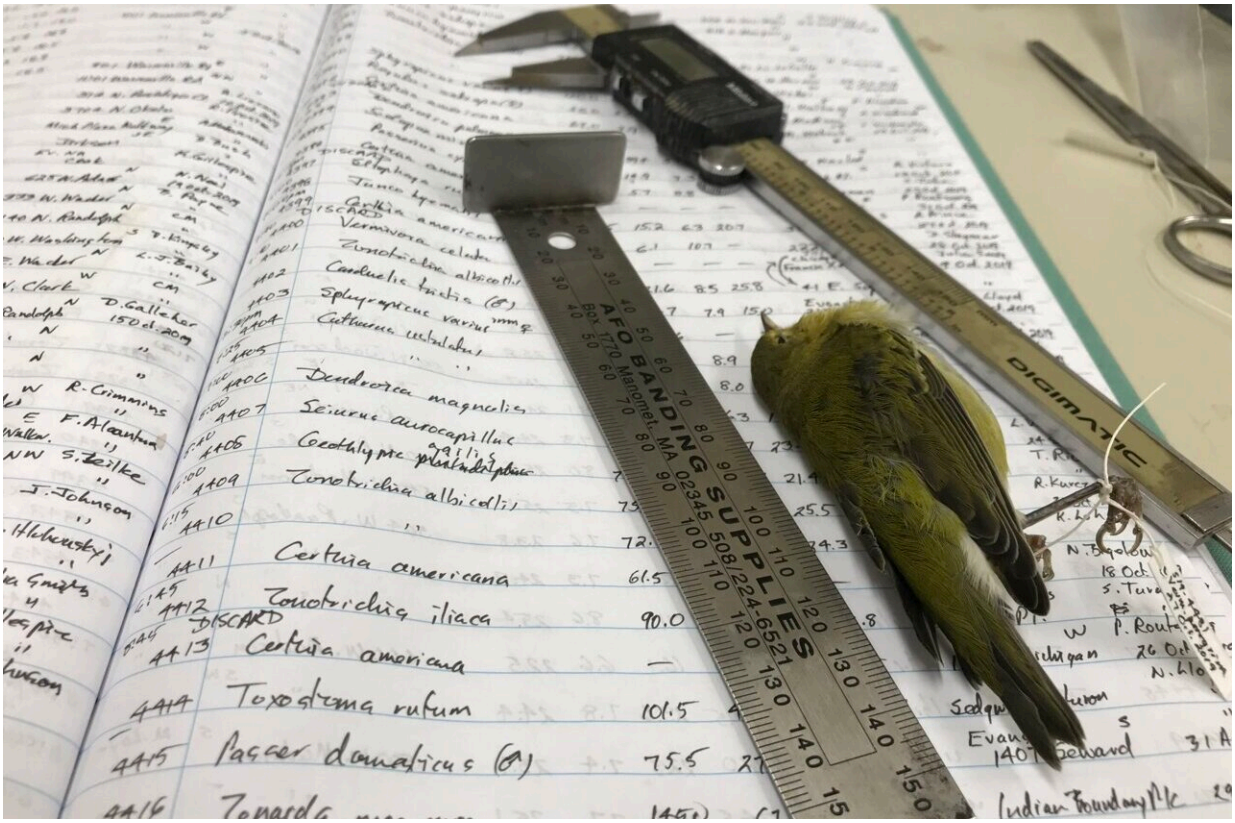
Turning off lights can save migrating birds from crashing into buildings

June 7 2021



Dave Willard's ledger of birds added to the museum's collections, with a measuring tool and a Tennessee Warbler specimen. Credit: Kate Golembiewski, Field Museum

Every night during the spring and fall migration seasons, thousands of birds are killed when they crash into illuminated windows, disoriented by

the light. But a new study in *PNAS* shows that darkening just half of a building's windows can make a big difference for birds. Using decades' worth of data and birds collected by Field Museum scientists at Chicago's McCormick Place convention center, the researchers found that on nights when half the windows were darkened, there were 11 times fewer bird collisions during spring migration and 6 times fewer collisions during fall migration than when all the windows were lit.

"Our research provides the best evidence yet that migrating birds are attracted to building lights, often causing them to collide with windows and die," says Benjamin Van Doren, a postdoctoral associate at the Cornell Lab of Ornithology and the paper's lead author. "These insights were only possible thanks to over 40 years of work by David Willard at the Field Museum, who led collisions and light monitoring efforts."

In 1978, Willard, the museum's collections manager emeritus, heard an offhand remark about birds hitting the McCormick Place, North America's largest convention center that happens to be just a mile south of the museum. So, he investigated.

"I went down early one morning, just out of curiosity, and wandered around and actually found four or five dead birds," says Willard. "I might not have gone back if I hadn't found anything that first day, and now here we are, 40 years later and 40,000 birds later."

Willard and his colleagues, including Field Museum co-author Mary Hennen and other Field staff and volunteers, have visited the site every day before sunrise during migration season, sometimes as early as 3:30 in the morning. Some days there are no birds; other times, there are as many as 200. Willard collects the dead birds and brings them back to the museum, where he records each one in a ledger and adds them to the museum's collection.

A drawer of birds killed crashing into the city's windows in the Field Museum's collection. Credit: Ben Marks, Field Museum

Around twenty years ago, Willard began to notice a pattern— on nights when the lights were out at McCormick Place, around holidays or construction work, there were fewer birds on the ground the next morning. As the building's lighting patterns began to vary more, he began gathering data on which windows were illuminated each night, in addition to collecting the birds he found on the pavement.

The new PNAS study is the most in-depth use of the data on lighting patterns to date, combining Willard's specimens and lighting observations with other conditions that might play a role in bird mortality, including weather records and radar data revealing the number of birds in the sky on a given night. "We developed a statistical model based on the number of windows illuminated at McCormick Place, weather conditions, migratory passage, and time of season. This allowed us to isolate the relationship between window lighting and collisions while accounting for these other factors," says Van Doren. "By joining these different sources of data, we were able to understand how lights, weather, and migration each contribute to collision mortality."

The team found that the total number of birds in the sky on a given night and the direction of the wind both play a role in mortality, but the biggest determining factor was light: when more windows were darkened, fewer birds died. "The sheer strength of the link between lighting and collisions was surprising," says Van Doren. "It speaks to the exciting potential to save birds simply by reducing light pollution."

The researchers were able to quantify that bird-saving potential: they

predict that halving the lighted window area could decrease collision counts by 11 times in spring and 6 times in fall. By turning out half the lights during migration seasons, bird mortality at McCormick Place could be reduced by 59%.

The researchers note that McCormick Place is far from unique— it's been monitored for longer than any other Chicago building, but, Willard says, "There's hardly an address in downtown Chicago that doesn't have a bird in the Field Museum's collection, thanks to the efforts of the Chicago Bird Collision Monitors." However, there are a few factors that make the McCormick Center especially dangerous for birds, including its massive size, its isolation from other buildings, and its proximity to Lake Michigan, which birds are sometimes hesitant to fly over.

Four colorful birds killed crashing into the windows at McCormick Place, now in the Field Museum's collections. Credit: Karen Bean, Field Museum

"Buildings all across North America, all across the world, are killing birds, and those add up," says Doug Stotz, a senior conservation ecologist at the Field. "What we've learned in the past 20 years about lights being on has caused the city of Chicago to create its Lights Out program, which requires buildings' external lights to be turned off during peak migration. I hope this paper will show why it's important to turn off

internal lighting as well, especially in Chicago, which is the country's deadliest city for migrating birds."

Van Doren is also eager to see the project's findings applied. "Our study contains a hopeful message: we can save birds simply by turning off lights during a handful of high-risk days each spring and fall," he says. "By adapting our existing public migration forecasts to identify nights with high collision risk, we will be able to issue targeted lights-out advisories several days in advance."

In addition to the study's implications for bird conservation, it also speaks to the importance of natural history collections in documenting global change. "These collision data are even more valuable because they are backed up by specimens that are available for study in the Field Museum," says Ben Winger, one of the paper's senior authors, an assistant professor and curator at the University of Michigan and a Field Museum graduate student alumnus . "This will allow future scientists to go a step further and study the connections between many aspects of avian biology and conservation relevant questions."

"It's a classic museum data set," agrees Stotz. "We do a lot of collecting without knowing exactly what the specimens will be used for. But down the line, when people say, 'I wish we had information on X, Y, or Z,' we do— it's in the museum."

More information: Benjamin M. Van Doren el al., "Drivers of fatal bird collisions in an urban center," *PNAS* (2021). www.pnas.org/cgi/doi/10.1073/pnas.2101666118

Provided by Field Museum