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# Bird Collisions with Glass, Human Health and Biodiversity

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A review of current conservation efforts and a photo essay.  
by

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Honoring the 40<sup>th</sup> anniversary of the Endangered Species Act of 1973, and The Biodiversity of  
Kentucky Day 2014.

On behalf of the KCC Biodiversity Committee.

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As I hurried into a place of business on a fine September afternoon, two iridescent hummingbirds flew right by me.

Within moments they had struck a glass wall and fluttered to the ground, landing on hot pavement. A bystander and I rushed over, and put a towel under them, for protection. But they perished a few minutes later.

Wild birds hit glass; that's not news. But if you believe that these accidents are inevitable, mysterious, or comical, you are stuck in the wrong century.

Collisions with glass take hundreds of millions of birds yearly, a secret slaughter of enormous magnitude. As building and development grow, collisions have become an under-the-radar threat to the survival of some species.



**Figure1. Beautiful September day; for bystanders this occurrence is distressing.**

Birds are not careless or stupid. They unintentionally hit glass for the same reason that we do: They cannot see it. Evolution has prepared living beings to see vertical translucency, such as smoke or fog, but not vertical transparency, a unique product of modern manufacturing. We cannot adapt to see glass, any more than we can grow a bulletproof chest.

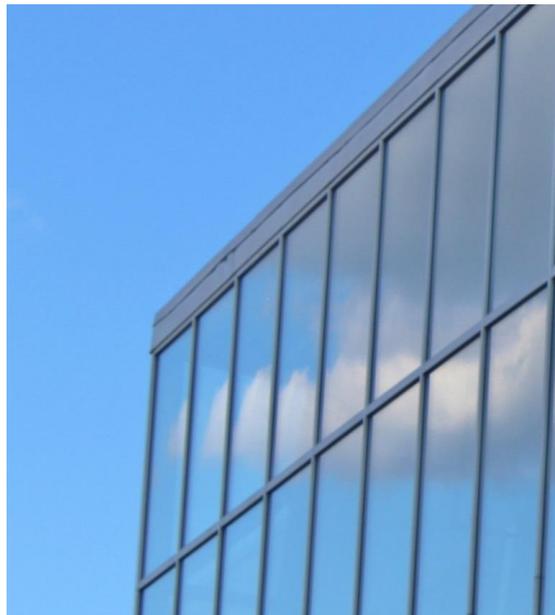
Birds, as fliers, are maneuverable and accurate. Their vision exceeds ours in having more cones and enhanced color vision. Although their visual fields differ, birds can see a wider spectrum, including ultraviolet (UV) light. Given their superior abilities, we might wonder why they collide with glass at all.

I spoke with a number of experts, to get their opinions, including Dr. Daniel Klem Jr., a tireless researcher who has spent decades, publishing on issues of bird, or avian, collisions. He can testify to the significance of our losses, perhaps as many as a billion birds per year, and the efforts of a lifetime that have brought increased public awareness.

Let's start with confidence in the universal desire for survival. Go back to the glass-lovin' 60's to see some shocking statistics.

Hundreds of thousands of people accidentally walked, fell and landed on glass, suffering injuries, deaths, and amputations. It was accepted as a consequence of modernity, until public opinion finally shifted, and the new federal Consumer Product Safety Commission undertook the task of making glass safer and more visible. If you blunder into glass now, tempering makes it resist breakage. If tempered glass does fail, it will break into beads instead of razors.

For people, detection of transparent barriers requires a multistep process called perceptual decomposition. In layman's terms it means that we develop the ability to interpret layers of reflections and solid objects. Our longer lifespan gives us an advantage, as we experience reflections in context.



**Figure2. The building above looks too much like the sky to be compatible with bird safety.**

Observing an impossible sky on the ground, for instance, reveals it as an illusion. However, the relative difficulty of this process is demonstrated by the frequency with which injuries can still occur when individuals are inexperienced or compromised, including children and the elderly, the intoxicated, those with mental disabilities or dementia. Normal people who are distracted are also at risk, especially with the widespread use of personal technology. Significant numbers of injuries and deaths occur yearly, but far fewer than before regulatory standards were adopted to mark and construct glass more cautiously.

Though we know bird deaths can be similarly reduced, builders, architectural designers and the glazing industry have lagged in developing solutions.

During spring and fall migrations, birds rain down in some cities, taken from the skies by glass, an indiscriminate predator. There is no upside here, no consolation. Hundreds fall in the space of an hour, and they are not flocks of urban starlings. These deaths do not drive natural selection, because they take all, including the young, the strong, and the fit.



**Figure3. Other birds are found nearby.**

They are often our finest birds, our rarest. Laid out concentrically by volunteers for purposes of education, these displays will take your breath away, both for their sheer numbers and their variety--- falcons, hawks, vireos, thrushes and Kentucky warblers-- and many that you would feel lucky to see in a lifetime. They are the birds of poetry, literature, art and music.

Dr. Klem thinks there are already laws on our books to address this problem. The Migratory Bird Treaty Act of 1918, one of our oldest and most effective conservation laws, guarantees wild birds' safe passage through North America. Signed by Canada and Mexico, the law precedes the Endangered Species Act of 1973. Ideally, these regulations could be used to crack down on buildings that are known to be causing excessive numbers of deaths or to push glass manufacturers to develop safer products.

The glass industry may be convinced that few people care about the issue or that that the public accepts these accidents as an unavoidable feature of modern life. The US Department of Fish and Wildlife could prosecute cases of negligence, where buildings are causing demonstrably high casualties; and environmental justice advocates could pursue lawsuits, but they cite limited resources and public apathy. Is it the manufacturers who need the prod of regulation to urge them toward better technology, or the builders and enforcers who need the pressure of public demand?

In the future, the ability of birds to see a broader spectrum may allow the best of both worlds. Marking windows with patterns visible only to birds could provide safety for them, plus an unimpeded view for people. Dr. Klem supports Leadership in Energy & Environmental Design (LEED) building certifications, but feels its standards have limitations, are slow in coming. LEED awards credits for using less glass and more visual noise to warn birds. But

changing windows will take generations. And still, so many people are in denial, unfamiliar with the extent of our casualties.



**Figure4. Reflections, without visual noise, look like distant trees.**

Unwilling to delay, advocacy groups are focused on changing public perceptions. Cities as diverse as Portland, Houston, Washington DC, Minneapolis and Detroit have taken steps forward. Volunteers man the streets now, documenting the dead, salvaging the stunned, releasing a lucky few after supportive care.

Minnesota passed legislation in 2013 that is a model for the rest of the nation, regulating changes in all public buildings, asking architects to avoid expanses of unmarked glass and to make other modifications. Denver felt their bird toll was unimportant-- even birding groups were convinced there was no real problem in their town, “until someone actually looked,” says Dr. Klem. Documentation came from outside the birding and academic communities. The local window washers said they witnessed the daily death toll.

Toronto is ahead of us on all fronts--in building adaptation, bird rescues and lights off programs. In the United States, a bill was introduced to Congress in 2011, based on modest changes to improve bird safety in new buildings, but it failed. Hundreds of citizens participate in bird counts yearly, gathering statistics that confirm drops in populations, even of our most common varieties.

Yet Congress lacks the political will to act on a remedy, in spite of the fact that the Congressional Budget Office calculates that modifications in new building design would be cost-neutral.

Wild birds near cities are often the victims of a double whammy. Drawn to artificial light during migration, many will circle until they are exhausted, then drop into unforgiving glass canyons. Searchlights at the World Trade Center, in 2010, commemorating the tragic event that took nearly 3000 lives, attracted a halo of birds revolving above the illuminated ghost towers. Hundreds of wings were glittering-- beautiful, until people realized the birds were

trapped and in danger, an event so distressing, that lights are now dimmed intermittently to prevent this disaster. Surprisingly, large numbers of birds travel at night and many cities now have well-coordinated campaigns to turn lights off during migrations.

When I returned to the building where I witnessed the hummingbird deaths, I found specific features which make the structure an efficient killer, including a high corner where panes overlap, and deceptive walls that looked like the sky.



**Figure5. Corners create a tunnel-like effect, an optical illusion of openness.**

Birds mistake this view as an open passage. They are misled by images of reflected trees, and perish while looking for shelter or food. It's head trauma that typically kills, and as in human head trauma, death can be delayed. Birds may be able to fly short distances after impact and then succumb to bleeding. On subsequent days, I found other birds, including those I have never observed or photographed in life.

Not just commercial buildings, but homes, especially new designs with extensive glazing, contribute to the nationwide losses. Estimates of total deaths necessarily come from a combination of observed strikes and mathematical models. Bodies are often whisked away by scavengers or injured birds may live long enough to hide.

Why would we care so much, about supporting our wild bird populations? The answer is that birds are helpful workers: pollinators, seed dispersers, and experts in rodent and insect control. Such varied eco-services quietly contribute billions of dollars to our nation yearly.

Woodlands do not perpetuate themselves unaided: Trees do not establish their own saplings. Birds dig holes and bury many of the acorns and seeds that build our forests, spreading them over distances and barriers where other animals cannot go. This transport enhances genetic diversity, because it spreads offspring away from the parents.

Many birds are scavengers, who clean and recycle organic materials. Other birds are widely hunted for food and provide recreational opportunities that contribute significantly to region-

al economies. Bird watching alone produces over \$30 billion in revenue annually in the States.



**Figure6. A healthy Wood Duck delights observers in a suburban setting.**

It's painful to realize that our mirrored buildings do not speak well of us, that a stylish exterior is a mask for an obsolete killing machine; or that a structure, intended to be green, discounts cruelty for passive solar gain. Yet collisions go from high to nearly zero when birds are given just a slim warning.

In essence, minimizing avian collisions requires surprisingly simple changes aimed at reducing reflections. These features can be integrated readily into new buildings. Changing existing buildings, or retrofitting, involves interrupting reflections and reducing interior lighting. Studies have shown that marking less than 7% of the area of the clear glass, applied in an exterior film, will prevent most strikes, a small concession for people to make visually.

Barring effective regulation, volunteers can tip the balance for change by documenting the wounded and the dead. In 2007, the Morgan Processing and Distribution Center in Manhattan was renovated to be more bird-friendly, after its appalling collision rate horrified bystanders and triggered awareness.

Yes, other things kill wild birds: Cats, power lines, vehicles and so on. But excuses based on such moral equivalency do not serve us well. How can we fix our house if every broken part justifies another?

Collisions undo the work of so many selfless citizens, their efforts nullified by mistakes we could mend. The nation builds and maintains refuges and bird enthusiasts pride themselves on creating urban or suburban sanctuaries to offset the losses of habitat inherent in cities. Yet we are at cross-purposes, if birds are lured into further peril by careless architecture.

It is no accident that our most ancient symbols are fliers-- flight revered as an unmatched miracle of freedom in all but the last moments of our recorded history. People will tell you how much they hate to see birds die in a collision, and that the death of a large bird or a rare one is remarkably troubling.



**Figure7. Flight and fliers are our symbols of freedom.**

But beneath our polished buildings and skyscrapers lie owls, Kentucky warblers, kinglets and others, felled in the middle of lives and migrations already perilous. These birds were not weak or silly, but were superb animals in the prime of life, strong enough to journey, and born to help us in so many ways.

As a physician I would advise people to stop apologizing for their reactions to these losses, and to take action. Heed the advice of modern medical experts who agree that mental health and physical health are inseparable, and that our longevity, fitness and mood are tied to environmental prosperity.

Numerous studies uphold the value of exposure to nature in our lives and the sickness that accompanies its loss. To be truly well, people need nature, whole. Whether you believe we were created by fiat or by the slow hand of evolution, science tells us plainly: This is who we are. Seeing wildlife perish is frightening to us. It reveals a collapse in the unseen foundation of survival, the pyramid upon whose summit we sit, held up by many other species.



**Figure8. The problem of collisions is one of science and technology, but it transcends both. A final photographic farewell, to the birds we studied, consisted of a tableau that honors their spirit and our memory.**

**More information on the topics discussed in this article is available here:**

The **American Bird Conservancy** offers a comprehensive guide to prevention of bird collisions. See this link for in depth information on building design:

<http://www.abcbirds.org/newsandreports/BirdFriendlyBuildingDesign.pdf>

<http://www.abcbirds.org/abcprograms/policy/collisions/index.html>

Information on the innovative Minnesota model, the **Sustainable Building Guidelines for New Buildings and Major Renovations**, is here:

[http://www.msbg.umn.edu/B3GuidelinesVersion2.2\\_130313\\_3.pdf](http://www.msbg.umn.edu/B3GuidelinesVersion2.2_130313_3.pdf)

**For more information on relevant legislation, and city ordinances, see below:**

<http://www.portlandoregon.gov/bps/article/446308>

[http://www.sfplanning.org/ftp/files/publications\\_reports/bird\\_safe\\_bldgs/Standards%20for%20Bird%20Safe%20Buildings%20-%2011-30-11.pdf](http://www.sfplanning.org/ftp/files/publications_reports/bird_safe_bldgs/Standards%20for%20Bird%20Safe%20Buildings%20-%2011-30-11.pdf)

<http://www.featherfriendly.org/feather-friendly-legislation.php>

<https://www.govtrack.us/congress/bills/112/hr1643/text>

**For more information on the federal laws that already in place to protect our wildlife:**

[http://www.dnr.state.md.us/wildlife/Plants\\_Wildlife/MBirdTreatyAct.asp](http://www.dnr.state.md.us/wildlife/Plants_Wildlife/MBirdTreatyAct.asp)

<http://www.fws.gov/migratorybirds/regulationspolicies/treatlaw.html>

Note: With the advent of National Electronic Injury Surveillance System, statistics are being developed that can aid in our understanding of accidents involving people and glass. For years since 2007, the US sees approximately 150,000 injuries related to glass door, windows and panes per year that are serious enough to prompt victims to seek care. Between 7000 and 9000 people yearly are hospitalized as a result or will perish prior to arrival. Of course not every person's encounter with glass is due to lack of perception; individuals may simply lose balance or they may smash glass intentionally, as in attempted suicide or acting out behavior. But these figures give us a broad measure that current regulations have been effective in reducing the total number of cases that are serious enough to be treated by health professionals. The American Board of Emergency Medicine (ABEM) emphasizes the importance of marking significantly risky glass surfaces with decals or other methods to insure the safety of all family members.

**For information related to glass injuries in people, see these helpful sites:**

<http://www.alzinfo.org/08/treatment-care/home-modification>

<http://www.emergencycareforyou.org/EmergencyManual/HowToPreventMedicalEmergencies/Default.aspx?id=142>

<http://www.ashireporter.org/HomeInspection/Articles/Safety-Glazing/1173>

**NEISS website and health statistics:**

<http://www.cpsc.gov/en/Research--Statistics/NEISS-Injury-Data/>

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