

**Bird Strike Prevention and Evaluation for the University of Utah
SCIF Medium Grant Proposal, Application Part 2, September 21, 2018**

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Introduction

The University of Utah's core values includes sustainability, defined as "the integrated pursuit of social equity, environmental integrity, and economic security for current and future generations" The University values "creating a living, learning laboratory on campus" (<https://sustainability.utah.edu/about/mission/>). Our goals are to mitigate an existing hotspot of bird deaths from window strikes, to evaluate the effectiveness of the mitigation, and to develop a citizen science awareness and outreach component to raise awareness and identify whether other hotspots exist. In this way, we are consistent with the SCIF mission statement that funds projects that "reduce the University of Utah's negative impact on the environment (SCIF by-laws). In the long run, these efforts will help engage campus participants with the biodiversity on campus and suggest whether long-term design standards are needed to prevent further bird strike deaths.

This project is also responsive to the four components of the rationale for SCIF (<https://sustainability.utah.edu/scif/>):

- Improve campus: Mitigating a building for bird strikes will reduce the U's negative impact on birds.
- Collaborate across departments: The affiliations of team members show 8 different collaborating units across campus.
- Gain unique professional experience: Students gain the experience of developing the grant proposal, the data collection, and the campus outreach and education.
- Leave a legacy: Our legacy should include fewer bird deaths documented at the mitigated building, a building mitigation that will be effective for years, and the greater awareness of the University of Utah campus regarding threats to bird life and how to mitigate them.

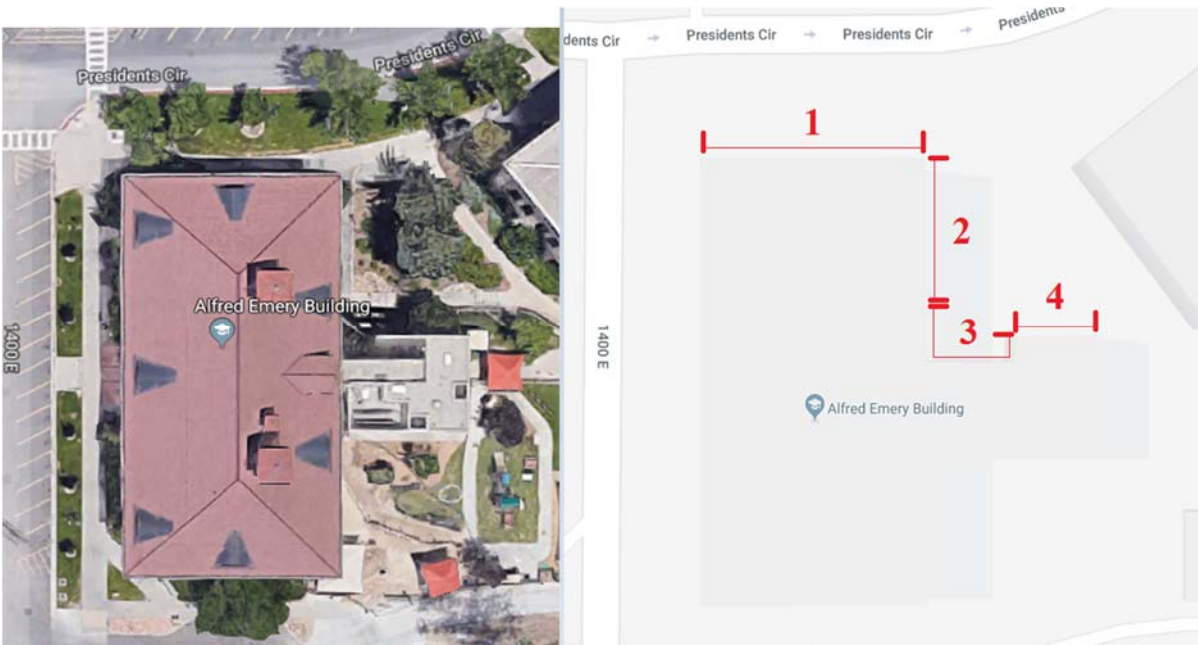
Alfred Emery Building's reflective glass extension is a bird strike hotspot

- 20 dead birds found by AEB within four months
- Downtown Salt Lake only found 44 dead birds by 196 buildings in 2017

The windows with reflective surfaces surrounding the northeast entry to the Alfred Emery building (AEB) constitute a hot spot of bird strike deaths that requires mitigation. Between 11/10/2017 and 3/28/2018, 20 dead birds were found next to those windows, mostly in November. In comparison, a more comprehensive survey--the Salt Lake Avian Collision Survey--counted only 44 dead birds across 196 buildings on 20 Salt Lake City downtown blocks city blocks in 2017 (Farr, 2017). Consequently, we believe the AEB bird strike count is especially high here. In addition, the downtown survey found that 9

different species were killed, with any one species accounting for no more than 10% of the total. In contrast, most of the bird deaths at AEB were Cedar Waxwings. In Figure 1, most bird deaths were recorded at area 3 on the map, directly south of fruiting crabapple trees in President's Circle where the Waxwings and some Robins feed. Figure 2 shows some victims of the window design.

Figure 1: Alfred Emery Building on the University of Utah campus and the main area 3 for bird strikes.



(Aerial satellite and map imaging of the Alfred Emery Building from Google Maps, 2018)

Figure 2: Cedar Waxwing and Robin bird corpses after collision with AEB windows



(Photos by Brown, 2017)

Figure 3 shows the windows involved. The mitigation area is 9 windows across and 6 windows in height, with heights varying. The historic AEB structure is visible in the reflections, but only the newer extension (for ADA-compliant bathrooms and elevator) requires mitigation.

Figure 3: View of AEB from the bird feeding tree, then left and right sides of the reflective windows on the northward extension from the historic building



Why bird strikes occur

Certain building features attract more bird strikes. Buildings with **larger amounts of windows**, **transparent windows**, and **reflective windows** especially attract bird strikes. Transparency is a problem with two parallel windows that act as a glass tunnel through a building. Reflectivity is the problem of outside reflections on the glass surface that make it seem like a passage. Birds are especially susceptible to these hazards when vegetation can be seen on the other side, or is reflected in the glass (Winton et al, 2016). A study at Duke University in Durham, North Carolina found that low to medium rise buildings are the cause for 44%-56% of all bird strikes in the United States (Ocampo-Peñuela et al., 2016). Most campuses have these low to medium rise buildings.

Why we should care about bird strikes

A systematic review of 23 past studies has estimated that between 365 million and 988 million birds die in the U.S. each year due to bird strikes (Loss, Will, Loss, & Marra, 2014). Bird strike deaths are a **second leading cause of death, after predation by cats** (Ocampo-Peñuela et al., 2016). Researchers, including an eminent University of Utah ornithology researcher (Sekercioglu, Schneider, Fay, & Loarie, 2008), have concluded that many species of birds are increasingly threatened by climate change deaths

(Sovacool, 2009). Preventing bird deaths is consistent with SCIF's mission to mitigate negative effects on the ecosystem.

Birds are important, not just in their own right, but also as species that provide valuable **ecological services** to humans and other animals. These benefits accrue from bird actions such as pollinating plants, spreading seeds, eating insects, and providing food for other animals (Franzen, 2018). Birds are important **indicator species for ecological health**, serving as the canaries in the coal mine (Franzen, 2018).

Studies also show that bird watching can be helpful for **human psychological well-being**. These days, urban residents often overlook the presence and activities of birds. Built environments that offer few chances to directly interact with nature could have a negative impact on an individual's well-being (Luck, Davidson, Boxall, & Smallbone, 2011) and connection to nature. Yet urban residents who feed and watch birds regularly report that these activities help them feel more relaxed and connected to nature (Cox & Gaston, 2016).

Unique focus: Older buildings and resident birds

Many new buildings across the U.S. are built with bird strike prevention in mind; however, older buildings are often ignored. For example, the University of Utah law school has used Ornilux glass that has embedded ultraviolet features that mimic spider webs and are visible to birds (<https://www.law.utah.edu/a-better-building-biomimicry-glass-working-with-nature-to-reduce-bird-window-collisions/>). The new Carolyn and Kem Gardner Commons building has dot fritted windows that reduce heat from the sun and deter bird strikes. It is important to understand whether bird strikes can be mitigated when considering older buildings. The University takes pride its older, historical building community. We aim to align with the SCIF mission to create sustainable campus communities, old and new.

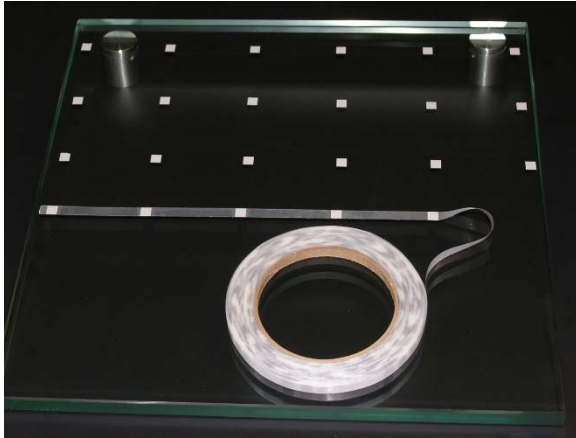
In addition, most studies of bird strike deaths focus on migratory birds, including nocturnal migrant who die when lights at night distract them. This study focuses on Cedar Waxwings, who are resident in the area nine months a year, and who have potentially longer duration of exposure to poorly designed windows.

Solution? Apply Feather Friendly bird tape on exterior glass in 2" horizontal rows

We request funding for mitigation that includes the purchase and installation of a window strike prevention tape on the array of 9 X 6 windows on the AEB extension wing. Dana Johnson, workplace manager for the President's Circle area of Workplace Services on campus estimated this to be 2500 square feet. We independently measured the area and are certain that 2500 square foot coverage would be sufficient (we actually estimated less than 1300 square feet). Precise measurement was difficult, given that the building is three stories high (as noted below, we are open to changing the site if a higher priority site is revealed through our bird strike crowd-sourced data collection on iNaturalist).

The tape is applied on the exterior of the windows, as required to mitigate collisions. As shown in Figure 4, the tape is mostly clear, but contains solid white dots that are visible to birds and reduce their tendency to fly into windows. It is applied so that white dots are 2" apart to meet the recommended 2" horizontal by 4" vertical minimum research-based spacing standard (US Fish and Wildlife Service, 2016). The product in Figure 4 can be viewed online (<http://shop.conveniencegroup.com/products.php?product=Feather-Friendly%C2%AE-Solution-for-%E2%80%98Do-it-yourself%E2%80%99-Residential-Applications>).

Figure 4: Feather Friendly product



Feather Friendly® Bird Deterrent was chosen because it is a long lasting solution, in keeping with SCIF goals, and maintains the historical integrity and architecture of the building, and is suitable for small-scale installations. Although we are not familiar with any testing of this product on campus, it is described as having a life expectancy that exceeds 8 years, and is not affected by any cleaning procedures. The Alfred Emery Building has historical significance, the tape's dot pattern design is compact and does not detract from the building's architecture. The Feather Friendly product was also tunnel tested by a third party, the

American Bird Conservancy. It provided Feather Friendly, and all other products scoring 70 or higher on the tunnel test, a "Saves Birds" endorsement (<https://abcbirds.org/get-involved/bird-smart-glass/>). The product web site includes an installation guide ([FFInstall_instructions.pdf](#)). We budgeted for bird tape and posters (\$2788) as well as labor and installation (\$7211.12; total= \$9999.12), detailed in Part 1.

Timing is critical: Mitigation needed by end of October to prevent deaths

In order to provide a timely evaluation of the mitigation, it is important that the window tape be installed as soon as possible. Last year, the first observation of a window strike was on 11/10/2017. At that time, there were already eight bird carcasses found. Therefore, in order to prevent more bird deaths and to evaluate the effectiveness of the mitigation, it will be important to install the window tape prior to when the Cedar Waxwings feed on the trees of President's Circle. The exact date of fruit ripening cannot be determined in advance, but it will be important to install the tape prior to November.

Evaluation plans: Compare post- to pre-mitigation bird deaths at AEB

Consistent with SCIF goals of having measureable outcomes, we will compare deaths before and after installation of the tape. We already have records from a search for dead birds near AEB that involved multiple days between 11/10/2017 and 1/1/2018. We will ensure that the same days are evaluated this year, after the tape has been applied. We will present results in terms of the number of birds and observation days each year to determine our **key outcome: do fewer birds die from AEB windows?**

Education and outreach plans

Because preserving bird life is integral to the University of Utah's commitments to sustainability, we have also planned an educational outreach component. This component is important for raising user awareness of the diverse bird life on campus.

We will use citizen science outreach to assess whether the AEB hotspot is the only one on campus. Sarah Siddoway, in consultation with Lisa Thompson, NHMU, developed the University of Utah Bird Window Collision Project (see Figure 5). This site also has a Gmail address in case observers prefer to email their observations or to contact the research team. Sadly, we have added our first two listings, a hummingbird dead from a bird strike at AEB, as shown in Figure 5, and a mourning dove from LCB.

iNaturalist has been used to pinpoint mitigation areas on the Duke University campus (Winton, Ocampo-Peñuela, & Cagle, 2018), as well as several other campuses where published results are not available. In

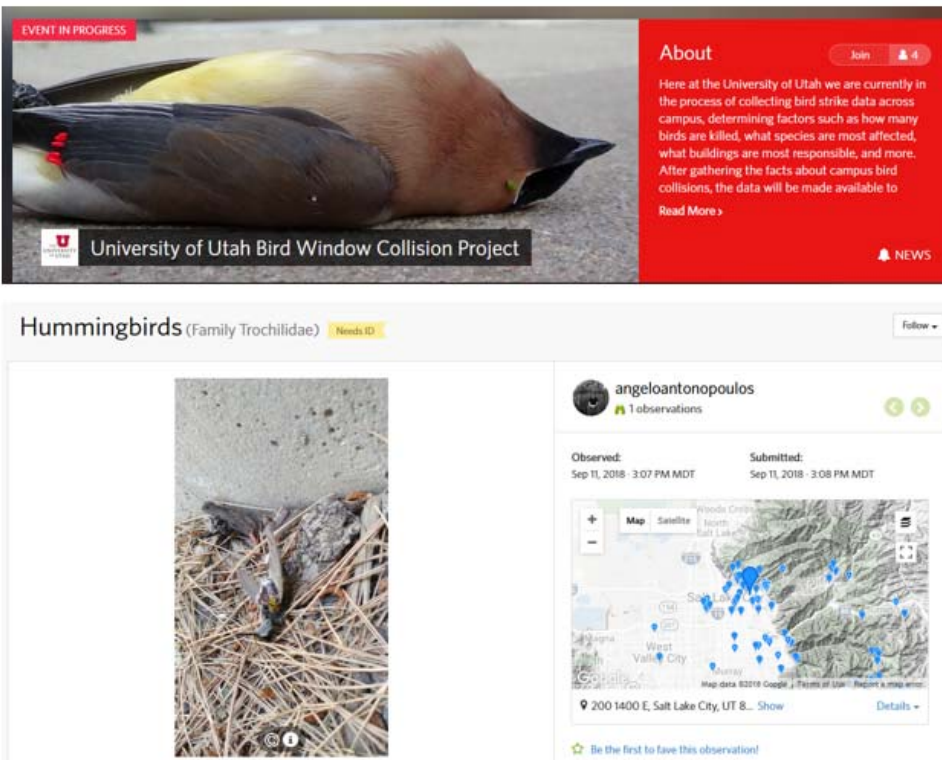
addition to easy uploading of photos of dead birds, the site can collect information such as the name of the building. The crowd-sourced data will provide a more comprehensive assessment of campus problems than we could.

We anticipate that our education and outreach plans will evolve as the project progresses, but at a minimum will contain these components:

- We will reach out to a growing contact list we have created including Natural History museum, the biology department, Tracey Aviary, and Environmental and Sustainability Studies, and the Ubird site.
- Kusakabe, Antonopoulos, and Hammes will have the opportunity to develop an educational paper and poster based on this project to present to FCS/PSY 3620, Environmental Psychology and Sustainability, taught by Brown.
- Hammes and Antonopoulos will develop educational outreach posters for likely strike sites that will educate the public and encourage citizen reporting and documentation of campus bird strikes.
- Lisa Thompson, UMNH, has invited us to contribute to the 2019 Urban Ecology exhibit

Depending on the result of our data collection, we may recommend that a) bird friendly solutions at other buildings be a higher priority than the AEB; b) prevention for new buildings be part of the design standards, as appropriate; and/or c) mitigation efforts be built into long-range maintenance and building renovation. An example of our first iNaturalist entry for this project is below, in Figure 5.

Figure 5. iNaturalist project page and first entry to the University of Utah Bird Window Collision Project



We have local support from users of Alfred Emery Building

The FCS Department Chair, faculty, staff, and students in the Alfred Emery Building support this mitigation effort, as shown by the appended signatures. The windows to be mitigated are adjacent to a hallway and elevator, areas that are not used for long periods of time; bird strike deaths in such a location seem especially pointless. The Child and Family Development Center also uses the entryway; preventing carcasses from collecting there can make the entry more appealing to children and their families.

Additional research opportunity for the Bush Biology lab

We have arranged to provide the bird carcasses to the Biology department. Sarah Bush of the Clayton-Bush lab in the Biology Department has begun to collect these carcasses for her bird parasite research. Drs. Bush and Clayton have the required federal and state salvage permits to collect bird carcasses. Dead birds that are in good condition for archiving can be prepared as museum specimens and deposited at the Natural History Museum of Utah. Other specimens will be properly disposed.

Conclusion

By providing mitigation to reduce bird deaths at one hotspot on the University of Utah campus and by enhancing awareness of bird threats and mitigation opportunities on campus, SCIF funding can assist in bird conservation efforts needed for greater sustainability. Consistent with SCIF goals, we hope this project can lower the negative impacts our buildings impose on birds and support a more biodiverse and sustainable campus.

The University of Utah campus, sited next to the Wasatch Mountains, is along important migration corridors. The university campus is a hotspot of bird diversity in the online bird tracking program eBird, with 125 different species being reported on campus (Frisch, September 13, 2018 ebird report, checklist S48492239). The campus itself is the state arboretum, with diverse trees attracting birds to nest and feed. From owls nesting in the stadium, to bird-banding activities in Red Butte canyon, SCIF-funded kestrel nesting boxes, the campus has a record of bridging research and education to enhance our understanding of bird and human life.

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