Bird Nesting Box Occupancy Based on Habitat Type

By: Samuel Beckett

Wittenberg University, Environmental Science Department

Introduction

- Cavity nesting birds are found throughout the state of Ohio.
- Species such as Eastern Bluebirds (*Sialia sialis*), House Wrens (*Troglodytes aedon*), Carolina Wrens (*Thryothorus ludovicianus*), and Tree Swallows (*Tachycineta bicolor*) all inhabit cavities in trees to build their nests.
- Competition over these cavities has made it so species such as Eastern Bluebirds do not have the cavities essential for the survival of the species.
- Researchers have used nesting boxes; in this study the X-box model was used. (http://www.nabluebirdsociety.org/)
- The average territories for these species ranged from territories of 15 ft to 300 ft depending on the species (citation).
- The habitat around the box is important as many of these birds prefer a specific habitat.
- For example Bluebirds prefer areas with open spaces such as pastures or open mowed grasslands with places to perch for food.
- I hypothesize that distance to trees is also a determining factor that birds use to pick a box.

Methods

- Boxes were checked weekly
- Check to see if there is a nest. If not close the box.
- If there is a nest the next step is identify the species, see if there are any eggs/hatchlings. (a useful guide can be found on the North American Bluebird Society website for nest identification which I used.)
- Species was identified by nest type and characteristics.
- In GIS I created a base map for both CB's place and CJ Brown Reservoir and added the boxes GPS coordinates to the map
- Then I added the territories of the three species of bird found in the boxes to compare them to the surrounding habitat.
- Buffer sizes were 300 ft for Wrens, 115 feet for Eastern Bluebirds, and 15 ft for Tree Swallows.
- After I clipped the habitat sizes to a "land use" layer that allowed me to see what kind of territory the successful boxes were in.
- Once those are in place add randomized points into the area(Figure 1 and 2).
- I then measured the distance in feet from the box to the nearest tree and recorded the results in excel
- I then ran a t-test for each sampling site
- Then I recorded nest to tree distance into box and whisker plots. (Figures 3&4)

Abstract

In this research I wanted to see what factors effected nesting box occupancy of cavity nesting birds at two sampling sites. I monitored boxes at CJ Brown reservoir and CB's place (a Wittenberg owned property). After identifying these boxes, the distance from the nearest tree was taken to see if that was a factor. The results show I should reject my hypothesis at CB's place. However they show I should not reject it at CJ Brown.

Figure 1. An ArcGIS map with the nest boxes locations, as well as land use and territories of the three bird species that use them at CJ Brown Reservoir.

Figure 2. An ArcGIS map with the nest boxes locations, as well as land use and territories of the three bird species that use them at CB's Place.

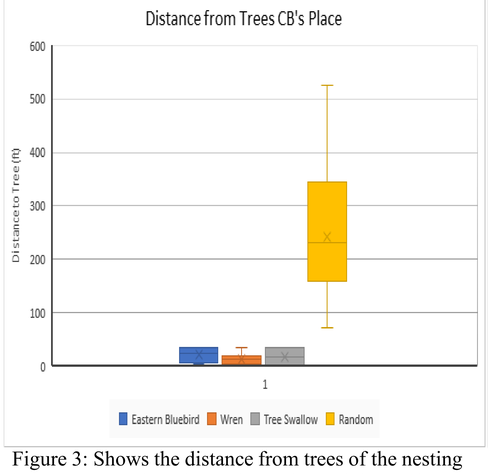

Figure 3: Shows the distance from trees of the nesting boxes at CB's place for each species and the random variables.

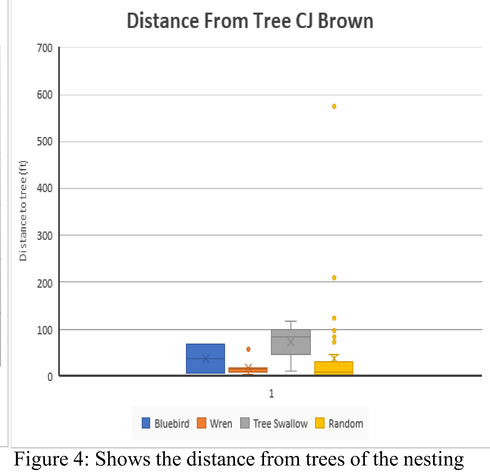

Figure 4: Shows the distance from trees of the nesting boxes at CJ Brown for each species and the random variables.

Acknowledgements

- Dr. Elizabeth Schultz
- Dr. John Ritter
- Wittenberg ESCI department

Results and Discussion

- At CJ Brown reservoir my results showed that I should not reject my hypothesis.
- The distance from trees was a factor in the three bird species decision to nest in the boxes.
- At CB's place my results showed that I should reject my hypothesis, tree distance may not be a factor in the decision to nest in a box.
- My results for each site may not line up but I believe that further research could provide answers.
- In another experiment I would want to get a count of natural cavities at each site and compare how the lined up if the sites were closer in size.
- Tree swallows were far more abundant at CJ Brown where they had an average nest to tree distance of 73.7 feet, while at CB's they only had an average of 35 feet.
- This may mean they need more space between cavity and tree than CB's place can offer them.
- The other two species (wrens and Bluebirds) had similar averages at both sites.
- Bluebirds had an average of 37.3 feet at CJ Brown and an average of 21.5 feet at CB's. There were 4 nests at CJ Brown and 3 at CB's.
- Wrens had an average of 17.3 feet at CJ Brown and an average of 13.4 feet at CB's. There were 9 nests at CJ Brown and 7 at CB's.

Image 1: A Bluebird on top of a X-box model bird box.

References

•Monitoring Bluebird Nestboxes. North American Bluebird Society. 2012 Feb.

•Montague-Drake R, Lindenmayer D, Cunningham R. Factors affecting site occupancy by woodland bird species of conservation concern. Biological Conservation. 2009;142(12):2896–2903. doi:10.1016/j.biocon.2009.07.009

•Remacha C, Delgado JA. Spatial nest-box selection of cavity-nesting bird species in response to proximity to recreational infrastructures. Landscape and Urban Planning. 2009;93(1):46–53. doi:10.1016/j.landurbplan.2009.06.004

•Robillard A, Garant D, Bélisle M. The Swallow and the Sparrow: how agricultural intensification affects abundance, nest site selection and competitive interactions. Landscape Ecology. 2012;28(2):201–215. doi:10.1007/s10980-012-9828-y

•Roux DSL, Ikin K, Lindenmayer DB, Bistricer G, Manning AD, Gibbons P. Effects of entrance size, tree size and landscape context on nest box occupancy: Considerations for management and biodiversity offsets. Forest Ecology and Management. 2016;366:135–142. doi:10.1016/j.foreco.2016.02.017

•Vepsäläinen V, Pakkala T, Piha M, Tiainen J. The importance of breeding groups for territory occupancy in a declining population of a farmland passerine bird. Annales Zoologici Fennici. 2007;44(1):8–19.

•Willner GR, Gates JE, Devlin WJ. Nest Box Use by Cavity-nesting Birds. American Midland Naturalist. 1983;109(1):194. doi:10.2307/2425530