



Bird Window Strike Monitoring at SUNY Plattsburgh

An Ecological Research as Education Network (EREN) Undergraduate Research Collaboration

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Abstract

Bird window collisions are a major anthropogenically-derived threat, resulting in 100-1000 million bird deaths annually in the U.S., making it the second largest mortality factor for birds. The relationship between bird window collisions (BWCs) and building factors, such as size, window area, proximity to nearest road (as well as traffic intensity on that road), and vegetation density surrounding buildings was studied. Six buildings, with different size and vegetation densities, were selected for this study. Daily carcass searches around each building were performed for 21 days, traffic intensity was determined via observation, and window area and vegetation density were calculated using ImageJ and ArcGIS respectively. Only one indicator of a BWC was found (a feather pile), thus there were not enough data to perform any correlation analyses between the factors mentioned above and BWCs based on the survey of SUNY Plattsburgh campus buildings alone. However, other BWC studies indicate that higher window area increases BWCs most strongly in areas of lesser development. This might be useful in focusing conservation efforts when planning major construction projects.

Introduction

Every year, millions of birds die from bird-window collisions (BWCs). Until now, BWC studies have been primarily focused on large commercial or high-rise buildings located along migratory routes or migratory stopovers. These areas often contain a high variation of building sizes and structures, and comprise large areas of residential development.

- Number of birds killed by bird window collisions in the U.S. is estimated to be between 100-1000 million in 1990 (Klem et al. 1990) and between 365 and 988 million in 2014 (Loss et al. 2014).
- Bird window collisions are the second highest bird mortality factor in the U.S.
- Estimates of the percentage bird window collisions each building type (residential, low rise, and high rise) is responsible for ranges between 90%, 10%, and <1% respectively (estimate for Canada) to 44%, 56%, and <1% respectively (estimate for the U.S.).

Goals

The purpose of the study was to pilot test universal protocols on college campuses and to provide quality data that might help best inform existing policies regarding BWCs. This information will also provide building owners and architects with ways to better focus building design and conservation efforts aimed at reducing the impact of BWCs.

Hypothesis

The hypothesis of the larger EREN study is that the frequency and magnitude of BWCs reflects landscape structure and architecture, such that large cities along migratory pathways will show high variations in BWCs across the landscape, while smaller towns with mostly small buildings outside of major migratory pathways will have fairly uniform BWC sightings.

The hypothesis for SUNY Plattsburgh is that the buildings with the highest vegetation density and window area will experience the greatest frequency of BWCs.

SUNY Plattsburgh Survey Buildings

Six study buildings with different structural components and surrounding habitat attributes were selected for bird carcass surveys.

- Two large (commercial/high-rise) buildings: **Wilson and Myers**
 - Two medium (2-4 story office structure) buildings: **Redcay and Harrington**
 - Two small (1-2 story residential) buildings: **Draper Ave. residence and Student Health Center**
- For each building size, one building with a high vegetation density (within a 50m buffer) and one building with a low vegetation density was selected.



Figure 1: Myers <http://www.plattsburgh.edu/files/648/images/myers-fine-art-building-01.jpg>



Figure 2: Wilson hall http://web.plattsburgh.edu/files/37/images/wilson_hall_2.jpg

Window Area

- Photographs of all windows in the survey buildings were taken with a known scale in picture (meter stick next to the window).
- Pictures were inputted into ImageJ and the scale was set, such that window area could be calculated.
- Measurements were made for each cardinal direction.



Figure 3: recording Myers window area

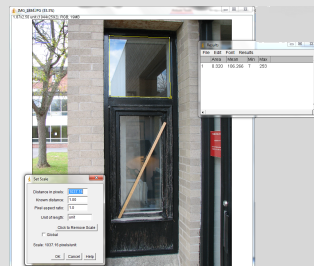


Figure 4: calculating Health Center window area in imageJ

Carcass Surveys

- Carcass surveys were performed daily for each building for 21 consecutive days during the open migration window:

Sept. 21-Oct. 21, 2013

- A perimeter check for bird carcasses/feather piles was performed around each building (moving in 2 different directions).
- If a carcass was found, photos were taken and the carcass was identified and labeled with an ID tag following EREN protocols for long-term storage. If a feather pile was located, only a photo was taken.
- Surveys were performed in the afternoon, between 1-6:00pm.



Figure 5: Feather pile near Redcay



Figure 6: Feather pile (not recorded)

Vegetation Density

- Spatially referenced aerial imagery (orthoimagery) of campus study buildings was obtained (e.g., ArcGIS basemap, Google Earth, GIS resource websites, etc.).
- Polygon shapefile features were created to represent the perimeter of buildings.
- A 50m buffer around each building perimeter polygon was created to assess vegetation density.
- Polygon shapefile features were created for all the vegetation, including grass, within the buffer. Building-specific proportional habitat composition was calculated by dividing the total vegetation area for each building by the total buffer area for that



Figure 7: Calculating vegetation density with ArcGIS (Harrington)

Results

Only one BWC was documented during the entire migratory window → a small feather pile outside Redcay

Table 1. results from carcass surveys and window area/vegetation density calculations

Building	Carcasses found	Vegetation Density (%)	Window Area (m ²)
Myers	0	27.80	357.70
Wilson	0	67.65	348.40
Redcay	1	64.20	382.80
Harrington	0	42.70	100.80
Draper Ave. residence	0	64.25	6.83
Student Health Center	0	61.01	104.70

Discussion and Conservation Implications

Due to the lack of bird carcasses found, no conclusions can be drawn from the study that was performed on this campus alone. However, other studies (Hager et al. 2013), indicate that increased window area increases BWCs most strongly in areas with lesser development (e.g. high vegetation density). Moreover, these same researchers observed no BWCs in buildings situated in areas with more than 66% impervious surfaces (e.g., less than 34% vegetation density). These two observations can help focus conservation efforts by focusing on the window area of buildings in developing areas.

Additionally, surveying newly constructed buildings (e.g., Ausable Hall), in addition to locating bird-deterrent features (e.g., patterned exterior window film, fritted glass, hawk silhouettes, decoy owls) on any of the buildings will be important. Finally, the bird migration window should be determined for this area specifically.

Collaborative Research Model

This project was part of a larger collaborative study, through the Ecological Research as Education Network (EREN), and was simultaneously performed under the same guidelines at 45 colleges throughout the United States, Canada, and Mexico.

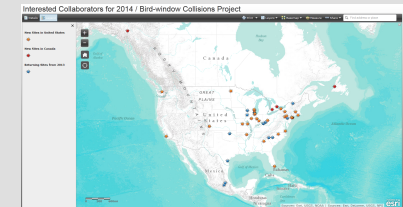


Figure 8: interested collaborators for the 2014 BWC project

The principal investigators for the project are **Dr. Steve Hager** at Augustana University and **Dr. Brad Cosentino** at Hobart William Smith College.

Literature Cited

- Hager SB, Cosentino BJ, McKay KJ, Monson C, Zuurdeeg W, et al. (2013). Window Area and Development Drive Spatial Variation in Bird-Window Collisions in an Urban Landscape. PLoS ONE 8(11): e53371. doi: 10.1371/journal.pone.0053371
- Klem, D. 1990. Collisions Between Birds and Windows: Mortality and Prevention. Journal of Field Ornithology 60(1):120-129.
- Loss SR, Will S, Loss SS, Marra PP. 2014. Bird-building collision in the United States: Estimates of Annual Mortality and Species Vulnerability. The Condor 116(1):8-23.