

UBC Social Ecological Economic Development Studies (SEEDS) Sustainability Program  
Student Research Report

**Birds & Buildings: Feather-Friendly Glass Bird Strike Monitoring & Perception**

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## Abstract

Bird strikes with building windows have been a worldwide issue leading to millions of deaths annually. This project is a continuation of previous SEEDS initiatives in monitoring bird strikes on the University of British Columbia (UBC) - Vancouver campus. The results of the project will contribute to the advocacy work of Penny Martyn, Green Building Sustainability & Engineering Manager, to encourage campus stakeholders to make campus buildings more bird friendly. Buildings with the Feather Friendly symmetry film were monitored, and perceptions of the new installation were collected through surveys. The data regarding the effectiveness of the installed Feather Friendly symmetry film was inconclusive. The survey data suggests that the UBC community had an overall positive reaction to the use of the Film. The hopeful expectation is for future buildings to abide by Bird Friendly Design Guidelines and install feather-friendly film on current and future buildings to reduce the number of bird strikes occurring on UBC campus.

## Introduction

Bird collisions with urban structures are a widespread phenomenon in North America and internationally, representing the second leading cause of anthropogenic bird mortality. An estimated 100 million to 1 billion birds are killed annually in collisions with buildings across North America (Klem, 1990). Recent investigations of bird collision frequencies at the University of British Columbia (UBC) Vancouver showed that birds frequently collided with window glass (Cavers, Chien, Leung & Nam, 2015). In fact, Huang and Porter (2015) estimated that over a 48 day period in January to March 2015, 2362 birds were likely to have collided with windows on UBC campus. UBC is continuously working towards gaining a better understanding of the location, timing, and reason behind the cause of bird strikes and different methods and policies to mitigate these collisions.

In response to the data collected from the research thus far, UBC (2016) developed the Bird Friendly Design Guidelines for Buildings. One of the strategies to reduce bird strikes is through increasing visibility of the glass through methods such as screens, netting, blinds and adhesives. Interest in effectively reducing bird strikes also led to the pilot program to install Feather Friendly symmetry film along the south staircase of the Biodiversity Research Centre (BRC) and the south end of the Beaty Biodiversity Museum (BBM). Feather Friendly symmetry film is a bird deterrent window film of equally spaced dots arranged in a grid pattern covering the entire window. Although Feather Friendly symmetry film has been tested to be effective by the American Bird Conservancy (ABC) in an experimental setting, there is very little research on the efficacy when installed. A combination of research and advocacy is needed to encourage the implementation of the Bird Friendly Design Guidelines on campus and in the community. We hypothesize that bird strikes would be reduced for the buildings that have installed the Feather Friendly symmetry film. This particular project seeks to test the recently installed Feather Friendly symmetry film and quantitatively prove that the mitigation strategy reduces bird strikes and use public perception to catalyze the policy change.

## Methodology

### Bird Strike Monitoring

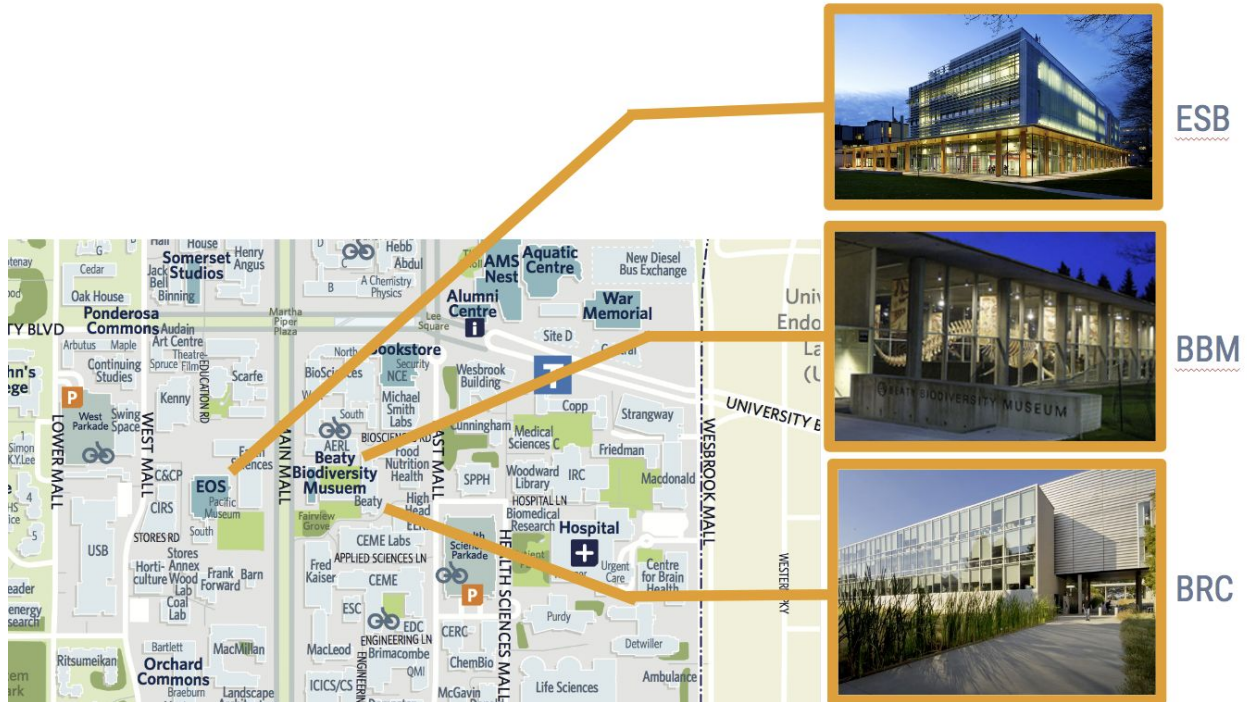
The bird strike survey protocol was adapted from Huang and Porter (2015).

#### *Schedule*

Bird Strike monitoring was conducted between 10am to 4pm Pacific Daylight Time (PDT). We followed a monitoring schedule of three consecutive days each week between November 18th 2016 to December 19th 2016 and again from January 3rd 2017 to January 19th 2017. Monitoring took place every day from January 23rd to February 20th 2017. Surveying was suspended between February 3rd and February 10th because of heavy snowfall impairing the observer's ability to locate potential carcass(es). Survey clean-up occurred on February 11th to remove any carcasses or remains accumulated during the heavy snowfall. Everyday surveys resumed the day after clean up and continued until February 20th. The schedule switched to three consecutive days per week (Tuesday, Wednesday, Thursday) from February 21st to March 9th 2017.

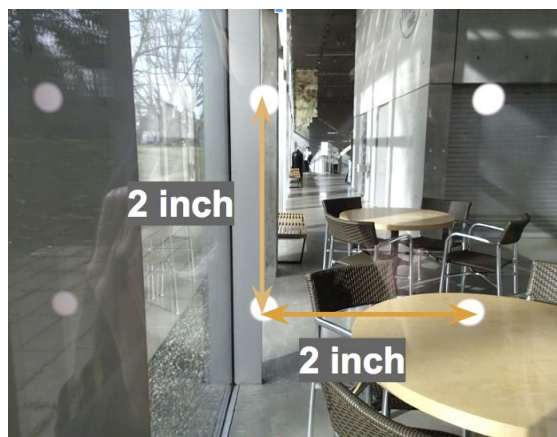
#### *Location*

Buildings selected for the study include the Earth Sciences Building (ESB), the Beaty Biodiversity Museum (BBM), and the south staircase of the Biodiversity Research Centre (BRC) (Fig. 1). ESB and BBM were selected because research done by Cavers et al. (2015) revealed that these two buildings had comparable high rates of bird collisions. The BRC was selected because there is data on pre-film installation and post-film installation that allows us to compare the effectiveness of Feather Friendly symmetry film. Surveyors walked around each location twice: once clockwise and once counterclockwise to observe from both angles. Each site was surveyed approximately six feet away from the window and up to one story above the ground.



**Fig. 1** Map of Monitored Buildings: Earth Sciences Building (ESB), Beaty Biodiversity Museum (BBM), Biodiversity Research Centre (BRC). Images from Campus + Community Planning, ArchDaily, Perkins+Will Global and Meetup.

Feather Friendly symmetry film from Convenience Group Inc. was installed on November 11 2016 on the south face of BBM and BRC fire escape. The two by four rule suggests gaps be no greater than two inches vertically and four inches horizontally to prevent birds from attempting to fly through glass (Sheppard and Phillips 2015). Complying with the maximum spacing two by four rule, the dots are approximately two inches apart (Fig. 2).



**Fig. 2** Configuration of dots installed at the Beaty Biodiversity Museum and Research Centre

## Data collection

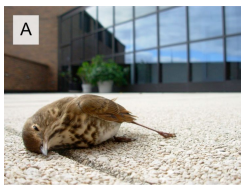
The information collected includes the date, building ID, observer, start time (PDT), end time (PDT), side of building, carcass, injured birds, evidence of a collision including bird smears and feathers on glass, and the details of the collected carcass.



**Fig. 3** Carcass

We considered the following situations as bird strikes:

- Partial carcass (Fig. 3)
  - e.g. wing, feet, beak
- Full bird carcass (Fig. 4A)
- Live bird (stunned or injured)
- Feather piles on the ground (>10 feathers, Fig. 4B)
- Collision evidence
  - e.g. feather smears on windows (>1 feather, excluding any that were caught in cobwebs)
  - e.g. dust imprint on windows



**Fig. 4** Result of Bird Strikes

If there were smears or feather piles, we recorded the approximate number of feathers, colour and the cardinal direction with respect to the building at which it was found. The number of feathers found had to be greater than ten and within a distance of two meters from the building to account for feathers that were lost due to other causes. All evidence was either collected in an envelope or removed to prevent double counting. Any feathers that fell under the criteria were noted and discarded to avoid double counting. Afterwards, an online resource was used to identify the feathers, if possible: <http://www.fws.gov/lab/featheratlas/>. In the event that a full carcass was found, the species, sex, and age were determined.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Date	Building ID	Observer	Start Time (PD	End Time (	Carcass / Injured bird	LIVE (stunned	Feather pile (>10 feathers)	Collision evidence e.g. bird smear and feathers on glass	Collected Carcass (Y=1, N=0)	Side of building	Comments	M or F	Species	Age

**Fig. 5** Bird Strike Monitoring Data Collection Sheet

## Building Perception Survey - Community Engaged Science

### Target Group

Any visitor or member of the community affiliated with UBC (student, faculty, staff, visitors, community member) were surveyed to gather input.

### Questionnaire

The survey took approximately five minutes to complete. The online survey hosted on Fluidsurveys was structured as follows (Fig. A1):

1. Survey Details and Ethics

2. Affiliation: Student, Faculty, Staff, Visitor, Community Member, Other
  - a. If Student was picked, had to choose their Faculty background
3. Location: Present at Niche Cafe while completing survey (Yes/No)
4. Distance test: Of all of these distances, at what point do you start to notice the dots (i.e., at what distance do you consider it a dotted window versus just a window?)
  - a. We used daytime photos at preset distance intervals (Fig. 10B) away from the south side of the BBM
  - b. Photo distance intervals were measured using a Bosch 65 Feet Laser Measure (GLM 20 X)
5. Does the design of the dots detract from the aesthetic appeal of the building? (Yes/No)
6. Strongly Agree/Agree/Neither Agree or Disagree/Disagree/Strongly Disagree Questions
 

\*Bird strikes are considered any collision between a bird and a building

  - a. Bird strikes\* are a concern
  - b. Future buildings on campus buildings should adhere to certain guidelines to minimize the amount of bird strikes\*
  - c. Implementing the bird friendly building guidelines OR bird friendly film (dots) to decrease the number of bird strikes\* occurring on campus to maintain biodiversity affects the way you perceive the university's reputation
  - d. UBC should apply feather friendly film (dots) in order to minimize bird strikes on Beaty Biodiversity Museum in front of the whale
7. Additional thoughts on Beaty Biodiversity Centre dotted glazing or bird strike prevention on campus? (Optional)
8. Email for the \$50 UBC Alma Mater Society (AMS) Food Services gift card raffle (Optional)
9. Debriefing page

### *Ethics Approval*

We obtained a Certificate of Approval - Minimal Risk (H17-00205) from UBC Behavioural Research Ethics Board (BREB) for the building perception survey portion of the project.

### *Recruitment*

We recruited study participants via posters in buildings, postings in buildings, email lists, campus building events, and classroom announcements (Table A3). Our project was advertised as a building perceptions survey because the knowledge of what the dots are used for could have potentially altered the participant answers as to how they perceived the dots. We also recruited participants during our drop in hours between the weeks of March 21st to March 31st:

- Tuesdays 2-4:30pm
- Wednesdays 10-11am
- Fridays 1-5pm

If they did not have a device, we provided computers with the survey. We raffled off one \$50 AMS food services giftcard to one of the participants that entered their email into the draw. 50 brownies were also bought from Sprouts (UBC club) to encourage participation during drop-in times.

## Analysis

### Building Perception Survey Data

Graphs were generated using the Fluidsurveys “Report” feature. The report was filtered to only include the completed responses for analysis. The emails and responses were separated to anonymize the data. The word cloud was also generated using the Fluidsurveys “Word Cloud” feature and the more a certain phrase was used, the bigger the phrase was in the generated image.

### Before Installation Data

We compared our data with two data sets from before the installation of the bird friendly film (November 11 2016). The before data at BBM and ESB was collected by the Cavers et al. (2015) from November 2014 to February 2015. We interpreted the comment “Feather on W.” as one bird strike. The first entry was kept and subsequent entries were removed for days with duplicate entries. BRC data was compared to the March 2016 data collected by the BRC volunteers. Observations were interpreted as one bird strike if the “Description of evidence column” noted evidence consistent with our bird strike criteria (Page 7). Keywords in the “Description of evidence column” such as “many” and “palmful” were considered more than ten feathers.

### Bird Monitoring Data

Before and after data was adjusted for effort (number of days surveyed per month). The number of bird strikes per day was calculated by dividing the total number of bird strikes by the number of days surveyed per month. Graphs were generated using Microsoft Excel 2016 (Mac V 15.24).

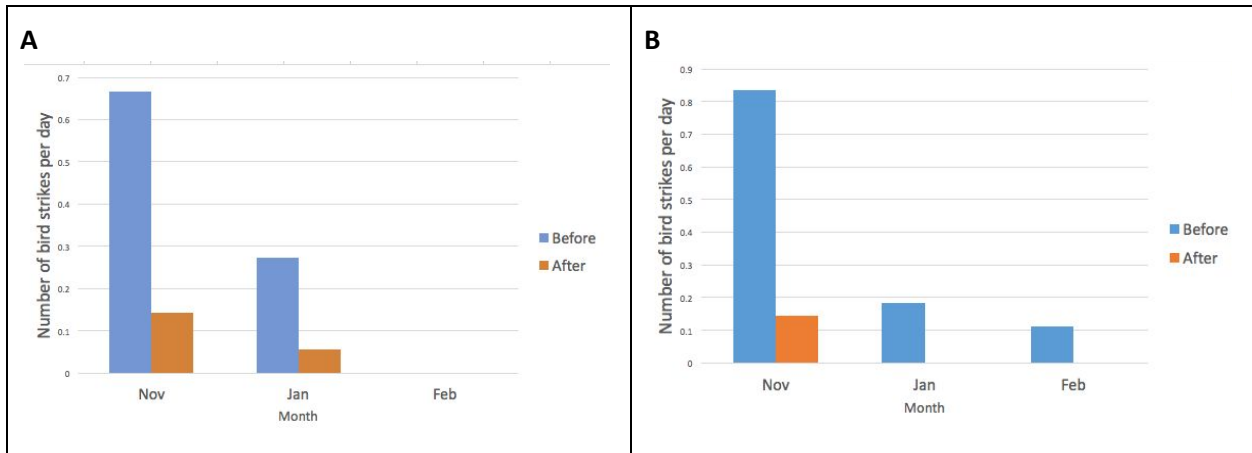
The dots were installed on BBM south face and the entire BRC fire escape. We compared the windows with dots were installed (experimental) and windows where no changes were made (control). A Fisher’s Exact test was performed comparing the number of strikes before and after on the experimental and control conditions. Before data includes data from Cavers et al., (2015) and 2016 data collected by the BRC volunteers.

## Results

### Bird Strike Monitoring

At ESB and BBM, there was a trend of more bird strikes from November to February before the installation of the Feather Friendly symmetry film than after the installation (Fig. 6).





**Fig. 6** Number of bird strikes per day, before and after the installation of the Feather Friendly symmetry film at the Beaty Biodiversity Museum from November to February of 2014/2015 and 2016/2017 at (A) Beaty Biodiversity Museum and (B) Earth Sciences Building .

At the BRC, there was a trend of more bird strikes before than after the installation of the dots (Fig. 7A).

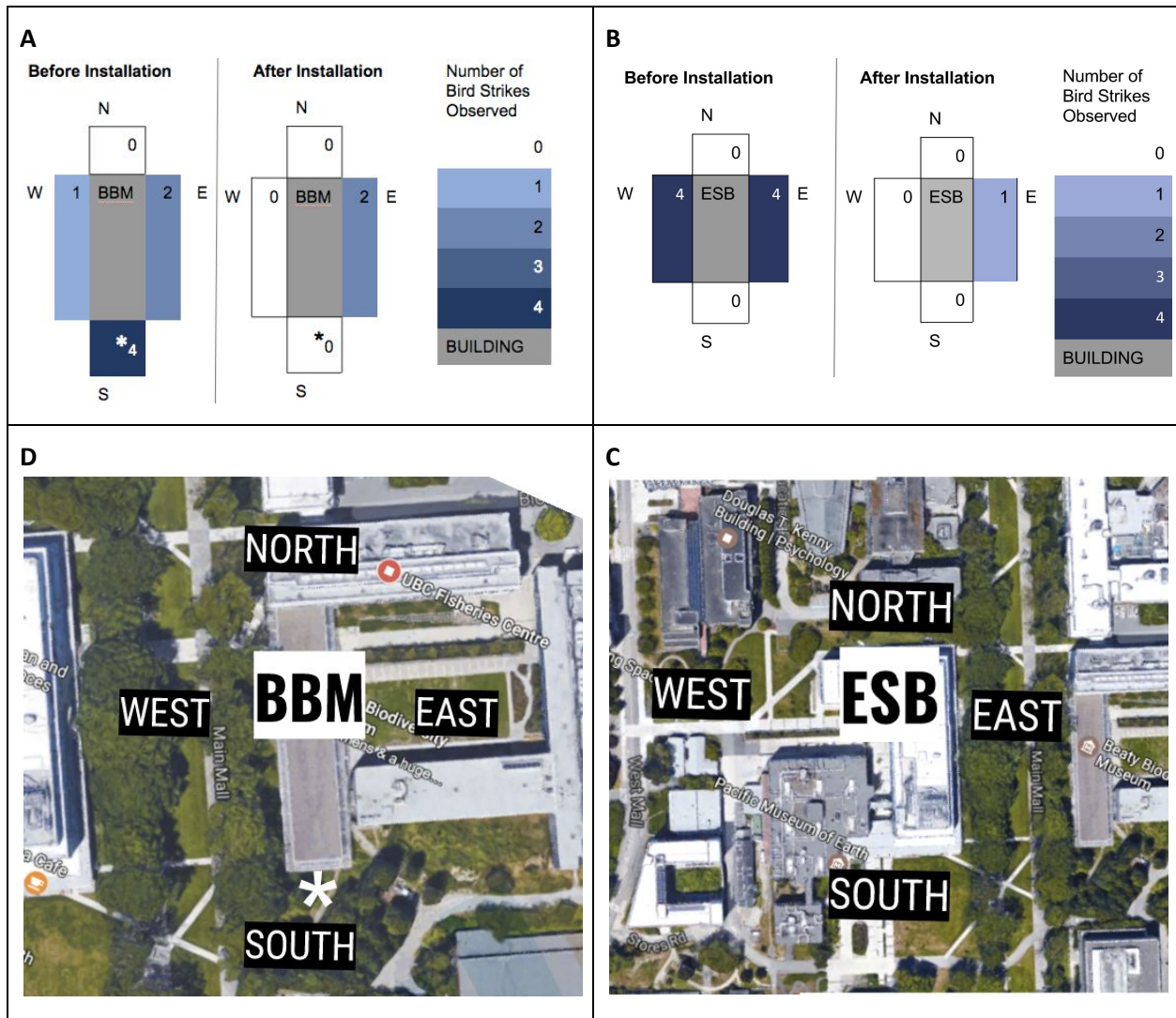


**C**

Date (YYYY-MM-DD)	Location	Description
2016-03-05	ground	Many small feathers along the window on the right side and left: difficult to tell if new collision or old feathers...
2016-03-21	ground	a palmful of down feathers partly submerged under the soil, it could be from a previous collision record?
2016-03-26	window	dust imprint (or mark), confirm with picture. No feathers on window or ground, but mark has the shape of a bird, maybe not lethal collision.

**Fig. 7** (A) Number of bird strikes per day, before and after the installation of the Feather Friendly symmetry film at the Biodiversity Research Centre in March 2016 and 2017. (B) A satellite image of the survey site. An asterisk denotes the location of dot installation. The line indicates the monitored area. (C) Data collected by BRC volunteers interpreted as a bird strike.

In the analysis of strikes per building face, there were more bird strikes recorded before the installation of the Feather Friendly symmetry film at the west and south faces of the BBM (Fig. 8A). The south face where the dots were applied had the most drastic change from four to zero bird strikes (Fig. 8A, 8D). There was no change in the number of bird strikes on the east face (Fig. 8A). The east and west faces of ESB had a reduction of bird strikes while the north and south faces remained unchanged (Fig. 8B).



**Fig. 8** Number of bird strikes observed at each building face before (Nov - Feb 2014/2015) and after (Nov- Feb 2016/2017) the installation of the Feather Friendly Symmetry (dots) at (A) Beaty Biodiversity Museum (BBM) and (B) Earth Sciences Building (ESB). Satellite photographs of the (C) BBM and (D) ESB. Asterisk denotes location of dot installation.

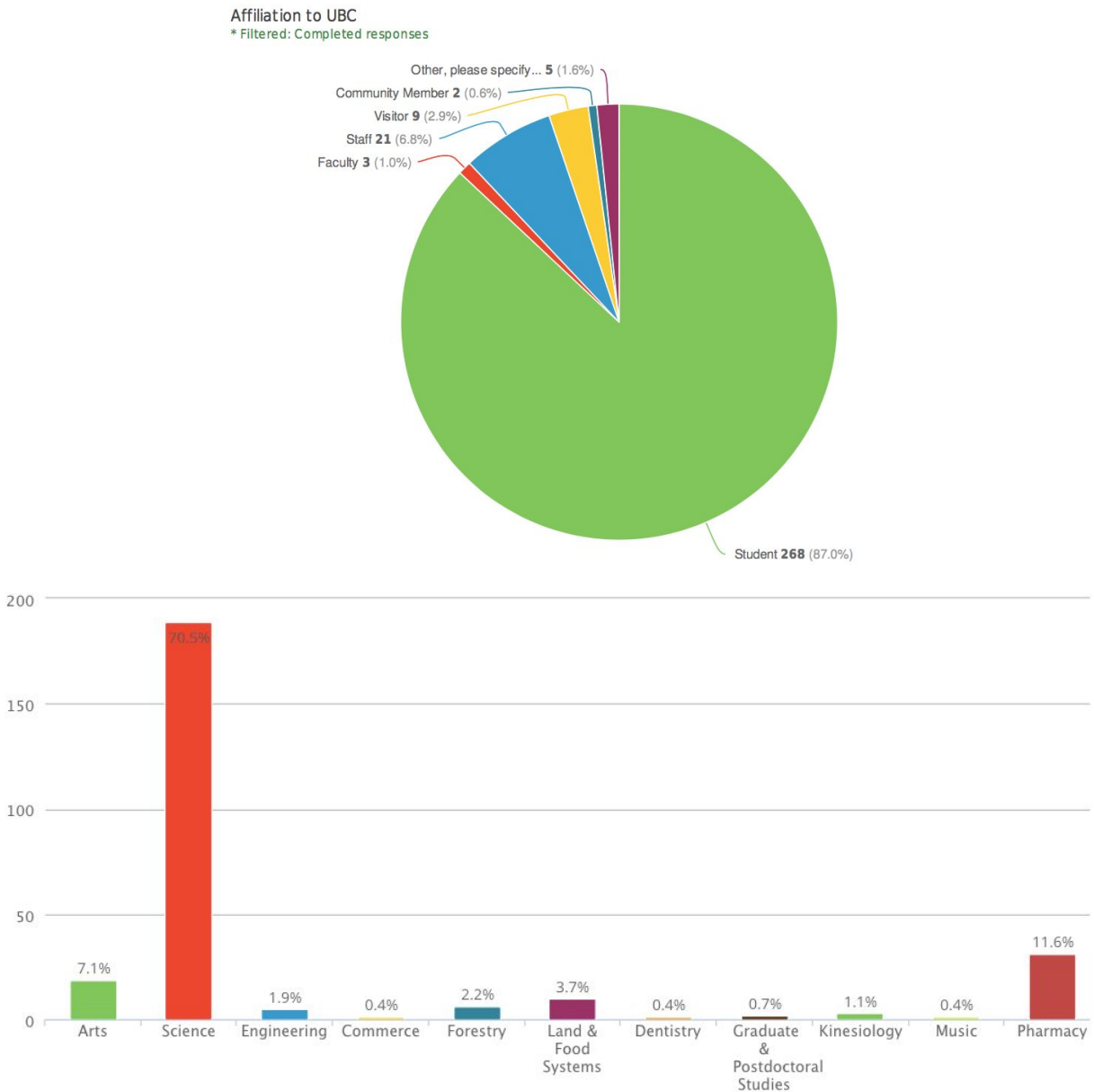
A total of 21 bird strikes were recorded on the windows of ESB, BBM and BRC from November 2014 to March 2017 (Table 1). No bird strikes were noted on the experimental faces after the installation (Table 1). There was also a reduction of bird strikes on the control faces (Table 1). The difference between before and after the installation of Feather Friendly film on November 11 2016 was not statistically significant ( $p > 0.05$ ).

**Table 1.** Number of bird strikes before (Nov 2014 - Jan 2015, Mar 2016) and after (Nov 2016 - Mar 2017) the installation of Feather Friendly film on the experimental and control windows ( $p = 0.236$ )

	Before	After
Experimental	7	0
Control	11	3

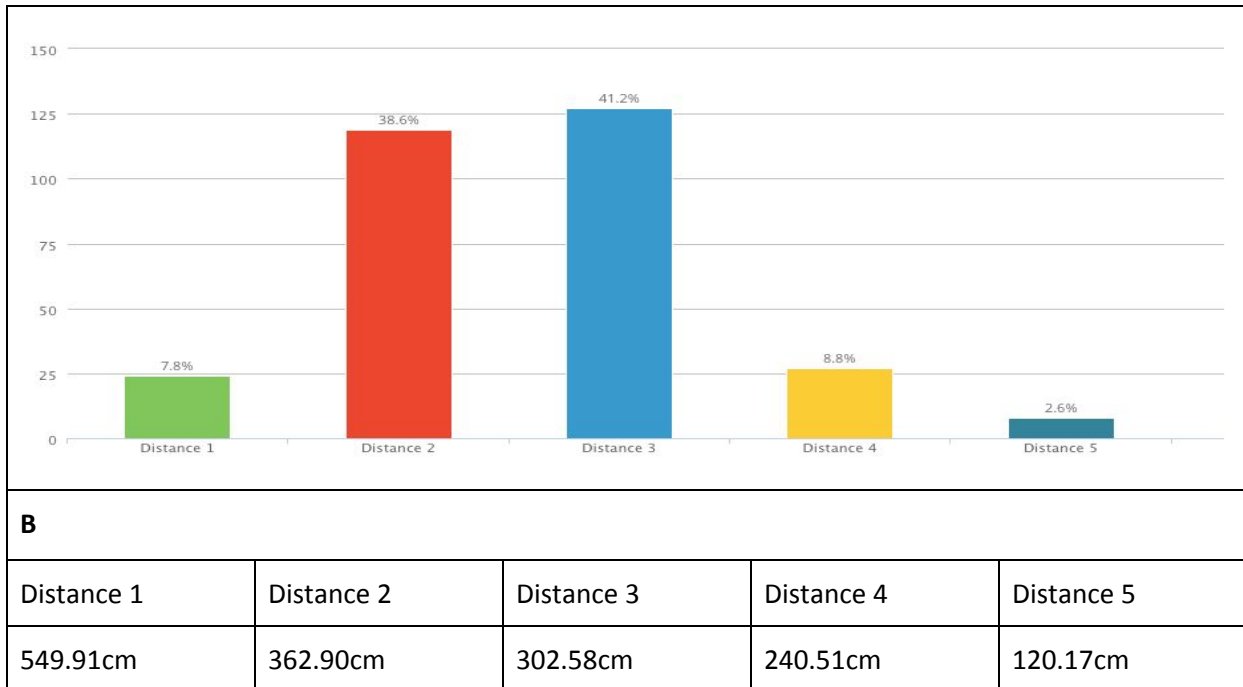
#### Building Perception Survey

The survey received a total of 308 completed responses while it was accessible online from March 17th to April 1st. Most responses came from Science students. However, there was representation from each faculty or school (Fig. 9).



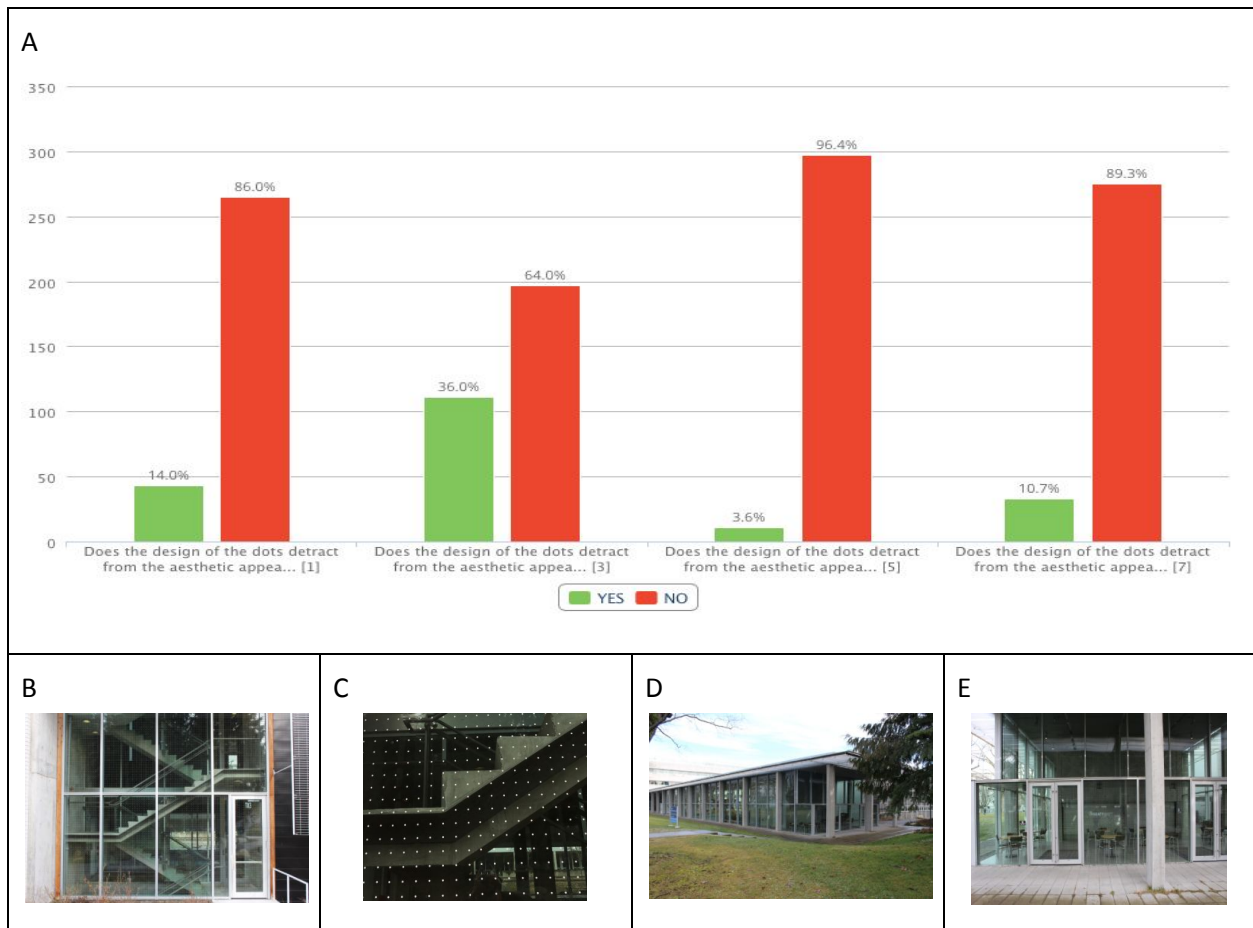
**Fig. 9** Distribution of Survey Participants

Examining photos taken from a distance of 120.17 cm to 549.91 cm, majority of the respondents chose Distance 3 (302.58cm) as the distance that they first noticed the dot installation on the south side of the Beaty Biodiversity Museum (Fig. 10).



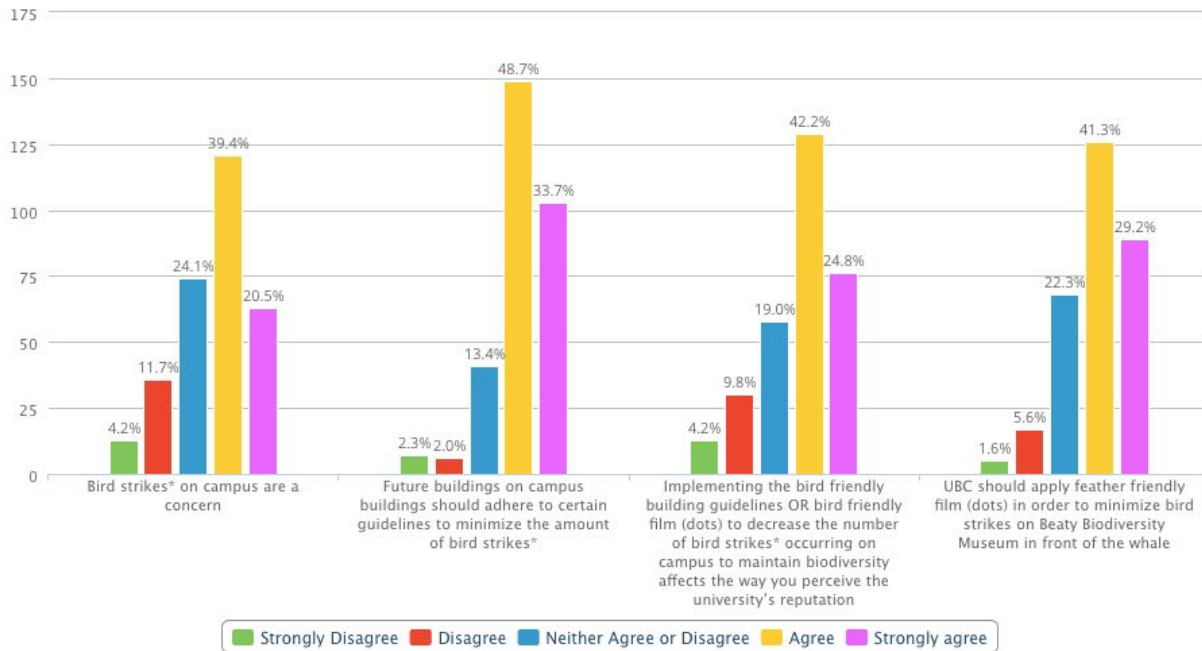
**Fig. 10** (A) Distribution of Responses for the Distance Test. (B) Distance away from the window. Measured using Bosch 65 Feet Laser Measure (GLM 20 X).

When asked about their opinions for the visual appeal of buildings and whether the dot installations detract from it, the responses were majority “no,” ranging from 64 - 95%. (Fig. 11)



**Fig. 11** (A) Distribution of Yes/No of Questions Asking About Perception of Dots on Building: “Does the design of the dots detract from the aesthetic appeal of the building?”. (B-E) Images correspond to each question

In addition, the survey respondents were asked to rank their opinions on following statements: (1) bird strikes on campus are a concern, (2) future buildings on campus buildings should adhere to certain guidelines to minimize the amount of bird strikes, (3) implementing the bird friendly building guidelines OR bird friendly film (dots) to decrease the number of bird strikes occurring on campus to maintain biodiversity affects the way you perceive the university’s reputation, and (4) UBC should apply feather friendly film (dots) in order to minimize bird strikes on Beaty Biodiversity Museum in front of the whale. Most of the responses are around 70% “agree” or “strongly agree” (Fig. 12).



**Fig. 12** Distribution of Strongly Agree/Agree/Neutral/Disagree/Strongly Disagree Question Responses of participant views on bird strikes.

Interestingly enough, an overwhelming majority of responses written in the optional “Additional thoughts on Beaty Biodiversity Centre dotted glazing or bird strike prevention on campus?” were supportive of the installation and had numerous suggestions (Fig. 13). Many respondents stated that they were not aware of bird strikes on campus and that there would be more public support if there was more promotion and also further emphasized their support for the Feather Friendly symmetry film installation as bird strike prevention was more important than the visual appeal. The common phrase “building take away from the aesthetic” observed in the word cloud (Fig. 13) is not representative of the full statement as comments that had that phrase were about the importance of protecting wildlife even at a small cost of the aesthetic appeal. Overall, there was an immense amount of support for the Feather Friendly symmetry installation from the responses that were received through the online survey as well as in person responses (Table A1).



**Fig. 13** Word Cloud of most commonly used phrases and words in the optional, open-ended question: “Additional thoughts on Beaty Biodiversity Centre dotted glazing or bird strike prevention on campus?”

## Discussion

### Bird Strike Monitoring

Our data neither support nor refute the claim that Feather Friendly symmetry film has reduced the number of strikes at BBM and BRC. Although our data suggests that the dots have mitigated the risk on the south face, during the same monitoring period the number of bird strikes on the east and west faces of our control (ESB) also went down. Huang and Porter (2015) reported that anecdotal observations and survey data suggested bird carcasses were most commonly found during the winter months of January to mid-February. Our data was inconsistent with their findings as all three buildings had very low number of bird strikes during the same period. However, the weather in Vancouver has been unusually cold this year with snow into late February and may have affected the behaviour of the resident birds.

Buildings previously prone to bird strikes that install fritted glass windows with the same dot configuration reported few to zero bird strikes after the installation (Klem, 2009). Consistent with previous research, windows with Feather Friendly symmetry film reported a decrease in bird strikes. However, our results are not statistically significant as there was a similar decline in bird strikes for both facades with and without the film. Our building bird strike count is likely an underestimate because many strikes may not have been counted due to scavenging or non-fatal collisions (Huang and Porter, 2015). Assuming that the before data sets were also underestimates, the difference between before and after installation should be proportional.



Several features of the buildings monitored may have contributed to attracting or deterring birds. Gleb and Delacretaz (2009) suggested that buildings with areas of higher levels of vegetation had more bird strikes. This was consistent with our results where faces with greater areas of vegetation correlated with a greater number of bird strikes (Fig. 8D, 8C). The coniferous vegetation on the BBM's south face is a habitat for many birds while the courtyard and native garden provides foraging opportunities on the east face. In contrast, high human traffic may have discouraged birds to approach specific building faces. Notably, the north and west faces of BBM are along a popular pedestrian pathway.

Compared to BBM and ESB, there are no comparative windows at BRC due to only one window being monitored. It is unclear if other windows of the BRC also experienced a reduction of bird strikes similar to BBM and ESB. There was insufficient amount of historical data for the buildings to determine if the decrease was consistent with overall bird strike trends or human intervention has helped.

### Building Perception Survey

Our survey was constrained by the building the dots were installed on hence the data may not extrapolate to other buildings. For example, this was only done with white Feather Friendly symmetry film (dots) although there are numerous variations and types that could result in differing responses. In addition, different devices were used during the drop-in hours and surveys completed online were completed on the participant's personal device. As the devices have different resolution, brightness settings, and other subtle differences that would affect the perception of the dots on the distance test question, these are major factors that we need to keep consistent. Results from the distance test questions should be interpreted with caution as it is a different experience actually viewing the glass in person compared to viewing it on a computer screen. The in-person responses were also incorporated into the conversation as a question so it was not standardized throughout the drop-in process. Since most responses were from Faculty of Science students, that could have skewed the responses favouring that certain demographic.

### Recommendations

The three sites alongside other UBC sites should continue to be monitored. Building monitoring at UBC started in 2014 hence, there is insufficient historical data to confirm if the reduction of bird strikes was due to the dot installation. In particular, there is a lack of data collected prior to the installation of feather friendly film. In addition to the winter months the spring and fall migratory seasons should also be considered to capture the film efficacy on different bird communities. Future projects would benefit from a standardized monitoring protocol for more comparable datasets. The efficacy of the dots may vary with different buildings depending on landscaping, architectural design and the strategy should be adjusted accordingly (Sheppard and Phillips, 2015). The entire building should be monitored before and after installation for windows considered for retrofitting.

For future building perception surveys, several improvements could be made. We can increase the diversity of participants by changing drop-in hour locations to cover areas where students and faculty

from various backgrounds frequent (all without the feather-friendly glass) and continue the usage of the incentive. We had trouble loading our web based survey when approaching individuals on Main Mall therefore having data or another source of wi-fi would be beneficial for future surveys to approach more participants. Additional survey models that were discussed included adding an in-person walking test to see the natural perception of the dots while walking along Main Mall as perceptions of the experience of the building cannot be measured by showing photos. However, when testing the experiment the accuracy of the laser pointer and Main Mall traffic was an issue. Improvements to the usage of the laser measure could be made to increase its effectiveness when surveying.

We hope to integrate our research into BBM's existing programming to generate interest in the issue. During our surveys at Niche Cafe, many patrons were unaware of the role of the dots in protecting birds. We were inspired by a father who used the knowledge after taking our survey to talk to his children about the the relationship between the dots and the birds to focus on outreach. Signage could be installed to accompany the dots to explain to visitors their significance. Additional support material can also be created such as volunteer training sheets and an updated project informational pamphlet to aid staff and volunteers in educating visitors. Furthermore, engagement opportunities such as the "Way Cool" presentation series, school group programming, and social media platforms can also be used to raise awareness. Activities where participants learn simple do it yourself methods using window markers and stickers to make windows bird friendly can be integrated (Raiche-Savoie, 2015).

Our results have been inconclusive but birds continue to have difficulty navigating the urban landscape. Thus, mitigation strategies like the Feather Friendly symmetry film may play a crucial role in protecting urban birds. The implementation of bird friendly features should become an integral component to future UBC buildings. We hope that, in the future, bird friendly design will be integrated as an "invisible" element in architecture that shapes our world.

## Acknowledgements

We would like to acknowledge Dr. Sally Otto and Elizabeth Kleynhans for their input throughout the project. Thank you to Hannah Brash and Penny Martyn from SEEDS for their support and coordination and to Catherine Ouellet-Martin and the rest of the Beaty Biodiversity Museum Staff for their help and providing the Niche Cafe space.

# Appendix

**Fig. A1 Building Perceptions Survey Screenshots**

THE UNIVERSITY OF BRITISH COLUMBIA

**Building Perceptions Survey**

0%

**Building Perceptions Survey**

Principal Investigator - Sarah (Sally) Otto, Professor of Zoology  
Departmental Affiliation - Zoology  
Co-investigators - Jasmine Lai and Sarah Park

**Purpose:**  
The 5 minute survey will ask about your feelings about the implementation of new building features on campus. The data collected will be used towards forming building guidelines for future UBC buildings. All of your responses will be kept confidential.

**Survey Host:**  
This online survey is hosted by Fluid Surveys with servers located in Canada. Fluid Surveys is a service provided by SurveyMonkey a company based in the US. This survey does not ask for personal identifiers or any information that may be used to identify you. The security and privacy policy for the websurvey company can be found at the following link: <https://www.surveymonkey.com/mp/privacy-policy>

**Potential Benefits:**  
There are no direct benefits to the participants. However, participating in the study will help inform future building policies at the University of British Columbia.

**Potential Risks:**  
Information presented in the survey may be upsetting to the participating as it contains alarming statistics regarding bird strikes. The researchers can provide educational and emotional support resources if you would like support. You do not have to provide answers to any questions you are uncomfortable with. You may withdraw from this survey at any time.

**Confidentiality:**  
Principal Investigator and Co-Investigators will have access to the data collected. The data will be stored in a secure password protected computer with encryption enabled. Your email entered for the honours/thesis will be separated from your survey answers.

**Measurement:**  
You have the option to enter in your email at the end of the survey to be entered in a draw for a \$50 AMS Food Services gift card. If you decide to withdraw from the study you are still eligible to enter the draw for the gift card.

If you have any questions about this project you may contact, Jasmine Lai at [jasmine.lai@ubc.ca](mailto:jasmine.lai@ubc.ca) or Sarah Park at [sarah.park@ubc.ca](mailto:sarah.park@ubc.ca).

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or if long distance e-mail: [RHSI@ers.ubc.ca](mailto:RHSI@ers.ubc.ca) or call toll free: 1-877-822-8598.

Your participation is voluntary. You may withdraw from this project at anytime. If the survey is submitted it will confirm that you agree to participate and understand the study.

[Next](#)

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**Building Perceptions Survey**

12%

**Affiliation to UBC**

Student  
 Faculty  
 Staff  
 Visitor  
 Community Member  
 Other, please specify..

**Faculty**

Are you in the Niche Café now?

Yes  No

[Back](#)
[Next](#)

THE UNIVERSITY OF BRITISH COLUMBIA

**Building Perceptions Survey**

25%

**Distance Test**

Of all of these distances, at what point do you start to notice the dots (i.e., at what distance do you consider it a dotted window versus just a window?) below:

Distance 1

Distance 2

Distance 3

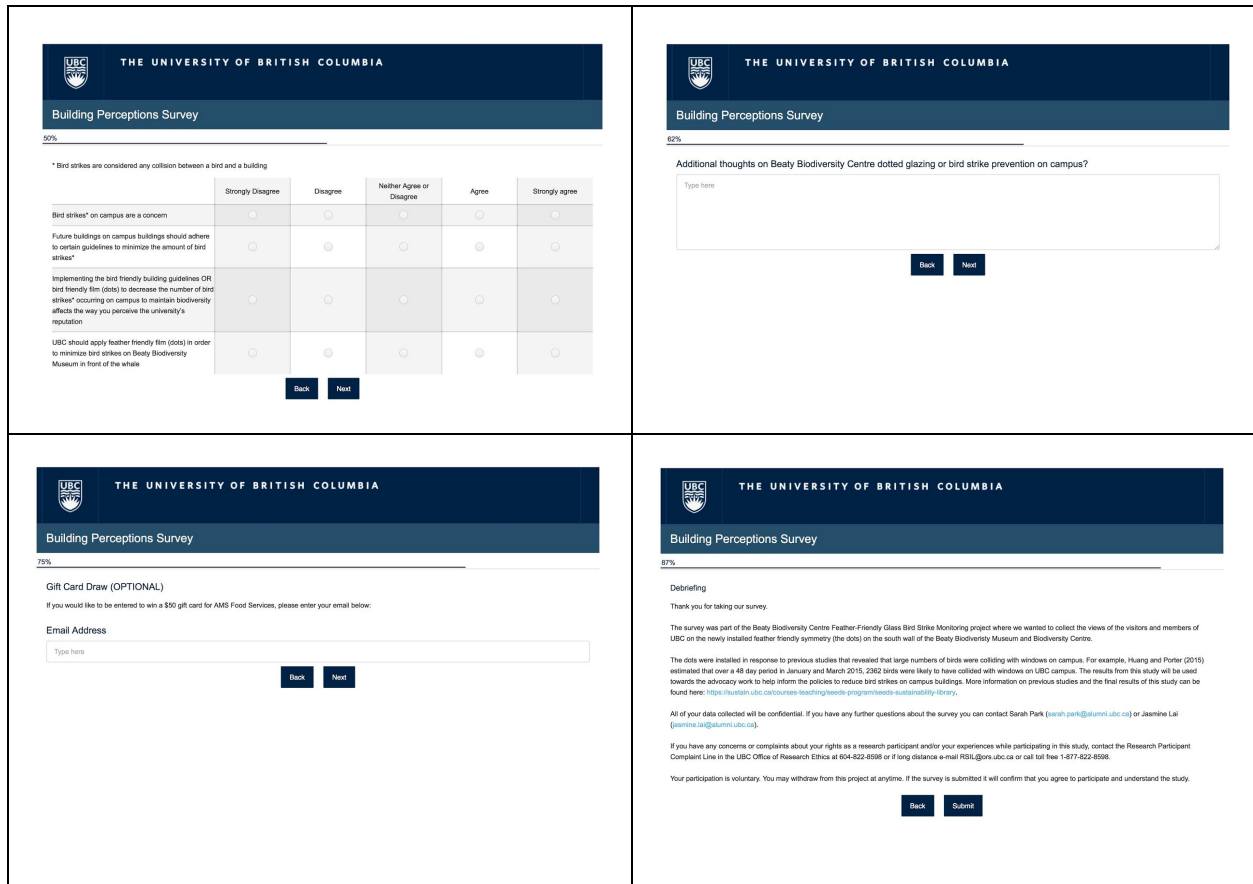
THE UNIVERSITY OF BRITISH COLUMBIA

**Building Perceptions Survey**

37%

**Does the design of the dots detract from the aesthetic appeal of the building?**

	YES	NO
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>



**Table A2** Responses for the “Additional Comments” Question on the Building Perception Survey  
Entire comments or portions containing identifying information were removed to protect participant privacy.

Comments
<ul style="list-style-type: none"> <li>● I think other tall buildings need that too.</li> <li>● If the dots are put right in front of the whale, any close up photos taken of the whale will be disrupted. Considering the whale to be a large and to some people a main attraction of the museum, I would think twice about putting the dots up (from asthmatic (sic) view). On the other hand, distance photos of the whale will not be disrupted.</li> <li>● In addition to preventing bird injury and death, the installation of dotted glazing for the windows of the Centre also be a good conversation starter with visitors for discussions regarding bird strikes and indirect human impacts on biodiversity. A win-win situation really.</li> <li>● More buildings with lots of windows need to be more bird friendly</li> <li>● I think bird strike prevention is important and doesn't really affect the overall visual of the building</li> <li>● Bird lives are more important than how I feel about a window with tiny dots on it! Save these little birds!</li> </ul>

- I am currently in a group doing a comprehensive survey of bird species found on UBC campus for a class. A final report summarizing our findings as well as additional analysis with the species data will be available by mid April.
- Great idea! I am in full support
- Great idea!
- I answered "agree" to implementing a feather friendly film in front of the whale in the biodiversity museum but without statistical knowledge of how many birds it effects, I am not confident in my answer. The whale skeleton on display is extraordinary and should be conserved as a pristine image so I think that if the amount of bird strikes on that window specifically is relatively low, there shouldn't be film applied to it.
- Ideally, dotted glazing would be implemented into the planning and design of all future construction projects on campus.
- What areas of the building will be treated? I think this is appropriate for large panes in public areas, but would be annoying for windows you look through up close (e.g. such as my office window!). Also curious as to what current bird strike rates \*are\* on campus, and what percentage reduction could be seen with the dotted glazing...
- I fully support bird strike prevention on campus.
- Bird cut outs could also work!
- Is this only a problem at this one location? I have only once seen a bird injured from presumably hitting a building in 4 years here
- I do not know if bird strike is a problem for the Beaty building. If so, I agree to use the dotted glazing for the prevention.
- I had no idea this was happening, interesting.
- Awesome idea!
- I believe it is very important, and not noticeable from a distance, nor distracting up close.
- Some of the more modern building projects on UBC also involved a large portion of glass windows-- the new Aquatic Centre, for one. I think the dotted glazing and subsequent regulations for bird strike preventions can be applied to the rest of the campus, as well. Bringing the issue to campus community should also be part of the prevention.
- I think that is an excellent idea which would reflect well on the university.
- I don't think this issue is being addressed enough on campus (i.e., awareness). But, if the feather film dots are proven to be successful in reducing bird strikes, then UBC should continue to use and implement them.
- Would detract from the viewing of the whale, elsewhere on building sounds like a good idea
- I hardly even notice the dots and never knew they had a reason to be there! Interesting.
- Humans should stop making things that kill other things
- I think it's great! I heard that bird collisions with windows is one of the main causes of bird deaths globally, so it's good to find innovative ways to prevent that from happening!
- I think it is a wonderful idea. After taking an ornithology course, one of my favourite pastimes is to see how many birds I can identify as I walk from class to class. Anything that could be done to prevent bird death would be great. My only question would be concerning the cost as I believe that would be the major issue of most people who were not so biologically inclined.

- This is great! We need to protect birds in urban areas/around campus
- The dots look pretty nice. It is really nice to see that steps are being made to minimize bird collisions and this program should get more publicity!
- I have witnessed 2 bird strikes personally and as we keep moving towards glass-heavy architecture I'm becoming very concerned. UBC has such wonderfully diverse bird populations
- The dots look nice and serve an important purpose!
- The aesthetics of the windows look cooler with the dots in my opinion. Learning the reasoning behind the dots make it even cooler and makes me want to support the implementation of the dots further.
- It looks nice from afar.
- I didn't know until this survey that the dots were to prevent bird strike. I feel like a lot of people on campus are unaware of the dots and the frequency of bird strikes on campus.
- Can you please also fix other buildings on campus? Thank you.
- Interesting! I never thought that dotted on window helps the birds.
- I think this is a fabulous idea, except that the whale skeleton itself shouldn't be obscured.
- I do quite like the idea of dotted glazing and I am in support of other bird strike prevention strategies. I hope this gets approved and implemented so that we can continue to decrease the incidents of bird strikes.
- Birds need protection, and it is our responsibility to help preserve these beautiful creatures, just as we are responsible for the construction to create more buildings.
- Protect the birds!
- I might be biased because I'm really into birds, but I just wanted to say that putting dots on the windows is a really really cool way to stop bird strikes and one that I never even considered to be an option.
- I love birds, but is this really where my tuition money is going?
- Not really noticeable from a distance
- Put up a sign about how many bird strikes happen on campus to increase the popularity of the dotted glazing. People would be horrified if they knew just how many happened.
- I think bird strike prevention is a great idea and I am fully on board with doing some things to help our local community.
- I think this is a fantastic program! Keep up all the good work. I love the monitoring it should be long term. I don't think the dots distract from the look of the building at all. In fact I think they make the building look better. We must save these birds!!!
- cool, haven't previously considered such a method of prevention
- I think using dotted glazing should be an easy procedure and if it's cost beneficial then implementing them would positively increase UBC's image
- I never realized UBC implemented these measures nor did I know the significance of the dots
- If there is disagreement about putting the dots on the main window that shows the whale from Main Mall, that does not mean the dots can't be put on all other windows. Many of UBC's buildings have a very large amount of glass and we have the responsibility to protect wildlife, even if it comes at a small cost to aesthetics.
- A great initiative but need to be taken great care not to implement haphazardly

- Different colours or different materials?
- If the Feather Friendly is applied on windows in front of the whale, would it be possible to make small peep holes at various heights for various ages (small children to adults on the western side of the atrium where visitors are most likely to be looking at the whale. for example just 4" x 12" for eyes?)
- I like the look
- How much does it cost, how is the university going to fund it. Also, how effective is this technique statistically.
- The fact that this could be a concern has never crossed my mind.
- A good idea, it's time to take responsibility of the impact we have on our environment.
- Led light around the south campus greenhouse seems to be attracting birds and causing bird strikes
- I don't think it takes away from the building's physical appeal - I think it looks nice and decorative
- I like birds, and I like dots
- Save the birds!
- I really appreciate this initiative; it is not something I would have necessarily pegged as a problem, but now that it has been raised I am concerned!
- Preventing bird strikes to buildings just makes sense. There are enough threats to bird populations worldwide due to hunting, poaching and capture, pollution and habitat loss.
- I don't think the dots on the building take away from the aesthetic therefore they should be used to prevent bird injuries.
- Great idea, think I'm going to implement this same idea at my house
- I don't have strong thoughts on it, but I had previously noticed the dots and hadn't known why they were there. I thought they were purely decorative. But now that I know what they are for, I like them even better. If they prevent bird strikes, then sure thing, put them on other buildings too.
- I have encountered so many dead birds from strikes, I feel that the UBC acts too slow to stop the killing.
- I have witnessed a bird strike while in the FNH building, which was definitely distressing to watch. So I am happy that niche has the dots. I really wish ESB did as well.
- Dots may also keep the light coming through the windows less intense on sunny days.
- I have never thought that this glass type of wall might be bad for birds until taking this survey. Absolutely great idea and strongly support this!!!
- Use reflective windows?
- I think the wall looks great and UBC should continue making them!
- I would be interested to see the bird strike data on both side of the whale (E window, W window) and if the courtyard side (E window) gets more bird strikes due to availability of habitat and food due to the courtyard (green roof). I think it would be great to put the dots on the E window, I am a bit concerned about the W window due to the Whale being a major attraction to the Museum. I also wonder if the dots are noticeable at night?

- Never noticed the dots before - thought they were just a design and not specifically for bird strike prevention
- Happy to see that something is being done!
- Seems like a cost-effective solution! Great!
- I would rather the money used for something else.
- didn't know dotted glazing was to reduce bird strikes - should be noted to raise awareness
- As an avid birder, I believe that it is a phenomenal idea to have dotted glazing or bird strike prevention. It's a simple fix to save a wide variety of passerines which tend to fly right into the clear windows. Since a lot of the new UBC buildings are heavily glass influenced, the dotting is a great warning for birds.
- Preventing bird strikes is more important than appearance

**Table A3** Advertising Contacts for Survey Promotion

Marketing Medium	Person of Contact	Notes
Science Newsletter - Distillation	<a href="https://survey.ubc.ca/s/distillation-request-form">https://survey.ubc.ca/s/distillation-request-form</a>	Attached link to the survey (NOT ACCEPTED)
UBC Events/FYI	<a href="mailto:info.events@ubc.ca">info.events@ubc.ca</a>	Attached powerpoint size graphic & link to the survey (NOT ACCEPTED)
Beaty Biodiversity Building	<a href="mailto:building@biodiversity.ubc.ca">building@biodiversity.ubc.ca</a>	Attached PDF of project details (ACCEPTED)
Posters	N/A	Locations: <ul style="list-style-type: none"> <li>• Beaty Biodiversity Museum</li> <li>• Biodiversity Research Centre</li> <li>• Abdul Ladha Science Student Centre</li> <li>• Chemistry Building</li> <li>• Hebb Building</li> </ul> (ACCEPTED)
Classroom Presentation	N/A	Emailed various professors to add in powerpoint size graphic & link to the survey during class (ACCEPTED)
Building Events	N/A	Attend events with laptops, brownies, signs to ask attendees to complete the survey



		(ACCEPTED)
Email Lists	Zoology/Biology Department Zoology Graduate Student List	Sent an email to all Biology students on behalf of the co-investigators with brief details of the project and the survey link (ACCEPTED)

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