

Bird-window collisions at Vancouver Island University: an assessment of severity and contributing factors

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Background

- Window collisions are among the top anthropogenic causes of bird mortality, killing 16 to 42 million birds annually in Canada.¹
- Birds are known to strike windows as they are unable to detect clear and reflective glass. Birds fly into the glass to get to the habitat visible through clear windows or the apparent habitat mirrored by reflective windows.^{1,2,3}
- Building factors associated with bird strikes include percent glass cover, window height, window type (i.e., clear or reflective), building cover, and the proximity and density of habitat adjacent to buildings.^{4,5,6}
- Birds are known to strike windows in every season, in all weather conditions, and throughout the day and night.^{1,2}
- Bird mortality rates are highest during spring migration, summer, and fall migration.⁶ Birds that migrate at night can be attracted towards artificial lighting from city centers, and become disoriented and collide with windows.⁷
- Approximately 10,000 species are affected by bird-window collisions, including species of conservation concern. The loss of productive individuals is associated with population declines and biodiversity loss.^{1,8}
- Several methods to prevent bird strikes exist. External UV films and uniform dot patterns have shown the most promise in reducing bird-window collisions.^{1,3}

Objectives

- Determine if bird-window collisions are a significant problem at the Vancouver Island University (VIU) Nanaimo campus.
- Identify problematic buildings and possible factors associated with bird strikes.
- Propose bird-window collision prevention methods.



Figure 1. (A) Photograph display of the 38 intact bird carcasses recovered during surveys from September 2017 to February 2018 at Vancouver Island University; **(B)** the corresponding identity (common name) and number of bird carcasses collected, where each letter adjacent to the species name is provided on the photograph.

Bird ID	Number retrieved
A: Varied Thrush	15
B: American Robin	5
C: Rock Pigeon	1
D: Eurasian-collared Dove	1
E: Golden-crowned Sparrow	1
F: Dark-eyed Junco	2
G: Pacific Wren	1
H: Song Sparrow	1
I: Fox Sparrow	1
J: Yellow Warbler	2
K: Orange-crowned Warbler	2
L: Golden-crowned Kinglet	2
M: Anna's Hummingbird	4

Materials and Methods

- Eight buildings on the VIU campus were monitored weekly for bird strike evidence from September 2017 to February 2018. The buildings surveyed included 170 (Aboriginal Gathering Place), 193 (Student's Union), 200 (Student Affairs), 205 (Career and Academic Preparation), 305 (Library), 310 (Theatre), 355 (Arts and Sciences), and 356 (Social Sciences).
- Each building was surveyed for injured birds, dead birds, or feathers within 2 m of a building, and feathers or dust marks on windows. In addition, GPS coordinates were recorded for dead birds found. Vegetation distance and height, percent window cover, window transparency and reflectivity, and light emission at night were also measured for each building façade.
- A Citizen Science component encouraged the VIU community to report bird strike evidence through a Google Form accessible at <https://wordpress.viu.ca/viubirdwindowcollisions/>.

Results

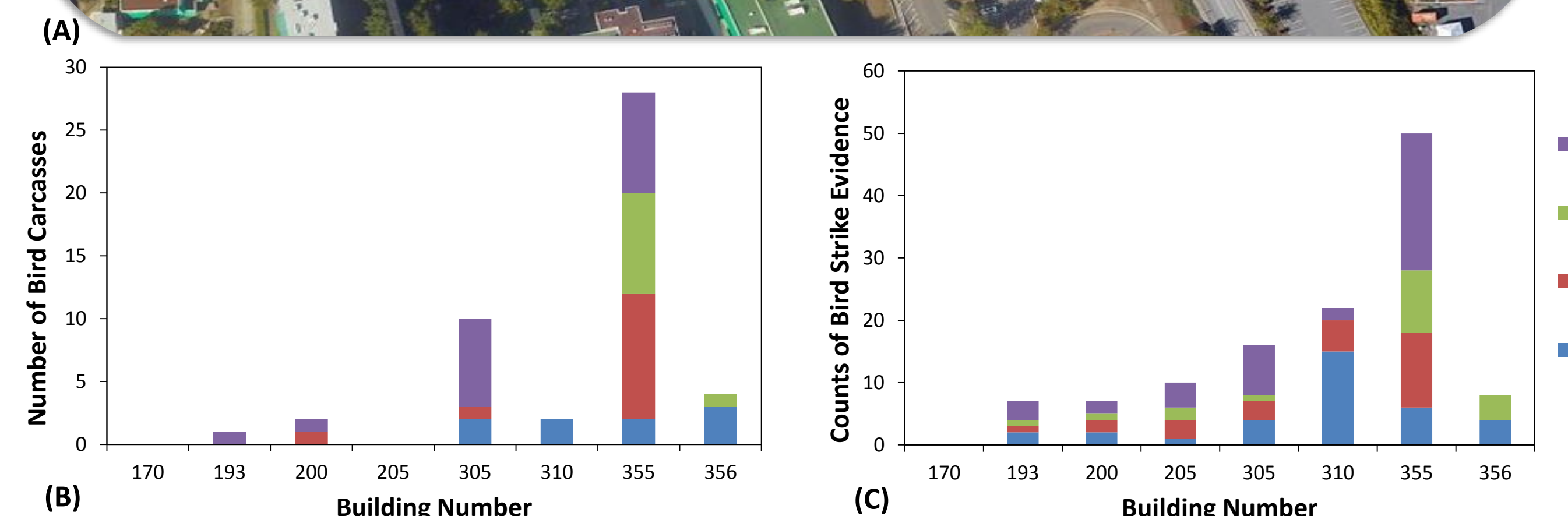
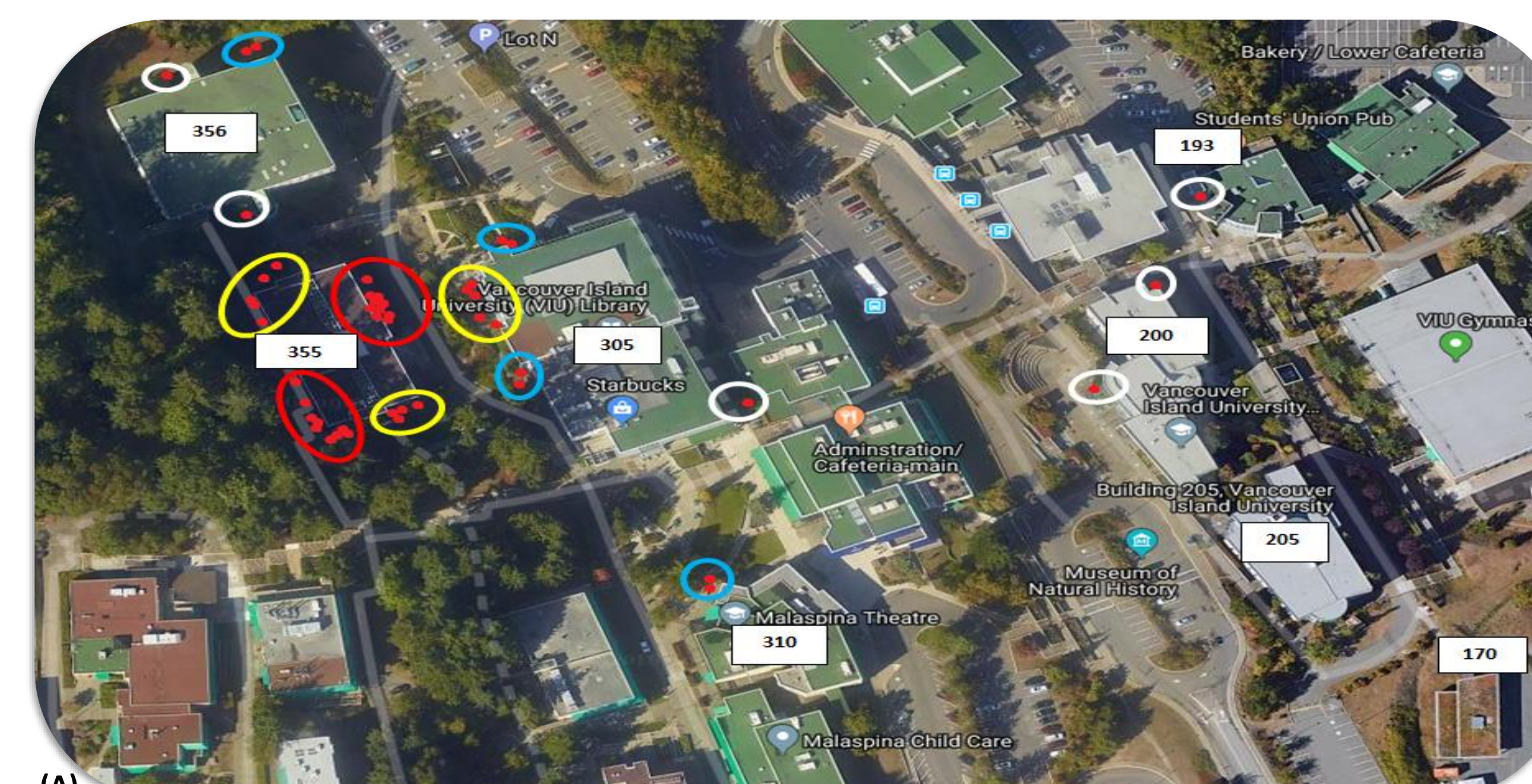


Figure 2. (A) Map of the VIU campus showing the eight surveyed buildings and bird-window collision hotspots. Areas where bird strikes occurred are shown as red dots within circles of red (8 or more collisions), yellow (4-7 collisions), blue (2-3 collisions), and white (1 collision). The red and yellow circles show hotspots, where a higher incidence of bird strikes occurred; **(B)** the number of bird carcasses found at each surveyed building façade; **(C)** the counts of bird strike events, excluding carcasses, at each surveyed building façade.

- A total of 47 bird carcasses were found and identified to 14 different species. A subset of intact carcasses are represented in **Figure 1**. The torn up remains of 9 Varied Thrushes, 1 Fox Sparrow, and a Northwestern Crow were also identified.
- The GPS location of bird carcasses are shown in **Figure 2(A)**. Hot spots (areas with a higher incidence of bird strikes) exist at building No. 355 (28 carcasses), and the west side of building No. 310 (10 carcasses)(**Figure 2(B)**).
- A total of 120 birds strike events were recorded (excluding bird carcasses), of which 50 events were recorded for building No. 355 (**Figure 2(C), 3**).
- Transparency ($\chi^2 = 11.6$, $df = 2$, $P = 0.003$) and presence of vegetation within 2-8 m ($\chi^2 = 48.4$, $df = 5$, $P < 0.001$) significantly contributed to bird-window collisions.
- A total of 22 Citizen Science entries reported 26 additional bird strike incidents.

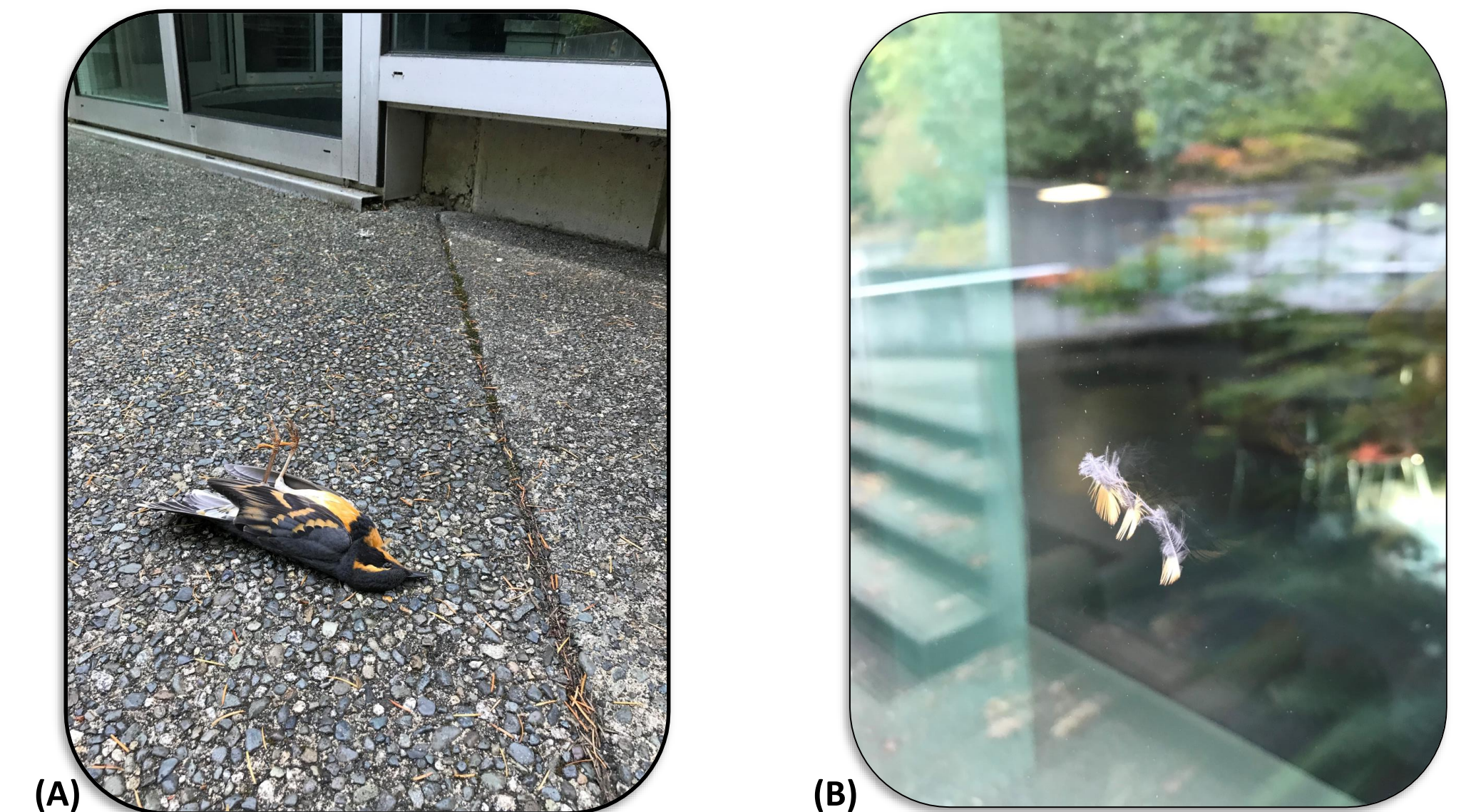


Figure 3. (A) A Varied Thrush found lying next to fully reflective and non-transparent windows at building No. 355; **(B)** feathers stuck to a window as a result of a bird collision.

Discussion

- Results indicate that bird-window collisions are an important issue at VIU. During the 5-month study period, evidence for 120 collisions was found. If extrapolated to the entire year, these data suggest upwards of 300 collisions may occur each year.
- Buildings No. 305 and 355 were deemed problematic, where 5 or more bird carcasses were found at these buildings. These buildings include façades with more than 50% window cover, with reflective, non-transparent windows, and that are surrounded by tall vegetation within 2-8 m on each side.
- GPS coordinates of bird strikes, such as those marked in **Figure 2(A)**, provide an effective way to focus mitigation efforts.⁹ By identifying areas with a higher concentration of bird-window collisions, preventative measures can be applied to those areas, and are thus cost effective.
- External UV absorbing and reflecting films, and uniform dot patterns on problematic windows have shown to be effective at mitigating bird strikes.^{3,4} These preventative measures could be successfully implemented at VIU.

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