



DIET DIFFERENTIATION AND HABITAT SELECTION OF BIRDS IN
FORESTED AND CLEAR-CUT AREAS

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INTRODUCTION

Habitat availability is probably the most important ecological variable that influences population size. Population size also depends on the availability of food, the variable climate, and the interactions among other factors in the environment like human interactions, activities and diseases. “Food supply, which often depends on climatic conditions, limits population growth and influences population size as well” (Lack 1954; Newton 1980). Resources, such as food and nest sites, determine how many species can co-exist in the same habitat. Competition¹ and resource availability both play major roles in the formation of communities. One essential mechanism that species have developed in order to decrease competition is their own ecological niche² (Grinnell, 1917). “Habitat disturbance, fluctuating resources, colonization, and local extinctions impose short-term changes on avian communities” (Gill, 1994).

Physical structures of habitats provide the options of nesting sites, protection, shelter, and food. Therefore, different species of birds are adapted to eat different things. Key characteristics include their bill structures. Species go through ecological adaptations³ that help satisfy specific environmental demands. The potential diet of a species is prescribed by the size, shape, and strength of their bills (Gill 1994).

¹ Competition-two or more species overlapping for resources that are short in supply

² Ecological niche-the specific requirements of each species

³ Ecological adaptations- any morphological, physiological or behavioral character that enhances survival and reproductive success of an organism.

The following study was conducted to determine habitat selection, feeding preference, and differences of distance to cover for different birds at Finzel Swamp. At the sites, platforms were placed in different habitat types (forest vs. clear-cut) to compare population sizes in the two sites. Furthermore, different seed types were utilized to test for dietary preferences that best fit the species bill type. Finally, certain birds prefer different levels of cover because it provides protection. Distance to cover in height was also observed in the study for comparison.

It was hypothesized that there should not be a preference shown by the different types of birds in relation to selection of habitat, seed type, and distance to cover. However, there was always the possibility that the birds would show a preference for a particular habitat, seed, and height.

METHODS

This experiment was conducted at Finzel, Maryland. Finzel swamp is a natural preserve. The two sites studied were a forested area and a clear-cut area. The forested area consisted of tall trees. The clear-cut area consisted of an open field composed of mainly grasses.

Feeding platforms were constructed to attract the birds. First, a hole two feet deep was dug; a main pole (4x4x8) was placed in the cavity upright. Next, platforms (three feet long and eight inches wide) were attached to the pole at 0 ft., 3 ft., and 6 ft., from the ground. Bowls (four inches in diameter), placed four inches from either side of the platform, held two different seed types. The bowls on the left side of the feeder were filled with sunflower seed, while the bowls on the right side of the feeder were filled with finch seed.

The times of observation at the site were conducted during the morning for one hour for a total of ten days. There were two groups that alternated every other day between the sites. Observations took place 30 ft. away from the feeder utilizing binoculars. Birds were only recorded if they actually fed from the feeder. The data were recorded in field books and then transcribed into an Excel file. For statistical analysis, Chi-Square tests were used because the data were counts of frequencies and distributions. Minitab (computer software) was used to run the analysis.

RESULTS

The total number of bird occurrences at the feeders was 324. There were twelve species of birds sighted at the feeder. There were 217 occurrences at the forested area and 107 occurrences at the clear-cut area. Significant differences were found in the total number of occurrences of birds in the clear-cut and forested area. Overall, birds preferred the forested area more than the clear-cut area ($X^2 = 132.868$, $df=9$, $P < 0.05$) (Fig. 1).

Significant differences were found in the preference for seed type. Overall, birds showed a preference for sunflower seeds ($X^2 = 16.16$, $df=1$, $p < 0.05$). (Fig. 2). The Black-Capped Chickadee and American Goldfinch both showed a preference for sunflower seeds ($X^2 = 10.3$, $df = 4$, $P < 0.05$), ($X^2 = .524$, $df = 1$, $P < 0.05$), respectively. The Tufted Titmouse and Blue Jay only visited the finch seeds once and the sunflower seeds twelve times. On the other hand, the Field Sparrow showed a preference for finch seeds ($X^2 = .248$, $df = 1$, $P < 0.05$). (Fig. 2).

Statistical analysis showed that there were significant differences in the preference of height levels on which the birds fed ($X^2 = 7.409$, $df = 2$, $P < 0.05$). (Fig. 3). The Black-Capped Chickadee and American Goldfinch showed a preference for the six-

foot level ($X^2 = 2.186$, $df = 1$, $p < 0.05$), ($X^2 = 0.848$, $df = 1$, $p < 0.05$), respectively. The Blue Jay did not produce enough data to run a statistical test, but visited the six-foot platform twelve times out of thirteen. The majority of the birds followed this trend with the exception of the Field Sparrow, which fed on the zero-foot platform more often than any of the other platforms. (Fig. 3)

Several interactions were observed during this study. A Tufted Titmouse was going to feed at the sunflower seed on the three-foot platform, but chose the finch instead because a chipmunk was present. A Blue Jay was eating at the six feet platform when a chipmunk approached and caused it to fly away. A chipmunk also caused another Blue Jay at six feet, a Black Capped Chickadee at six feet, and a Field Sparrow at zero foot to fly away from the feeder. A Blue Jay scared a Field Sparrow from the six feet platform. An American Goldfinch and a Black Capped Chickadee were feeding at sunflower seeds on the six feet platform at the same time. A White Breasted Nuthatch saw a Blue Jay feeding at the six-foot platform and chose to feed at the three-foot platform.

DISCUSSION AND CONCLUSION

The results of the study have shown that there were more abundant occurrences in the forested area than the clear-cut area. The sunflower seed had more abundant visits than the finch seed, and the 6ft. platform was the most preferred over the 3ft. and 0ft. platforms. Significant differences were found among the variables above.

Different species of birds have adapted to their environment over time; therefore, many adaptations could play a part. Smaller birds, such as the Black-Capped Chickadees, American Goldfinch, and Tufted Titmouse were more abundant in the forested area. The forest canopy and forestry around the feeder protected them from

predation. Camouflage helps the birds blend into the environment surrounding them.

Therefore, the birds, such as the Field Sparrow, which is brown in color, can blend into the grassy ground.

The number of birds in the covered area was higher as opposed to the number of birds in the clear-cut area (Fig. 1). The majority of the birds seen at the feeder in the covered area is small, so the birds would need to seek cover quickly probably due to their vulnerability to predation. There are several reasons that explain why the covered area had more birds than the clear-cut. The covered area provides a source of nesting, food resources, and protection. The covered area has a shorter distance to cover, which is very important. The birds are less exposed to predation and have a much better chance of survival.

Over half of the birds chose to feed on sunflower seeds rather than the finch seeds (Fig. 2). These birds have a bill types that are stronger and wider than other birds. This bill type is adapted for cracking seeds; therefore they would choose the sunflower seeds because of that particular adaptation. These birds can spend the extra moment cracking the seeds to obtain a higher energy level from it. The birds that preferred finch seed include the Field Sparrow, House Finch, and Chipping Sparrow. These birds have smaller bill types adapted for smaller seeds and would have a harder time cracking seeds. The diet of birds relies mainly on the adaptation of the birds to feed.

A significant difference was found between the three height levels. The six-foot level was the most common because it is a shorter distance to cover in the forested area and more birds were seen there. The birds that have a preference for the six-foot level include: Black-Capped Chickadees, American Goldfinches, Blue Jay, and White

Breasted Nuthatch. One factor that influences this choice is the fact that all but one of these birds are small and need to take cover quickly. The fastest way to take cover is be closest to it. The next most visited platform was at three feet, but there were no birds that visited it more than the other two platforms. The zero-foot platform was visited the least. The Field Sparrow is the only bird that visited the zero-foot platform more than the others. The reason for this could be because Field Sparrows are brownish in color and would therefore camouflage with the ground. The remaining birds seemed to have no preference to one particular platform. The Tufted Titmouse, House Finch, and Chipping Sparrow stayed between the six-foot and three-foot platforms evenly. Cover is extremely important to the strategies a bird uses to feed. Small birds can fly to the feeder, take a seed, and fly to the nearest cover area quickly to avoid much exposure to predation and competition.

Interactions were observed between birds and between birds and chipmunks. The chipmunks always seemed to dominate. Any of the birds observed would almost always fly away when a chipmunk approached the feeder. In days when few birds were seen, many chipmunks were present at the feeder. During interactions between birds, body size seemed to play an important role. When the Blue Jay, a larger bird, approached the feeder, the White Breasted Nuthatch, Field Sparrow, and American Goldfinch were all seen flying away. On the other hand, two birds with the same body size did not seem to be threatened by each other. A Black-Capped Chickadee was seen eating at the same feeder with an American Goldfinch. The most remarkable observation was that of the Tufted Titmouse. When the Tufted Titmouse landed on the sunflower seed and saw a

chipmunk, it went to the finch seed. As a result of ecological adaptations, the Tufted Titmouse used other resources to find food.

As with every experiment, this one had complications. The main one was that of the placement of the feeder in the clear-cut area. When it was first placed there it was put too far out from the covered area. During the summer, birds can find food rather easily, so it would be too dangerous to fly the distance to the feeder (50 ft. from cover). After the mistake was realized, the feeder was moved to about 20 ft. from the covered area but still in an open field. Another error was counting birds more than once. Since there was no way of knowing if the bird flew away and came back or if it was a different bird, the groups counted visits instead of birds. Limitations that were encountered were times of data collecting and weather. Because of the short amount of time available, data was collected nearly everyday and at different times in the morning. Whenever the weather was poor, birds were not seen, so the weather had a significant affect on the number of visits recorded for that day. The errors may have been limiting, but they were easily overcome. This study poses new questions; such as if there were fewer chipmunks in the area would that have affected the data. This study could be investigated further to find out more accurate results and statistical analysis.

Despite a growing conservation ethic, expanding human population continues to threaten native bird populations. The threats range from exploitation by hunting, to habitat loss or degradation, to poisoning of food supplies with pesticides and other chemical contaminants. Also, there is the threat by a steady annual death rate due to road kills, window strikes, and the predation of pets. “Human activities are directly responsible for about 270 million bird deaths every year in the continental United States”

(Gill 1994). These attritions add to the primary losses due to destruction of breeding habitats and interferences with reproduction.

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