Lights Out Buckeyes – Landscape and Architectural Influences on Avian Window Collisions

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ABSTRACT

Window collisions due to both glass reflectivity and lights at night are the second leading cause of bird death in the United States (Klem 1990). Many efforts have begun across the country to more accurately assess the impact and provide rehabilitation for window strike victims that survive. Many of the fine scale factors leading to window collisions have not been fully determined. Using data collected by myself and fellow members of the Lights Out Buckeyes team (OSU's avian window strike monitoring team), these smaller scale factors were further explored. The Lights Out Buckeyes team seeks to better understand specific factors causing birds to collide with a given building. These factors include the amount of tree cover, percentage and area of glass on buildings, as well as location on campus. The Lights Out Buckeyes team monitors campus four times a week, covering the entirety of campus twice per week. Over the course of four semesters of recording, 445 window strikes have been documented on campus by the team, 339 of which have been fatal. Most of the collisions found are migratory species while traveling between wintering and breeding grounds. Assessing these landscape and architectural factors can not only allow us to focus efforts on mitigation for these buildings but can help us to predict the likelihood of a given building being problematic and requiring extra monitoring efforts.

Figure 1. This Nashville Warbler is just one of many fatal window collisions found during a given season during the Lights Out Buckeyes monitoring efforts. Photo: Tyler Ficker

INTRODUCTION

Problem: Window strikes are occurring all across campus but not consistently across all of the buildings on campus.

Objectives: To assess which landscape and architectural factors have the highest influence on location of window strikes.

Question 1: Does the landscape and design of the building relate to the number of strikes present?

Question 2: Do similarly designed buildings on different areas of campus experience similar amounts of collisions?

Prediction 1: The landscape and/or architectural design of campus buildings will influence the number of collisions.

Prediction 2: The location of similar buildings on different parts of campus will have a part in the frequency of collisions.

STUDY AREA

The predetermined monitoring routes covered Ohio State University's main campus area on the Columbus campus. Main campus, defined as Lane to 10th and the Olentangy River to High Street, has both a north and south route. Buildings chosen for the study include the top ten buildings with the most window strikes present as well as ten randomly selected buildings for comparison.

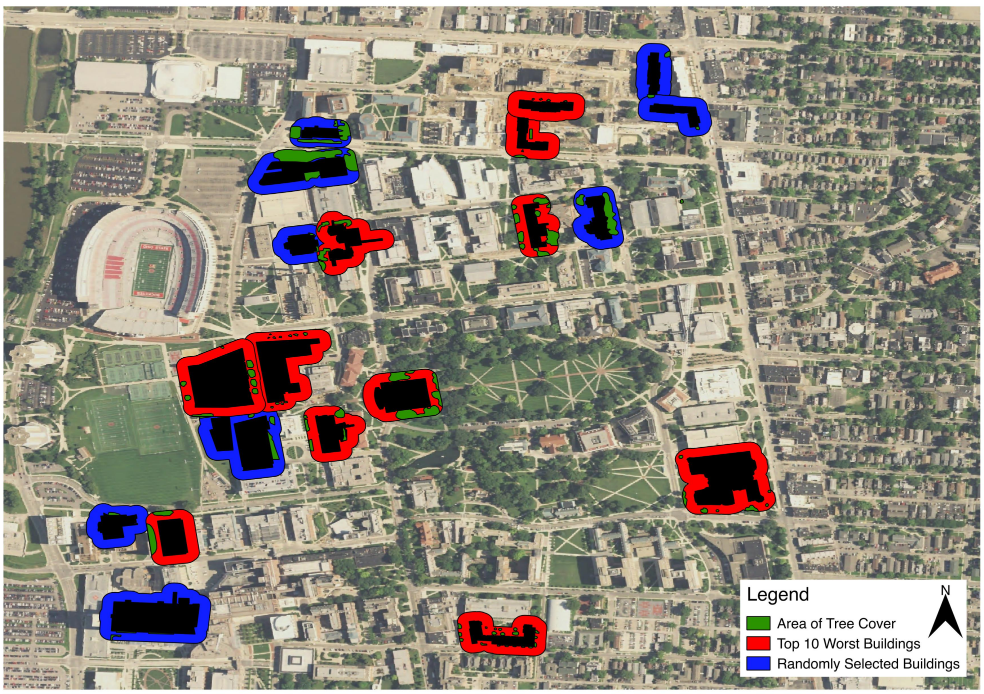

Figure 2. Map of Ohio State University main campus with selected problematic buildings in red, randomly selected buildings in blue, and tree cover within a 20 meter buffer of the building.

METHODS

Organized efforts of 4-6 volunteers monitored a predetermined route four days a week from the end of August through the first week of November and then again from the third week of March through May to look for window strikes. So far, the Lights Out Buckeyes team has searched for 160 hours, covering 257 miles and resulting in 606 effort hours. Tree cover near each building was determined by tracing satellite imagery in QGIS and measuring where it intersects within a 20m buffer area. Glass measurements were taking as visual estimates in percentages and converted to area using the building length as determined in QGIS. Models were run using Program R from the data for analysis.

RESULTS

As a result of the R table, the model including the area of campus and the area of glass on the building proved to be the best indicator for a building and window strikes. (Table 1). The central campus high-collision buildings had a much wider range of glass than any other category did. After testing the odds-ratio, it was found that every square foot of glass added increases the likelihood of a building being classified as a high-collision by 1.0007.

Model	K	logLik	AICc	delta	weight
Portion.of.Campus + Glass.Area	5	-38.52	**87.85**	0	0.95
Global Model	8	-37.91	**93.84**	5.992	0.047
Percent.Glass.Cover + Portion.of.Campus	5	-45.35	**101.51**	13.657	0.001
Portion.of.Campus + Building.Height	5	-45.53	**101.86**	14.011	0.001
Portion.of.Campus	4	-47.19	**102.91**	15.057	0.001
Portion.of.Campus + Percent.Tree.Cover	5	-47.06	**104.92**	17.071	0
Glass.Area + Building.Height	3	-52.21	**110.74**	22.883	0
Glass.Area	2	-53.75	**111.66**	23.803	0
Percent.Glass.Cover	2	-54.07	**112.29**	24.435	0
Null Model	1	-55.45	**112.95**	25.103	0
Glass.Area + Percent.Tree.Cover	3	-53.69	**113.7**	25.846	0
Percent.Glass.Cover + Building.Height	3	-53.84	**114**	26.144	0
Percent.Glass.Cover + Percent.Tree.Cover	3	-54.02	**114.35**	26.497	0
Building.Height	2	-55.38	**114.93**	27.073	0
Percent.Tree.Cover	2	-55.42	**115**	27.152	0

Table 1. AIC table as produced by R comparing the different models tested. The model with portion of campus and glass area showed to be the top model.

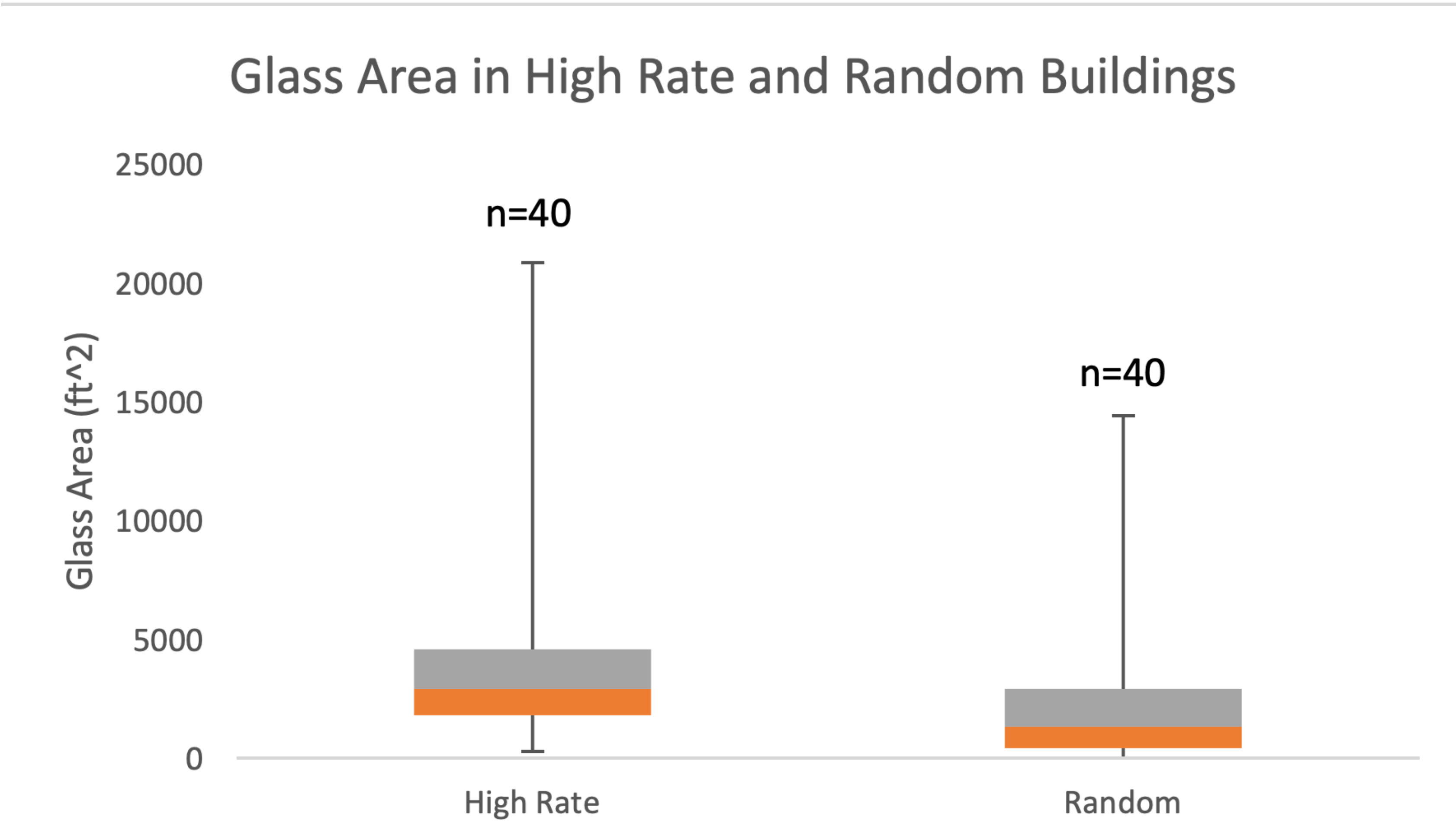

Figure 3. Box plot of the area of glass by category of building. Each sample size consisted of four walls from ten buildings.

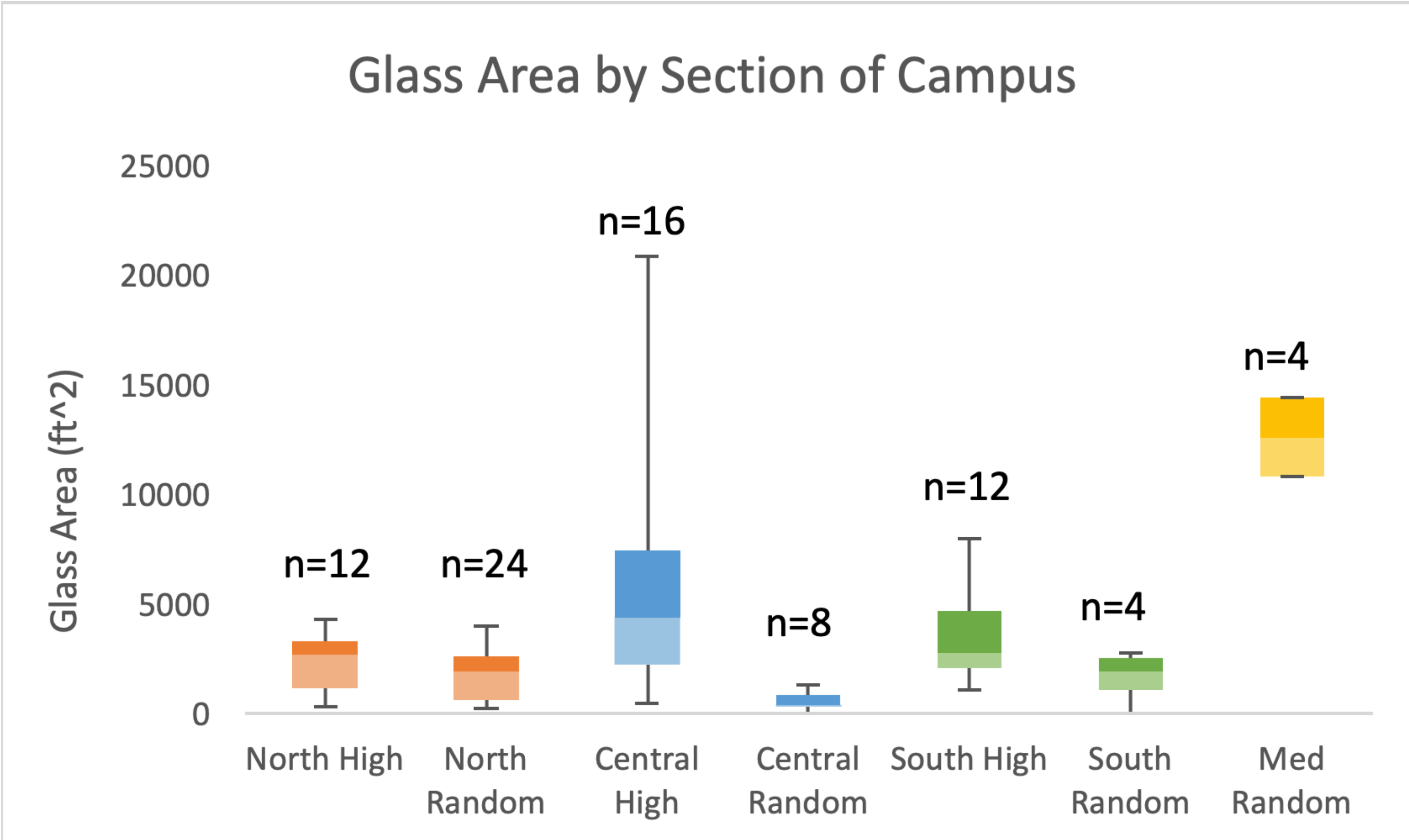

Figure 4. Box plot of the different sections of campus and the high collision buildings and randomly selected buildings.

DISCUSSION

Glass area paired with portion of campus showed to be the best model. Many of the largest, most glass covered buildings on campus are on central and north campus. This is also where the Lights Out Buckeyes team finds the most of their strikes. The high collision central campus variation in glass is due to the amount of glass present on the RPAC being so much higher than any other building. As new buildings are developed on campus, the odds ratio can help to estimate that certain buildings are going to be more likely to need attention while monitoring and for mitigation

FUTURE OBJECTIVES

Expand the study to further represent the different areas of campus with more buildings. The large number of similar dorms and large buildings on north and central campus do pose a threat but may make data appear biased. Encourage the university to address current buildings as well as future building plans to consider the likelihood of a building being classified as problematic and taking the steps to mitigate and reduce the number of collisions.

LITERATURE CITED

Klem, D. (1990). Bird Injuries, Cause of Death, and Recuperation from Collisions with Windows . *Journal of Field Ornithology*, *61*, 115–119.

R Core Team (2019). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

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