

Bird's Reliance on Bird Feeders During the Winter at Purchase College

by
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ABSTRACT

As we continue to interact with the natural world, we continue to learn more about how our actions are impacting our environment and the other species' around us. People have been feeding birds for nearly two centuries, yet a lot is still unknown about this relationship and the impacts it has. Human interference in the environment can have negative impacts, but we also have the ability to really help the ecosystems around us. Every year, birds in North America fly south for the winter in order to survive the colder months and then return in the spring, while other birds stay for the winter. In this study, I observed bird frequency at bird feeders during the winter to see the relationship birds have with feeders at varying temperatures and weather conditions. Results of this study showed that while temperature variation had very little impacts on the amount of birds at bird feeders, birds were far more likely to be at the feeders on days of snow than on cloudy or sunny days. From this research, I believe bird feeders are beneficial to birds at least during the winter months, and that more research should be done in order to get a better idea of these implications.

INTRODUCTION

Earth's environment has been impacted significantly and rapidly due to human activity over the past 50 years (MA, 2005). This idea that human activity has been disrupting the planet's ecosystems during this Geological Time Scale is referred to as the Anthropocene (Hamilton, 2019). Prior to this, Earth's environment has been stable for 12,000 years since the last ice age. This Geological Time Scale of Earth's stable environment is referred to as the Holocene (Carrington, 2016). As we realize our own ability to disrupt the planets ecosystems on a small and large scale, the kinds of questions we are starting to ask about human impact and the

environment are changing. There has been an increase in values shifting towards nature and wildlife, which is hoped to be a solution towards biodiversity and a better understanding of our relationship with other species' (Manfredo, 2015). Anthropogenic change can be extremely challenging for many species. The intensity of these changes puts stress and pressure on wildlife forcing them to change their behavior in order to survive (Garces, 2019). This is why it is so important for us to understand the impacts of everything humans are doing to our environment and its wildlife.

One prominent interspecies relationship humans have in our environment is our relationship with birds. People have been feeding birds for nearly two centuries, yet a lot is still unknown about this relationship and the impacts it has. The first ever commercially made bird feeder went on the market in 1926, and today more than 50 million North Americans put out over 1 billion pounds of bird seed each year (Greig, 2017). Bird feeders offer an alternative source of food to birds throughout all parts of the year. Every year, over 50 billion birds show some form of seasonal migration, while others stay for the colder months. In North America, over 350 species of birds migrate south in order to avoid geographical areas of low food availability, habitat, and climatic conditions (Gauthreaux, 2010). Not all birds make this yearly journey south, so this brings up the question: Do these birds that stay north rely on bird feeders during colder temperatures and harsher weather conditions?

This study investigates the relationship between birds and bird feeders during the winter in southern New York. I studied three species of native birds that remain on the Purchase College campus while others have migrated south. Northern Cardinals, Song Sparrows and White-Throated Sparrows all remain in the Westchester, New York area year-round (Sibley,

2014). I predict that on days where temperature is lower and weather is harsher, more birds will turn to utilizing bird feeders.

METHODS

Field Site. One site for this study was selected on the SUNY Purchase campus. Four hanging platform bird feeders were put at this site (Fig. 1) located behind the Dance Building and in front of The Commons apartments on campus (Fig, 2). The four feeders were placed around a tree and in-between two small wooded areas on either side. Three bird species were included and recorded in this study, Northern Cardinals (*Cardinalis cardinalis*), White-throated Sparrows (*Zonotrichia albicollis*) and Song Sparrows (*Melospiza melodia*). Bird feeders were filled with seed for a week prior to the start of observations in order for birds to be aware of this food source.



Figure 1. View of bird feeder set up behind the Dance Building on the Purchase College campus.

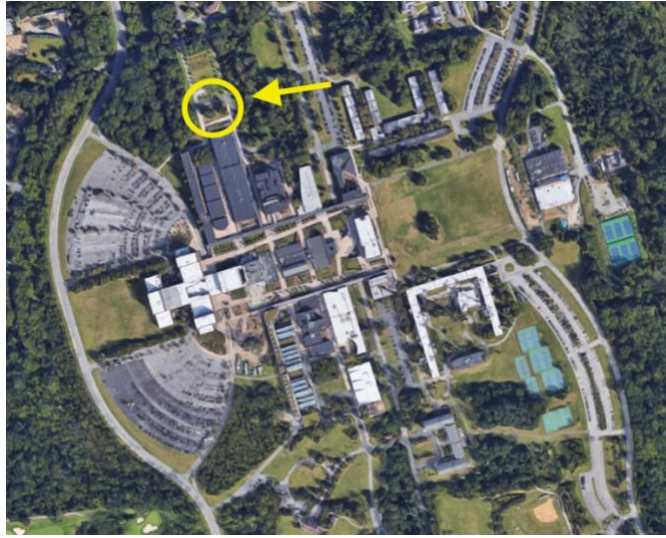


Figure 2. Satellite view of the observation site on the SUNY Purchase campus.

Procedure. Every day for 3 weeks, from February 18th to March 10th, bird activity at the study site was video recorded for the 30 minutes leading up to the sunset. A Go-Pro Hero4 was used and placed in one of the feeders to record the species and the number of birds at the feeder (Fig. 3). Three of the four feeders were taken away during these video recordings in order to get all the birds at the same feeder and on camera. The feeders were refilled with seeds once a day in order for there to be a steady supply over these 3 weeks. Temperature and weather conditions were also recorded each day at the start of each 30-minute time interval using the Weather app and written into a field journal. Statistical analyses were completed in R Studio using ANOVA and Linear Regression tests.



Figure 3. Still shot of Northern Cardinal and Song Sparrow at the bird feeder obtained from GoPro Hero4 footage.

RESULTS

The birds recorded in this study are Northern Cardinals (*Cardinalis cardinalis*), White-throated Sparrows (*Zonotrichia albicollis*) and Song Sparrows (*Melospiza melodia*). Varying weather conditions had the most impact on these bird's food source choice over these 21 days. In instances of snow, more birds were more likely to be seen using the feeders than on days when it was sunny or cloudy (Figures 4, 5 & 6). A one-way ANOVA showed that there was a difference in bird abundance between weather conditions ($F = 9.447$, $P = 0.00157$). A Tukey's Honest Significant Difference test was used to determine differences between pairs of groups. For snow-cloudy group ($p=0.0045$), for sunny-snow ($p = 0.0011$) and for sunny-cloudy ($p = 0.8469$). However, varying temperature had less of an impact on the bird's food source choice, with colder temperatures not always predicting the likelihood of birds at the feeders. (Figures 7 & 8). A linear regression showed there was a slight difference in bird abundance between temperature ($F = 0.872$, $P = 0.3621$).

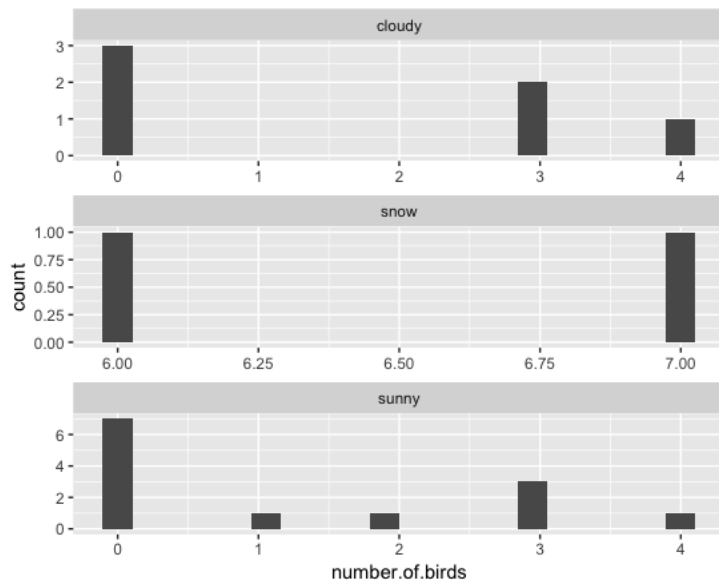


Figure 4. Histogram with facetwrap showing amount of times a number of birds were recorded at the bird feeders during cloudy, snow, or sunny days. Cloudy days received three days of 0 birds, two days of 3 birds, and one day of 4 birds. Days where it snowed received one day of 6 birds and one day of 7 birds. Sunny days received six days of 0 birds, one day of 1 bird, one day of 2 birds, three days of 3 birds, and one day of 4 birds.

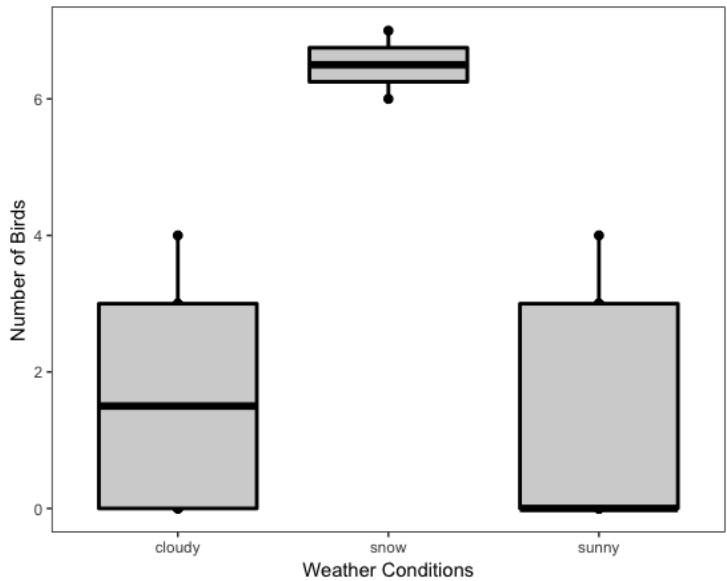


Figure 5. Boxplots showing maximum, minimum and median number of birds during three different kinds of weather conditions. Cloudy conditions had maximum of 4 birds, a minimum of 0 birds, and a median of 1.5 birds. Snow conditions had a maximum of 7 birds, a minimum of 6 birds, and a median of 6.5 birds. Sunny conditions had a maximum of 4 birds, a minimum of 0 birds, and a median of 0 birds.

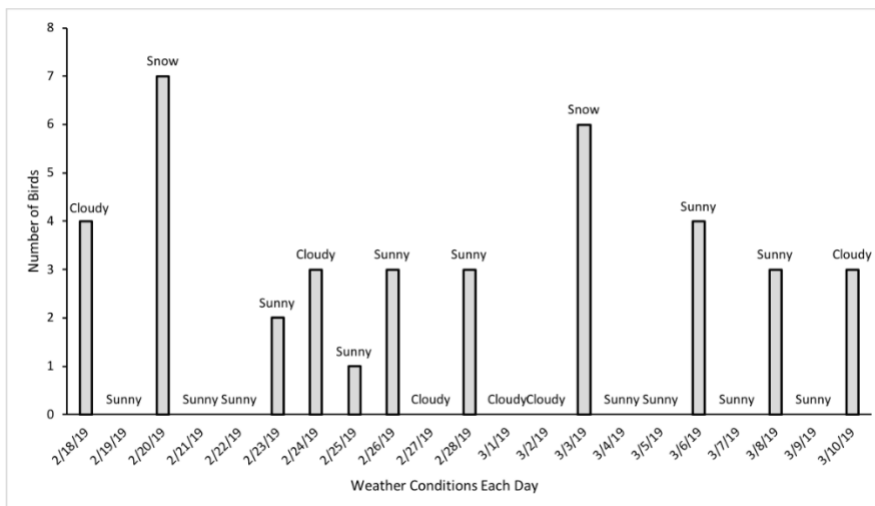


Figure 6. Histogram showing the number of birds on each day of observation during different weather conditions.

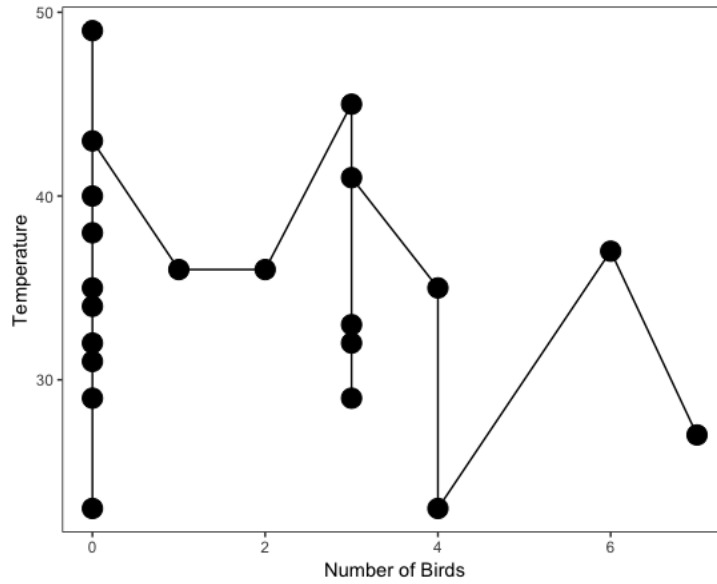


Figure 7. Correlation showing temperature in relation to how many birds were recorded at bird feeders each day. The graph shows that no birds were seen at the feeders between temperatures of 20- and 50-degrees Fahrenheit, but more birds tended to be at the feeders on days of lower temperatures.

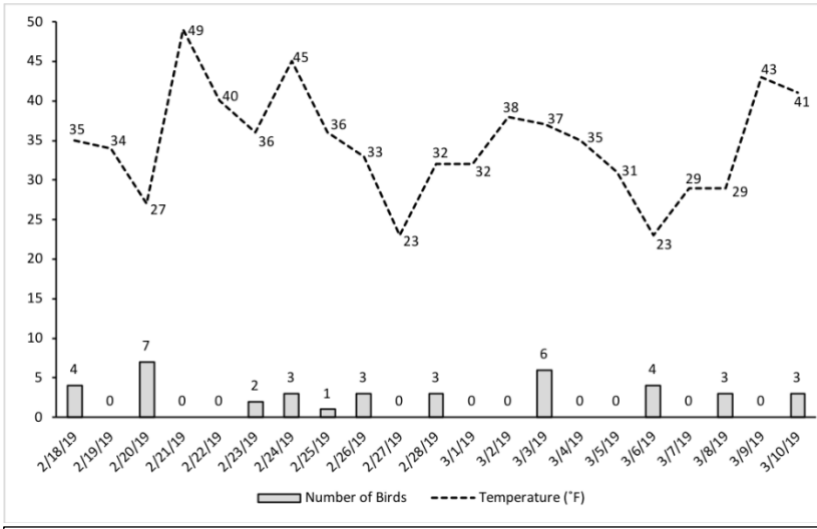


Figure 8. Scatterplot and histogram combo showing number of birds on each day and the temperature of each day.

DISCUSSION

My results showed that the birds on campus did rely on the bird feeders for food during harsher weather conditions. Birds were far more likely to be at the feeder in instances of snow, compared to instances of sunny or cloudy weather (Figures 4, 5 & 6). However, variation in temperature had little to no impact on the amount of birds seen at the feeders during this observation (Figures 7 & 8). Lower temperatures didn't limit bird's natural sources of food the way harsher weather conditions did. This observation was only a beginning step in our understanding of the relationship between birds and feeders, and doesn't answer a much more important question: Are birds benefiting or being harmed by relying on us to feed them?

While I believe the feeders in this observation were beneficial to the birds over the winter, this study was not able to look at the whole picture of how birds rely on bird feeders. Some studies suggest that feeding birds in the winter increases their chance of survival (Wilson, 2013). While other studies suggest that the feeders have no impact on bird's survival (Harrison, 2007). In future studies, it would be better if the observation was conducted over a longer period of time than 3 weeks. If done over a longer time frame you could get a better idea of this relationship as the season continues to change year-round, since this study was only able to look at birds that are in the North-Eastern United States during the winter. It would also be better if cameras were placed to record the feeder from outside of it, instead of recording from inside the feeder itself. If positioned to record from outside the feeder, you would be able to include birds who are picking up fallen seeds off the ground in your data, not just the birds actually in the feeder.

CONCLUSION

Higher numbers of birds were recorded at the bird feeders on days of snow compared to cloudy and sunny days. However, varying temperature had less of an impact on the number of birds at the bird feeders over the course of this observation. This showed that birds did rely on the feeders over the winter, but not in the way I expected. In order to better examine this relationship, this study could be made better with longer time intervals and bigger sample sizes.

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