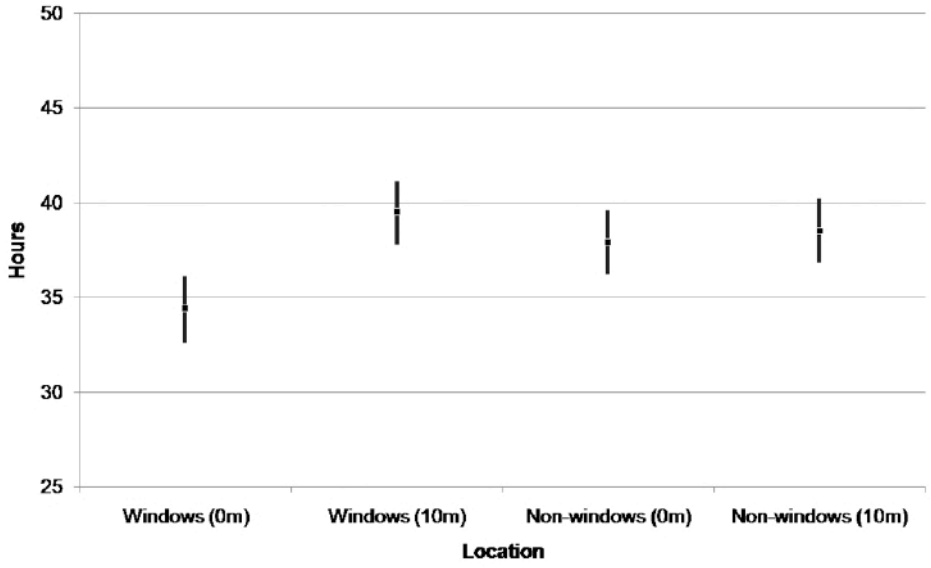

Figure 2. Cumulative results of scavenging rates by season. Scavenging rates were generally faster in the spring and summer months compared to the fall and winter months.

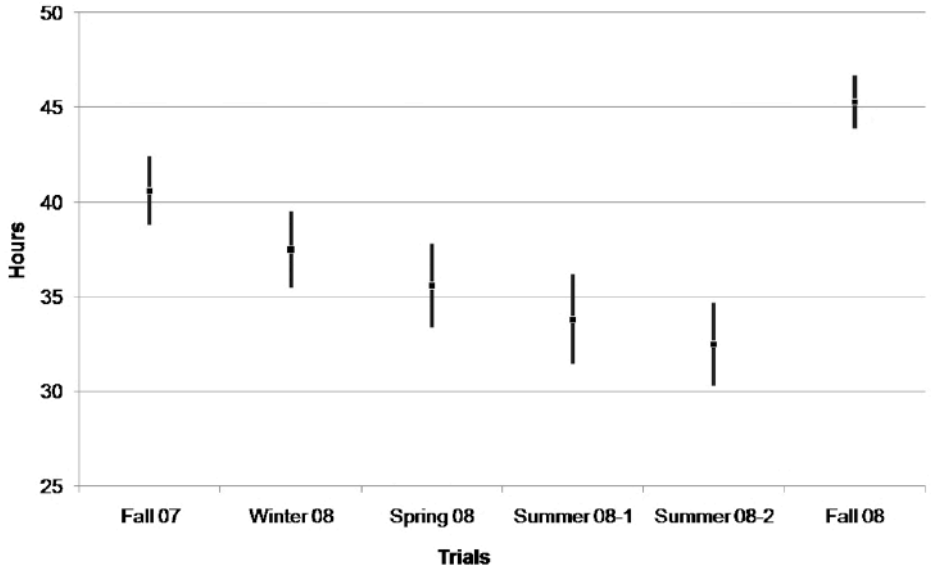

Figure 3. In Fall 2007 and Winter 2008 (shown), scavenging rates were faster at windowed sites 0 m from the building compared to locations 0 and 10 m from windowless walls.

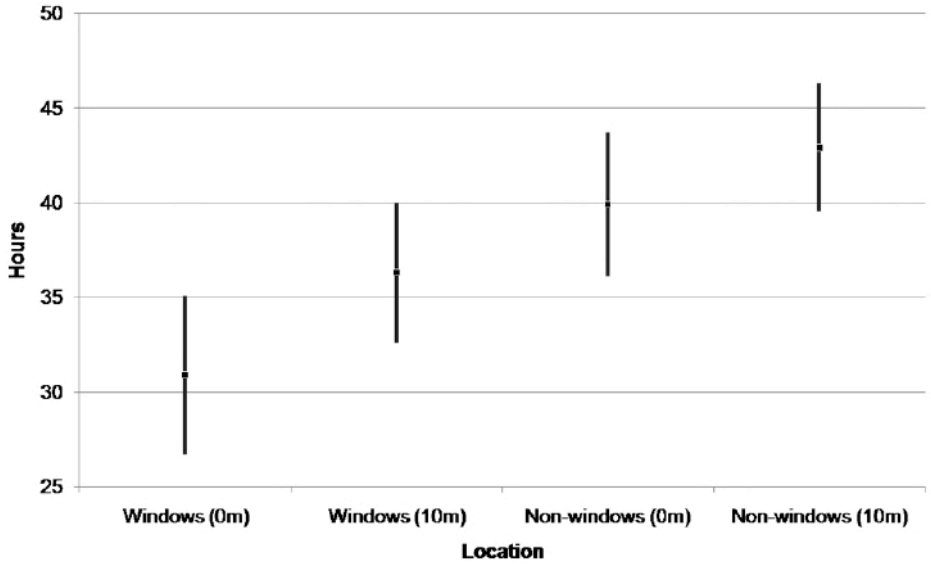

Figure 4. In Spring and Summer 2008 (May 20-June 30 shown), no differences in scavenging rates were found between windowed and windowless-wall sites.