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Bird Collision Mitigation Report

The Bird Strike team has worked over the course of three semesters within the Sustainability Exchange to gain a better understanding of what bird collisions look like on Washington University's campus. Over the course of the project, we have collected data by walking the area of the campus and searching for birds that have collided into a building. We have narrowed down these "collision hotspots" to the top eight buildings that pose the largest threat to birds. In this report, we hope to focus on the top three of these eight: Hillman Hall, the McDonnell archway, and the Sumers Welcome Center. In this report, we will propose potential solutions to the Wash U administrations along with the costs and benefits of these solutions.

Hillman Hall:

Hillman Hall is an aesthetically beautiful new addition to the WashU campus; however, as it is made primarily out of glass windows, the building poses a serious threat to birds. Glass windows tend to reflect the surrounding area and vegetation. These reflections confuse birds as they cannot distinguish objects reflected off the glass from its real version. Therefore, because of Hillman's large panel windows, birds often get confused and will fly into the glass at high speeds attempting to find food, escape danger, or rest on a branch. In fact, in this photo of Hillman (figure 1), one can even see how the tree tops are reflected on the large window panes. This north facing facade has been found to be particularly problematic as it juts out of the rest of the building. For these reasons, we are suggesting three solutions for the school to help mitigate the number of bird collisions.



Figure 1

The first option, which has already been tested out, is to lower the blinds of Hillman Hall, particularly in the morning and in the evening when bird migration is most active. Because of the COVID pandemic, our team was able to measure the effects of having the blinds down on the first floor and compare it to other semesters. There was a notable drop from five to two bird collisions, just through the simple act of lowering the blinds during certain periods of the day. This solution is very cost efficient as it will not require any more spending. In fact, lowering the blinds will help save the school money. Lowering the blinds in the warmer season would conserve energy in Hillman by keeping the room cooler; in the colder season, having the windows down would help insulate the interior of the building. For these reasons, we find that the option of lowering the blinds is a viable and feasible solution. Figure 2 is a photo of what the north facing facade looks like with the blinds down where we saw a significant drop in bird collisions.

Another possible solution is the implementation of vertical monofilaments. Besides implementing blind practices and replacing glass windows with etching. Implementing vertical monofilament modules to place at specific problematic areas would be an excellent investment.

The primary reason is that this solution is extremely cost effective, but there are benefits as well. This could be a student run project that would over the next semester give students an opportunity to learn about design, architectural theory, and ornithology. Due to the great emphasis of verticality in the design and space of hillman hall these vertical modules could be installed by a team of students with the guidance of technicians to ensure the safety of all students involved with the project. Alternatively, a design competition could be held for the design of these vertical modules and that way a community solution can be resolved in a very cost effective way. See Figure 3 for an example. Another benefit to this solution is that the cost of the monofilaments themselves is very cheap. We were unable to find the exact price for monofilaments the size of Hillman's windows, but for a kit of 12 monofilaments that span up to 7ft, the cost was just over \$25. Lastly, this curtain of monofilaments is proven to reduce birds strikes by over 50%. As a result, we believe that these monofilaments would provide a strong alternative to lowering the blinds in Hillman.



Figure 2

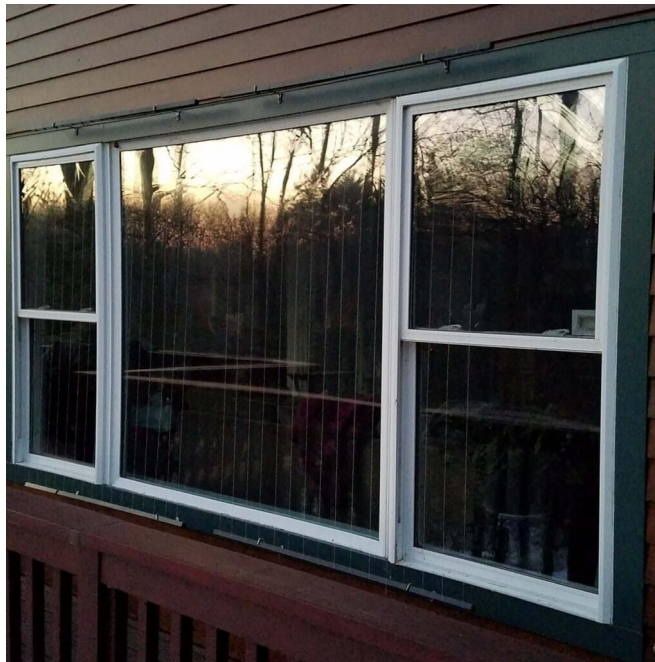


Figure 3

Solutions Summary Hillman Hall:

Solution type	Estimated Price	Threat Level (1-30)
Lowering Blinds	\$0	According to our data, blinds reduced bird collisions over 50%
Monofilament Curtain	~ \$35/12 strings	21

McDonnell Hall Archway:

The McDonnell Hall Archway can be a very confusing area for birds. At first glance, one would not expect this to be an area with a high number of bird collisions because the windows here are relatively small. However, depending on how the sun hits these windows, they can become very reflective of the surrounding trees. This effect is shown in Figure 3, where one can see how the tree branches are reflected into the windows. Previously for Hillman Hall, we suggested blinds as a way to mitigate bird collisions, but because of the way the light reflects on

these windows (seen on the bottom right window) we will suggest another type of bird repellent. Additionally, archways in particular can be confusing to birds as they can fly under, but they can not fly through the windows located above the archway. This is shown in Figure 4, an image of McDonnell Hall where the windows above the archway reflect the blue sky.



Figure 3



Figure 4

The first bird collision mitigation technique we suggest for these windows is insect netting. According to the American Bird Conservatory (ABC), insect netting is extremely

efficient and has a threat level of one. Threat level is the relative ability of a material to reduce collisions. The lower the number, the more effective the material is, and a rating of 30 is measured to decrease the number of bird collisions by 50%. With a rating of one, insect netting is one of the most reliable materials to prevent bird collisions. Insect netting is also relatively cheap. A roll of insect netting that measures 100ft and 84in wide costs just over \$100. The netting comes in both black and grey so there is flexibility in choosing which is the best option for the building. Being both cheap and such an effective mitigator, our team's first choice for bird collision material at the McDonnell archway is insect netting.

A second potential solution to reduce the number of bird collisions at the McDonnell archway is to use window stickers created by the company *decorative films*. This company specializes in making window stickers of all kinds, but the ones we recommend for the McDonnell windows are the "SOLYX SX-BSFD Frost Dot Bird Safety Film" (see Figure 5). These applicants are especially useful because they can be placed on the windows without removing the glass itself. Additionally, these stickers are more transparent than other stickers and so they would not inhibit the view to the human eye. According to the ABC, the threat level on this applicant is 15. Although this measure is higher, it is still significantly lower than 30 (the highest on the ranking) and will help decrease the number of bird strikes. This applicant comes on a sheet and it can be stuck on the window accordingly. A foot of this sheet with a width of 60 inches costs a little over \$30. Because the windows at McDonnell archway are not very large, we believe these circular stickers are a viable solution.



Figure 5

Solutions Summary McDonnell Archway:

Solution type	Estimated Price	Threat Level (1-30)
Insect netting	100ft and 84in wide costs just over \$100.	1
Frost Dot Stickers	\$30.67 per foot for a sheet 60” wide	15

Sumers Welcome Center:

For the brand new Sumers Welcome Center on the East End of Campus, the fact that the exterior of the building is almost entirely made of glass poses a problem for bird collisions. We recorded five collisions at Sumers over the course of our walks, which tied for the third most of any building. It is obviously the goal of our team to limit bird collisions on any building, but given the frequency with which the building is used and what it is used for — conducting

informational and promotional sessions for prospective students — it is of particular interest to the school to reduce collisions at Summers. This building is also interesting because there are preventative measures already installed, with three sides of the building sporting etched windows (two of them can be seen in Figure 5). However, the side facing Schnuck pavilion has no preventative measures in place, and, unsurprisingly, all five of the documented bird collisions occurred on this side. At the least, the school should quickly apply mitigation techniques to this fourth side of the building in order to limit the amount of collisions at this hotspot.



Figure 6

Our first proposed solution for the Welcome Center is to purchase and install an Acrylite® Soundstop Bird Guard on the side facing Schnuck Pavilion. This device has undergone considerable testing and has proven to be extremely effective at reducing bird collisions. The ABC has given this product a threat factor of seven, one of the highest scores awarded to any mitigation technology that they have listed. This barrier contains 2mm-wide black stripes that are spaced 30mm apart (shown in Figure 7), providing an ideal mechanism through which to deter bird flight paths while also retaining a high level of transparency for

humans. While this solution would be more costly than others, we believe that since the Sumers Welcome Center is a new and vitally important building to WashU and that this technology more or less matches what is already in place on the other three windows, purchasing an Acrylite® Bird Guard would be a wise investment to make.



Figure 7

We would also like to propose the use of Solyx SX-BSFH Horizontal Bird-safety Film (Fig. 8) as a second solution to mitigating bird strikes on Sumers' north-facing windows. This solution is a film that is applied to the existing glass, so the cost will be much lower than replacing the glass windows. However, the cost of the film is just over \$30/ft², resulting in a total installation cost of around \$11,000. The film is horizontally striped with gray 0.125 inch thick stripes with 1.0 inches between each stripe. The film is applied on the outside of windows and is weatherable and scratch resistant. It is important to note that it has an outdoor lifespan of seven years, and removal of the adhesive film does not leave any marks or residue on the glass it is attached to. The horizontally striped film mitigates bird collisions by reducing the effectiveness of windows. The American Bird Conservatory has given this bird mitigation technique a score of

10 for a threat factor, making it a suitable solution for Washington University’s Danforth campus. This technique has also proven to be 100% effective at its implementations at both the Philadelphia and the Bronx Zoos.



Figure 8

Solutions Summary Summers Welcome Center:

Solution type	Estimated Price	Threat Level (1-30)
Acrylite® Bird Guard	Varies	7
Solyx SX-BSFH Horizontal Bird-safety Film	\$30.67 per foot for a sheet 58” wide	10