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Bird Abundance at Feeders Increases with Decreasing Distance to Cover

David Joseph Horn, Mahubah Abdallah, Meredith K. Bastian, Jessi R. DeMartini, and Robert M. Wilhelmi
Division of Natural and Mathematics Sciences
Aurora University
Aurora, Illinois 60506

ABSTRACT

When given a choice, birds should choose to visit food sources closest to cover in order to reduce the probability of predation. We examined the effects of distance to nearest cover on bird abundance at feeders. The study was conducted at four suburban residences in and around Aurora, Illinois during the winter of 2002. At each residence, four birdfeeders were placed 0.0, 2.5, 5.0, and 7.5 m, respectively from the nearest tree. We monitored bird attendance at these feeders. Eight species were more abundant at feeders closest to cover: Mourning Dove (*Zenaida macroura*), Black-capped Chickadee (*Poecile atricapilla*), Northern Cardinal (*Cardinalis cardinalis*), White-throated Sparrow (*Zonotrichia albicollis*), Dark-eyed Junco (*Junco hyemalis*), Red-winged Blackbird (*Agelaius phoeniceus*), House Finch (*Carpodacus mexicanus*), and House Sparrow (*Passer domesticus*). Distance to cover had no effect on abundance of American Crow (*Corvus brachyrhynchos*) and European Starling (*Sturnus vulgaris*). Birdfeeders placed closer to cover will have more birds than feeders farther away when birds are given a choice.

INTRODUCTION

The positioning of vegetative cover influences the feeding behavior of birds (Schneider 1984, Slotow and Rothstein 1995, Slotow and Paxinos 1997). Specifically, birds should choose to feed in locations closest to cover in order to decrease the risk of predation, reduce energy costs associated with flight, and potentially minimize exposure in severe weather (Grubb and Greenwald 1982, Lima 1985, Todd and Cowie 1990). However, our understanding of how the location of cover influences seed consumption by birds that use feeders in suburban neighborhoods is not well known. In North Cardiff, Wales, Cowie and Simons (1991) found that the amount of seed consumed at feeding stations adjacent to hedgerow cover was approximately double that of feeders 7.5 m away.

We performed a study similar to Cowie and Simon's (1991) study in order to examine the effect of distance to the nearest cover on the abundance of birds that use feeders in suburban Illinois. We predicted that when offering seed at various distances to the nearest tree or shrub, bird abundance would decrease as distance to cover increases. Results from this study can be used to make informed decisions about where to place birdfeeders to increase their usage by specific bird species.

METHODS

The study was conducted at four residences in the cities of Aurora, Batavia, and Geneva in Kane County, and Rochelle in DeKalb County, Illinois. At each residence, four platform feeders or silo feeders were placed at distances 0.0, 2.5, 5.0, and 7.5 m away from the nearest cover (i.e., the farthest point a branch of a small tree extended; Cowie and Simons 1991). To minimize the effect position of the house has on bird abundance at feeders, at three residences, feeders were placed parallel to and at least 7.5 m away from the house (Cowie and Simons, 1991). At the fourth location, there were no buildings for approximately 50 m. Feeders were placed adjacent to a tree in an athletic field.

The silo feeder used was the Hyde Super Silo feeder mounted on a 1.8 m Hyde pole (Horn 1999). The feeder was hexagonal-shaped and contained nine feeding ports. Below the feeder was a circular aluminum tray that allowed larger birds to perch, and caught seeds that had fallen from the ports. The platform feeder was made by Woodcraft, and measured 0.60 m long by 0.45 m wide with legs 0.15 m high. Prior to the start of the study, two residences were randomly assigned to begin the study with four silo feeders, while the other two residences began with four platform feeders. After four weeks, residences with silo feeders received platform feeders, and vice versa. Different feeder types have different abundances of birds (Horn 1995); hence, having two types of feeders allowed us to increase the types of birds present. Feeders were filled with black-oil sunflower seed, a preferred seed of birds that use feeders (Geis 1980), and filled prior to monitoring.

Feeders were monitored during an eight-week period from January 21 - March 17, 2002. Four 90-minute monitoring sessions took place at each residence each week. With few exceptions, two of the weekly monitoring sessions began no earlier than sunrise, and ended no later than three hours after sunrise. The remaining two weekly monitoring sessions took place anytime from 3 hours after sunrise to sunset. An early and late monitoring session could take place on the same day, but two consecutive early or late monitoring sessions on the same day were not permitted. During each monitoring session, we recorded the maximum number of individuals of each species we could account for at each feeder or on the ground within 1 m of the feeder (e.g., if a Black-capped Chickadee was seen multiple times flying to and from a feeder 2.5 m away from cover it would be recorded as 1 chickadee unless the observer could simultaneously see >1 chickadee in the surrounding area using the feeder) (Horn 1999). If a mammal approached the feeders during the monitoring period it was chased away. We did not monitor the feeders for five minutes after chasing away the mammal, and five minutes were added on to the total monitoring time.

To determine if bird abundance differed at feeders 0.0, 2.5, 5.0, and 7.5 m away from the nearest cover, a slope of the total number of individuals of all species combined, total number of species, and abundance of individual species was calculated from the four feeders during each monitoring session. Ninety-five percent confidence intervals of the slopes were then calculated using the slopes from all monitoring sessions from all four residences combined (n=126 slopes used to calculate confidence intervals; the total number of monitoring sessions [slopes] should have been 128, however, two monitoring ses-

sions were removed from analysis because they were considerably longer than 90 minutes). We used Microsoft Excel 2000 to determine slopes and confidence intervals. If the 95% confidence intervals of the slopes did not overlap with 0, we considered bird abundance to differ at feeders 0.0, 2.5, 5.0, and 7.5 m away from the nearest cover. In an attempt not to subscribe significance to spurious results, only the 10 most common species were used in the analysis.

RESULTS

We made 2,492 observations of 20 species. The ten most common species in decreasing order of abundance were: House Finch (*Carpodacus mexicanus*), House Sparrow, Northern Cardinal (*Cardinalis cardinalis*), Black-capped Chickadee (*Poecile atricapilla*), Red-winged Blackbird (*Agelaius phoeniceus*), Dark-eyed Junco (*Junco hyemalis*), European Starling (*Sturnus vulgaris*), Mourning Dove (*Zenaida macroura*), American Crow (*Corvus brachyrhynchos*), and White-throated Sparrow (*Zonotrichia albicollis*).

Total number of individuals of all species combined, and total number of species, increased at feeders as distance to the nearest cover decreased (Figs. 1 and 2, Table 1). Of the 10 most common bird species observed, the abundance at feeders of eight species decreased with increasing distance from cover: Mourning Dove, Black-capped Chickadee, Northern Cardinal, White-throated Sparrow, Dark-eyed Junco, Red-winged Blackbird, House Finch, and House Sparrow (Table 1). The abundance of two species was not influenced by distance to nearest cover: American Crow and European Starling.

DISCUSSION

As distance to nearest cover increased, total number of individuals of all bird species combined, total number of species, and the abundance of eight species decreased at feeders. These results are similar to the findings of Cowie and Simons (1991) who found a near doubling of seed consumption at feeders 0.0 m away from hedgerow cover compared to 7.5 m away. Individual species such as Blue Tit, *Parus caeruleus*, and House Sparrow, *Passer domesticus*, were observed more often at feeders closer to cover, while Greenfinches, *Carduelis chloris*, used feeders at all distances from cover. Furthermore, Cowie and Simons (1991) found that when birds were using the feeder 7.5 m away, the proportion of time spent being vigilant at feeders was greater compared to feeders closer to cover.

In our study, the abundance of two species was not influenced by distance to cover: American Crow and European Starling. These species are aggressive, large-bodied, and were frequently found in large flocks. Presumably they are less susceptible to predation because of the combination of their larger body size and tendency to form flocks (Page and Whitacre 1975, Siegfried and Underhill 1975, Howe 1979). Therefore, they may be less likely to make foraging decisions based on distance of a food source to cover. For example, individuals found in large flocks may be less susceptible to predation as a result of increased predator detection by the flock as a whole (Siegfried and Underhill 1975), and decreased probability of any given individual being killed (Page and Whitacre 1975).

Birdfeeders placed closer to cover may have a higher abundance of birds as a result of a decreased probability of predation, lower energy costs associated with flight, and potentially reduced exposure in severe weather. Lima (1985) examined whether the frequency at which Black-capped Chickadees remained at feeders to consume seeds was equal at distances 2 – 18 m from cover, and how predation risk influenced the choice of whether to stay. He found that as distance from a birdfeeder to cover increased, the proportion of Black-capped Chickadees carrying seeds to cover decreased. This finding is most likely due to the increased energy costs of flight, and a lowering of foraging efficiency, if the bird was to fly back and forth from a feeder far from cover. In our study, birds would presumably use less energy by flying to the feeder 0.0 m away from cover compared to 7.5 m away. Lima also found that increasing the predation risk associated with feeding influenced the bird's choice of whether to stay at a feeder or fly to cover. When a simulated predator was present, chickadees at feeders farthest from cover flew to cover more often than when predation risk was low. In our case, birds may have selected feeders closer to cover to reduce the time required for escape.

In addition to reducing predation risk, and lowering energy costs, birds may use feeders placed closer to cover to reduce their exposure to severe weather. Grubb and Greenwald (1982) examined how the choice of feeding location by House Sparrows was influenced by distance to a brush pile and its microclimate (i.e., wind and solar radiation). House Sparrows were more likely to feed closer to the brush pile when microclimate was similar at both locations, but fed at locations farther from the brush pile when microclimate of the farther food source was more favorable (i.e., lower wind velocity and greater solar radiation) to that of the nearer location. In our study, feeders placed closer to cover may have been more protected from the wind than feeders farther away.

There are a number of uncontrolled factors in this study that had the potential to influence our results. First, the cover from which feeders were placed was not of the same tree species. Birds may react differently to different types of trees as cover. The surrounding landscape around a residence varied. In Iowa, Horn et al. (2002) found that the occurrence of 22 of 23 bird species was influenced by the habitat (i.e., suburbs, town, farm, and timber) surrounding the yard. Finally, this study focused on suburban birds. Birds in other habitats, such as prairies, may not respond to a small tree or shrub in the same way as suburban birds when making decisions about feeding location.

In 2001, over 40 million Americans over the age of 16 watched birds around their homes and spent more than 2 billion dollars on birdseed (U.S. Fish and Wildlife Service 2002). The public's interest in bird feeding has resulted in increased scientific research on the subject including studies on the use of feeder surveys to determine population trends (Wells et al. 1998), irruptive migrations of finches (Hochachka et al. 1999), extent to which birds use feeders to meet daily energy requirements (Geis and Pomeroy 1993), how feeders impact overwinter survival (Brittingham and Temple 1988), spread of emerging diseases such as Mycoplasmal conjunctivitis and population-level effects on avian hosts (Hochachka and Dhondt 2000), and individual variation in use of feeders (Wilson 2001). Comparatively little research has examined the effects of birdfeeder position on the abundance of birds (although see Cowie and Simons 1991, and Dunn and Hussell 1991). Results from this study can be used to make informed decisions about where to place birdfeeders to enhance use. Specifically, birdfeeders placed closer to trees

or shrubs will have more birds than feeders farther away from cover when birds are given a choice of where to feed. Results from this study, however, may only be representative of feeding patterns when multiple feeders are present in a yard. Future studies should examine whether a single feeder when placed at different distances from cover receives the same number of visits at all distances.

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Table 1. Mean and 95% confidence limits, and slope and 95% confidence limits, of the total number of individuals of all species combined, total number of species, and 10 most common bird species observed per monitoring session at feeders 0.0, 2.5, 5.0, and 7.5 m away from the nearest cover at four residences in and around Aurora, Illinois during the winter of 2002.

	Feeder 0.0 m away			Feeder 2.5 m away			Feeder 5.0 m away			Feeder 7.5 m away			Slope		
Species	UCL[A]	Mean	LCL[B]	UCL	Mean	LCL	UCL	Mean	LCL	UCL	Mean	LCL	UCL	Mean	LCL
Total number of individuals	9.3	7.5	5.7	6.6	5.3	4.1	5.1	4.1	3.1	3.6	2.9	2.1	-0.7	-1.0	-1.4
Total number of species	2.4	1.9	1.5	1.9	1.6	1.2	1.6	1.3	1.0	1.3	1.0	0.8	-1.6	-2.1	-2.5
Mourning Dove	0.3	0.2	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	-0.6	-2.0	-3.3
American Crow	0.2	0.1	0.0	0.2	0.1	0.0	0.1	0.1	0.0	0.2	0.1	0.0	0.2	-1.0	-2.3
Black-capped Chickadee	0.8	0.6	0.4	0.5	0.4	0.2	0.3	0.2	0.1	0.3	0.2	0.1	-1.2	-1.9	-2.6
European Starling	0.3	0.1	0.0	0.3	0.2	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.6	-0.8	-2.1
Northern Cardinal	1.8	1.4	1.0	1.3	1.0	0.6	1.0	0.7	0.5	0.8	0.6	0.4	-1.5	-2.0	-2.6
White-throated Sparrow	0.3	0.2	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	-1.8	-2.6	-3.5
Dark-eyed Junco	0.4	0.3	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	-1.8	-2.8	-3.7
Red-winged Blackbird	0.4	0.2	0.0	0.3	0.2	0.0	0.2	0.1	0.0	0.0	0.0	0.0	-0.8	-2.6	-4.3
House Finch	3.4	2.8	2.2	2.9	2.4	1.9	2.8	2.2	1.6	1.8	1.4	1.0	-0.8	-2.6	-4.3
House Sparrow	3.0	2.5	2.0	2.3	1.8	1.4	2.1	1.6	1.1	1.4	1.1	0.7	-0.5	-0.9	-1.2

[A] 95% upper confidence limit; n = 126 monitoring sessions.

[B] 95% lower confidence limit.

Figure 1. Mean and 95% confidence intervals of the total number of individuals of all bird species combined observed per monitoring session at feeders 0.0, 2.5, 5.0, and 7.5 m away from the nearest cover at four residences in and around Aurora, Illinois during the winter of 2002.

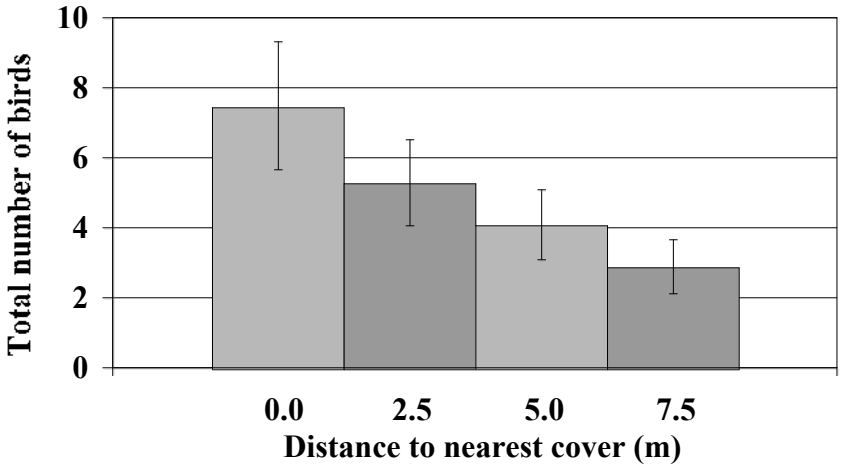

Figure 2. Mean and 95% confidence intervals of the total number of bird species observed per monitoring session at feeders 0.0, 2.5, 5.0, and 7.5 m away from the nearest cover at four residences in and around Aurora, Illinois during the winter of 2002.