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WINDOW STRIKE BIRD MORTALITY ON THE UNIVERSITY OF NEBRASKA – LINCOLN CITY CAMPUS

By Thomas E. Labeledz, University of Nebraska State Museum

INTRODUCTION

On May 25, 1915, in Lincoln, Lancaster County, Nebraska, a Gray-cheeked Thrush was “killed by flying against the library building on city campus” and was found by Robert H. Wolcott and prepared as a scientific study skin by Leroy M. Gates. This thrush is now ZM-6674 in the University of Nebraska State Museum (UNSM) Zoology collections. Birds are typically killed at low level buildings by flying into windows. This thrush is the first documented window strike death for what is now the University of Nebraska – Lincoln city campus. Based upon the UNSM bird collections I report on the last 100+ years (1915 through Dec 2019) of window strike bird mortalities on the city campus (especially 1985-2019). There were a total of 980 specimens of 87 species from 39 separate buildings or building complexes.

STUDY AREA and METHODS

The University of Nebraska State Museum (UNSM) Division of Zoology collections database was examined for avian specimens salvaged from city campus and whose label data indicated they had died, or very likely died, as a result of striking a window. For the purposes of this project the city campus was defined as being bounded on the east by Antelope Valley Parkway, the south by ‘Q’ Street, the west by 10th Street and what is now Interstate 180, and on the north by what is now Salt Creek Roadway and the approximate location of ‘X’ Street. Only specimens salvaged from university-related buildings within those boundaries were included. The campus has changed markedly over the past 100 years. In 1915 it was only beginning to expand beyond the original four city blocks from 10th to 12th Streets and ‘R’ to ‘T’ Streets. Some specimens had a street address recorded and when that could be determined to be a university building, it was included. Building, or building complexes, are recorded in the Appendix using the current name of the building. If questions arose from the database concerning the specimen, the specimen’s original label was consulted.

Recording cause of death of specimens deposited at UNSM prior to my arrival on campus in 1985 was subject to the discretion of my predecessors. No attempt was made to re-interpret their wording on labels. Undoubtedly some specimens from city campus resulted from window strikes but were not noted as such, and not included herein. And I am unaware of any attempts to survey window strikes on campus prior to 1985. Since 1985 the cause of death has been recorded on specimen labels when known. During a period from 1992 to 1995 (approximately 3.5 years) I made regular walking trips around city campus during migration periods of mid-April to mid-June

and mid-September to mid-November specifically in search of window strike mortalities for UNSM (Labeledz 1997).

Not all mortalities were saved and deposited at the museum. The species and numbers listed herein represent an absolute minimum number of birds killed by windows on this campus. Specimens unidentifiable due to decomposition or partial scavenging, or otherwise unsuitable for museum preservation, were retrieved but discarded to dissuade scavengers. Over the years it was noted that some specimens were being removed by mammalian scavengers that had also learned which windows produced mortality. Scavengers noted by the author include: dog, cat, raccoon, Virginia opossum, red fox, and fox squirrel. Some work has been done to compensate for scavengers in reporting mortality rates at windows (Bracey et al. 2016) but these processes were not applied here. Some building and landscape services personnel were also noticed removing window strikes to keep the buildings attractive. Personal time constraints sometimes meant that not all buildings were visited on a particular day, or even visited regularly during a particular season. There was no record of effort on my part to search campus for window strike mortality. Because this was primarily a way to grow museum research collections and train students, there was no detailed examination of buildings not known to cause mortality (control group). Since 1995, examination of campus windows for dead birds has been irregular at best; sometimes a whole year (e.g., 2017) would go by with no window strike birds deposited in the collections. Searches for window strike mortalities outside passerine migration periods have been intermittent to non-existent and relied upon the fatality being noticed by others and brought to my attention.

RESULTS

Museum records from the initial specimen mentioned above (ZM-6674) in 1915 through all of 2019 indicate 980 specimens entering the UNSM collections resulting from window collisions at 39 separate buildings. Only 19 of these records can be attributed to the period prior to 1985. Many of those 19 do not list a specific building. A smaller subset (3.5 years, Jan. 1992 - Jul. 1995) was examined in a general education publication (Labeledz 1997). This is more realistically a 35-year summary (1985-2019). Buildings listed herein which were present on city campus prior to 1985 were very likely causing mortality similar to that reported post-1985, but very few specimens were retained or labeled as such. Summarized in Table 1 are the numbers of each species from each building. Those where a building was not specified are in the column labeled "Building Unknown".

Examination of Table 1 shows three buildings (approximately 7.7% of the buildings listed) accounting for over 50% of the mortality: Cather-Pound-Neihardt (CPN) Dining Link (23.98%), Sheldon Art Gallery (17.04%), and Oldfather Hall (15.20%). Further examination of Table 1 shows just nine species accounting for nearly 50% of the mortality: Lincoln's Sparrow (8.78%), Orange-crowned Warbler (6.33%), White-throated Sparrow (6.22%), Dark-eyed Junco (5.71%), Nashville

Warbler (3.98%), American Robin (3.88%), Swainson's Thrush (3.88%), Clay-colored Sparrow (3.78%), and Common Yellowthroat (3.67%).

Figure 1 plots the number of specimens based on the month they died at windows. The total number represented is 979 because one specimen was listed with only a year (no month or day) indicated on the label. It is easy to see the bi-modal distribution of fatalities corresponding to spring and fall passerine migration. There were 291 deaths in May (29.72%) and 271 in October (27.68%), accounting for over 50% of all deaths. Adding the preceding months, April with 87 deaths (8.89%) and September with 183 (18.69%), shows that the 4-month migration period accounts for 85% of the deaths.

DISCUSSION

Recently, there has been documentation of large declines in North American bird populations (Rosenberg et al. 2019). It has been well known for many years that birds and windows do not interact well (Nuttall 1832:88, Lucas 1881) and window-bird interactions have been included in several summary works on human-caused avian mortality in the United States (Loss et al. 2014) and Canada (Machtans et al. 2013). These figures are staggering with total building-related mortality of 100 million to 1 billion birds in the United States per year (Loss et al. 2014) and an additional 16.1 to 42.2 million in Canada (Machtans et al. 2013). In these studies mortality is subdivided based upon the type of building: high rise, low rise (which best fits the UNL campus), and residential. Low rise buildings estimated to cause 62.2 to 664.4 million fatalities per year (95% confidence interval) for the US and a mean of 2.4 million per year in Canada. Machtans et al. (2013) goes a step farther and ranks low rise buildings as to the likelihood of causing mortality: least likely, somewhat likely, and most likely. The 'most likely' category includes office, education, and health care structures. The UNL campus would come under this 'most likely' category, and it is hoped that this report of fatalities will be used to better quantify future estimates and hopefully lessen future mortality.

It is unfortunate I did not plan or execute some sort of organized methodology when surveying windows and salvaging these birds for the museum. My not doing so prevents detailed or statistical comparison to other works where such planning was incorporated. Comparisons herein to those studies can only be made at superficial levels.

Three published works document bird deaths at windows on university campuses in Midwestern states. Two of which pertain to three campuses in a nearly north-south line near the Mississippi River in Illinois (Hager et al. 2008) and Wisconsin (Schoefnacker et al. 2016). A third pertains to an urban campus along Lake Erie in Cleveland, Ohio (Borden et al. 2010).

Table 1. Window strike mortality list of species and buildings on the University of Nebraska - Lincoln city campus: 1915 - 2019.

Common Name	Total	% Total	Building Unknown	Architecture Hall	Brace-Behlen Hall	Cather-Pound- Neihardt Link	Hawks Hall	Love Library - Adelle Commons	Manter Hall	Memorial Stadium	Memorial Union	Nebraska Hall - Scott Eng. Link	Oldfather Hall	Sheldon Art Gallery	Other Buildings *
Rock Pigeon**	2	0.20			2										
Eurasian Collared-Dove**	1	0.10												1	
Mourning Dove	17	1.73	1	1							4		3	6	2
Black-billed Cuckoo	1	0.10												1	
Common Nighthawk	2	0.20												2	
Chimney Swift	2	0.20	1	1											
Ruby-throated Hummingbird	2	0.20			1		1								
American Woodcock	3	0.31	1							1					1
Sharp-shinned Hawk	1	0.10										1			
Red-tailed Hawk**	1	0.10												1	
Belted Kingfisher	2	0.20			1						1				
Red-headed Woodpecker	1	0.10	1												
Red-bellied Woodpecker**	1	0.10				1									
Yellow-bellied Sapsucker	3	0.31												1	2
Northern Flicker	5	0.51					1				1			2	1
Willow / Alder Flycatcher	14	1.43	1			7				1	1		3	1	
Least Flycatcher	4	0.41						1					1	1	1
Blue-headed Vireo	2	0.20		1								1			
Warbling Vireo	5	0.51	2			1							1		1
Red-eyed Vireo	12	1.22	1	1		6						2		1	1
Blue Jay**	5	0.51	1			4									
Barn Swallow	1	0.10										1			
Black-capped Chickadee**	1	0.10										1			
Tufted Titmouse	1	0.10											1		

Table 1. Window strike mortality list of species and buildings, continued.

Common Name	Total	% Total	Building Unknown	Architecture Hall	Brace-Behlen Hall	Cather-Pound-Nehardt Link	Hawks Hall	Love Library - Adelle Commons	Manter Hall	Memorial Stadium	Memorial Union	Nebraska Hall - Scott Eng. Link	Oldfather Hall	Sheldon Art Gallery	Other Buildings *
Red-breasted Nuthatch	3	0.31			1							1	1		
White-breasted Nuthatch**	1	0.10							1						
Brown Creeper	17	1.73	2			4	3		1				5		2
House Wren	28	2.86	3		2	1	1			4			6	10	1
Sedge Wren	2	0.20												1	1
Marsh Wren	5	0.51					1						1	1	2
Ruby-crowned Kinglet	12	1.22	1	1	1	3	1					1	3	1	
Veery	2	0.20						1					1		
Gray-cheeked Thrush	3	0.31	1	1								1			
Swainson's Thrush	38	3.88	3	1		12	1	2	1		1	6	3	7	1
Hermit Thrush	9	0.92	1	3		1	1		1	1				1	
Wood Thrush	1	0.10										1			
American Robin	38	3.88	2	1		15		3				1		11	5
Gray Catbird	25	2.55	5	2	1	11		1				1	1	2	1
Brown Thrasher	25	2.55	1	1	1	6					1		7	8	
European Starling**	5	0.51				4				1					
Cedar Waxwing	1	0.10										1			
House Sparrow**	3	0.31				2									1
Pine Siskin	6	0.61		1		2			1				2		
American Goldfinch	4	0.41				1								2	1
Grasshopper Sparrow	10	1.02		1			4			1			2	2	
Chipping Sparrow	5	0.51				1								3	1
Clay-colored Sparrow	37	3.78	9		1	3				5	2		8	7	2
Field Sparrow	8	0.82				2	1			2			1	2	

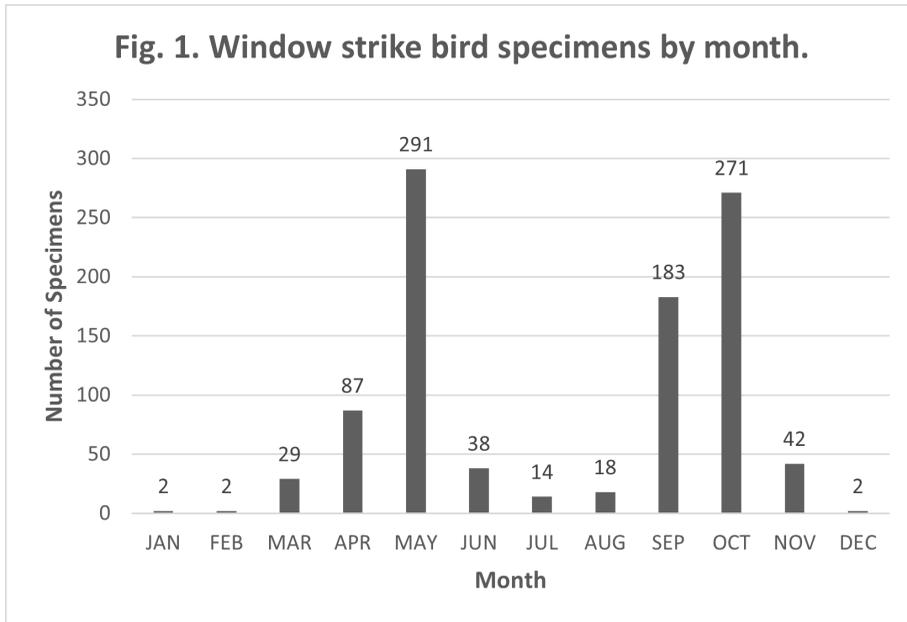
Table 1. Window strike mortality list of species and buildings, continued.

Common Name	Total	% Total	Building Unknown	Architecture Hall	Brace-Behlen Hall	Cather-Pound-Nehardt Link	Hawks Hall	Love Library - Adelle Commons	Manter Hall	Memorial Stadium	Memorial Union	Nebraska Hall - Scott Eng. Link	Oldfather Hall	Sheldon Art Gallery	Other Buildings *
Cape May Warbler	2	0.20		2											
Magnolia Warbler	3	0.31				1	1				1				
Bay-breasted Warbler	1	0.10				1									
Yellow Warbler	11	1.12	1	3		2		1					2	1	1
Chestnut-sided Warbler	2	0.20		1										1	
Blackpoll Warbler	3	0.31		1								1		1	
Black-throated Blue Warbler	1	0.10													1
Yellow-rumped Warbler	6	0.61		1		2							1	1	1
Black-throated Green Warbler	1	0.10											1		
Canada Warbler	4	0.41	1										1	1	1
Wilson's Warbler	10	1.02		1		3	2			1			3		
Northern Cardinal**	8	0.82		1		2				1			1	1	1
Rose-breasted Grosbeak	18	1.84	1		1	6							5	4	1
Indigo Bunting	5	0.51		2		1							1	1	
87 species	980	100.00	77	58	17	235	34	36	19	55	16	59	149	167	58
% Total			7.86	5.92	1.73	23.98	3.47	3.67	1.94	5.61	1.63	6.02	15.20	17.04	5.92

* Other Buildings: 17th & R Street Parking Garage, 501 Building, Andrews Hall, Avery Hall, Beadle Center, Burnett Hall, Carson Media Arts Center, Cather Dining, Coliseum, Hamilton Hall, Jorgensen Hall-Nanoscience Center, Kimball Hall, Knoll Residence Hall, Lied Center, Lutheran Student Center, Mabel Lee Hall, Morrill Hall, Nebraska Hall, Othmer Hall, Pound Hall (formerly CBA), Sapp Recreation Center, Scott Engineering, Selleck Hall, Stadium Drive Parking Garage, Student Health Center, University Health Center-College of Nursing, Westbrook Music Building, Wick Alumni Center.

** Considered by author to be resident species on campus.

Hager et al. (2008) reports 215 fatalities consisting of 48 species over four years at the one building surveyed on the Augustana College campus. That study also reports 142 fatalities of 37 species over 23 months at 4 buildings at Principia College and an additional 58 fatalities including an additional four species at buildings not included in the study. In total Hager et al. (2008) reports 415 fatalities of 69 species in their study. Schoefnacker et al. (2016) very systematically surveyed for window strikes at 6 buildings at the University of Wisconsin – Platteville campus for 21 days during fall migration finding 11 dead birds of 7 species plus one unknown species (feather pile). Different was the Borden et al. (2010) report from the urban campus of Cleveland State University in downtown Cleveland near the shore of Lake Erie. This 12 month study (137 sample days) found 271 fatalities of 50 species. Herein I report 980 fatalities of 78 species.



Studies operating through several seasons (Hager et al. 2008, Borden et al. 2010) show a very strong trend of fatalities occurring primarily in spring and fall migration. This is not unexpected. Borden et al. (2010) describes 90% of their reported kills during the spring and fall migration period as “a non-random distribution of deaths”. Deaths/month figures shown in Hager et al. (2008) and Borden et al. (2010) are very similar to that reported in Figure 1 here. Different is that Borden et al. (2010) reports 3.7 times as many deaths in autumn and attribute this as being consistent with expected migration numbers due to augmentation with immatures resulting from summer reproduction. Though fall migration shows more deaths than spring on the Lincoln campus (Figure 1) it is not as great as on the Cleveland campus (Borden et al. 2010). Similarly the numbers for the Augustana and Principia College campuses are

greater in the fall (Hager et al. 2008) but not as great as Cleveland. This might be due to the impact of Cleveland campus being on the shore of Lake Erie while Augustana, Principia, and Lincoln campuses have no such large geographic influence nearby.

In common with other campus studies is the predominance of North American and neotropical migrant species as compared to the resident species. Schoefnaker et al. (2016) in their 21-day study in Wisconsin report only one resident, a House Sparrow, among the 10 identifiable birds. This represents 10% of individuals and 14.28% of species. Borden et al. (2010) reports 2.61% of individuals and 10% of 50 species as resident. Hager et al. (2008) reports 8.84% of the individuals and 16.95% of 59 species as resident. This study reports 2.86% of individuals and 12.82% of species as resident (Table 1). It should be noted that in this study some species which might otherwise be classified as 'resident' (e.g., Tufted Titmouse) are not classified as such because no resident populations existed nearby when the window strike occurred. Many of the North American and neotropical migrants are nighttime migrants. Arnold and Zink (2011) estimated that nighttime migrants are 10.9 times as likely to have collisions. It has been hypothesized that sleep deprivation due to night migration may play a role in the susceptibility of certain species (Nichols et al. 2018). Additionally migrant birds stopping to rest and refuel may spend more time in an area than previously thought (Schaub et al. 2001) and increase the chances of interactions with glass.

As previously stated Cather-Pound-Neihardt (CPN) Dining Link, Sheldon Art Gallery, and Oldfather Hall account for over 50% of the mortality. CPN was demolished and is no longer a factor. Oldfather has received some modification (external window decals and vegetation removal) that seem to have reduced mortality. Sheldon has remained unchanged and continues to kill. In addition there are several buildings with relatively high kill percentages that deserve scrutiny and perhaps modification. Architecture Hall (5.92% of kills), in its current configuration for over 40 years, has the potential to maintain this impact level. Memorial Stadium (5.61% of kills) has been in its current arrangement since 1999 on the west side and 2012 on the east side. Very little vegetative habitat exists near this building and thus little beside exterior decals on window might reduce the mortality it causes. Hawks Hall has only been present for 3 years and already has accounted for 3.47% of bird deaths. The Nebraska Hall Link to Scott Engineering was in place for 35 years before demolition and accounted for 6.02% of the deaths reported herein. The architectural drawings of the replacement link structure give the impression that this mortality level will not go down. A building currently causing minimal mortality (e.g., 501 Building) may see an increase should there be changes in the windows or landscaping. Valenziano (unpublished report 2014) in a spatial analysis utilizing many of these same data (up to 2014) in looking for hotspot relationships stated "university campuses change greatly in design and structure over and [*sic*] number of years, it would be interesting to see how these changes may adjust the areas of clustering on campus."

Commonly reported, but unrelated to fatal window strikes, is the situation of a bird constantly flying against windows from close range. Rather, a bird (usually

male, but sometimes female) defending its territory against a perceived intruder, their reflection in the glass. While sometimes bloodied from constant impacts, the individual rarely gets enough momentum for a fatal collision. Also commonly reported is that a bird dies of a “broken neck” when it fatally impacts glass. In the examination of the specimens reported herein, and of many other window strike fatalities not from campus, this author has never seen a broken neck. A bird neck is long, very flexible, and usually held in a shortened, curved position during flight. Upon relaxation, as in death, the neck appears longer and very mobile giving the impression of being broken. I have seen numerous skull, shoulder, and sternal fractures, but never a cervical fracture. The carcasses of most specimens were prepared as skeletons and such fractures would be evident. They are not. The usual cause of death is likely a cranial hematoma (bleeding on the brain) or other trauma from impact (Veltri and Klem 2005).

It is not my intent to have this paper become a catchall source of information on preventing bird strikes at windows, a portion of which I covered previously (Labeledz 1997). There are several resources on this topic and building design are easily better than anything I could present here (Brown and Caputo 2007, City of Toronto 2007, Klem 2009, Klem et al. 2009, American Bird Conservancy website).

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LITERATURE CITED

- Arnold TW, Zink RM. 2011. Collision mortality has no discernible effect on population trends of North American birds. *PLoS ONE* 6(9): e24708.
- Borden WC, Lockhart OM, Jones AW, Lyons MS. 2010. Seasonal, taxonomic, and local habitat components of bird-window collisions on an urban university campus in Cleveland, OH. *Ohio J. Sci.* 110(3): 44-52.
- Bracey AM, Etterson MA, Niemi GJ, Green RF. 2016. Variation in bird-window collision mortality and scavenging rates within an urban landscape. *The Wilson Journal of Ornithology* 128(2): 355-367.

- Brown H, Caputo S. 2007. Bird-safe building guidelines. New York City Audubon Society, Inc. 59 pp.
- City of Toronto. 2007. Bird-Friendly Development Guidelines. City of Toronto Green Development Standard. 42 pp.
- Hager SB, Trudell H, McKay KJ, Crandall SM, Mayer L. 2008. Bird density and mortality at windows. *The Wilson Journal of Ornithology* 120(3):550-564.
- Klem D Jr. 2009. Preventing bird-window collisions. *The Wilson Journal of Ornithology* 121(2):314-321.
- Klem D Jr, Farmer CJ, Delacretaz N, Gelb Y, Saenger PG. 2009. Architectural and landscape risk factors associated with bird-glass collisions in an urban environment. *The Wilson Journal of Ornithology* 121(1):126-134.
- Labeledz TE. 1997. Windows of death: a look at bird strikes. Museum Notes No. 95, 4 pp., University of Nebraska State Museum, Lincoln, Nebraska
- Loss SR, Will T, Loss SS, Marra PP. 2014. Bird-building collisions in the United States: estimates of annual mortality and species vulnerability. *Condor* 16:8-23.
- Lucas FA. 1881. Birds and windows. *Bull. Nuttall Ornith. Club.* 6:125.
- Machtans CS, Wedeles CHR, Bayne EM. 2013. A first estimate for Canada of the number of birds killed by colliding with buildings. *Avian Conserv. Ecol.* 8:6.
- Nichols KS, Homayoun T, Eckles J, Blair RB. 2018. Bird-building collision risk: An assessment of the collision risk of birds with buildings by phylogeny and behavior using two citizen-science datasets. *PLoS ONE* 13(8): e0201558.
- Nuttall T. 1832. *A manual of the ornithology of the United States and Canada.* Hilliard and Brown, Cambridge, Mass. 683 pp.
- Rosenberg KV, Dokter AM, Blancher PJ, Sauer JR, Smith AC, Smith PA, Stanton JC, Panjabi A, Helft L, Parr M, Marra PP. 2019. Decline of the North American avifauna. *Science.* 366:120-124.
- Schaub M, Pradel R, Jenni L, Lebreton J-D. 2001. Migrating birds stop over longer than usually thought: an improved capture-recapture analysis. *Ecology*, Vol. 82(3): 852-859.
- Schoefernacker NA, Carpenter AM, Martin MA, Habeck KK, Schmitz RT, McKay KJ. 2016. The effects of building size, window area, and development on bird-window collisions in an urban landscape: A preliminary assessment. *The Passenger Pigeon.* 78(3): 307-316.
- Valenziano RL 2014. Windows of death: a spatial analysis of bird window strike mortalities on the University of Nebraska – Lincoln city campus. Unpublished project report for Community and Regional Planning 432 class at the University of Nebraska – Lincoln. 19 pp.
- Veltri CJ, Klem D Jr. 2005. Comparison of fatal bird injuries from collisions with towers and windows. *J. Field Ornithol.* 76(2):127-133, 2005.

APPENDIX: BUILDING DESCRIPTIONS

The following paragraphs describe the 39 buildings at which birds are known to strike windows and for which specimens are deposited at UNSM. The alphabetical

list has the current name of the building, GPS coordinate obtained from Google Earth, the approximate time period the building has been in existence, and some comments on why the building has killed birds. To determine the age of some buildings I utilized the web site <https://historicbuildings.unl.edu/>.

17th & R Street Parking Garage (40.8166, -96.6963), 2004 – Present. Built in approximately 2004, this, like many modern parking structures, has glass-enclosed stairwells on some corners. Not a significant cause of mortality, but habitat plantings near any building can cause this to change.

501 Building (40.8184, -96.7072). I was unable to find a construction date but this single-story brick building still in use. It is not a significant cause of mortality.

Andrews Hall (40.8193, -96.7019), 1928 – Present. An older three-story brick and stone building with relatively small windows and doors. Not a significant cause of mortality.

Architecture Hall (40.8173, -96.7064), 1978 – Present. [Old library (stone) 1892, link built in 1978]. The windows of the original stone building probably did not have a great impact on birds. Replacement windows are often more reflective and some fatalities have been noted. The three-story link built in 1978 has had the largest impact. It is constructed nearly entirely of moderately reflective glass panels with recessed alcoves on all four corners of the attachment to the original buildings. While most fatalities here are direct impact due to reflections, these recessed alcoves of glass create a very confusing maze of reflections sometimes entrapping birds that have been found fluttering in exhaustion near the base.

Avery Hall (40.8194, -96.7044), 1919 – Present. Has not been a significant cause of mortality due to small windows and very little nearby habitat, but any building with windows has potential.

Beadle Center (40.8197, -96.6934). 1995 – Present. While only one specimen is known from this building, the low number might be due to its not being checked very often. The glass entryway on the west side and greenhouses have a higher potential than evidence indicates.

Brace-Behlen Hall (40.8181, -96.7066), Brace 1905 – Present, Behlen and Brace-Behlen Link 1965 – Present. The shaded north side of the link has large glass panels that reflect surrounding habitat. This was a continual cause of mortality until an external building overhaul was done in about 2017. Construction of a glass-enclosed, subway-style stairwell entrance (itself a hazard) a few years earlier is believed by this author to have altered the habitat enough to reduce bird strikes against the link windows. From prior to 1985 until at least 2010 there was large plastic replica of a Great Horned Owl strung up as a deterrent, but I don't think it had much effect.

Burnett Hall (40.8193, -96.7033), 1946 – Present. A brick, three story building with smaller windows. Most fatalities are associated with first floor windows and are likely cause by reflection of suitable habitat.

Carson Media Arts Center (40.8162, -96.7023), About 1988 – Present. Formerly known as the Nebraska Bookstore, this brick building in an urban setting was not much of an issue for bird mortalities until remodeled in 2018 with expansion of the windows.

Cather Dining (40.8186, -96.6958), 2017 – Present. A replacement for next building listed, Cather Dining incorporated large windows of moderately reflective glass on the two- and three-story front. This arrangement, with landscaping, is showing itself to be a fatal combination.

Cather-Pound-Neihardt Dining Link (40.8186, -96.6971), 1965 - 2018. Commonly referred to as “CPN dorm link” in museum records, this location references an east-west, second-story, clear glass-enclosed walkway link between buildings. A common name for it among students was “the window of death”. Larger trees had grown on the north and south sides. Birds were apparently funneled into this area between taller buildings where this walkway was at the perfect height to be a lethal obstacle as they moved from tree to tree. Students and staff made efforts to curb this carnage but it was not resolved until demolition in 2018.

Coliseum (40.8212, -96.7027), 1925 – Present. This large brick building with small windows has not been a significant cause of mortality, but any building with windows has potential.

Hamilton Hall (40.8187, -96.7047), 1970 – Present. This very tall building does not have a large amount of glass on its exterior and has not been a significant cause of mortality, but the entrance doors on the west side have claimed some birds. A glass link between Hamilton Hall and Manter Hall at the fourth floor level has also not been a significant cause of mortality. I believe this link is too high and is above the average movement elevation (above tree height) of most susceptible birds.

Hawks Hall (College of Business) (40.8204, -96.7006), 2018 – Present. Only recently constructed, Hawks Hall is becoming a major disaster for migrating birds. Primarily sheathed in a moderately reflective glass, the south side is about four stories tall. This massive structure mirrors any surrounding habitat. The north and west sides also have large glass surfaces but so far do not appear as deadly. Opening to the west is a large interior courtyard that begins one story below ground level. This lower level is lined in glass and the upper floors of the courtyard have large windows. Although the courtyard is open to the west, this subsurface feature means that birds descending to the bottom may have difficulty seeing any way out except for that reflected in the glass.

Jorgensen Hall - Nanoscience Center (40.8224, -96.6985), 2010 – Present. Though modern, these structures have avoided large areas of glass sheathing, lack nearby habitat, and have not been a large source of avian mortality.

Kimball Hall (40.8168, -96.7050), 1969 – Present. Not a significant cause of mortality, but entrance doors and full-length foyer windows on the north side are glass that can be reflective in certain light conditions.

Knoll Residence Hall (40.8176, -96.6964), 2010 – Present. A four-story residence hall of brick with smaller windows and no large areas overly attractive to birds. However,

there are several recessed entrances that also serve as connections between building sections that have glass walkways that have been known to cause fatalities. This building has not been regularly surveyed for window strikes.

Lied Center (40.8166, -96.7045), 1991 – Present. Large brick structure with glass windows at ground level and on upper balconies on the northeast side. Only the ground level windows could be checked for mortality and even with nearby plantings this building does not seem a major cause of bird mortality.

Love Library (40.8185, -96.7026), 1943 – Present, North Library (now Adele Commons) and Library Link 1972 – Present. The original Love Library likely was not a significant cause of mortality due to small windows. The north library building and its upper story link to Love Library have been serious offenders. The link has four corners of glass at the second story level which causes mortality. The north library building is surrounded on the ground level by glass windows. Prior to remodeling in 2016 these were not much of an issue because white blinds on the inside usually negated reflective images of habitat. The remodel and rededication as the Adele Commons area in 2016 removed much of that and added a protruding clear glass entrance on the north side, which is killing birds regularly during migration.

Lutheran Student Center (40.8188, -96.6985), unknown construction date – 2019. Was not known to be a significant cause of bird mortality but was not regularly checked. This building is undergoing an extreme remodel at this time and could become a problem if large amounts of glass are used in façade design.

Mabel Lee Hall (40.8219, -96.7008), 1977 - 2020. Has not been a significant cause of mortality due to very small, recessed windows. The building is slated for demolition in 2020 with public design illustrations of the replacement building showing a large, three-story glass entrance area on the west side that could be trouble for migrating birds. The design of the other sides is not known to the author.

Manter Hall (40.8189, -96.7050), 1974 – Present. An atrium with interior vegetation on the ground level of the east side of the building exposed by glass to exterior environments may have been the cause of some bird mortality against these windows. From the outside the windows were reflective in certain light conditions and that may have been a larger cause of mortality. Luckily this side of Manter Hall is very close to Hamilton Hall and not a great attractor to birds. A renovation of first floor in 2014 removed the interior atrium gardens.

Memorial Stadium (40.8206, -96.7056), 1923 – Present. The stadium probably did not cause many avian fatalities until the remodeling and expansions of the past 25 years. These expansions, particularly on the west (1999) the east (2012) sides included large, tall glass panels which can reflect habitat. There is not much vegetated habitat near the stadium to be reflected in these windows, but it might be that with such a massive structure, the reflection of sky is perceived as an escape route for birds. In addition recessed, glass-lined alcoves near ground level on the east side also attract and kill birds. A second-story, glass-encased walkway from the stadium to another building to the north does not seem to be a significant cause of mortality, probably due to lack of appropriate bird habitat nearby.

Memorial Union (40.8179, -96.7005), 1938 – Present. Only the north side of the Union has been an issue with birds. This is where a large number of windows, reflective in certain light conditions, do sometimes create a fatal attraction to migrant birds. The presence of a large, ornamental water fountain immediately to the north also attracts birds to the area.

Morrill Hall (40.8199, -96.7018), 1927 – Present. Most fatalities are associated with first floor windows and are likely caused by reflection of suitable habitat. In 1988 a glass-enclosed, subway-style stairwell entrance was constructed on the south side of the building for student access to a lecture hall. This entrance structure has at times been a cause of mortality greater than Morrill Hall itself. However, landscaping shrub growth very near the windows, while attractive to birds, may actually be preventing mortalities by itself being the destination for birds rather than the reflection of habitat in the glass. And being so close to the glass, a bird in the vegetation likely does not build enough momentum to have fatal collision.

Nebraska Hall (40.8231, -96.6973), 1931 – Present. Built in several stages (3 floors, then 2 additional floors) this very large brick building was likely not a big factor in bird deaths due to small windows. With the possible exception of the large-windowed southwest stairwell, Nebraska Hall has small windows. Old single-pane windows were replaced with energy efficient, but more reflective, double-pane windows in 2002. Bird strikes occur at these smaller windows, perhaps for the same reason as Memorial Stadium, the reflected sky is seen as an escape. The 5-story glass-stairwell in the southwest corner has had numerous bird strikes that cannot be retrieved as they fall on a first floor roof.

Nebraska Hall Link to Scott Engineering (40.8225, -96.6978), 1985 - 2019. This second- and third-story link had moderately reflective glass on the east and west sides, and was open underneath. Reflections of large trees along 16th Street made for frequent window strikes on the west side. This link was demolished during the winter of 2019-2020, but a larger replacement is under construction with an architectural drawing indicating a glass facade. These drawings even illustrate the reflections of trees in the glass, promising future avian mortality.

Oldfather Hall (40.8197, -96.7035), 1970 – Present. This 10-story building itself is not a significant cause of mortality. However, second-story, glass-enclosed links on the north and south sides to adjacent Bessey and Burnett Halls have been an issue, especially on the north. The south link is over a paved drive and offers little in the way of habitat to attract birds. The north link had trees in the area and has contributed to the museum collections. Efforts years ago (1990s) by Jim Ducey got reflection-disruptive decals placed on the glass. This may have reduced mortality but the eventual loss of the trees was likely more effective.

Othmer Hall (40.8212, -96.6975), 2002 – Present. Othmer is joined on the north to Scott Engineering. Ground level glass panels and doors on the west side and associated landscape plantings have created a fatal mix. Large windows along a covered walkway on the south side do occasionally kill as well.

Pound Hall, formerly College of Business Administration (CBA) (40.8181, -96.7035), 1917 – Present. This older-style building was not a significant cause of mortality except after a remodel in the mid-1990s replaced north entrance doors with newer glass that can be reflective in certain light conditions.

Sapp Recreation Center (40.8220, -96.7021), 1989 – Present. Large glass windows on the east entrance have some potential, but overall this building is not a significant cause of mortality.

Scott Engineering (40.8219, -96.6976), 1972 – Present. This four-story brick building has not been the cause of much mortality due to the very limited number of windows. A full-height glass stairwell entrance on the west has had some bird strikes. A renovation project beginning in 2020 to construct a new link to Nebraska Hall appears in architectural drawings to extend a glass façade from the link to include parts of the west side of Scott Engineering, greatly increasing the chance of avian mortality.

Selleck Hall (40.8190, -96.6996), 1952 – Present. This residence hall with smallish windows has not been a significant cause of window strikes. Potential exceptions are large windows in the central cafeteria and second floor glass-enclosed walkways on either side of the west entrance.

Sheldon Art Gallery (40.8175, -96.7044), 1961 – Present. Large two-story plate glass windows on east and west sides allow light to the main gallery area and visibility through to the other side of the building. During brighter daylight hours this see-through feature appears as an uninterrupted passage. During dimmer daylight conditions when the building's interior is not lit, the glass panels reflect nearby habitat. This building continues to be a major source of bird fatalities.

Stadium Drive Parking Garage (40.8197, -96.7073), 1999 – Present. Like many modern parking structures this building has glass enclosed stairwells on corners. Not a significant cause of mortality, but habitat plantings near any building can cause this to change.

Student Health Center (40.8201, -96.6993), 1958 – Present. This building has small windows and has not been a significant cause of mortality, but any building with windows has potential.

University Health Center / College of Nursing (40.8182, -96.6932), 2018 – Present. Built to replace the above mentioned Student Health Center, large numbers of glass windows were incorporated in design of the facade. Current landscaping might limit the attractiveness to birds, but it is already producing fatalities.

Westbrook Music Building (40.8169, -96.7057), 1967 – Present. With one story above ground and few windows except on the north side, this building is not a significant hazard to birds.

Wick Alumni Center (40.8173, -96.6990), 1985 – Present. On the north side of this building is a large, second-story window of moderately reflective glass that faces an area of trees and landscaping. While the building overall is not a significant cause of mortality, this one window has produced specimens.