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Siv	Samuel Ives
SKr	Scott Krych
SLF	Steve L. Falkowski
SLP	Susan Plankis
SMC	Scott M. Clark
SPS	Steve Stucker
SSc	Susan Schumacher
STW	Sylvia T. Winkelman
SuW	Suzanne Weber
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TAF	Troy A. Foster
TAT	Tom A. Tustison
TD	Tim Dawson
TEB	Tom & Elizabeth Bell
TFB	Tom F. Boevers
TLy	Toni Lyrenmann
TPW	Terry P. Wiens
TRP	Three Rivers Parks Wildlife Staff
WCM	William C. Marengo
WOS	Bill Stjern

Abbreviations

C.P.	County Park
F.R.	Forest Road
N.C.	Nature Center
N.P.	Nature Park
N.W.F.R.	National Wildlife and Fish Refuge
N.W.R.	National Wildlife Refuge
P.R.	Park Reserve
R.A.	Recreation Area
S.N.A.	Scientific & Natural Area
S.P.	State Park
W.M.A.	Wildlife Management Area
W.P.A.	Waterfowl Production Area
W.T.P.	Wastewater Treatment Ponds

Twin Cities Bird-Building Collisions: A Status Update on "Project Birdsafe"

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It has been known for decades that birds do not perceive glass in the same way that people do. Birds are routinely found either dazed or dead under windows at homes and buildings. In the past, the primary threat was thought to be tall lighted buildings that attracted songbirds during nighttime migration, leading to collisions with glass or rooftop structures. Indeed, large numbers of birds have been recovered in such circumstances, especially during nights in which the cloud ceiling drops while a large migratory flight is underway. More recently, daytime collisions are being recognized as a problem for birds, owing to the confusing nature of highly reflective glass windows and see-through effects, exacerbated by nearby trees and ornamental plantings.

Many organizations are monitoring bird collisions with windows, following the lead of the Toronto group FLAP (Fatal Light Awareness Program; http://www.flap.org). FLAP's website states that "Each year in Toronto, over a million birds are killed by colliding with buildings." Promoting awareness of this serious source of bird mortality is an important function of their group. Part of the public awareness promoted by such groups is a dedicated movement to get tall buildings, or ones on direct migratory pathways, to dim or turn off their lights during migratory periods. The value of this was well-documented at Chicago's McCormick Building on the shores of Lake Michigan, where the number of birds hitting the building declined by 80% after a lights-out program was initiated. The Lights Out program also has been successful in reducing bird strikes in Toronto.

In Minnesota a Lights Out program was established in spring 2007. As of this writing (February 2010) there are 20 buildings in Minneapolis, 7 in St. Paul, 6 in Bloomington, 2 in Golden Valley, 1 in Minnetonka, and 1 in Shoreview that have agreed to dim their lights during spring and fall migration. The Mayo Clinic in Rochester also has six participating buildings. We are all grateful to these companies for their efforts.

Our involvement has been not only with the Lights Out program, but in setting up

Table 1. Total number of the ten most common species found in downtown Minneapolis and St. Paul from spring 2007 to fall 2009 and their fates.

Species	Total number found	Released	Dead	Rehab
White-throated Sparrow (*Zonotrichia albicollis*)	204	20	182	2
Nashville Warbler (*Vermivora ruficapilla*)	173	40	128	5
Ovenbird (*Seirus auricapilla*)	111	9	101	1
Tennessee Warbler (*Vermivora peregrina*)	107	5	101	1
Dark-eyed Junco (*Junco hyemalis*)	75	4	70	1
Common Yellowthroat (*Geothlypis trichas*)	55	4	51	0
Black-capped Chickadee (*Poecile atricapillus*)	37	0	37	0
Brown Creeper (*Certhia americana*)	33	8	23	2
Yellow-bellied Sapsucker (*Sphyrapicus varius*)	30	3	27	0
Lincoln's Sparrow (*Melospiza lincolnii*)	25	3	22	0

a scientifically sound monitoring program. For the past three years, Project BirdSafe volunteers have traversed a prescribed route in downtown Minneapolis and St. Paul, and also in Rochester, looking for birds that have collided with buildings during spring and fall migration periods. Live birds are captured if possible and later released outside the city. Injured birds are taken to the Wildlife Rehabilitation Center for treatment. Dead birds are tagged and taken to the ornithology collection at the Bell Museum. In all cases, information is recorded as to where and when each bird was found.

Because of the time involved in preparing standard museum study skins and the poor condition of some of the birds, most are preserved as a spread wing (see Figure 1) and a tissue sample (good for DNA extraction, pesticide analysis, etc.). Upon dissection, we determine each bird's sex, age, molt status, fat condition, and what it had been eating immediately prior to its death. In this way, each bird strike is scientifically documented. Many students have been involved with the preparation of specimens.

We have several goals both short- and long-term. We were first interested in determining which species collide with buildings and in what numbers in our area. After three fall and three spring monitoring periods (2007 through 2009), we have received approximately 1400 individual birds representing 100 species from the Twin Cities routes (Rochester data will be analyzed separately). Table 1 shows the ten most commonly found species. White-throated Sparrows (*Zonotrichia albicollis*) were found most often, followed by three Neotropical migrants — the Nashville Warbler (*Vermivora ruficapilla*), Ovenbird (*Seirus auricapilla*), and Tennessee Warbler (*Vermivora peregrina*). About 50% of all birds belong to the warbler family. Some relatively rare species have been found, including a Connecticut Warbler (*Oporornis agilis*), Carolina Wren (*Thryothorus ludovicianus*), and Townsend's Solitaire (*Myadestes townsendi*; Figure 2).

There are definite peaks of migratory activity as judged from our collections. The last ten days of September are usually the fall peak in migration, and in the spring, the first half of May is most active. More birds are found in fall than spring, as would be expected owing to the large representation of young birds.

Slightly more birds were found in St. Paul than in Minneapolis. We have little explanation as to why this is the case (although we entertained the suggestion by a former governor that St. Paul is inherently more difficult to navigate).

One of our goals, ultimately, is to analyze the characteristics of the buildings on our routes in comparison to the frequency of collisions. This will contribute to what is known about which sorts of buildings pose the greatest threats to birds. We do know that not all buildings pose an equal threat to birds. Our routes sample a cross section of buildings with differing heights, amounts of glass, and location within an urban core. Importantly,

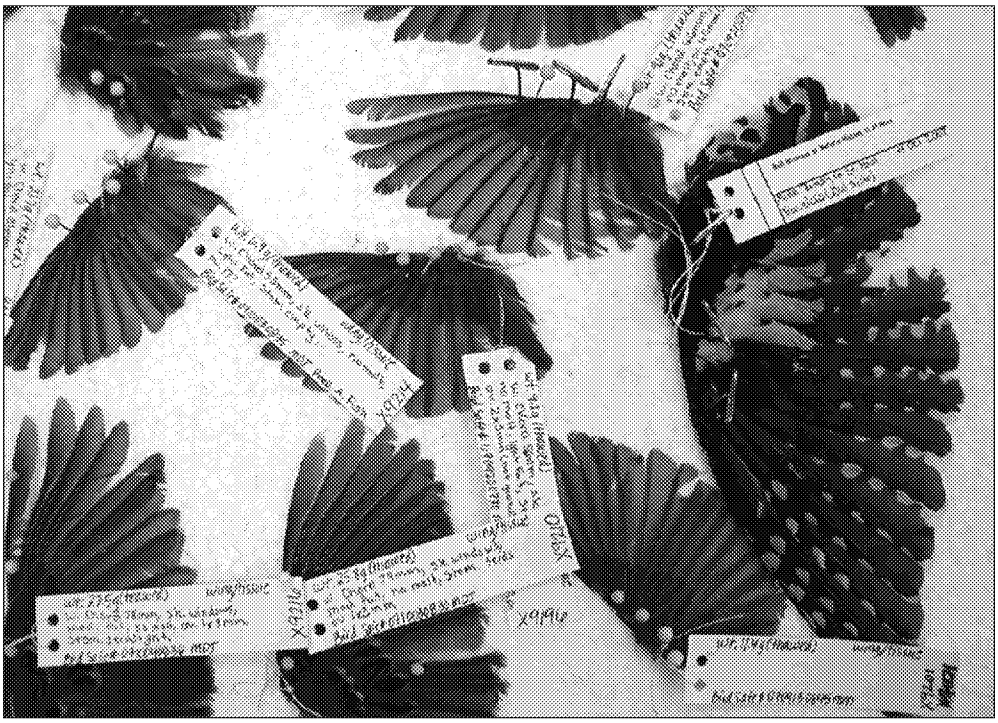

Figure 1. Example of wing specimens in the Bell Museum, University of Minnesota, associated with BirdSafe birds.

we do not target just a few buildings that we know pose a threat to birds, rather we sample a random set of buildings (about 120 in all). Most birds were found at a relatively few buildings, with many buildings yielding only a bird or two over this time period. At the other extreme, one building was associated with about 250 birds, 18% of the total. The top five buildings accounted for 662 birds, or 48% of the total mortality.

There have been some surprises in our effort to date. One of the biggest surprises is that many birds seen commonly in the Twin Cities during migration apparently rarely collide with buildings and their windows. For instance, the Yellow-rumped Warbler (*Dendroica coronata*) is a common migrant, yet ranked 15th most common in our sample. In fact, we found more Black-and-white Warblers (*Mniotilta varia*) than Yellow-rumped Warblers even though the latter are more common in our area. Our total of four Red-eyed Vireos (*Vireo olivaceus*) is astounding considering that this is an abundant bird. A future goal is to try and determine why some birds collide less frequently with windows. For example, the large eyes of vireos might allow them to see windows more clearly as a threat, and could account for the relatively few vireos found in our surveys. However, from other studies we know that they do collide with lighted radio towers (and their guy wires) at night.

Although we now have an idea of which species strike buildings in the Twin Cities, and their relative abundances, it will take a longer period of scientifically sound data gathering and consideration of confounding variables before we can extrapolate our findings to the entire metro area. One of these variables concerns when birds actually strike windows, day or night? We are now relatively certain that some of the buildings with the highest mortality are more of a threat to birds during the day than at night. However, in our original study design, we asked our

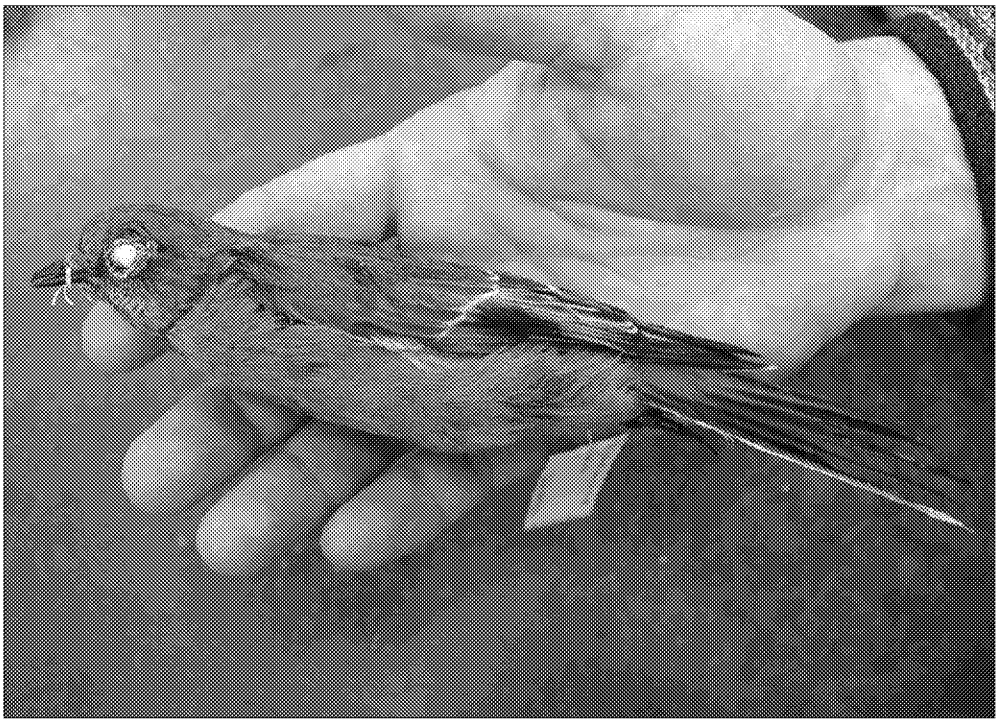

Figure 2. Townsend's Solitaire found in downtown Minneapolis.

volunteers to walk their routes first thing in the morning, which we thought appropriate because we were looking for nighttime collision causalities. And, if one waits too long to check the buildings for birds, scavengers of many types (including building cleaning crews!) will have already removed some of the dead birds. We now realize that we cannot assume that all of the birds found collided during the previous night. Thus, we will be modifying our search methods to attempt to determine the extent of daytime and nighttime collision frequency. It will be important to make this distinction because if a building were to attempt to mediate its effects on flying birds, it is useful to know when it is the greatest threat — day or night. There are very different procedures to limit daytime versus nighttime strikes.

We intend to continue to monitor our research routes to build upon what we have learned to date. Anyone wishing to volunteer can contact either of the authors. We are grateful to Audubon Minnesota, TogetherGreen, the Katherine B. Anderson Foundation, the University of Minnesota, and the Minnesota Ornithologists' Union for providing funding for this work. We greatly appreciate all the BirdSafe volunteers who have spent so much time and energy helping us to establish procedures and walk routes and who continue to show great insight and interest in the project. We also wish to thank the many students at the University of Minnesota who have prepared hundreds of birds, especially Alex Fish and Luke Klicka. Finally, we would like to acknowledge the Project BirdSafe Partners: Audubon Minnesota, Audubon Chapter of Minneapolis, Bell Museum of Natural History, BOMA Greater Minneapolis, BOMA Saint Paul, DNR Non-game Wildlife Program, National Parks Service, Perkins+Will Architects, Wildlife Rehabilitation Center, and Zumbro Valley Audubon Society.

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