Birds Flying Into Windows? Truths About Birds & Glass Collisions from ABC Experts

Glass collisions kill vast numbers of birds in the United States each year. Yet most Americans know little about this danger, and even fewer are aware of the solutions available to help prevent these deaths — fixes that in many cases are easy and inexpensive.

To shed light on this pervasive threat, ABC's collisions experts, Christine Sheppard, Ph.D., and Bryan Lenz, Ph.D., put together a list of responses to the 15 questions they are most frequently asked. Take a look. Chances are, we've got an answer for you below.

1) How many birds are killed by glass collisions in the U.S. each year?

Because glass is used so widely, giving a definitive answer is difficult, but Smithsonian researchers attempted to do so in 2014.

They estimated that homes and other buildings one to three stories tall accounted for 44 percent of all bird fatalities, about 253 million bird deaths annually. Larger, low-rise buildings four to 11 stories high caused 339 million deaths. And high-rise

buildings, 11 floors and higher, kill 508,000 total birds annually. Individual skyscrapers can be quite deadly for birds, but they kill fewer birds overall due to their limited numbers.

By combining these numbers, the Smithsonian reported that collisions likely kill between 365 million and 1 billion birds annually in the United States, with a median estimate of 599 million[1].

We believe that the true number is closer to a billion, or higher, for several reasons. For one, data used in the study is now more than ten years old, and there has been a steady increase in glass use since that time, increasing the likelihood of fatal collisions. In addition, we've learned that bird carcass reports tend to underestimate deaths (see questions 4 and 5), meaning that more dead birds go uncounted than we realized.

This means that the only anthropogenic (human-caused) threat that kills more birds in the United States each year is domestic cats[2].

2) Why do birds collide with glass?

Transparent glass is invisible to both humans and birds, but humans can use door frames and other visual clues to anticipate the presence of glass and avoid collisions — most of the time. Birds, of course, don't share this ability. They perceive reflected images as literal objects, which explains why glass reflections, especially ones that present images of food, shelter, or an

escape route, can trigger collisions. Learn more by visiting our "Why Birds Hit Glass" page.

3) Are birds okay when they hit windows and fly away?

After colliding with glass, some birds may be only temporarily stunned and without lasting injury — but often they are not so lucky.

In many of these cases, birds suffer internal hemorrhages, concussions, or damage to their bills, wings, eyes, or skulls[3]. While they may be able to fly temporarily, birds with even moderate injuries are much more vulnerable to predators and other environmental dangers.

In many instances, however, birds are killed immediately and never fly away.

4) Why don't I see birds that have been killed by collisions more often?

Collisions often go unnoticed at both homes and commercial buildings for several reasons. First, many of the birds that hit windows do not die immediately and fly off without leaving a trace.

One study found that, out of 29 window collisions, only two birds died immediately and left a carcass that at the foot of the window[4]. However, birds can sustain severe injuries such as

fractured bones and beaks, concussions, and internal bleeding[3], so even birds that initially fly away likely die elsewhere.

Second, for those birds that do die and end up at the base of the building, animal scavengers often quickly remove carcasses. Cats, raccoons, birds of prey, and even squirrels, can learn to wait at windows where collisions occur for an easy meal.

Birds may also fall on inaccessible rooftops, fall through grates, end up in landscaping, or land in dense vegetation that makes them difficult to see.

5) Do collision monitoring programs find all collision victims?

Even for intensive collision monitoring programs the total number of dead birds found are always a large underestimate of the number of birds that actually collided with the glass. This is the case for reasons similar to the answer above.

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Second, for those birds that do die and end up on the ground, animal scavengers – and people, frequently facilities teams – often remove carcasses before monitors can find them. Collision

monitors even report animals, such as gulls and squirrels, learning to wait at windows where collisions occur for an easy meal. This problem is so serious that academic monitoring efforts conduct “carcass persistence studies” to estimate the number of dead birds removed before monitors walk their routes and find them[5,6].

The rate at which dead and injured birds disappear can vary a lot from site to site[7]; researchers have found that in some places carcasses are removed within hours[8] while at others it takes days[5,6,7]. At some locations in NYC, for example, only 25% of carcasses placed on collision monitoring routes remained when collisions monitors walked their routes later the same morning[8].

Finally, for those birds that are left, monitors do not always detect all of them[9]. Birds may fall on inaccessible rooftops, fall through grates, end up in landscaping, land in dense vegetation that makes them difficult to see, be swept away in the gutter, or just overlooked because they blend in with the ground.

In one study where researchers accounted for both scavenging and imperfect detection, they estimated that only about 20% of birds killed were actually found by people who were searching for them[9]. So, it is safe to say that any number of birds picked up in a monitoring effort especially if it is not a rigorous monitoring effort, is going to be a small fraction of the birds that actually died and an even smaller fraction of the total number of birds that hit the windows.

6) How do I stop birds from hitting my windows?

There are many ways to making windows bird-friendly. One of the best is to use external insect screens. These screens virtually eliminate reflections, and if birds do hit them, the impact is cushioned, reducing the likelihood of injury. An added benefit is that these screens are easy to install on existing or new home windows.

If screens aren't an option, you can use a range of materials — tape, decals, strings, cords, paint, netting, and shutters are options — to create window patterns that birds will interpret as solid objects, needing to be avoided. Check out our great home-friendly solutions guide here.

It's important to make sure that birds see no viable way to fly between the markers or objects you're using, so make sure to eliminate all spaces larger than two inches.

Remember, whichever material you use needs to be visible to birds from at least ten feet away so that they have time to see the material and change course.

7) Can I apply something to the inside of my windows to stop bird collisions?

The best place to apply solutions is on the outside of the window, where they are easily visible.

However, using external solutions isn't always an option. Some windows — like those on tall buildings — can be difficult to access from the outside.

In these cases, we recommend testing a variety of solutions. This is because different kinds of glass have varying reflective levels and, unfortunately, there is no universal solution.

To conduct a test, apply a sticky note, tape, or sample of your proposed solution to the inside of the window and then look at it from the outside every hour or two, starting in the early morning.

If you can see your test material most of the time, birds will too, and an inside solution may work for you.

In many cases, however, internal solutions do not work, and reflections will hide your solution during part or all of the day, thereby reducing or eliminating its effectiveness.

But this shouldn't deter you from acting. is better than doing nothing. Adding something to your windows is better than doing nothing.

8) Will bird-friendly window products obscure the view from my window?

No, you don't need to impair your view to save birds.

There are effective solutions that cover as little as 1% of the window area, allowing sunlight in and a view out. In our experience, people quickly adjust to bird-friendly design solutions, often forgetting that they are even there. We have also found that when family, friends, or customers notice the pattern and learn its purpose, they appreciate the effort to protect birds.

If you're looking to retrofit existing windows, there is a wide range of solutions from which to select, depending upon personal preferences.

If you are designing a new building or replacing windows, consider the professional solutions favored by architects. Many of these elegant products have enjoyed long-standing popularity among architects for their aesthetic appeal alone. For more on designing a new building or replacing windows, visit the "Resources for Architects, Planners, and Developers" page. Looking for inspiration? Check out our bird-friendly building gallery.

Bird-friendly window products have little impact on views. Photo by Arenal Observatory Lodge

9) Does light cause birds to hit buildings?

Light can increase collision numbers in several ways. Recent studies confirm that urban glow attracts birds into the human-built environment[10,11], where they run a higher risk of collisions.

Migratory birds traveling at night are also attracted by intense lights contrasted against the night sky. The “beacon effect,” as this occurrence is commonly known, can be caused by lighthouses, offshore oil platforms, or powerful light displays, like the twin beams at the 9/11 Tribute in Lights memorial in New York City. These lights can thoroughly disrupt birds' ability to navigate, pulling them off course and effectively trapping them around the light[12] or disorienting them. At the 9/11 memorial, volunteers monitor the birds and the lights are turned off when needed to allow safe passage.

Brightly lit building facades can also affect birds. In some cases, these facades and brightly lit windows can cause collisions at night[13,14]. These birds are seen fluttering at lit windows or exhausted on the ground[14] where they are vulnerable to predators.

Despite the dangers posed by nighttime lights, it's important to note that most collisions take place during the day. These collisions are due to habitat reflected in or seen through glass, and they are often direct and deadly.

While turning off lights is a great way to help birds and other wildlife, the best way to prevent collisions, especially at homes, is to use one of the many options available to treat your windows.

10) I put a decal up, but birds still hit my windows. What can I do?

A single decal may be enough to warn an alert human to expect a glass door, but for a bird it's simply an obstacle to fly around.

To successfully deter birds, decals and other collision deterrents must be applied with proper spacing to create the illusion of a cluttered environment through which it would be difficult or impossible to fly. You can learn more here. Remember to make sure that whichever pattern you use on your windows should not have any spaces more than two inches wide.

11) What can I do about a building that causes collisions in my town?

The first thing to do is document the problem. Take photos of the dead birds you find and keep a list of numbers and dates.

If there is a facilities or maintenance department, ask what they have noticed; they are usually responsible for cleaning up birds that have died after hitting glass and may be great allies who help you collect data or convince building managers of the danger to birds.

After documenting the problem, review the window solutions on ABC's site, contact the building owner or manager to tell her or him about the problem, and provide advice or resources (such as this blog) on how to address it.

Keep in mind that you are making a request and looking for a partner to save birds, so be sure to keep these interactions

positive and non-confrontational. Avoid vilifying the responsible party for a collision problem that they likely had no idea existed.

You can also talk to people who live, work, or shop in the building in question to see if anyone else shares your concerns. If so, ask them if they would like to be involved. By working with others, you build a collective voice that can draw more attention to the problem.

Remember, there are many ways to get involved. These include helping with monitoring, writing letters to building owners, attending meetings with building management, and organizing community action.

For more tips see our "How to Advocate for Retrofits" page.

Window imprint from bird collision. Photos by David Fancher

12) What can I do to keep buildings that harm birds from being constructed where I live?

Buildings designed without bird-friendly design principles have the potential to be deadly for birds.

A variety of factors determine the level of the threat they pose, including the amount of glass used, placement and reflectivity of the glass, the height and extent of vegetation around the building, and the presence of water, among other things.

Given incremental cost of constructing a bird-friendly building, we believe that all new buildings — not just glass-covered skyscrapers — should incorporate bird-friendly features. It is less expensive to incorporate these features from the beginning of the planning process, compared to retrofitting a building later.

There are several ways to help make this happen. The first is to develop and pass a local ordinance requiring the adoption of bird-friendly building standards in your community. To download an easy-to-use ordinance template, click here. You can also take a look at our list of existing ordinances mandating bird-friendly design or creating voluntary standards.

Keep in mind that ordinances tend to apply to large buildings and exempt low rises and homes, so it is important to make sure that the ordinance applies to as many buildings as possible.

Although passing an ordinance is a great accomplishment, it's not the only thing you can do.

Consider approaching the developers of new and proposed building projects with your concerns. Since this can be a time-consuming process, we suggest focusing on projects with a high likelihood of success (e.g., nature centers, museums) or organizations that influence multiple buildings (e.g., local government, universities, health care organizations, and

architecture firms) to help them adopt bird-safe building policies.

While it's critical to make sure that new buildings incorporate bird-friendly designs, don't forget that existing buildings already account for hundreds of millions of bird deaths annually. Consequently, the need to retrofit homes and other buildings will remain an important way to reduce bird collisions for the foreseeable future.

To learn more visit our "Creating Bird-Friendly Legislation" page.

Bird-friendly building design can improve a building's appearance while reducing bird deaths. Photo by Almere

13) Are all LEED-rated buildings bird-friendly?

14) When do most bird collisions with glass take place?

Collisions don't happen at an even pace over the course of a year, or even throughout the day.

Most collisions happen during daylight hours or immediately before dawn, with some occurring at night. Mornings, in particular, tend to be the worst time of day for collisions[15,16,17, 18]. During migration, this is because migratory birds that have flown all night stop to look for a place to land and refuel. Those that land in and near cities find themselves in a maze of deadly glass. In addition, resident birds are generally most active in the morning, as they wake up hungry and immediately search for food.

During the course of a year, migration periods often bring the largest upticks in collisions, when huge numbers of birds stop to rest, often in unfamiliar areas where glass is common[10,19,20]. Many collisions programs are focused collisions during migration in cities where they tend to occur in large numbers. Migrant mortality in fall tends to be worse than spring due to the larger number of birds in flight. This is because fall migration includes both adult birds and juveniles that were born over the summer. Spring migration includes only adults returning to breed.

But migration is not the only dangerous season. We also see collision increases in late spring[18], as nesting birds fledge their young, and in winter[21,22], when resident birds leave their territories and cover larger areas in search of food. In the winter, bird feeders near windows can be a cause of mortality from collisions[23].