

Educating and Preventing Avian Window Collisions on UNCP Campus

Senior Project

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By

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**Abstract**

Unnatural mortalities are a major ecological issue for avians, with window collisions causing the second highest number of annual mortalities at nearly 600 million deaths. Birds often struggle with understanding windows due to a variety of variables including cleanliness, environmental reflections, and individual avian reflections. Collisions often result in injuries and easily cause death. Collision-prevention stickers can be added to windows to assist birds with seeing the windows as an obstacle while minimally obscuring the window for humans. Education and spreading awareness aids in encouraging the obtaining of collision-prevention stickers and being mindful of building architecture. This project’s main components included a classroom PowerPoint and oral presentation, a physical research-style poster, and this final written report.

**Educating and Preventing Avian Window Collisions on UNCP Campus**

**Introduction**

Ornithology has been a long-time interest of mine; this interest is reflected in my past courses, choice of research during my time within the RISE program, and the multiple summer internship programs I have completed. It is only fitting that my Honors Senior project should also reflect such a vital interest.

Bird mortality is an important ecological issue that has been affecting our environment for years and will increasingly impact our future, including the local community. Injurious and even fatal collisions are a major issue that are an aspect of yearly bird mortalities. Loss et al stated in their 2014 article that “Building collisions, and particularly collisions with windows, are a major anthropogenic threat to birds,” but this intense threat is not discussed as much as it should, especially not within our campus[[1]](#footnote-1). I personally have found evidence of fatal collisions on this campus, including finding multiple carcasses of various bird species that I fully believe to have been killed by collisions with buildings on the southern section of UNCP (near the Herbert G. Oxendine Science Building and Old Main specifically). This project aimed to not only educate at least the campus students on the issue of collisions and subsequently bird conservation at hand, but also directly prevent more collision deaths in our campus community’s future. However, due to inability to obtain funding, the project was forced to focus solely on the education aspect rather than also actively preventing collisions.

***Collisions and Stickers***

 Birds will collide with glass for multiple reasons. Most often it is because the glass reflects the environment around them, imitating a clear opening for them to fly into, or because the glass is clear and clean enough that it does not appear to be a solid object, but simply an opening. People even have had the issue of walking into clean glass, so birds are not completely misunderstood in this, nor is it due to the perceived notion that birds are unintelligent. Other times it is because the glass ends up reflecting other birds, even causing a bird to see their own reflection but not realize it. This can cause territory aggression as the individual attempts to fight off the “rival” and ends up only hurting themselves. Flying full force into an opening that ends up being a wall is very likely to cause a major injury for the small animals. Birds can sustain injuries such as concussions, broken bones, and can even end up in death.

Collision-prevention decals (stickers) can be bought in a variety of shapes, colors, and levels of transparency. Bird silhouettes are popular but need to be placed in high densities in order to be effective. Good sticker designs include vertical lines/dots and horizontal lines/dots. Many stickers can be made of materials that are reflective to humans and birds, such as colorful, stained-glass-like designs, are translucent to humans but reflective to birds, or are fully opaque to both humans and birds. Stickers that are translucent to us but not to birds utilize the bird ability to see ultraviolet (UV) light. These stickers reflect UV, so the birds see an almost glowing object, while we simply see a translucent sticker.



Figure 1 Black Dot Collision-prevention stickers[[2]](#footnote-2)



Figure 2 Rainbow Window Film[[3]](#footnote-3)

 These stickers must fit size criteria and be placed correctly on the exterior of glass in order to maximize their effectiveness. For vertical patterns, the stickers must be at least ¼ inch wide and be placed 4 inches apart. For horizontal patterns, the stickers must be at least ¼ inch wide and be placed 2 inches apart. Vertical patterns are more efficient. For miscellaneously shaped stickers, such as bird shapes, it is recommended to place them 2 inches apart in each direction.

 Before applying any sticker to the glass, cleaning is recommended to ensure the sticker stays on the glass. A half water and half rubbing alcohol solution is recommended to clean the glass without leaving residues that could interfere with application. The glass must be completely dry before adding the stickers to enable proper adhesion.[[4]](#footnote-4)

 These stickers do not just provide an aesthetic benefit for humans while protecting birds, they can also provide housing energy and monetary benefits. Depending on the material and design of the stickers added to windows, they may help thermoregulate the building. By reflecting solar rays outside and reflecting heat inside, the energy used to heat and cool the building can be reduced. Tax credit is available for up to 500$ for the addition of energy saving improvements to one’s primary residence. This includes films applied to windows as a method to insulate and regulate one’s home temperature.[[5]](#footnote-5)

***Initial Research***

Figure 3 Average Estimated Avian Mortalities Annually[[6]](#footnote-6)

The figure above displays the causes of the average estimated non-natural mortalities that avians annually face from data collected up to 2017. Collisions with building glass causes nearly 20% of avian deaths annually. Four other causes of mortalities were recorded but in total accounted for less than 1% of annual mortalities. These causes were Collision – Communication Towers, Collision – Land Wind Turbines, Electrocution, and Oil pits. Total annual deaths are approximately 3 billion. Nearly 600 million of these deaths are caused by collisions with building glass. For reference, the current US human population is approximately 332 million individuals. It is an apt comparison then to say that one would have to kill every person in the US almost twice over to match the number of birds that die yearly just to collisions with windows. This pie chart was created from the data given within the 2021 article, “Threats to Birds”, by the US Fish and Wildlife Service.



Figure 4 Annual Avian Collision Mortalities by Building height[[7]](#footnote-7)

The above figure demonstrates the annual estimated mortalities of flighted avians caused by collisions to buildings of three different types, considering height and if they were residences or not. Low-rises have the highest median mortalities, with Residences just under and High-rises being much lower than either. It is important to keep in mind that most buildings on campus would classify as Low-Rises, with some classifying as Residences, the buildings that cause the most avian deaths. This figure was directly taken from “Bird–Building Collisions in the United States: Estimates of Annual Mortality and Species Vulnerability” by Loss, et al (2014).

Figure 5 Annual Estimated Median Avian Mortalities per Building Height[[8]](#footnote-8)

This pie chart was created using the median estimated flighted avian mortalities from the above figure’s data for each building type. With this form of chart, it is easier to see that Low-rises make up over half of all the estimates mortalities and Residences being just under half, while High-rises make up less than 1% of all median estimated mortalities. The total estimated mortalities has a median of approximately 599 million deaths. Like the previous figure, this data was obtained from “Bird–Building Collisions in the United States: Estimates of Annual Mortality and Species Vulnerability” by Loss, et al. (2014).

***Methods***

The initial and most vital step for this project was the initial research. The information and data that was compiled formed the basis for not only fully understanding the issue of collisions for avians, but also enabled me to present that information in multiple methods. After understanding the issue, my plan was to obtain funding in order to apply collision-prevention stickers to the Herbert G. Oxendine science building. This building was my focal point as it was the building where I found most of the (likely) collision-caused avian carcasses. It is also where science majors and scientific faculty are often found, these are the individuals who would most likely support the project and be involved in the issue in the future. Instructors could easily use the stickers as a teaching mechanism, and it would encourage those who enjoy wildlife to obtain stickers for their own residences and/or future buildings. However, I was unable to obtain funding from PURC, causing me to transition the project more towards the presentation-education aspect.

The poster presentation acts as an educational tool to the many students, staff, and faculty that may see it displayed within the Mary Livermore Library through the Honors College. Information gathered and shown here has also been presented in a PowerPoint format to students and faculty at UNCP during a Vertebrate Zoology (BIO 2040) course session. This information aided in educating students as well as connecting this issue to various topics within the course material.

 The whole of this project aids in spreading awareness and educating others about the issue of avian window collisions. Discussion is encouraged via those who interact with this poster and with the author, as well as who experienced the PowerPoint presentation.

***Future***

Although unable to procure means to add stickers to the UNCP campus, protecting birds and continuously spreading awareness, this project serves as a base for future projects and funding for collision-prevention and bird conservation. The addition of educating individuals on this campus also serves to encourage future work in collision-prevention and bird conservation at home and in this campus community.

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