



Building Safer Cities for Birds

How Cities Are Leading the Way on Bird-Friendly Building Policy

By Meredith Barges and Viveca Morris



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ABOUT THIS REPORT

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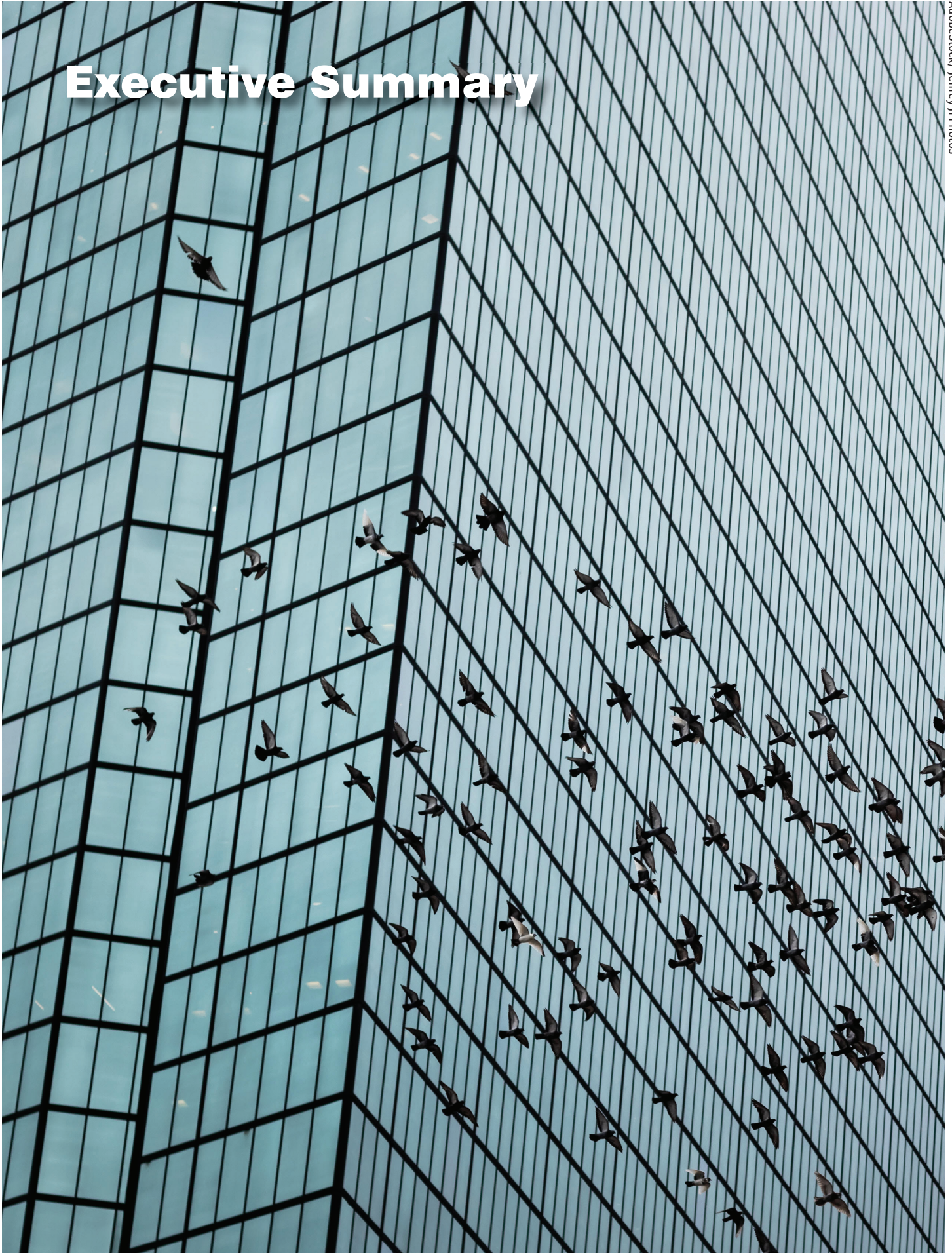
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Executive Summary



Executive Summary

Viveca Morris



Building collisions are among the leading causes of wild bird mortality in the United States.

Nearly one out of every three breeding birds in North America has quietly disappeared since 1970, a loss of nearly three billion individual birds.¹ Building collisions are among the leading direct causes of this massive decline with up to one billion birds killed by window collisions every year in the United States alone.² That may represent as much as 2 to 10 percent of the country's entire bird population,³ and recent studies indicate that even one billion may be an undercount.⁴ Much of that staggering loss consists of songbirds and backyard bird species that many Americans know and love, such as warblers, sparrows, finches, doves, thrushes, and wrens.

Without significant and targeted conservation action, avian declines are expected to continue.⁵ Such loss will result in extraordinary direct and indirect ecological, social, and financial costs. Simply put, we *need* birds and can not afford to take them for granted. In addition to their intrinsic and cultural value, birds provide significant economic and ecologic benefits to humans: they control populations of insects and rodents that spread disease, scavenge carrion, pollinate plants, disperse seeds, regenerate habitats, move nutrients, and stimulate the economy.⁶ The US government estimates that 45 million Americans watch birds and spend an estimated \$39 billion per year on bird-

related trips and equipment alone.⁷ Bird-watching expenditures create an estimated 782,000 jobs.⁸

We have the knowledge and tools needed to fix the problem of bird-building collisions. The root cause is simple: birds generally cannot see or recognize transparent glass. As large glass sheets and windows proliferated on buildings across the United States starting in the mid-20th century, birds became unintended victims — lured to their deaths by optical illusions of open sky and habitat created by mirrored and transparent glass. Yet, most of the public knows little about the profound danger that our buildings pose to birds and fewer still know that there are effective solutions that can prevent these unnecessary deaths.

Bird mortality due to building collisions can be significantly reduced or eliminated by incorporating mitigation techniques and deterrents into building design. And preventing birds from crashing into windows can be an easy and inexpensive problem to solve. Over the past fifty years, a substantial body of scientific research has emerged about the causes of bird-window collisions: mainly a combination of glass, lighting, and landscaping choices.⁹ In response, architects, scientists, advocates, and businesspeople have identified and developed a

wide range of affordable and attractive bird-friendly building design solutions, materials, and strategies for both new and existing buildings. Many of these design strategies also improve building energy efficiency.¹⁰ Examples of effective bird-friendly solutions include fritted glass, glass with an ultraviolet (UV) pattern, louvers, insect window screens, artistic etching, acid etching, patterned window films or markers, frosted glass, stained glass, photovoltaic glass, and more.¹¹ Major commercial building material manufacturers now offer bird-safe product lines, and many award-winning building designs follow bird-friendly design practices, both intentionally and unintentionally.

But bird-friendly building strategies and materials will only work to help save bird populations if they are widely adopted.

This first-of-its-kind report, *Building Safer Cities for Birds*, considers how public policies can accelerate the adoption of bird-friendly buildings at scale in the United States. Despite being one of the leading causes of bird death in the country, bird-window collisions have received little attention from US federal and state policymakers to date. Legislative efforts at the state and federal levels have focused on regulating public buildings. As of June 2023, four US states – Maryland (2023), Maine (2023), Illinois (2021), and Minnesota (2013) – have adopted, or have committed to adopting, bird-friendly building requirements for new state-owned buildings and major facades retrofits of existing state-owned buildings. At the national level, an act requiring incorporation of bird-safe design and materials on all federal public buildings constructed, acquired, or significantly altered has been introduced every year in the US House of Representatives since 2009, most recently in June 2023. The act has twice passed the US House but has not yet passed the US Senate.¹² The US federal government’s real estate portfolio includes nearly 400,000 buildings, so this effort is significant, but it still represents only a fraction of one percent of the nation’s building stock.¹³ Addressing collisions at both public and privately owned buildings is critical to protect birds.

In the absence of federal and state action to reduce collisions at greater scale, a growing group of US cities and counties have emerged over the past two decades as leaders in advancing bird-friendly building design.

Bird-friendly building legislation in the United States started in 2008 in the Forest Preserve District of Cook County, IL, with the unanimous approval of legislation proposed by US Congressman Mike Quigley, who was then a member of Cook County’s Board of Commissioners. Since then, more than 20 US cities and municipalities have enacted bird-friendly building policies. (See the appendix table for an overview of bird-friendly legislation in the United States to date.) The policies vary in form, reach, and effectiveness. Since 2008, both the science of bird-window collisions, standards for rating materials and strategies, and the availability of building materials to mitigate them have advanced considerably.

This report highlights examples of municipalities that have been at the forefront of the bird-friendly building movement, with the hope that they can inspire and inform efforts to protect birds from unnecessary collision injuries and deaths in other localities. Produced by the Yale Bird-Friendly Building Initiative, the Law, Ethics & Animals Program at Yale Law School, and American Bird Conservancy, the report features in-depth case studies of five localities that have enacted bird-friendly building policies. Each case study examines the city or county’s policy, advocacy history, cost, implementation strategy, effectiveness, and lessons learned that may be useful to other localities. To inform the case studies, nearly two dozen policymakers, advocates, glass manufacturers, architects, scientists, and community members involved in designing, implementing, and/or working within the enacted policies were interviewed.

The featured localities include New York, NY, which adopted one of the country’s most comprehensive and rigorous bird-friendly building laws in 2019; Arlington County, VA, which incentivized bird-friendly building in 2020 with a density bonus program requirement through its Green Building Incentive Program; Madison, WI, which amended its zoning code to include bird-friendly building requirements in 2020 and faced the country’s first legal challenge of a bird-friendly policy; Cupertino, CA, which addressed both glazing and light pollution hazards for birds in its 2021 law; and San Francisco, CA, which enacted the country’s first bird-friendly law in a city by amending its planning code in 2011.

KEY FINDINGS

Cities and counties are accelerating the adoption of bird-friendly building design.

The case studies included in this report make it clear that local governments in the United States are significantly advancing the adoption of bird-friendly building design through policymaking, at little or no additional cost to the jurisdictions. With varying approaches and degrees of success, these localities are helping to protect birds from collisions within their cities, establishing themselves as national leaders in sustainable design and driving market innovation in the development of new bird-friendly building technologies. A city’s passage of a bird-friendly building policy can provide a powerful example for neighboring and peer cities to adopt similar policies, creating a cascade effect. At the same time, each city addresses bird-safe building rules in its own way to fit its long-term municipal development plans, legislative structures, existing legal codes, and local culture.

The glass manufacturers and architects interviewed for this report cited the growing wave of bird-friendly building policies as key to incentivizing the development of new products. The passage of local bird-friendly building laws, especially in New York City, San Francisco, and other global cities, has created increased demand for bird-friendly glass – and innovations in building products and technologies.

Some bird-friendly building policies are more comprehensive than others.

Cities address bird-friendly building standards in different ways. How bird-friendly building policies are designed matters. To date, most local policies in the United States aimed at preventing bird-window collisions have focused on amending building or zoning codes to regulate materials on new structures and major retrofits of existing structures. Dr. Christine Sheppard, a leading expert on bird-window collision science and public policy, summarizes the three key questions that all such bird-friendly building policies must answer:

- 1) What structures are covered by the policy?
- 2) How much and what portions of each structure must be “bird-friendly”?
- 3) How is “bird-friendly” defined?

The answers to these questions vary significantly among existing bird-friendly building regulations and dramatically impact the effectiveness of policies.

Different municipal laws do not uniformly apply the same standard or metric for defining bird-friendly building materials or design. Many laws enacted in recent years – such as New York City’s Local Law 15 (2019) – use the Material Threat Factor system developed by American Bird Conservancy and a team of architects in 2010. This system assigns scores of 1 to 100 representing the likelihood that a material will result in collisions, with 1 being the least likely. The system is based on birds’ ability to see and avoid glass and other building materials as assessed in tunnel tests and field trials. The creation of this functional standard and the ever-growing database of rated materials has helped to make effective bird-friendly regulation of building materials possible and allowed for the inclusion of new bird-friendly materials as they are developed and rated. Some ordinances, such as Madison’s (2020) and Cupertino’s (2021), do not specify exactly what standard must be used as glass treatments; instead, they provide a list of accepted bird-safe treatments for standard glass that is created and maintained by the city.¹⁴

Further, bird-friendly building development is not limited to glazing. Since the first bird-friendly ordinance was passed in San Francisco (2011), legislation at the city, county, and state levels have commonly addressed the problem of bird mortality by regulating both glazing and light pollution as two cumulative and interacting anthropogenic threats to birds. Since then, Dark Sky lighting standards, created by the nonprofit organization Dark Sky (formerly International Dark Sky Association), have been adopted by municipalities, including Cupertino, CA,¹⁵ and states to reduce mortality of night-time bird migrants and to protect the natural environment from the harmful effects of light pollution. Over 70% of birds in North America migrate at night,

including commonly known species like the Baltimore Oriole.¹⁶

Some localities have successfully improved and refined their bird-friendly building policies over time to keep pace with emerging science and mitigation techniques by requiring that the policy be regularly reviewed and updated by the city government. Arlington County has taken this approach with its Green Building Density Incentive Program, which was updated in 2020 to include mandatory bird-friendly building requirements after its 2014 updates made them only optional.

Local bird-friendly building laws in the United States share many of the same limitations.

Residential exemptions

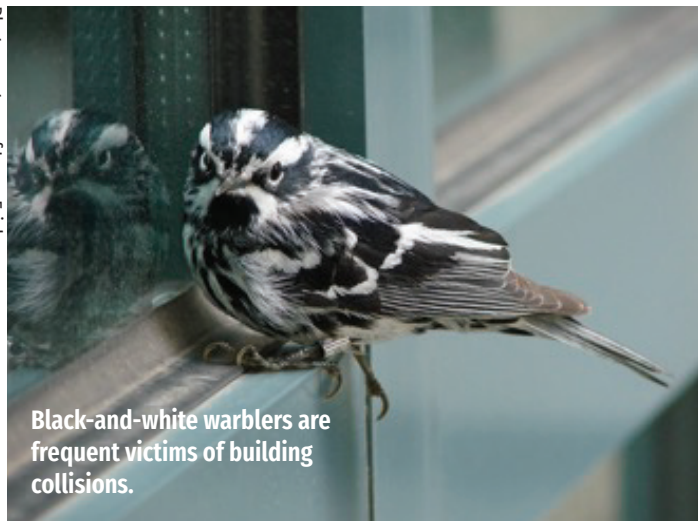
Exemptions of residential units represent significant gaps in most bird-friendly building policies. Birds can collide with buildings of all types, not just commercial high-rises; window strikes at one to three story buildings, including residences account for an estimated 44 percent of fatal bird collisions in the United States.¹⁷ Yet, many effective, affordable, and easy-to-install designs and technologies for bird collision deterrence for single-family residences and low-rise buildings are widely available, including commonly used window insect screenings.¹⁸ For example, San Francisco’s Standards for Bird-Safe Buildings exempt low-rise residential buildings (under 45 feet tall) in residential districts with an exterior facade comprising less than 50 percent glass.¹⁹ Yet, because residential zoning districts encompass approximately 70 percent of privately owned land in the city, this exception means the majority of buildings in San Francisco are not regulated.²⁰ Madison’s bird-friendly building law only regulates buildings over 10,000 square feet in size, leaving a high percentage of buildings in the city without a bird-friendly building requirement.²¹ Bird-friendly building laws should regulate equally all categories of residential housing, including multi-unit apartment buildings, high-rises, condominiums, and single-family homes. New York City’s bird-friendly building law is an excellent example of comprehensive legislation that regulates all types and sizes of buildings, including the city’s current 3.6 million units of single-family detached homes that represent half of all residential units in the city.²² This shows that applying such regulations to single-family residences is possible.

Storefront exemptions

Several city policies exempt ground floors, especially storefronts,²³ including San Francisco (2011), Cupertino (2021) and Arlington (2020). Many policies exempt the first 15 feet of storefronts. Many localities have laws in place that require storefronts to meet transparency standards (e.g., 60 percent of the street frontage at ground level must allow visibility into the inside of the building). The logic of excluding storefronts from bird-friendly building requirements is typically to ensure “transparency” and to avoid conflict with existing law.

For instance, under San Francisco’s law, building owners are encouraged to concentrate the permitted 10 percent of untreated transparent glazing on ground floor fenestration and lobby entrances in order “to enhance visual interest for pedestrians.”²⁴ However, this fails to recognize that many effective strategies for reducing collisions at the ground floor do not compromise views or natural lighting, including glass with UV and acid-etched patterns, glass with ceramic frit patterns, and glass with other opaque markers. The Audubon Society of Northern Virginia has explained that bird collision deterrence does not prevent visibility or light travel: “Glass featuring a pattern visible to birds on the 2” x 4” pattern is still ‘transparent’ to people.”²⁵

Photo courtesy of Laura Erickson



Black-and-white warblers are frequent victims of building collisions.

Low height thresholds

All glass can be problematic for birds but it is especially dangerous where it reflects trees, shrubs, and other habitat that birds use for foraging, nesting, and resting.²⁶ Therefore, the failure to regulate storefronts likely results in bird collisions that could have been avoided with a more rigorous standard. New York City’s law requires bird-collision deterrence on all first-floor storefronts with limited exceptions for buildings in a flood zone, showing that ground-floor rules are workable.²⁷ Among ordinances studied in this report, Arlington’s rule is the weakest as it only regulates glass up to the first 36 feet above grade.²⁸ Laws in San Francisco (2011), Madison (2020), and Cupertino (2021) regulate the first 60 feet above grade, New York City (2019) covers the first 75 feet, and Washington D.C. (2023) goes furthest to the first 100 feet above grade.

Limiting applicability to ‘bird-sensitive areas’

Several municipal laws in California limit bird-friendly building design requirements to areas they deem to be more “bird-sensitive” than others.²⁹ However, studies show that birds make diffuse use of all parts of urban and suburban environments,³⁰ including to move to and from their nesting and food-foraging sites.³¹ As a result, restricting bird-friendly building design to only areas near “Urban Bird Refuges” or “bird-sensitive areas” falls short of current understandings of the wide-ranging

threat of window collisions that birds face throughout the built environment. Laws in New York, NY (2019), Evanston, IL (2022), and Washington, DC (2023),³² which do not identify particular areas as more sensitive for birds than others, should be followed.

Retrofitting existing buildings is key to reducing collisions, including with incentives and co-financing.

Mitigating collisions with the nation’s existing building stock is needed to protect birds. Bird-friendly building zoning and building code requirements passed to date do not apply retroactively. Beyond adding new requirements to building and zoning codes, local governments can use a wide range of regulatory policies and financial incentives to advance the adoption of new building technologies by developers and homeowners. In 2014, Arlington County, VA, pioneered the first use of a market incentive – a “density bonus” – to incentivize bird-friendly building and in 2020 successfully integrated mandatory bird-friendly building requirements into its optional green building program. Many other policy tools, such as expedited review and permitting, have yet to be attempted with bird-friendly building. These could be effective tools for local governments to use in the future to incentivize the adoption of bird-friendly building materials. Creating financial incentives for developers and homeowners is particularly important in accelerating the retrofitting of existing buildings that are dangerous to birds.

Such policy tools could be modeled on the energy-efficiency financial and structural incentive policies passed by many U.S. and global cities in recent decades. Common city-level green building incentives include: expedited review and permitting processing, density and height bonuses, tax credits, fee reductions, grants, revolving low-interest loans, and technical and marketing assistance.³³ The increased demand that these green policy incentives have created has, in turn, driven innovation for green-building technologies.³⁴ Some of these policies can be implemented at no or low cost to local governments.

Bird-friendly design can be successfully integrated into green-building policy incentives.

Many policy incentives designed to accelerate energy efficiency retrofits could also incentivize retrofits to make buildings bird-friendly. The United States has over 244 billion square feet of residential buildings and 97 billion square feet of commercial buildings.³⁵ An estimated 80 percent of buildings today will still be standing in 2050.³⁶ Because buildings are responsible for up to 60 percent of carbon emissions,³⁷ retrofitting buildings to improve energy efficiency has been identified as a critical climate strategy. According to the World Economic Forum, real estate is now at the “start of its retrofitting journey,”³⁸ which could be transformational to the nation’s building stock with

ambitious federal, state, and local action. Incorporating bird-friendly building practices into this once-in-a-generation, or once-in-a-century, transformation of cityscapes through net-zero and/or green legislation is probably the best, and perhaps only, opportunity to accomplish large-scale installation of bird collision deterrence measures, especially because glass is often replaced to improve energy efficiency.

The Maryland Sustainable Buildings Act, passed in 2022, addresses both building energy efficiency and bird-friendly building requirements, with the recognition that bird-safe building standards “will reduce energy consumption, making state buildings more sustainable and saving taxpayers money.”³⁹ The US Green Building Council recognizes that “bird collision deterrence” is both feasible and an important part of green building practice.⁴⁰ Because of this, institutions that intend to own their buildings for the long-term, such as governments and universities, may tend to be early adopters of bird-friendly building practices, to benefit from the long-term energy cost savings of using bird-friendly materials and lighting strategies.

Local action complements, but does not replace, the need for state and federal action to reduce bird collisions.

While this report highlights the power of cities to advance bird-friendly design, it also reveals the limits of individual cities to protect birds, especially when most migratory birds travel through hundreds of jurisdictions twice per year. (Seventy-five percent of birds in North America migrate.) Enacting the local bird-friendly policies featured in this report all required significant and sustained multi-year efforts by advocates – a formidable level of work that is unlikely to be replicated in the over 100,000 cities and towns nationwide. As awareness of the need for bird-friendly building regulations grows, city examples of bird-friendly building policies provide valuable proof of concept and demonstrate that such policies can be affordable, effective, and popular. For example, in California, a dozen cities have implemented bird-safe building requirements or voluntary guidelines over the past 15 years, raising the question of whether a uniform state-level policy may be more effective at preventing collisions statewide while at the same time facilitating compliance by builders and product manufacturers.

Local data on bird collisions is valuable, but localities should not require it to take action to protect birds from collisions.

In some cases, local data on bird collisions helped to show the toll of the built environment on bird populations and justify the need for regulations in policy discussions. In some jurisdictions, advocates and community organizers should be prepared to show local evidence of bird collisions when such data are available, while providing the figures on avian populations declines in North America due to window collisions. Citizen science projects like iNaturalist and dBird.org can be valuable tools in these efforts.

At the same time, in several cities – including Toronto, Canada; San Francisco, CA; and Cupertino, CA – local activists did not present or require local collision data to demonstrate the city’s need for a bird-friendly building policy. For example, more cities in California have passed bird-friendly building requirements or guidelines than in any other state, even though there is comparatively little published research on bird-window collisions in California specifically.⁴² This is because, in many cases, the threat level of a building can generally be assessed based on architectural features such as the percentage of glass on facades and whether glass reflects vegetation,⁴³ obviating the need for time-consuming and complicated collision monitoring. Collision monitoring is a process that can require years of effort, expertise, and resources, and may not be realistic in all localities. Often, such monitoring is conducted in partnership with universities and museums with the help of volunteers.



A window imprint left on glass by a pigeon.

Adobe Stock / HAS Photos

Further, in locality after locality, the landmark 2019 *Science* article “Declines in North American Avian Fauna” that showed staggering drops in bird populations across North America since the 1970s was cited to convince elected officials of the urgency to act on behalf of birds. Therefore, it may be helpful to uncouple the need for local data from the mounting evidence of major bird declines, the staggering problem of bird collisions, and the availability of effective remedies. Lack of local collision data reflects lack of comprehensive collision monitoring – it does not mean that collisions are not occurring.

Even though collision monitoring data are not needed to begin the process of adopting a bird-friendly building policy aimed at new construction and glass replacement in existing buildings, they can help to make the case for it. In addition, even rudimentary monitoring data are hugely important for determining which existing buildings cause the most collisions and therefore most urgently need to be retrofitted to prevent collisions.



The Brooklyn Botanic Garden Visitor Center (2012), designed by Weiss/Manfredi, features patterned bird-friendly glass and has won multiple architectural awards.

Passing local bird-friendly building laws often requires sustained local advocacy.

In addition to examining the structure and implementation of the laws themselves, the case studies in this report include narrative histories of how the laws came to be enacted. All five of the policies featured in this report required sustained campaigns over multiple years, often led by highly motivated individuals and local and national bird conservation groups, including American Bird Conservancy and local chapters of the National Audubon Society and the Sierra Club, and aided by opportune timing (i.e., key local government officials appreciating the importance and benefits of birds). Bird-friendly building policies generally receive wide public support. Birds are special animals that many people feel appreciation for and connection with. In each city, passage of the policy required the coordinated efforts of several local conservation groups that could use their public standing, expertise, membership base, and communication platforms to launch a successful campaign. Bills in Madison and New York City also benefited from the support of a specially formed coalition of local conservation groups and nonprofits dedicated to raising awareness of the problem of bird collisions and advocating for bird-friendly building practices.

Opposition to bird-friendly policies tends to fall under two broad categories, indicating poor understanding of the wide range of bird-friendly design strategies and materials.

Increased costs

Some groups, mainly development and real estate firms and organizations, may raise objections to bird-friendly building policies because they worry that mitigation requirements will

make it more costly for them to do business. This concern is largely unfounded, though, particularly given that bird-friendly building policies to date apply only to new buildings and major retrofits of existing buildings. Hundreds of bird-friendly building solutions exist, ranging from very cost-efficient and widely available products like insect screens to more expensive options like patterned UV glass coatings. Further, common building features like exterior insect screens are approved treatments under most bird-friendly building policies. There may also be benefits for developers and building owners in addressing the potential risks to birds from their glazing, fenestration, and lighting choices upfront in the design and review process instead of after a building is constructed and requires mitigation to reduce collisions.

When bird-friendly building standards are considered from the beginning of a project, additional costs associated with mitigation can often be eliminated through material and design choices.⁴⁴ Major bird-friendly building projects have reported that the use of bird-friendly materials added only a fraction of a percent to their total cost of construction.⁴⁵ Further, because of the energy savings generated by some bird-friendly building options, the cost of materials can often be recovered or offset. For example, ceramic frit can help to make glass more effective at insulation, thereby reducing the cost of heating and cooling. This is significant because heating and cooling are among the most expensive costs for maintaining buildings, accounting for 40-60 percent of total energy use.⁴⁶ At the Javits Center in New York City, for example, adding frit and other upgrades to the existing structure to improve energy efficiency and reduce bird collisions resulted in a 26 percent annual energy savings,⁴⁷ generating over \$2 million savings in energy costs from 2013 to 2017,⁴⁸ and a 90 percent decline in bird collisions.⁴⁹ Still, one of the most effective and economical approaches to reducing the threat

of bird collisions at building facades is to reduce the amount of glass (or glazing), because glass is expensive and difficult to insulate.⁵⁰ As demand increases for bird-friendly building solutions in response to bird-friendly building policies, it can be expected that more competition and increased production of bird-friendly building materials should continue to lower prices for state-of-the-art bird-friendly building materials and spur innovation.

Aesthetics

Concern over the aesthetics of bird-friendly building design often stems from a lack of familiarity with the many different options for mitigating structures for bird collisions. Hundreds of solutions exist, ranging from simple glass and screen treatments that are virtually invisible to the human eye to creative, sophisticated, one-of-a-kind design approaches worthy of architectural awards. Architects and designers are creating beautiful, interesting, and sustainable buildings that are as attractive to people as they are safe for birds.

The long list of building materials rated by American Bird Conservancy⁵¹ – and referenced in many US bird-friendly building policies – gives architects and designers wide freedom and flexibility in designing highly-attractive buildings incorporating bird collision deterrence. And when buildings and structures are designed from the beginning with bird safety in mind, there should be no need to sacrifice appearance, natural lighting, or view clarity at building facades in pursuit of bird-friendly building standards.

Policy makers should trust that architects and designers are skilled and inventive enough to create structures that can satisfy consumer needs and preferences while also meeting important safety and environmental standards.

At the same time, many experts interviewed for this report explained that, with the recent popularity of all-glass buildings and glass curtain walls that give the “appearance” of proximity and close connection to nature but may actually cause serious harm to nature and wildlife, a shift needs to happen in how we understand and relate to the natural environment through our buildings. “Our sense of aesthetics needs to change, what we think of as beautiful. When you know the underbelly of it, it’s not so beautiful anymore,” said Joan Kelsch, former Green Building Manager for Arlington County.⁵³

The bird-collision issue is part of the larger picture of human’s impact on the world and our unintended consequences. The magnitude of the problem of bird collisions should lead us to reimagine architectural forms and functions in consideration of the vital role that buildings can play in helping to protect the natural environment and halt biodiversity loss, especially when two out of three North American bird species are expected to

become vulnerable to extinction in the coming decades.⁵⁴ As architect Dan Piselli, Director of Sustainability and Principal at FXCollaborative, put it: “What does it mean to design a building today in our context? An all-glass building might have made sense in the 1980s for some reason, but we know more now. There’s a different set of issues that we are dealing with.”⁵⁵

CONCLUSION: THE POWER OF PUBLIC POLICY TO PROTECT BIRDS

As a group of leading ornithologists wrote in their seminal 2019 study on bird population declines: “History shows that conservation action and legislation works.”⁵⁶ Past examples of bird population recoveries demonstrate that depleted bird populations can recover following policy changes, such as the recovery of many raptor species following the ban of the insecticide DDT, waterfowl following the allocation of billions in federal funding to protect and restore wetlands, and imperiled species following protection under the Endangered Species Act and international treaties.⁵⁷ Much work remains to be done to protect birds from building collisions – and that work requires effective policymaking. We hope this report contributes to that effort.

ENDNOTES

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Case Study » **NEW YORK, NEW YORK**

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Designed by FXCollaborative and opened in 2018, the Statue of Liberty Museum features glass with a fritted dot pattern. The pattern is practically invisible to human visitors but effective at preventing bird collisions.

Case Study » NEW YORK, NEW YORK

BIRD-FRIENDLY BUILDING POLICY

Adopted: January 10, 2020

Effective: January 10, 2021

Policy Type: Amendments to the administrative code of NYC and NYC building code

Category: Legislation

Scope: All new construction and major renovations that include modifying existing glass

Voluntary/Mandatory: Mandatory

Vote: Approved by New York City Council, 43-3

Expense for Municipal Govt: Cost neutral

CITY STATISTICS

Location: Northeast;

Atlantic Flyway

Land Area: 300 sq miles

Total Bird Species Identified: 477¹

Human Population: 8,804,190

Density: 29,303 people/ sq mi

Median Household Income: \$67,046

Situated at the mouth of the Hudson River, New York City is the country's most populous city and a global mecca for business, design, arts, and culture. It is home to over eight million people, nearly 500 bird species,² roughly one million buildings,³ over 1,000 architecture firms,⁴ and some of the world's most expensive real estate. The city's iconic skyline is ever evolving. Last year, construction spending in the city reached an all-time high of \$86 billion.⁵ Prior to the COVID-19 pandemic temporarily slowing down construction in 2020, New York City underwent a six-year building boom,⁶ with a spike in the number of glassy, luxury skyscrapers built in Manhattan.⁷

Since the 1940s, glass curtain walls and expansive glass windows have become increasingly common across the city, enabled by advances in glass and air conditioning technologies and the availability of cheap energy.⁸ New York's early glass buildings, such as the United Nations Secretariat Building (405 East 42nd Street, built in 1952) and the Seagram Building (375 Park Avenue, built in 1958), became international symbols of progress and sophistication, inspiring similar glassy buildings around the world.⁹ In recent decades, glass-intensive facades have dominated new construction throughout the five boroughs.

The abundance of glass in the city has slaughtered millions of birds. Every year, birds representing nearly 500 species nest in or migrate through New York City, attracted by its prime location at a point of watershed concentration along the Atlantic Flyway and its posit of islands, greenery, and waterfront that serve as important bird habitat. Data collected by NYC Audubon's Project Safe Flight, a city-wide bird collision monitoring program, suggests that at least 90,000 to 243,000 birds—mostly migrants—die due to building collisions in the city every year.¹⁰ This figure is most likely a serious underestimate due to underreporting of collisions and the expansion of the number of glassy buildings in the city since the study's publication in 2015.

In December 2019, the New York City Council passed a comprehensive bird-friendly building policy to reduce the threat

of collisions in the city. The law, which went into effect on January 10, 2021, requires the use of bird-friendly materials on facades of all new construction and significant retrofits of existing glass. The policy applies to all types of buildings in all five boroughs. Because of its sweeping scope, New York City's law is considered the most comprehensive bird-friendly building policy in the country and perhaps the world.

With the new law, the City Council normalized the use of bird-friendly building construction in one the world's leading cities and set a gold standard for bird-friendly building policies. Former NYC Audubon Executive Director Kathryn Heintz called



Melissa Breyer

the law a “huge leap forward for long-term conservation.”¹¹ The City Council’s overwhelming support for the ordinance signaled that bird-friendly materials should not be seen as an occasional add-on or extra but as an integral part of sustainable construction as our environment and bird populations face existential threats due to human-induced climate change, habitat destruction, and biodiversity loss.

HOW THE POLICY WORKS

Due to its high population and density levels, the City of New York has long had the authority to set its own building code and zoning regulations, separate from the rest of New York State. Since the city adopted its first building code as a five-borough incorporated city in 1899, it has tended to pass more stringent building rules than the state’s, particularly in regard to fire safety, sanitation, and, more recently, environmental sustainability.¹²

Local Law 15 of 2020, which amends the city’s building code, requires the use of bird-friendly materials on 90 percent of the first 75 feet of building envelope on both new buildings and significant alterations to existing exterior glazing (i.e., the glass component of a building’s facade or external surfaces). Further, it requires the installation of bird-friendly materials on exterior wall envelopes up to 12 feet above a green roof system and on certain structures that create hazards for birds, including glass awnings, handrails, windbreak panels, acoustic barriers, and parallel glass panels, regardless of their height on the building. The rule applies to all project applications filed in the city on or after January 10, 2021.¹³

The policy defines a “bird-friendly material” as one with a maximum material Threat Factor (TF) of 25, as defined by American Bird Conservancy, following its Bird Collision Deterrence Material Threat Factor Reference Standard.¹⁴

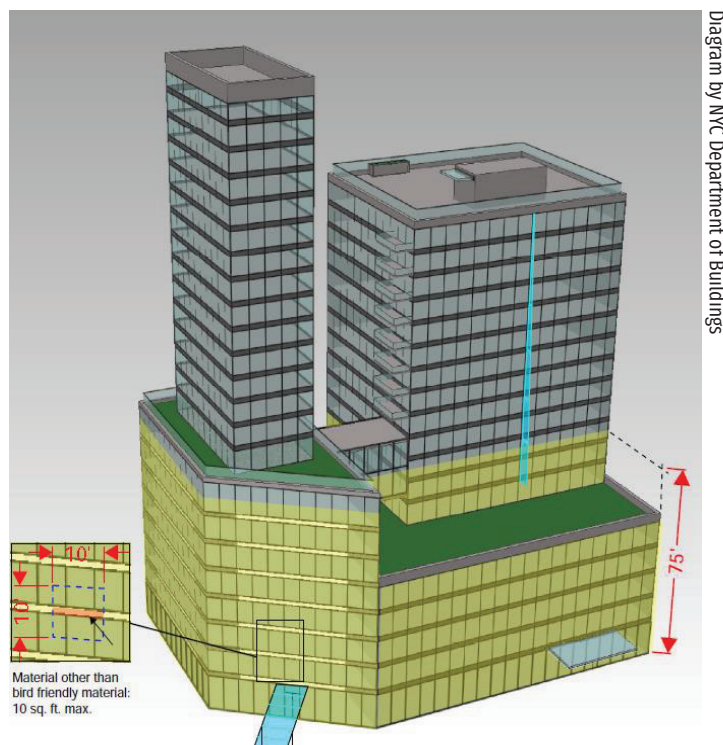
Where the New York City Zoning Resolution requires transparency on the ground floor and in areas with particular flood hazards, the law requires the use of transparent ultraviolet-treated material and a slightly higher Threat Factor of 27 and 36, respectively.¹⁶ For new construction and significant refurbishments of single-family homes, property owners may choose to implement low-tech mitigation measures such as window decals, exterior screens, and bird collision adhesives.

The full range of different types of structures are covered by Local Law 15 of 2020 – from skyscrapers and residential homes to bus stations and municipal buildings – as well as all areas and zoning districts within city limits, without exception. Most other bird-friendly building rules limit the types of buildings or zones that must follow bird-friendly standards (e.g., high-density), and, notably, many policies do not cover new construction or retrofits by the city government itself, as in Toronto, Canada.

RATING BIRD-FRIENDLY BUILDING MATERIALS

There is currently one rating system for bird-friendly building materials: the Material Threat Factor system developed by American Bird Conservancy (ABC). This system assigns scores of 1 (least likely to result in collisions) to 100 (most likely to result in collisions) based on birds’ ability to see and avoid glass and other building materials based on data from tunnel tests and field trials. In a tunnel test, birds are released at one end of a tunnel and fly to escape towards the opposite end of the tunnel, which is covered by a control sample of transparent glass and a sample of the test product. As the bird approaches, netting prevents the birds from colliding and researchers record their behavior to score the sample material. The Threat Factor score is the percentage of tested birds that flew toward the test pattern instead of the transparent control.¹⁵ ABC defines “bird-friendly” products as having a threat factor of less than 30. Several bird-friendly laws, including New York City’s and Arlington County’s also reference “a relevant ASTM standard.” However, there is currently no ASTM standard for bird-friendly materials.

As part of the rule-making process, the City Council tasked the New York City Department of Buildings (DOB), which oversees and enforces the city’s building code, with posting information and guidance for property owners and real estate developers on how to interpret and comply with the law.¹⁷ DOB consulted closely with American Bird Conservancy’s Glass Collisions Program and industry experts while writing the rules and



NYC’s guidance documents illustrate in yellow the portions of buildings that are required to meet bird-friendly standards.



guidance documents. In 2020, the city published *Bird Friendly Building Design & Construction Requirements Guidance Document*, a 23-page compliance manual with figures, images, and examples to help the public understand the law's requirements.¹⁸ Few cities provide such descriptive guidance documents for their bird-friendly building rules, suggesting a high level of commitment from the city to successful implementation of the ordinance.

The DOB's standard review and approval process for building permits and licenses, inspections, and fines is the city's standard building code enforcement mechanism. Architectural plans submitted to the DOB for approval must identify all locations where bird-friendly materials are required under the law. To show compliance, property owners must retain documentation verifying that bird-friendly materials were used.

According to the new law's Fiscal Impact Statement, the city of New York incurs no additional expenses from implementing Local Law 15.¹⁹

IMPACTS TO DATE

Effect on regional and international markets

New York's passage of its robust bird-friendly building law has expanded markets for bird-collision mitigation solutions and bird-friendly glass technologies, spurring innovation across industries. In 2015, American Bird Conservancy listed 18 bird-friendly rated products on its online product database;

today, the database includes over 160 products and options.²⁰ As a global business center, New York City's bird-friendly building policy has the potential to create enormous changes to industry far beyond its borders. Research and development teams are now incentivized to create products to meet New York's robust bird-friendly building standard. Daniel Piselli, director of sustainability and principal at FXCollaborative, a New York-based architecture firm, explained: "New York City's law really changed the way that manufacturers see this issue. Previously, some [glass manufacturers] saw that there might be an opportunity here. But now, virtually all glass manufacturing companies have something to offer and wide lines of product."

Gary Falco, architectural manager at Quebec-based Walker Glass, a glass manufacturing company that markets AviProtek, a line of bird-friendly glass, reported that their company has raised production of bird-friendly building materials and expanded product offerings to meet increased demand for bird-friendly building materials in New York resulting from Local Law 15.²¹ Falco stated, "When the [NYC] legislation came along, the bird-friendly track just picked up steam. I'm working with architects and consultants on over 75 potential projects in New York City alone where bird-friendly glass will be needed."²²

Following increased demand, more competition and increased production should lower prices for bird-friendly glass, especially for costlier products like ultraviolet-treated glass that is visible to birds but less visible to humans. Explained Piselli: "Just like

any technology, eventually the cost comes down. LCD TVs were \$10,000 at one point, and now they're a few hundred dollars. Once we get over the first couple years of this law, then hopefully prices will come down – at least with the UV glass, which is expensive.”²³

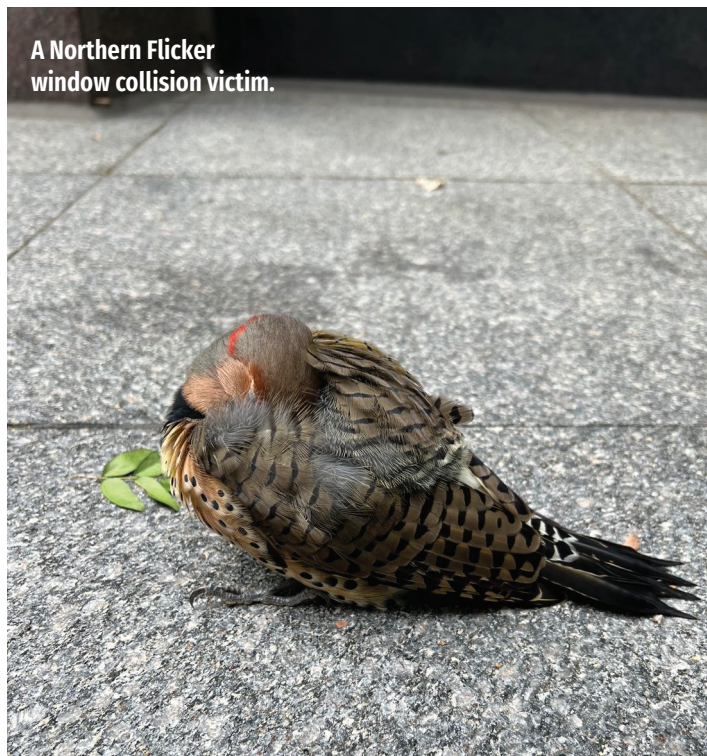
Influence on public policy in other localities

New York’s landmark bill also set a new gold standard for bird-friendly building policies. Bird conservation groups, including American Bird Conservancy and the National Audubon Society, called the law the “most comprehensive bird-friendly building legislation in the U.S.”²⁴ The bill’s wide-sweeping scope and stringent standards are important for protecting birds from preventable window collisions in the world’s 11th largest city – but the law is also important for the high bar it sets for other cities considering passage of bird-friendly ordinances, because cities tend to model their bird-friendly building laws on existing laws, especially regionally. Glenn Phillips, executive director of the Golden Gate Park Audubon Society and former executive director of NYC Audubon, reported that, in working with local city governments in the San Francisco Bay area to pass their own bird-friendly laws, he now holds up New York City’s law as the premier model for other cities to follow.²⁵ “If New York can do it, it becomes much more difficult for another city to say they can’t do that, or that it’s too hard,” Dr. Christine Sheppard, director of the American Bird Conservancy’s Glass Collisions Program, told *Bloomberg News*. “Nothing is going to be as hard as getting this to work in a big, complicated city like New York.”²⁶

HISTORY OF ADVOCACY EFFORTS

In the 1990s, NYC Audubon began working on the problem of bird window collisions following major bird mortality events at four landmark buildings in Manhattan in which dozens of migratory birds were killed in major collision events: the original World Trade Center twin towers, the Jacob K. Javits Convention Center, the Metropolitan Museum of Art, and the Morgan Postal Processing and Distribution Center. To understand and document the fatalities, the group began tracking bird collisions at the buildings. “Those big buildings were what got us engaged,” said Phillips, who led NYC Audubon at the time. “You’d walk out of One World Trade Center and see hundreds of birds dead on the ground.”²⁷

In 1997, NYC Audubon created Project Safe Flight, a community science bird-collision monitoring program run by volunteers that has documented over 7,000 bird strike mortalities and injuries across the city.²⁸ In 2014, the group launched a new tool to aid in data collection, dBird.org, an online platform that gathers reports of bird collisions from community scientists and helps to document and map the problem of collisions in the city. Bird advocates have used this data to convince property owners to undergo facade renovations to deter collisions.²⁹



A Northern Flicker window collision victim.

Melissa Breyer



Wild Bird Fund

A map of birds found in NYC from 2014-2019 that were brought to the Wild Bird Fund with injuries consistent with window strikes.



The Javits Center was the first major NYC building retrofitted with bird-friendly glass.

Major retrofits of several high-collision buildings in the city to make them more bird-friendly brought attention and credibility to a possible solution to the problem. Renovation of the state-owned Javits Center marked the first time that the facade of a major NYC building was entirely renovated with materials to increase energy efficiency and potentially lower bird collisions rates. Data from Project Safe Flight showed that nearly 500 bird collision deaths had been reported at the 814,000-sq.-ft. building from 2004 to 2009.³⁰ When the state upgraded the building from 2009–2014, expanding it and making it more energy efficient, it chose to replace the existing glass with fritted glass, along with stainless steel panels on the north-facing facade.³¹ Typically, fritting helps to make glass more effective at insulation and solar gain regulation. The addition of fritting and other upgrades at the Javits Center resulted in a 26 percent annual energy savings.³² A study by NYC Audubon also found that bird collisions reduced by 90 percent after the renovation.³³ Architect Bruce Fowle, whose firm led the renovation, told *The New York Times* that New York State, which owns the building, “did not necessarily wish to spend extra money only on bird protection,” but the same features that made the building more energy efficient potentially also made it more bird friendly.³⁴

The continued rarity of bird-friendly building design and materials on new construction and renovation projects in the city, however, underscored the need for mandatory bird-friendly building rules to make bird-friendly building the norm in the city, not the exception. High-collision buildings throughout the city continue to kill birds at alarming rates. For example, the 41-floor office building 1095 Avenue of the Americas (completed in 1973), which features floor-to-ceiling glazing, is a high-collision building abutting Bryant Park’s northwest corner. Kathryn Heintz, former executive director of New York City Audubon, recalled: “We could see that not having

regulation meant that only a few select showpiece buildings would receive bird-friendly treatment, not regular buildings. There were just too many of them going up for direct advocacy to have any impact.”³⁵

In 2019, an opportunity opened to pursue a legislative solution to the problem. A bill proposed by Brooklyn Councilmember Rafael Espinal, Jr., to require bird-friendly building standards across the city (Int-1482B of 2019), gained support from Council Speaker Corey D. Johnson and sponsorship from 23 council members. As the bill took shape, a coalition of conservation biologists, architects, and other bird-friendly building experts formed. The group – which includes representatives from American Bird Conservancy, NYC Audubon, the New York Chapter of the American Institute of Architects, FXCollaborative, Ennead Architects, CEO Alan Steel of the New York Convention Center Operating Corporation, and volunteer lawyers and policy advocates – engaged directly with the City Council to provide expertise on the city’s bird-collision problem and offer feedback on draft legislation. As the draft law progressed through legislative channels, the City Council held a public hearing on September 10, 2019, where 39 bird advocates provided in-person testimony in support of the bill.³⁶ The council heard just one testimony in opposition, from the Archdiocese of New York, which expressed concern about how the law would affect historic buildings and stained-glass features. It was noted that stained glass is bird-friendly; therefore, stained glass windows should not be impacted by the law.

Three children and youths who were part of Project Safe Flight testified about their experiences of collecting injured and dead birds that had collided with buildings. “Many kids my age have never held a bird alive or dead,” Elias Markee-Ratner, a fourth grader and Project Safe Flight volunteer, told the committee.



Children testified before the NYC Committee on Housing & Buildings in favor of the bird-friendly building policy.

“I’ve been lucky enough to hold many live birds, but I’ve held even more dead ones. And every time it makes me sad . . . Before I started volunteering, I thought the idea of these beautiful birds hitting windows and dying was terrible, but actually witnessing it is ten times worse.”³⁷

Rita McMahon, founder and executive director of the Wild Bird Fund, which provides medical care and rehabilitative services to injured and ill birds and wildlife in the city, testified about the kinds of traumatic injuries that the birds suffer: “Most of the Wild Bird Fund’s collision patients are brought in by compassionate New Yorkers who have found a songbird, woodcock, or falcon at the base of a glass building. We treat about 1,000 a year. Our window-strike patients suffer from concussions, eye and beak damage, broken wings and legs, and internal injuries . . . Just over one-third survive.”³⁸

Many testifiers cited the dramatic reduction of collisions following the installation of bird-friendly materials at high-profile building sites as justification for requiring more buildings to be made bird-friendly. Piselli, testifying on behalf of both the architecture firm FXCollaborative and the New York Chapter of the American Institute of Architects,³⁹ explained that many bird-friendly building solutions exist, ranging from very cost-efficient and widely available insect screens to more expensive ultraviolet glass coatings: “The simplest way for a large building in New York to deal with this is patterns, which adds only a fraction of a percent to the cost of such a building.” Despite this cost effectiveness, Piselli said, his firm’s experience is that “most building owners will not do this on their own, and that’s why legislation is necessary.”⁴⁰

A 1,300-member “Avian Advocates” email network, organized by NYC Audubon, flooded City Council members’ inboxes with messages supporting the bill, and over 500 advocates wrote postcards to council members. Conservation organizations used social media – including posts of photos and stories of collision victims, maps of bird strikes, and Project Safe Flight’s scientific estimate of the number of birds killed in the city each year – to build broad public support for the measure.⁴¹

From the beginning, bird advocates understood that passing a robust bird-friendly law would require buy-in from local real estate developers and industry stakeholders. Their input, solicited by NYC Audubon and the Bird-Safe Buildings Alliance, proved crucial to writing a bill that would be reasonable for building owners and effective at saving birds. Leading property development firms such as The Durst Organization and Rudin Management Company served as industry allies who could speak the language of New York real estate. Heintz explained: “What [NYC Audubon] didn’t want was to have the Real Estate Board of New York oppose this law . . . We wanted to hear what we could do to get them to support this bill – or at least not oppose it.”⁴² Advocates also credited dozens of continuing education courses on bird-friendly design organized by NYC Audubon and American Bird Conservancy with convincing potential detractors that bird-friendly building design is an attractive, affordable, and saleable option, especially with the rise in popularity of Green Building practices in the city. “When the legislation was finally passed, we had done these programs for enough of the big firms in New York that people knew what the issue was. They weren’t afraid of it,” said Phillips.

A spokesman for the Building Contractors Association, Inc., (BCA) told a local news station that the organization did not take a position on the bill: “Our general position is that BCA member contractors can and will install whatever materials are mandated by code or contract.”⁴³

When the DOB in the first draft of the bill originally set a strict requirement of TF 15 and below for facades, matching the standard in the US Green Building Council’s then LEED Pilot Credit 55 (which became a full LEED innovation credit in 2022), surprisingly it was bird advocates who first objected. Heintz recalled cautioning drafters against setting the bar too high. Drafters eventually set a less-strict standard of TF 25.

Linking the draft bird-friendly building legislation with the city’s long-term sustainability goals helped to convince some lawmakers to act in response to plummeting bird population numbers nationally.⁴⁴ According to Sheppard and Heintz, New York City’s passage of a pair of sustainable construction regulations in 2019 – namely, Law 92 of 2019 mandating solar panels and Law 94 of 2019 mandating green roofs on new buildings – helped to draw support for Local Law 15 of 2020 from many City Council members who saw bird-friendly building rules as in line with the city’s commitment to green building and sustainable development.⁴⁵ Studies show that buildings produce 70 percent of greenhouse gas emissions in New York City.⁴⁶ To address the problem, city officials set ambitious decarbonization goals and passed new energy standards, understanding that reducing the city’s carbon footprint and protecting biodiversity within the city requires co-benefiting solutions.⁴⁷

CHALLENGES AND LIMITATIONS

While Local Law 15 of 2020 is among the most comprehensive bird-friendly building law in the nation, more could have been done to make it effective in helping to prevent bird collisions in New York City. It only applies to new buildings, so many existing buildings remain problems.

Retrofits

The biggest challenge to the law's effectiveness is the interpretation of what constitutes a significant enough "alteration" to trigger bird-friendly building requirements in the permitting and licensing process. As the city applies the law, a permit applicant planning to alter an existing building only needs to comply with the law if *all* of the windows on the building are retrofitted.

However, because most of the city's residential and commercial building stock is older and does not meet the city's 2020 Energy Conservation Code standards, they must undergo significant renovations to improve energy efficiency and building envelope performance, including installation of high-performance, glazing (glass windows, doors, walls, etc.).⁴⁸ This means that the pace of conversion to bird-friendly glass in the city should increase as mandated energy retrofits are carried out. It would make sense for property owners to undergo renovations to meet both energy standards and bird-friendly building standards at the same time, especially considering that many bird-friendly building solutions make buildings more energy efficient.

It is not yet known whether the law may have incentivized property owners to refit building facades in stages (e.g., floor by floor) or piecemeal (e.g., replacing all but one window) in order to avoid following the city's bird-friendly building rule. Sheppard said, "If projects do take that approach, we could then circle back to the City Council. But until we show that there's a problem, the city doesn't really have a mechanism to address it."

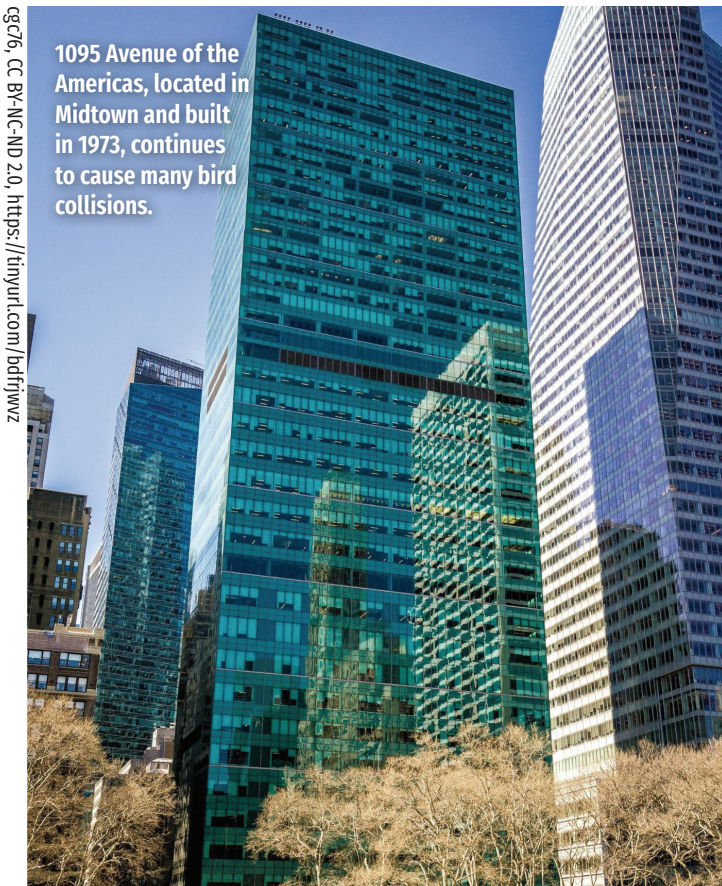
Height

New York City's law falls short of American Bird Conservancy's recommendation that 100 percent of the glass and other building materials on 100 percent of the building facade should be bird friendly on the first 100 feet above grade (first 100 feet rule), where birds are most active.⁴⁹ The height compromise was intended to ensure that the new rule would easily match the height threshold of 75 feet used in the New York City Building Code to distinguish between low-rise and high-rise buildings. Policy makers speculated that creating a unique 100-foot rule specially for bird collision deterrence would prove confusing and unpopular with designers and developers.⁵⁰

LESSONS LEARNED

New York City has the power to influence sustainable building practices globally. In the 1950s, New York City's pioneering glass buildings became symbols of futuristic design and business innovation, spawning an architectural trend that proved deadly for birds. Now, New York's bird-friendly building law has the power to set a new standard in sustainability for other cities and states to follow, to help reverse bird population declines.

In part, the New York City Council was able to pass a comprehensive bird-friendly building law because local conservation groups presented decades' worth of data on bird collisions across the city (documented on dbird.org and organizational records by NYC Audubon and the Wild Bird Fund), showing the toll of collisions on avian wildlife as well as evidence that bird collision deterrence methods are effective. Several cities lacking a bird monitoring program – including Arlington, VA, and Cupertino, CA – have successfully adopted bird-friendly building policies in recent years; however, they set less comprehensive standards than New York City's. While bird monitoring may not be a prerequisite for passing a bird-friendly rule, in the case of New York City, the availability of extensive bird-collision data may have incentivized city officials to pass more robust protections for birds.



TIMELINE: NEW YORK CITY'S BIRD-FRIENDLY BUILDING POLICY

- 1997** ● NYC Audubon launches Project Safe Flight. The project's first recorded casualty is a Common Yellowthroat, found in Lower Manhattan.
- 2005** ● Wild Bird Fund becomes New York City's first permanent wildlife rehabilitation center to care for injured birds. The group now treats over 1,000 window-strike victims annually.⁵¹
- 2006** ● NYC Audubon approaches the City Council about passing a rule requiring bird collision mitigation city-wide; James F. Gennaro, then chair of the Environment Committee, cites lack of a clear bird-safe standard and tested building materials to make it operable.⁵²
- The Bird-Safe Glass Foundation is formed, led by NYC Audubon. (Its name changes to Bird-Safe Buildings Alliance in 2019.)
- 2007** ● The Morgan General Mail Facility in Midtown Manhattan, where Project Safe Flight had recorded over 350 collision victims during the previous fall migration, replaces its windows with opaque panels, significantly reducing bird mortalities.⁵³
- *Bird-Friendly Building Design*, a landmark report by American Bird Conservancy and NYC Audubon, is published. Updated editions follow.⁵⁴
- 2008** ● Development of the Material Threat Factor rating system is created by Christine Sheppard and a team of architects mostly based in New York, providing a working standard for measuring the effectiveness of bird collision deterrence techniques.
- 2009** ● Wildlife Conservation Society's Bronx Zoo installs collision deterrence on a portion of the Center for Global Conservation to deter bird strikes.
- 2011** ● The US Green Building Council launches LEED Pilot Credit 55 for Bird Collision Deterrence.
- American Bird Conservancy and NYC Audubon begin teaching a "Bird-Friendly Building Design Course" at NYC architectural firms for continuing ed credit. Over 500 NYC architects attend.⁵⁵
- 2014** ● NYC Audubon launches dBird.org, an online data collection tool that empowers community members to report birds killed or injured by building collisions.
- 2015** ● The Javits Center (655 West 34th Street), one of the largest convention centers in the U.S. and a major site of bird collisions, completes renovation.
- 2018** ● Chance meeting between City Council Speaker Corey Johnson and an NYC Audubon member renews discussion of the need for bird-friendly building legislation in the city.⁵⁶
- 2019** ● NY City Council passes Local Law 15 of 2020 (Int 1482-B).
- 2021** ● Local Law 15 of 2020 goes into effect.
- NY City Council unanimously passes Lights Out bills (Local Laws 30 and 31 of 2021).⁵⁷
- 2022** ● US Green Building Council upgrades Bird Collision Deterrence to a LEED Innovation credit.

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Case Study » **ARLINGTON COUNTY, VIRGINIA**



Arlington County's Long Bridge Aquatics & Fitness Center (2021) includes fritted bird-friendly glass.

Case Study » ARLINGTON COUNTY, VIRGINIA

BIRD-FRIENDLY BUILDING POLICY

Adopted: December 12, 2020

Effective: March 31, 2022

Policy Type: Amendment to the county's Green Building Density Incentive Program

Category: Financial Incentive

Scope: New commercial and residential projects

Voluntary/Mandatory: Voluntary

Vote: Approved by Arlington County Board

Fiscal Impact on County: Cost neutral

COUNTY STATISTICS

Location: Mid-Atlantic; Atlantic Flyway

Land Area: 26.0 sq miles

Total Bird Species Identified: 252¹

Human Population: 232,965²

Density: 9,180 people/ sq mi³

Median Household Income: \$128,145⁴

Located across the Potomac River from Washington D.C., Arlington is the fourth-most densely populated county in the United States. Less than five percent of its land remains undeveloped.⁵ The county has undergone intense development over the last 50 years.⁶ Given its siting at an important confluence of the Middle Potomac Watershed, Arlington County provides important habitat for both migratory and year-round bird populations, with over 250 bird species identified in the county.⁷

Recognizing that space in Arlington is at a premium and sustainability measures are needed to mitigate against pressures on the natural environment, the Arlington County Board offers a voluntary Green Building Incentive Program (GBIP) to motivate private developers to use green building practices. Through the

voluntary program, the county approves site-plan requests for higher density buildings than the county's zoning code allows in exchange for meeting specified sustainability criteria. In December 2020, Arlington amended the GBIP with a suite of updates, including a new requirement that all developments participating in the program meet specified bird-friendly building standards.

The timing of the GBIP updates is significant. Amazon.com, Inc., announced in 2018 that it planned to build its second global headquarters (HQ2) in Arlington. The move is expected to bring an estimated 25,000 jobs to Arlington and the greater Capital region,⁸ significantly increasing demand for residential units as well as commercial and retail space.



Duane Lempeke

HOW THE POLICY WORKS

Arlington County’s 2020 GBIP amendment requires all site proposals seeking bonus density in the county to achieve at least U.S. Green Building Council LEED Gold certification and other prerequisites, including bird-friendly building standards.⁹ Through a tiered benefit system, site plans in which property owners and developers commit to following “high performance green building standards” are awarded “bonus density” in the form of higher “floor-to-area ratio” (FAR, i.e., the ratio of the building’s total floor space to the land area on which it is built), with five FAR levels, ranging from 0.25 to 0.7 FAR, each with increasing requirements for energy efficiency.¹⁰ Since its launch in 1999, the county has updated the program five times, each time setting the bar higher for sustainable building standards. The 2020 update followed the introduction of LEED version 4.1 in 2019.¹¹

Arlington’s GBIP provides an inroad for the county to express and establish community standards for the built environment within the limits of state law. Like many other states, Virginia has a statewide building code based on the International Building Code. A legal principle known as “Dillon’s Rule” limits the power of local governments in many U.S. states to set rules that go beyond those explicitly authorized by the state.¹² As a result, local governments cannot require building standards stricter than the state standard without authorization from the state legislature, but they can incentivize such standards.

Arlington’s 2020 GBIP updates require that all projects approved under the program meet “baseline community sustainability priorities,” including the use of bird-friendly materials.¹³ This new prerequisite is classified along with “human interaction with nature” and “light pollution reduction” as a means of addressing “how buildings interact with nature.”¹⁴

The policy defines a “bird-friendly material” as one with a maximum threat factor of 30 in accordance with one of three standards: American Bird Conservancy’s Bird Collision Deterrence Material Threat Factor Reference Standard, American Bird Conservancy Bird-Friendly Materials Evaluation Program at Carnegie Museum’s Avian Research Center test protocol, or a relevant ASTM standard.¹⁵ (There is currently no ASTM standard for bird-friendly building materials.)

The policy requires that the exterior wall envelope and any associated openings between 8 and 36 feet above grade use bird-friendly materials.¹⁶ Alternatively, a developer may follow the bird-friendly building methodology in the U.S. Green Building Council’s LEED Bird Collision Deterrence innovation credit, for which the calculated weighted average of all the Threat Factors of materials on the facade, including non-glass materials, must equal a building score of 15 or less.¹⁷ Further, materials that are not bird-friendly cannot exceed an “aggregate of 10 square

feet within any 10 foot by foot square area of exterior wall” in designated areas.¹⁸

As a compliance mechanism, the county requires the developer to post a bond or letter of credit – equal to the size of the bonus density multiplied by the average rental rate for real estate in the particular area of the county – before the county will issue a final occupancy permit.¹⁹ If the project fails to meet the required environmental certifications, the financial security defaults to the county.

Arlington’s Green Building Incentive Program adds no fiscal cost to the county government, and the County Board foresaw no increased costs to the county from the inclusion of bird-friendly standards in the GBIP.²⁰ Public education, staff training, and compliance for the program is financed by a Green Building Fund that private developers must pay into if they choose not to meet LEED or Energy Star certification, at a current rate of \$0.045 per square foot.²¹ If a developer achieves LEED certification within 18 months of completing a project, the payment is refunded.²²

The policy has a built-in requirement for periodic review every three to five years or “when the LEED green building rating system is updated,” to ensure it stays current with new technologies, trends, and community needs.²³

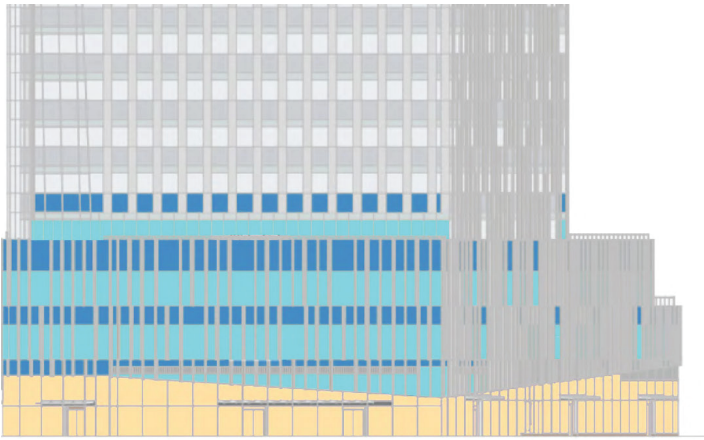
IMPACTS TO DATE

Because the law only recently went into effect, the full impact of the 2020 GBIP updates are yet to be seen. However, as of April 2023, the county has approved nine site plans for “bonus density” under the 2020 GBIP rules, including Wendy’s Residential and PenPlace.²⁴

Amazon.com’s PenPlace

In late 2018, Amazon.com announced that it had chosen Arlington as the site of its new \$2.5-billion second headquarters (HQ2). For the project, dubbed PenPlace, the e-commerce tech giant submitted a site plan request for a 10.4-acre tract of land in Arlington’s Crystal City neighborhood – which was one of the largest undeveloped parcels close to downtown Washington, D.C.²⁵ The final design, which includes four towers, was approved by the County Board in April 2022, making the project among the first to receive bonus density approval pursuant to the 2020 GBIP.²⁶

While Amazon’s participation in GBIP provides assurance that the site will follow high-performance green building standards, the significant size and amount of glazing planned for the four buildings raised initial concerns that bird-friendly building requirements were needed at PenPlace beyond the GBIP standard to adequately prevent deadly bird collisions. Ultimately,



Sample Tower Elevation

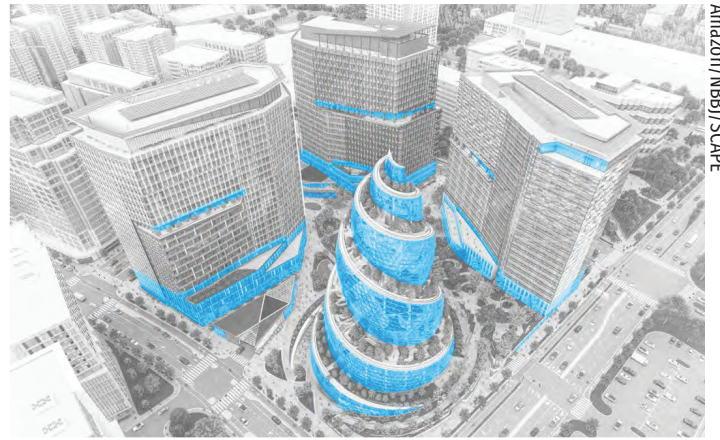
- Arlington & High Risk Bird-Friendly Frit
- Back Painted & Bird-Friendly Frit
- Ground Floor Zone - Bird-Friendly Products under Evaluation

Slide from a PenPlace presentation to Arlington’s Site Plan Review Committee highlighting Amazon.com’s plans to incorporate bird-safe fritting, given on December 3, 2021.

Amazon committed to achieving LEED Platinum certification and using bird-friendly materials exceeding the 2020 GBIP standard.²⁷

The project’s signature architectural feature will be an eye-catching, 350-foot spiral-shaped office tower called “The Helix.” Designed by the architecture firm NBBJ, the glassy building will be encircled by a spiraling exterior walkway covered with trees, shrubs, and other greenery from Virginia’s Blue Ridge Mountains.²⁸ When Amazon first revealed design plans for PenPlace in early 2021, the Helix design rang alarm bells for bird conservationists. The Helix, while an innovation for human architecture, could create ideal conditions for bird collisions from top to bottom if constructed without bird-safe materials.

The Audubon Society of Northern Virginia contacted the project architects to discuss potential hazards for birds before the beginning of the site plan review hearings, and experts at American Bird Conservancy were consulted.²⁹ Given PenPlace’s size, the county’s review process assumed unusually high stakes. Concerned community members contacted local bird advocacy groups and submitted comments to the county’s Site Plan Review Committee about the importance of using bird-friendly materials on the entire structure beyond the 2020 GBIP’s 8 to 36-foot bird deterrence requirement.³⁰ Ultimately, the incorporation of bird-friendly materials into PenPlace’s final design from top to bottom won the approval of leading bird conservation nonprofits, including Audubon Society of Northern Virginia and National Audubon Society.³¹ In March 2023, Amazon announced that it was moving forward with construction of PenPlace on a delayed timetable.³²



Amazon/NBBJ/SCAPE



BIRD-FRIENDLY

HISTORY OF ADVOCACY EFFORTS

In 1999, Arlington County launched its Green Building Density Incentive Program to curb the impact of development on the natural environment. Through the program, more than 17 million square feet of development in Arlington has been certified green.³³

Leading up to the 2020 GBIP updates, concerns about the impact of window collisions on bird populations had been growing in Arlington County. Joan Kelsch, former Green Building Manager for Arlington County, explained, “People had been talking about [bird-friendly] for a long time, and then we had this opportunity [with the planned updates to the GBIP] to incorporate it into our policy.”³⁴

Another factor that helped to set in motion Arlington’s passage of a bird-friendly provision was the county’s decision to become an official international “Biophilic Cities Partner” in 2019. Seeking that designation motivated county officials to prioritize human connections to nature and birds in the 2020 GBIP updates. As a growing architectural trend, biophilic design is part of the larger “Green Building movement,” bringing an awareness of the importance of “daily contact with nature as an element of a meaningful urban life” as well as an ethical responsibility to “conserve global nature as shared habitat” for people and other living things.³⁵ David Howell, a member of the Arlington County Forestry and Natural Resources Commission and local Certified Master Naturalist, shared: “Becoming a Biophilic City was the mechanism that we needed to pull all the right things together under one umbrella, which is fundamentally about the fact that people need nature and we benefit from nature.”³⁶

Earning the “biophilic city” designation required that Arlington County expand its notion of what it means for humans to live, work, and share space more equitably with local wildlife and plant species in the larger Middle Potomac Watershed ecosystem. This meant re-evaluating the burdens that the built environment was placing on local bird life. Kelsch recalled, “After Arlington applied to be a Biophilic City, the advocates said, ‘Hey Arlington, you’re a biophilic city. Now you need to actually implement some things. We’d like you to take care of buildings and birds . . . The Green Building Incentive Policy was a really obvious inroad to that.’”³⁷

Meanwhile, several local conservation groups, including the Audubon Society of Northern Virginia, the Energy and Environment Commission, the Urban Forestry Commission, and the National Audubon Society, helped to push Arlington to include a more stringent bird-friendly building requirement than the optional bird-friendly standard in the 2014 GBIP.³⁸ As the policy took shape, several groups submitted testimony to the County Board on the need for better protections for migratory birds in Arlington and helped officials to draft and negotiate the final details of the rules. American Bird Conservancy shared expertise and guidance on model bird-friendly building ordinances. And local residents and bird experts, including Ericson and Howell, testified on behalf of the updates.³⁹

Although Arlington does not have a bird collision monitoring program or comprehensive data on local bird strikes, county officials grasped the urgency of addressing declining bird populations across North America. Kelsch recalled that the main statistic that helped to make the case for the bird-friendly provision was the staggering estimate that at least 365 to 988 million birds are killed in window collisions each year in North America.⁴⁰ “We relied on the bird experts to make a very simple, clear argument: this is a problem and here’s how you fix it,” Kelsch said.⁴¹

The GBIP amendment met little opposition.⁴² The Arlington Chamber of Commerce and NAIOP Northern Virginia, Arlington’s leading commercial real estate development association, expressed concern that the 2020 GBIP changes, as a whole, would “make it more costly to do business in Arlington;”⁴³ however, neither group cited or objected to the bird-friendly provision in their written comments to the county. Bird-collision experts showed statistics that using bird-friendly materials only adds a small percentage of the total construction cost of a building,⁴⁴ and that when bird-friendly design is considered as a part of a site plan from the beginning, including by using specially treated glass and/or fewer windows, additional costs can be eliminated or recovered through energy savings.

Howell credited several county officials as key to supporting the passage of the updates, including County Board Member (then-Chair) Libby Garvey and County Planning Commissioner Elizabeth Gearin.⁴⁵ Howell said, “There were a lot of county staff

in the right positions who thought this was a good idea. At least one board member was actively aware of bird issues five or six years ago, before the updates.”⁴⁶ Further, Kelsch explained that passing Arlington’s bird-friendly standard as part of a larger suite of sustainable building updates to the GBIP made it more likely to pass than if it had been presented and voted on as a stand-alone policy.⁴⁷

CHALLENGES AND LIMITATIONS

While Arlington’s definition of “bird friendly” is rigorous, the county’s choice to limit requirements to new large, high-density buildings and on facades at only 8 to 36 feet above grade means that additional bird fatalities will occur that could have been



White-throated Sparrow, a common window-collision victim in the region.

avoided if requirements had been applied more comprehensively. Certainly, existing buildings and smaller-scale projects will continue to pose threats to birds from fatal window collisions.

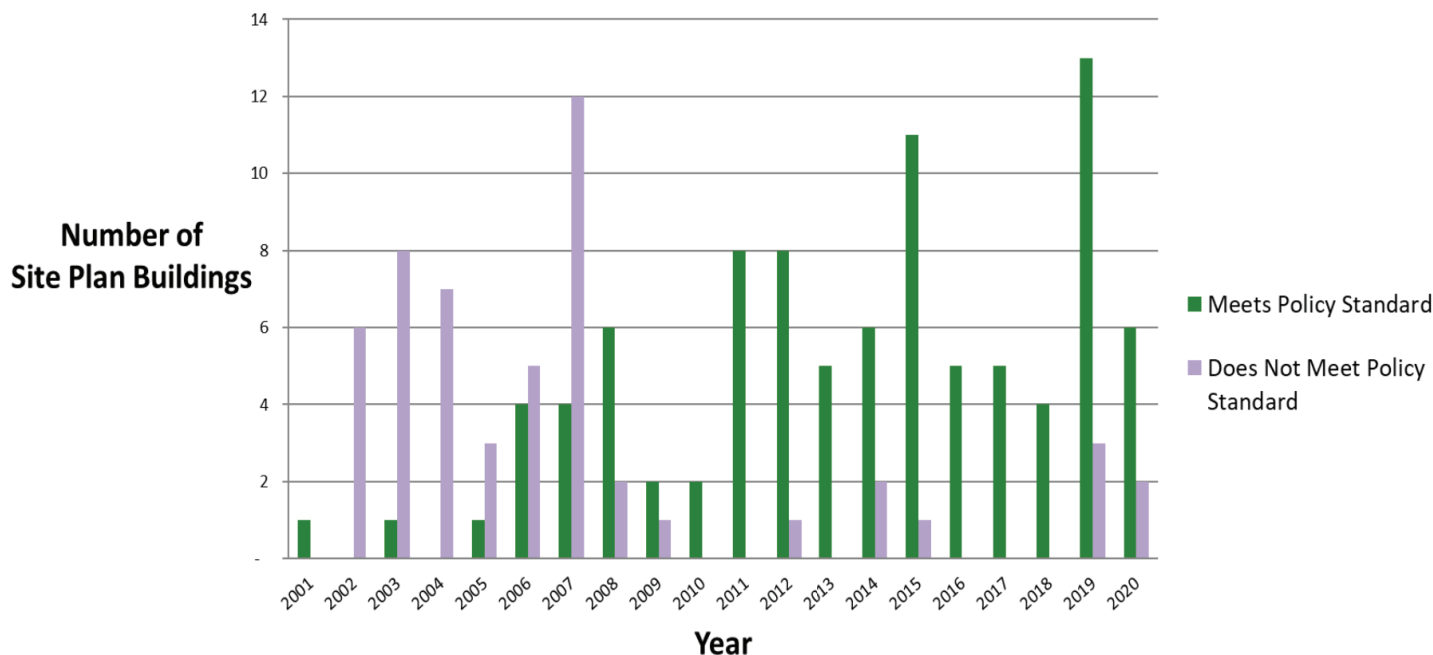
Voluntary Program

Participation in Arlington’s Green Building Incentive Program is voluntary, so the rules do not cover all new construction or retrofits in the county. Additionally, developers can pursue zoning changes and usually sizable increases in density by negotiating to provide other community benefits such as affordable housing or even parks for the community. EcoAction Arlington cited developers’ ability to opt out of the program or achieve density bonuses without meeting sustainability standards as a barrier to Arlington meeting its sustainable building goals.⁴⁸

First-Floor Exemption

The 2020 GBIP updates exempt property owners from following the bird-friendly requirement from the ground floor up to eight feet. Ericson, speaking on behalf of the Audubon Society of Northern Virginia, argued unsuccessfully that the

Green Buildings Approved in Arlington



GBIP participation rates have climbed since the program's inception.

requirement should also apply to the ground floor.⁴⁹ Reportedly, the county set the 8-foot starting point due to concerns that including the ground floor would conflict with Arlington's 2015 retail plan, which requires transparent windows on storefronts at the first floor. For applicable buildings, the first floor must have "a facade which is at least 70 percent transparent (i.e., 70 percent glass and 30 percent solid walls)."⁵⁰ County officials interpreted the rule to mean that bird-safe building strategies would be incompatible with the requirement, although most bird-friendly materials are still "transparent" to people, creating no conflict with the county's storefront transparency goals.

Howell suggested that the perceived conflict between retail and bird-safe requirements stems from a misunderstanding about bird-friendly design.⁵¹ In its written comments, the Audubon Society of Northern Virginia explained: "Glass featuring a pattern visible to birds on the 2" x 4" pattern is still 'transparent' to people. It does not prevent visibility or light travel from outside to inside (or from inside to the outside)."⁵²

Height

Arlington's policy mandates bird-friendly building standards on facades of regulated buildings from 8 to 36 feet above grade. This 36-foot height limit falls far short of American Bird Conservancy's recommended "first 100 feet" rule. Any glass at bird foraging height (up to 100 feet) can be problematic for birds because it can reflect trees, shrubs, and other habitat, creating a deadly optical illusion. Audubon Society of Northern Virginia and other conservation groups pushed unsuccessfully for a higher height threshold. However, the 36-foot rule was

reportedly a compromise to address concerns from the business sector about potential economic and design impacts of the proposed changes.

County-Owned Properties

While Arlington County has committed to a green building policy for construction and major renovations of county-owned buildings, it does not yet include a provision for bird-friendly building practice in its own Capital Improvement Plan (2023-2032).⁵⁴ Arlington County's Long Bridge Aquatics & Fitness Center (built in 2021), was outfitted with Guardian-brand bird-friendly glass,⁵⁵ further demonstrating that bird-friendly design is an attractive, affordable, and practical option. To make bird-friendly building practices accessible to the wider public and to help normalize bird-friendly building practices, it is helpful for local governments to implement bird-friendly building material in their own municipal buildings.

LESSONS LEARNED

The effectiveness of Arlington's density bonus program for accelerating the adoption of bird-friendly glass is yet to be seen, but it appears promising so far. The program is a valuable example of how localities can motivate developers to include bird safety in designs at low cost and how bird-friendly requirements can be smoothly integrated into a green building policy. A density bonus is most effective as a policy tool in a dense, highly developed city like Arlington, where the ability to add more floor space to a site is appealing for developers; this policy tool is not as effective in a locality where developers can access plentiful



Arlington County's Long Bridge Aquatics & Fitness Center (2021) includes fritted bird-friendly glass.

and affordable undeveloped land.⁵⁶ In those cases, other green incentives for developers – such as tax incentives or expedited permit review and approval for buildings meeting green standards, including bird-safe building design – may be more appropriate than a density bonus.

The program's built-in review requirement creates important opportunities for Arlington to regularly refine and improve the bird-friendly requirements in the GBIP in the future, including to keep on pace with more comprehensive bird-friendly building laws, such as New York City's law (2019).

Arlington's bird-friendly policy is inexpensive for the city to implement. Kelsch indicated that including bird-friendly standards in an existing green building incentive program and suite of environment-related building issues made it easier for developers to comply with the rules, more popular, and more likely to pass than if a bird-friendly policy had been presented and voted on as a stand-alone program.⁵⁷

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Case Study » CUPERTINO, CALIFORNIA



McClellan Ranch Preserve's Environmental Education Center (2015), designed by Siegal & Strain Architects, uses fritted bird-safe glass to prevent window strikes.

Case Study » CUPERTINO, CALIFORNIA

BIRD-FRIENDLY BUILDING POLICY

Adopted: April 6, 2021

Effective: May 6, 2021

Policy Type: Amendment to Cupertino Zoning Code

Category: Legislation

Scope: All new construction and all replacements and alterations to existing structures involving exterior glass or transparent windows, doors, or features, with the exception of certain properties in certain residential zones

Voluntary/Mandatory: Mandatory

Vote: Unanimous approval by City Council, 5-0¹

Expense for Municipal Govt: Cost neutral²

CITY STATISTICS

Location: West; Pacific Flyway

Land Area: 11.33 sq miles

Total Bird Species Identified: Identified: 303³

Human Population: 58,622⁴

Density: 5,330 people/ sq mi⁵

Median Household Income: \$199,788

OVERVIEW

Nestled at the edge of the Santa Cruz mountains, the city of Cupertino is among several northern California cities that have adopted bird-friendly building requirements since 2011. These laws vary in rigor and scope; but no other state has such a high concentration of municipal bird-friendly building laws as California. In recent years, many large technology companies based in Silicon Valley have incorporated bird-friendly design in their corporate campuses, including Intuit, Google, LinkedIn, Meta, and Microsoft.⁶ Cupertino is popularly known as the global headquarters of Apple Inc., the world's largest technology company.⁷

Cupertino's Ordinance 21-2225, passed in April 2021, amends the Cupertino Zoning Code.⁸ It requires new construction and major retrofits to follow bird-friendly building and lighting standards to protect local birdlife, with significant exemptions for first-floor storefronts and single-family residences.⁹

HOW THE POLICY WORKS

As an amendment to the city's zoning code, Cupertino's bird-friendly building ordinance regulates the design and construction of certain structures and additions in the city to protect bird populations and, more broadly, the natural environment.¹⁰ Specifically, it establishes "regulations to reduce bird mortality from windows, other specific glass features, and certain lighting elements that are known to increase the risk of bird collisions."¹¹

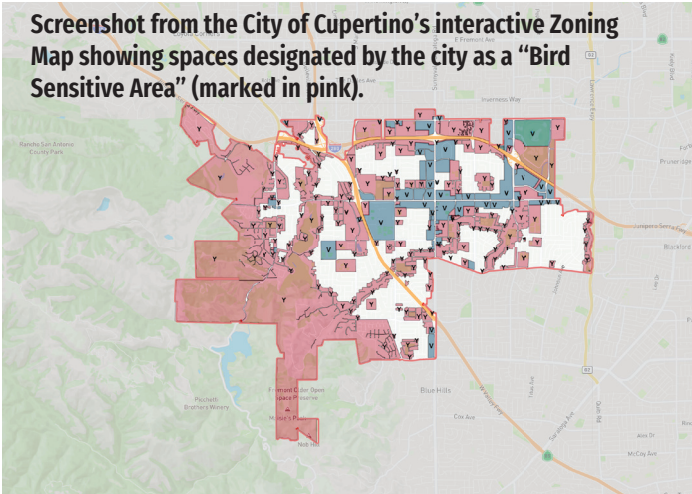
The law's fenestration, glass, and indoor lighting requirements apply to: new construction (primary or accessory building); complete or partial remodels (primary or accessory buildings); and new or replacement glass windows, doors, or features of any size. While the law is applicable to all properties in Cupertino, the city broadly exempts three types of structures: certain properties in the city's "R1 zoning districts" (mostly single-

family homes, which comprise the majority of buildings in Cupertino),¹² first-floor retail store storefronts, and government-designated historic structures. Because most of Cupertino's buildings were constructed during or after Silicon Valley's post-World War II building boom, just three buildings in the city are currently listed on the State and National Register of Historic Places.¹³ The law does not apply retroactively.

Importantly, bird-safe requirements apply without exception to structures in spaces that the city of Cupertino labels as "bird-sensitive areas,"¹⁴ a new definition created by the city of Cupertino for this law that refers to areas that it deems to be more important for birds than others.¹⁵ The city applies this designation to all areas that are: in or within 300 feet of the city's Wildland Urban Interface fire area (a "zone of transition between unoccupied land and human development" required by the federal government to protect against wildfires);¹⁶ within 300 feet of watercourses; in the city's Residential Hillside (RHS) zoning district;¹⁷ and/or within 300 feet of public or private open spaces and parks that are "dominated by vegetation, including vegetated landscaping, forest, meadows, grassland, or wetlands," without size limits.¹⁸ Notably, this definition goes beyond definitions of vital bird habitat provided by government agencies like the U.S. Fish and Wildlife Service. Importantly, in identifying "bird-sensitive areas," the law mimics San Francisco's bird-friendly building law (2011), which identifies city-designated "Location-Related Hazards" where bird-friendly treatments are required without exception.¹⁹ Also, both Cupertino and San Francisco's laws use the same measurement of "300 feet" to regulate the space surrounding these areas.²⁰

Cupertino's ordinance requires that all facades of applicable projects use at least 90 percent treated glass on the surface area of facades from the ground floor to 60 feet above grade and 95 percent of the surface from 60 feet above grade and higher. On these facades, property owners must avoid using highly reflective glass or highly transparent glass; prevent funneling bird flight

Screenshot from the City of Cupertino's interactive Zoning Map showing spaces designated by the city as a "Bird Sensitive Area" (marked in pink).



paths along buildings or trees towards a building facade; and “not include skyways or walkways, balconies, freestanding walls, or building corners made of untreated glass or other transparent materials, or any other design elements that are untreated and through which trees, landscape areas, water features or the sky are visible from the exterior or from one side of the transparent element to the other.”²¹

Bird-safe treatments approved under the law include “permanent treatments such as opaque glass, window muntins, exterior insect screens, exterior netting, or special glass treatments such as fritting to provide visual cues and reduce the likelihood of bird collisions,”²² without specificity as to spacing (e.g., the 2” x 2” rule). It should be noted opaque glass is a vague term. Mirrors are opaque, yet they present significant hazards for birds. The law also allows property owners to propose an “alternate compliance method,” which must be peer-reviewed by a third-party consultant at the applicant’s expense and approved by the Director of Community Development.”²³

City officials also included Dark Sky lighting regulations in the law, to reduce the threats and harms associated with light pollution, including “bird mortality, reduced visibility of the night sky, and adverse impacts to human health.”²⁴ Projects subject to outdoor lighting regulations include: 1) new building or construction of primary or accessory structures, 2) complete or partial remodeling of primary or accessory structures, 3) parking lot upgrade or redesign, and 4) new or replacement exterior lighting on any structure.²⁵ Building permits for regulated structures must provide extensive mapping and documentation of outdoor lighting usage.²⁶ All exterior lighting must be fully shielded to avoid light trespass, with strict maximum light intensity within the warm 3,000 Kelvin or less color spectrum, and with motion-sensor programming that begins at 11:00 pm.²⁷ (The rules exempt seasonal holiday string lights from October 15 to January 15 and lighting for “special architectural features,” “historic lighting fixtures,” and “public art.”²⁸) While security lighting is permitted, outdoor floodlights, spotlights, and lighting that blinks, flashes, or rotates are generally not allowed.²⁹ Additionally, non-residential buildings

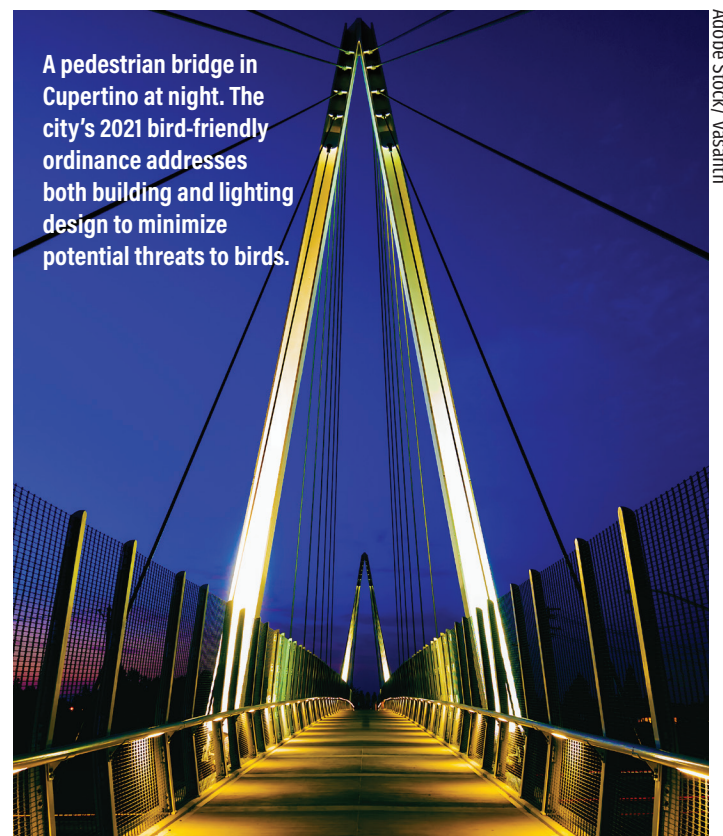
must use time-switch control devices or automatic occupancy sensors on non-emergency interior lights that turn off at 11 p.m. or within two hours of closing.³⁰

The city’s Building and Public Works Department is responsible for enforcing the ordinance. During the permitting process, city staff review building permit applications to ensure that they comply with the city’s zoning code. After permitted construction or renovation work is completed, the city inspector is responsible for identifying any sites that fail to comply with the law. If substantial evidence indicates that the conditions of a permit or variance were not met, the Director of Community Development may order a public hearing.³¹ If found to be noncompliant, a permit may be revoked or modified,³² and no certificate of occupancy is issued.³³

According to city officials, the ordinance was not expected to result in any additional financial costs to the city.³⁴ The city has not needed to hire additional staff to implement it.³⁵

California Environmental Quality Act

Certain types of building projects in California are subject to environmental review under the California Environmental Quality Act (CEQA, 1970). This law requires local governments to review and disclose significant environmental effects and impacts resulting from public projects and private development projects that require governmental approvals, with some exceptions. Municipalities are required to identify ways to mitigate any significant effects.³⁶ While CEQA makes



environmental protection a mandatory part of California state and local agency decision-making, environmental impact assessments do not uniformly consider a project’s potential risk for bird collisions, require bird collision deterrence, or set uniform mitigation standards. Therefore, Cupertino’s ordinance sets a clear standard for preventing bird collisions beyond what might normally be assessed and required through the CEQA review process.

IMPACTS TO DATE

Since the law went into effect on May 6, 2021, multiple major building projects that must meet bird-friendly building standards have been approved by Cupertino’s city planning department.³⁷ This includes two mixed-use redevelopment projects in Westport Cupertino (21267 Stevens Creek Boulevard) and a new proposed Apple office building (19191 Vallco Parkway).³⁸

The current proliferation of bird-friendly building laws in California with differing standards may motivate the state to adopt a uniform bird-friendly building standard. This would have the advantage of instituting uniformity in bird-friendly building regulations across jurisdictions for the benefit of architects, designers, builders, and developers. The California Building Standards Commission recognizes the challenge of patchwork rules. In its 2022 code rulemaking process, the commission proposed that voluntary bird-friendly design recommendations for non-residential buildings be included in California’s state building code.⁴⁰ A statement rule is pending.

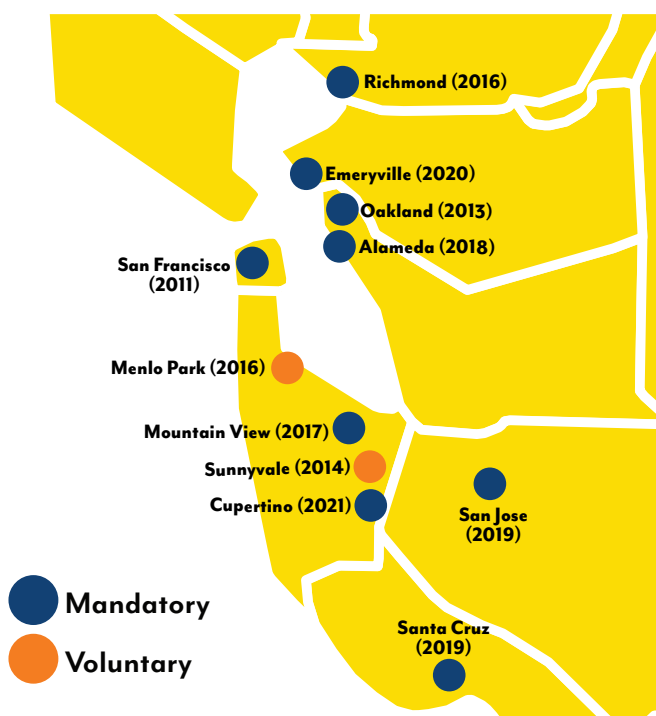
HISTORY OF ADVOCACY EFFORTS

Discussions about passing a bird-friendly building law in Cupertino began in earnest in 2018.⁴¹ At the time, concerns were raised in Cupertino about the impact of bird collisions and artificial lighting on local bird populations and the natural environment, particularly after the California state legislature passed SB35 (2017), a law allowing developers to lock in state-level building standards if they provide multifamily housing supply in cities with limited housing stock.⁴² As a result of SB35, Cupertino is expected to undergo increased development over the next decade.⁴³

The city’s inability to convince the developers of The Rise, a building project approved under SB35, to employ bird-friendly glass on its planned highly glazed facades may have spurred the city to adopt its bird-friendly building law, to prevent the construction of similarly glassy buildings lacking bird collision deterrence.⁴⁴ The Rise is a multi-billion dollar, mixed-use development with more than 7 million square feet of offices and 2,400 housing units. “They predicted, if we don’t do this now, when the high-rises come up, a lot of birds will die,” recalled Hung Wei, Councilmember of the city of Cupertino.⁴⁵

In 2019, the City Council scheduled a study session to provide the Cupertino Planning Commission with an opportunity to evaluate the bird-friendly building standards in other cities, review development proposals, and discuss possible approaches for Cupertino.⁴⁶ The Santa Clara Valley Audubon Society (SCVAS) made the case in a letter to the mayor and councilmembers that bird-friendly building rules were becoming the norm in the Bay Area: “The issue is addressed in General and Specific Plans (San Jose, Palo Alto, Mountain View), in Ordinances and mandatory Guidelines (San Francisco, Oakland, San Jose, Sunnyvale, Richmond) and in Mitigation Measures for areas near the Bay (Menlo Park). In our experience, when bird-safe design is adopted as a guiding principle, bird collision hazards can be greatly reduced.”⁴⁷

As law making for a bird-friendly building ordinance in Cupertino began, the SCVAS and the Loma Prieta Chapter of the Sierra Club actively supported the amendment.⁴⁸ To help pass the law, SCVAS mobilized its membership to contact their



Map of California cities that have adopted bird-safe building policies as of June 2023.

Wave of California Bird-Friendly Building Legislation

With the passage of Ordinance 21-2225, Cupertino joined the growing list of California cities with bird-friendly building laws. Advocates interviewed for this report said they hope to build on this momentum to pass additional laws in other California cities. The Santa Clara Valley Audubon Society, the Loma Prieta Chapter of the Sierra Club, and local allies are currently organizing to pass or strengthen bird-friendly building ordinances in multiple cities in Santa Clara Valley.³⁹

Cupertino Library's 2022 expansion project incorporated bird-friendly glass.



Photo courtesy of Dale Lang

councilmembers in support of the proposed legislation. Shani Kleinhaus, an ecologist and Environmental Advocate at the SCVAS, took individual council members bird watching and led a field trip to buildings in the area with bird-friendly glass and design.⁴⁹ According to Wei, this helped city officials and residents to see and understand how bird-friendly building design works.⁵⁰

With high levels of public support, bird advocates decided to push for both bird-friendly building and lighting regulations to protect birds in the same ordinance. This was a gamble because push back against one portion of the ordinance could have jeopardized the ordinance. Of the two standards, the lighting rule initially drew the most concern from the business sector because of perceived concerns about its potential impact on commerce.⁵¹ However, after some negotiation, the Cupertino Chamber of Commerce ultimately supported the bill.⁵² According to Kleinhaus, in Cupertino, the passage of the bill's fenestration component may have benefited from being paired in the same bill with Dark Sky standards because of strong public sentiment against light pollution in the Cupertino community.⁵³

Concerned residents and city officials were mindful that following bird-friendly building standards can in some cases result in additional costs for developers and property owners, which can be passed onto residents and retailers.⁵⁴ Explained Liang Chao, Councilmember and former Vice Mayor of the city of Cupertino, "Some people can't really afford that. That's the main concern, some people are on limited income. What would be the impact on them?"⁵⁵ Building and design experts presented data showing that the cost of bird-friendly glass is small in proportion to a total construction budget.⁵⁶ Also, the law permits very affordable mitigation solutions like exterior netting.⁵⁷ At the same time, as part of their rationale for passing the law, city



Adobe Stock Photo / Nina

Like other songbirds, Cedar Waxwings can commonly mistake transparent windows for safe flight paths.

officials recognized the financially significant environmental and economic services provided by birds: "Birds are critical to our ecosystem and provide many benefits including plant pollination, seed dispersal and insect and rodent control."⁵⁸

Notably, city officials did not rely on or ask for data on local bird collisions to conclude that window collisions are a problem in Cupertino.⁵⁹ Like most cities and towns, Cupertino does not have an active bird collision monitoring program, and no comprehensive data is available on local bird mortality caused by window collisions in the city. National data on bird-window collisions was compelling enough to merit city action, according

to Wei.⁶⁰ Advocates pointed to scientific research showing that certain design elements, like the amount of glazing on a building, positively correlate with the frequency of bird collisions.⁶¹ Further, the 2019 study published in *Science* detailing massive declines in North American bird populations since the 1970s provided additional urgency and impetus to address the problem of window collisions and light pollution.⁶²

Kleinhaus recalled, “There was an opportunity [to pass a law] because there were City Councilmembers that seemed to really care.”⁶³ Two councilmembers championed the law’s passage. Chao said that city officials did not need much convincing about Cupertino’s need for a bird-friendly building ordinance because councilmembers were able to see both the problem of bird collisions and a viable solution for their city.⁶⁴

Glass at Apple Park

Cupertino’s most famous building is Apple Park (1 Apple Park Way, 2014), designed by the global architecture firm Foster + Partners and constructed at an estimated cost of \$5 billion. The massive ring-shaped building is now “an iconic symbol of the Apple brand.”⁶⁵ The building includes an all-glass facade and an interior courtyard with a glassy perimeter, two hallmarks of high-bird-collision buildings.⁶⁶ Apple Park predates the passage of Cupertino Ordinance 21-2225, which likely would have required bird-friendly building materials at the site.

Before construction began on the building, Cupertino city officials addressed the likelihood of collisions due to the building’s glassy design, “fearing birds would easily fly into open-loop glass buildings and birds hit glass more easily than humans.”⁶⁷ After the building opened in 2018, local authorities were alerted after multiple Apple employees injured themselves by walking into glass doors, leaving some bleeding and potentially concussed.⁶⁸ If humans are unable to see the glass and risk injuries at the site, the threat of collisions for birds is likely high. To date, bird

monitors have not been permitted to visit the Apple Campus to assess the building’s impacts on local bird populations.⁶⁹

Notably, the same architecture firm that designed the Apple Campus also designed Yale School of Management’s Edward P. Evans Hall (165 Whitney Avenue, New Haven, CT 2014). Like the Apple Campus, it is built entirely of glass with an inner courtyard with tall trees. Reportedly, when Evans Hall first opened, some visitors were injured after walking into all-glass interior walls. Ongoing, multiyear bird monitoring at the building shows hundreds of birds die or are injured after colliding with the building each year, including species of concern and endangered species, like the Bicknell’s Thrush.⁷⁰

A small portion of Apple Park along its southern facade falls within a city-defined “bird-sensitive area,”⁷¹ which means that, under the law, any future remodeling or glass replacements on that portion of the building will need to be bird-friendly.



Adobe Stock/ JHVEPhoto



Adobe Stock/ Sundry Photography

After Apple opened its Cupertino campus in 2018, multiple employees suffered injuries after walking into glass walls. In most cases, if humans cannot see glass, birds cannot either.

CHALLENGES AND LIMITATIONS

Cupertino's bird-friendly ordinance lacks the comprehensiveness of bird-friendly building laws passed by other cities in recent years, most notably New York City's. Many more bird collisions likely would have been prevented if the law did not provide as many broad exemptions.

Residential Zoning Exemption

The law's exemption of residential units in single-family zoning districts represents the policy's most significant gap. Reportedly, 91 percent of the city's residential housing stock comprises single-family homes.⁷² Even with the exemptions for "bird-sensitive areas," the rules leave much of the city and most residential properties exempted under the law.⁷³ According to interviewees, as the law-making process unfolded, homeowners expressed concern about the aesthetics, availability, and additional cost of bird-friendly building materials.⁷⁴ This failed to account for the many easy, affordable technologies that serve as effective bird collision deterrence, including commonly used products like window insect screens.⁷⁵ It is also important to remember that birds collide with buildings of all types, not just commercial high-rises; window strikes at residences account for an estimated 44 percent of fatal bird collisions in the United States.⁷⁶ Bird-friendly laws should regulate equally all categories of residential housing, including multi-unit apartment buildings, high-rises, and single-family homes.

Bird-Sensitive Areas

The law identifies particular areas of the city as more "bird-sensitive" than others.⁷⁷ However, studies show that birds make diffuse use of all parts of urban and suburban environments for their different purposes,⁷⁸ including traveling to and from nesting sites and food sources. Cupertino's formulation of "bird-sensitive areas" falls short of current understandings of the wide-ranging threat of window collisions that birds face throughout the built environment. By comparison, the bird-friendly law passed in New York City in 2020 applies to the entire city and does not identify specific areas as more sensitive for birds than others.⁷⁹

Storefront Exemption

Retail property owners are not required to follow the city's bird-friendly glass rules on the first 15 feet of storefront.⁸⁰ This exemption will likely result in bird collisions at ground-floor retail spaces that could have been avoided with a more rigorous standard. Glazing at bird-foraging height (first 100 feet above grade) can be problematic for birds because it can reflect trees, shrubs, and other habitat, creating a deadly optical illusion.⁸¹ According to interviewees, this exemption was intended to limit any potential burdens on small business owners.⁸² Rick Kitson, Executive Director of the Cupertino Chamber of Commerce, explained: "One of the articles of faith that the City Council

was acting on was, they didn't want to do anything that hurts the small retailer."⁸³ However, there are several bird-collision solutions for storefronts that maintain high levels of visibility and natural lighting, so clarity of view should not be an issue in a city's decision to exempt the first 15 feet of storefronts. New York City's bird-friendly building law, for example, requires bird-collision deterrence on all first-floor storefronts with limited exceptions for buildings in flood zones.⁸⁴



Cupertino's bird-friendly building requirements exempt retail store storefronts.

LESSONS LEARNED

Cities often model their laws on the laws of other cities in their region. This can have benefits, including creating similarity across a regional market for designers and builders. It can also have drawbacks if the law used as a model has shortcomings because some bird-friendly building laws are much more rigorous than others. The outmoded definition of "bird-friendly areas" that originated in San Francisco's bird-friendly building law (2011)⁸⁵ was replicated in ordinances in nearby Oakland (2013) and then Cupertino (2020).⁸⁶ Before replicating the laws of other cities, bird advocates and city officials should ensure their draft laws reflect the latest science on bird-window collisions.

A continuing norm for bird-friendly building laws since San Francisco passed the first ordinance in the United States (2011) is to address both fenestration and artificial lighting together in one bill as significant anthropogenic threats to birds. Like Cupertino's ordinance, bird-friendly building laws in Evanston, IL (2022) and Maryland (2023) also require mitigation of glass surfaces and use of quality nighttime lighting at select buildings to protect birds and curb energy waste and greenhouse gas emissions.⁸⁷ This reflects the current state of research that identifies bird collisions and artificial lighting as cumulative, interacting threats to birds in the built environment.⁸⁸

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Case Study » MADISON, WISCONSIN



Wisconsin's state capitol dome, reflected in a nearby building.

Case Study » MADISON, WISCONSIN

BIRD-FRIENDLY POLICY

Adopted: August 4, 2020

Effective: October 1, 2020

Policy Type: Amendment to the Madison Zoning Code

Category: Legislation

Scope: New construction and refurbishments of buildings over 10,000 sq feet, skybridges, and at-grade glass features

Voluntary/Mandatory: Mandatory

Vote: Madison Common Council, 20-0¹

Municipal Expense: Cost neutral

CITY STATISTICS

Location: Midwest; Mississippi Flyway

Land Area: 76.79 sq miles

Total Bird Species Identified: Identified: 372²

Human Population: 269,196³

Density: 3,505 people/ sq mi

Median Household Income: \$67,565

The city of Madison, Wisconsin's capitol and a university town, sits among four lakes. Its most densely populated area – known to locals as “The Isthmus” – is built on a narrow land mass between two lakes, Monona and Mendota. The same water bodies and green spaces that make Madison one of the best U.S. cities to live in, according to Livability.com,⁴ also provide important habitat for hundreds of bird species – from the Golden-Crowned Kinglet to the Common Loon – along the Mississippi Flyway, one of the world's largest avian migratory flyways. Madison has taken important steps in recent years to protect and improve its bird habitat, earning it the distinction of “High Flyer” from the nonprofit Bird City Wisconsin.⁵

On August 4, 2020, the Madison Common Council adopted Madison General Ordinance (MGO) § 28.129, an amendment

to the Madison Zoning Code requiring bird-safe glass treatment on new large-scale construction and refurbishment projects and certain glassy architectural features to reduce the threat of bird collisions.⁶ The law became the first bird-friendly policy in the United States to face a legal challenge when a coalition of trade organizations represented by the conservative nonprofit law firm Wisconsin Institute for Law and Liberty (WILL) filed a lawsuit against the city on July 22, 2021.⁷ American Bird Conservancy, Madison Audubon Society, and the Wisconsin Society for Ornithology filed an amicus curiae brief for the trial, explaining the need for protections to support bird populations in the city.⁸ In August 2022, the court sided with the city in favor of the law. After WILL appealed the decision in December 2022, the fate of Madison's bird-friendly regulation hangs in the balance until a higher court ruling.⁹ Meanwhile, the law remains in effect.



Downtown Madison.

Marc Buehler, CC BY-NC 2.0, <https://tinyurl.com/yd6cnd67>

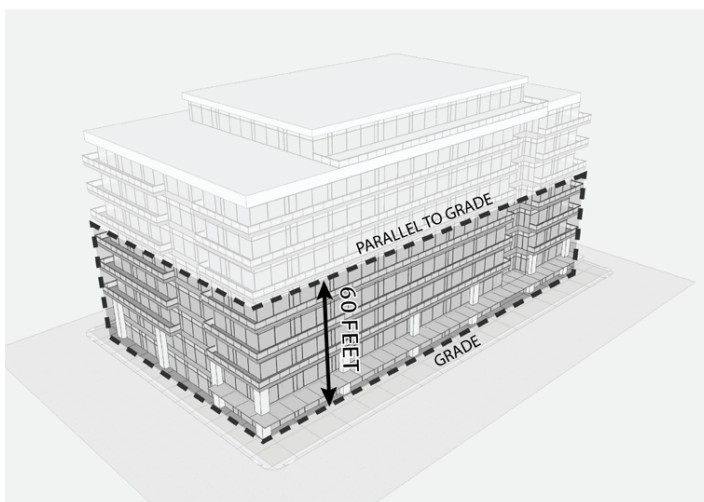
HOW THE POLICY WORKS

Madison’s Common Council adopted Section 28.129 as an amendment to the Madison Zoning Code, a set of laws that governs a range of city practices, from bike parking and beekeeping to civil engineering and street-facing facade design. Zoning Code rules reflect community standards for the built environment.

To reduce the threat of bird collisions in the city, the ordinance subjects certain buildings and structures to controls for bird-safe glass, specifically construction or new refurbishments of: 1) all buildings or structures over 10,000 square feet (measured in total floor area on above-grade stories); 2) sky-bridges (elevated pedestrian pathways connecting buildings); and 3) at-grade glass features, such as sound walls and glass screens.¹⁰ The law also applies to the expansion of these same existing structures.

For buildings over 10,000 square feet, the area of glass requiring bird-friendly treatment depends on the percentage of glass on the building facade. Buildings with facades comprising 50 percent or more glass on the first 60 feet above grade must use bird-friendly treatments on at least 85 percent of the glass.¹¹ Additionally, all glass within 15 feet of a building corner must be treated “when see-through or fly-through conditions exist.”¹²

For buildings over 10,000 feet with less than 50 percent glass on the first 60 feet above grade, bird-friendly treatments must be installed on at least 85 percent of continuous or closely placed “glass areas” that are 50 square feet or larger and on all such “glass areas” over 50 square feet within 15 feet of a building corner.¹³ (“Glass areas” are defined as “one continuous panel of glass or other transparent material, or a set of two or more such panels divided by mullions of six inches in width or narrower.”¹⁴) Additionally, all “glass railings” on buildings over 10,000 square feet must be treated, along with all glass on “enclosed building connections” from grade to 60 feet.¹⁵



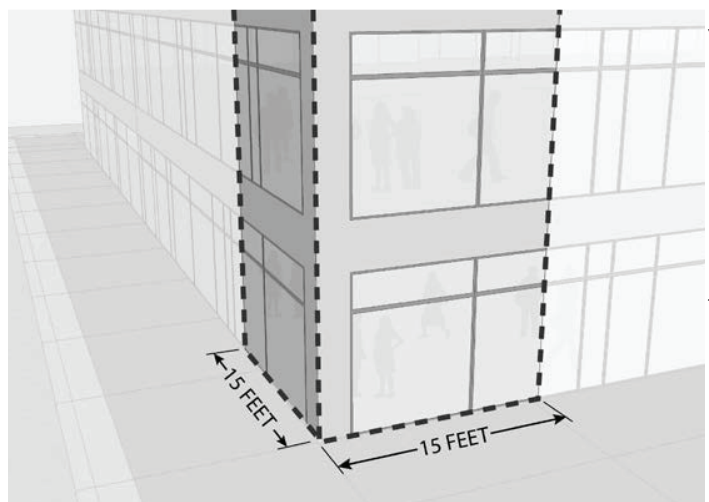
Madison’s bird-friendly rules apply to the first 60 feet of facades of buildings over 10,000 square feet. For structures over 10,000 square feet, all glass within 15 ft of a building corner must be treated.

The law also regulates glass on all new and expanded “sky-bridges” and “ground-level glass features.” These structures must be treated to reduce bird collisions regardless of their size or height (or the size of the associated structures),¹⁶ because such features commonly cause bird collisions by creating “visual confusion” (e.g., reflections and illusions) for birds.¹⁷ Multiple studies dating to the 1970s document bird mortality rates at glassed-in walkways across the United States.¹⁸

Madison’s ordinance requires that property owners employ bird-friendly treatment strategies on regulated buildings and structures, offering a suite of possible collision mitigation methods. For example, to meet city requirements, owners may treat qualifying glass with “a pattern of visual markers that are either: a) dots or other isolated shapes that are ¼” in diameter or larger and spaced at no more than a two-inch (2”) by two-inch (2”) pattern; or b) lines that are 1/8” in width or greater and spaced no more than 2” apart.”¹⁹ Certain structural features that cover glass such as fixed solar shading and exterior insect screens may also qualify. Other mitigation strategies may be approved by the city’s zoning administrator on a case-by-case basis, including new technologies as they become available.

The way that city officials wrote the ordinance also allows real estate developers and property owners ample leeway to comply with the law without necessarily using bird-friendly building materials. For example, under the law, a new building over 10,000 square feet could be designed with ample windows without triggering a bird-safe glass requirement by limiting the size of glass areas.²⁰ As Matt Tucker, the city of Madison’s Building Inspection Division Director, explained: “If someone doesn’t want to use bird glass, they can choose not to use windows over 50 square feet or glass railings. They can just avoid the eligible things.”²¹

To show compliance, property owners must submit design plans to the city’s Planning and Zoning Department for approval,



City of Madison, “Bird-Safe Glass Requirements” (2020)

identifying all locations where bird-friendly materials are required under the law. The city's Department of Planning, Community & Economic Development reviews the plans as part of their standard review and approval process. Property owners must retain documentation verifying that the specified bird-friendly materials were used in construction. Fines for noncompliance with an issued zoning permit are \$1 to \$1000 per day for each violation,²² plus court costs.²³

The ordinance does not add to the city's fiscal costs and no expected new staff hires or training of staff were expected. It is labeled, "no City appropriation required."²⁴

IMPACTS TO DATE

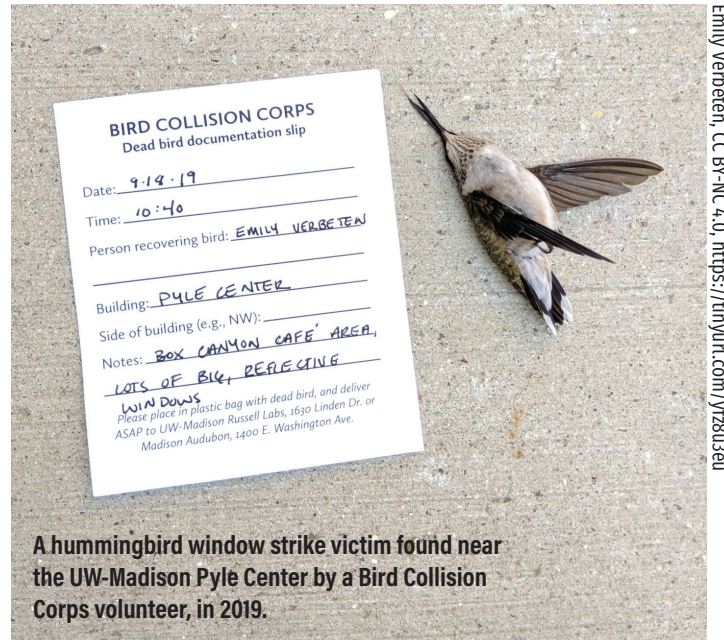
Legal Challenge

In July 2021, WILL, a conservative non-profit law firm based in Milwaukee, mounted a legal challenge against Madison's law in Dane County Circuit Court.²⁵ Acting on behalf of five state-level development and real estate groups (namely, the Associated Builders and Contractors of Wisconsin, the Commercial Association of Realtors of Wisconsin, NAIOP Wisconsin – the Commercial Real Estate Development Association, the Wisconsin Builders Association, and the Wisconsin Realtors Association), WILL alleged that Madison's bird-friendly building ordinance (MGO § 28.129) violates Wisconsin's uniform building code, which requires that all municipalities in the state follow the same building rules.

At issue before the Court in the case, *Associated Builders & Contractors of Wisconsin, Inc. et. al. v. City of Madison*, is whether the ordinance is valid²⁶ and whether it is preempted by the Uniform Building Code adopted by the State of Wisconsin in 2014 (2013 WI Act 270).²⁷ According to WILL, the city overstepped its authority by setting a standard that was "additional or more restrictive" than the state's building code.²⁸ Further, they argued that state law preempts MGO § 28.129.²⁹

This represents the first legal challenge to a local bird-friendly building law in North America. Over 20 bird-friendly building policies have been adopted by U.S. cities requiring or incentivizing bird-friendly building and/or lighting practices; and to date, only the city of Madison has been sued to overturn such a law.

Funded by the Lynde and Harry Bradley Foundation, the Charles Koch Institute, the Walton Family Foundation, and other grantmakers,³⁰ WILL has pushed a broad agenda in Wisconsin. It advocated purging over 200,000 voters from Wisconsin's voter rolls in 2019,³¹ sued the Wisconsin Department of Resources in 2021 to establish a wolf hunting and trapping season,³² and defended the state's Republican gerrymandering in 2022 before midterm elections.³³



Emily Verbeten, CC BY-NC 4.0, <https://fintyurl.com/yfz8u3eu>

Among other claims, the plaintiffs argued that the ordinance would increase the cost of construction in the city for developers, which would be passed on to residents in the form of higher purchase prices and rents.³⁴ Certainly, affordability and housing stock are important considerations amid rising housing insecurity in the state, especially as Madison residents pay some of the highest rent prices in Wisconsin. (Madison rents average \$1,491 per month for a typical 843-sq.-ft. apartment,³⁵ while the state average is approximately \$1,026 per month.³⁶) However, bird-friendly buildings can be constructed at the same cost as other buildings if bird-friendly materials and design are considered from the beginning of the building's design phase.

Wisconsin bird advocacy organizations, including Madison Audubon, American Bird Conservancy, and Wisconsin Society for Ornithology, encouraged the city to vigorously defend the law given the suit's potential to have a chilling effect on other municipalities considering similar policies to address bird collisions. As a group, they filed an amicus curiae brief in support of the law, providing local and national data and background on why the law is vitally needed to protect bird populations in the city.³⁷

On August 14, 2022, the court ruled in favor of the city of Madison.³⁸ Dane County Circuit Court Judge Nia Trammell found that Madison's bird-friendly standard rightly falls under the Madison Zoning Code, which the city has the authority to amend.³⁹ She ruled that Wisconsin state law does not preempt zoning ordinances and that the city's bird-friendly ordinance, as written, is a legitimate use of a zoning ordinance.⁴⁰ Further, Trammell determined that the amendment was "no different than ordinances dictating setback lines, building envelope standards, or minimum square footage."⁴¹ She explained: "These requirements are far from resembling building codes. They have nothing to do with the stated purpose of the Commercial

Some of the birds killed by collisions in Madison, collected by Bird Collision Corps volunteers in spring 2018.



Code or the incorporated IBC provisions, which set minimum standards to ensure that buildings are safe and structurally sound for the people who use and occupy them.”⁴²

Importantly, the court’s analysis leads with consideration of the significant collision hazards that birds confront nationally and in Madison, citing bird-monitoring data presented by the defendants to show the problem of collisions in Madison.

Bird conservation groups locally and nationally hailed the decision as a victory for birds and the right of cities like Madison to pass municipal-level regulations to address pressing environment- and climate-related issues. WILL appealed the decision on December 30, 2022.⁴³ American Bird Conservancy, Madison Audubon Society, and the Wisconsin Society for Ornithology filed an amicus brief with the Wisconsin Court of Appeals in support of the law in January 2023.⁴⁴

Influencing Wisconsin State Sustainability Rules

A year after Madison passed its ordinance, the state of Wisconsin for the first time included a provision for “Bird Collision Deterrence” in its 2021 “Development Sustainability Guidelines for Capital Projects,”⁴⁵ recognizing that “good design mutually benefits human and nonhuman inhabitants.”⁴⁶ The language in the state’s bird-friendly guidelines resembles that of MGO § 28.129, suggesting that the city of Madison’s ordinance likely influenced Wisconsin’s state-level rule. The new mandatory guidelines, which are intended to promote “energy efficiency, sustainability and renewable energy” in building practices across the state, cover three types of capital projects: new construction, major renovations, and “site and civil” projects (i.e., any landscape or underground work which impacts the land and

does not replace the disturbed area in-kind”).⁴⁷ Further, the state recommends that all capital projects, regardless of their size or type, be assessed based on the guidelines during the scope development and approval stages.⁴⁸

The guidelines offer a range of glass treatments for facades instead of setting a maximum Threat Factor. They also point to the addition to the UW-Madison’s School of Veterinary Medicine as a prime example of bird-friendly building in the state.⁴⁹

HISTORY OF ADVOCACY EFFORTS

In 2017, City of Madison Alders Ledell Zellers and Marsha Rummel began receiving questions from constituents about highly glazed buildings proposed for downtown Madison. One building in particular, the Archipelago Village, put forward by real estate developer Curt Brink and designed by Madison-based architecture firm Potter Lawson, raised concerns. The project, replacing the Mautz Paint factory, was originally proposed as a 1.4-million sq-ft, 11-story mixed residential-commercial building covered in floor-to-ceiling glass in the heart of Madison.⁵⁰ It received unanimous approval from the city’s Plan Commission, despite concerns from the public and some commissioners that birds could collide with the highly glazed building. Said Commission Member Michael Rewey, who understood threats of highly glazed surfaces for birds, “I love the concept of a cool glass building like this but I’m concerned about the impact on migratory birds.”⁵¹

As in other American cities, bird strikes have been a known problem in Madison for decades. Dr. Stanley Temple, a forest and wildlife ecologist and professor at UW-Madison, began

studying bird strikes on the UW-Madison campus in the 1970s. Reports of bird strikes in downtown Madison increased in the 2000s, after the city launched a redevelopment plan for the East Washington Avenue corridor, a gateway to the Capitol region between Mendota and Monona lakes. In 2016, Peter Cannon, former Regional Director of the National Audubon Society and a Madison resident, spoke out about the toll that the new glassy buildings were taking on bird populations, noting that glass had become the “surface treatment of choice” for major new construction in Madison: “Buildings last a long time. If we don’t get things right when the building is first built, the problem may still be with us in 50 to 100 years.”⁵²

Since 2018, Madison Audubon Society has partnered with the UW-Madison’s Facilities Planning and Management Department, Dane County Humane Society’s Wildlife Center, American Bird Conservancy, and local businesses to study where and how often bird-window collisions happen in Madison. This group, called the Bird Collision Corps, works with trained volunteers to regularly monitor select buildings for evidence of collisions and document occurrences. From 2018 to 2020, over five survey periods totaling 35 weeks and including 22 buildings, Bird Collision Corps volunteers documented 718 dead birds and 44 injured birds from collisions.⁵³

Concerned local residents also raised questions about proposed glassy buildings on the UW-Madison campus, including the Nicholas Recreation Center, a 30,000-square-foot fitness space. Aaron Williams, interim director of Campus Planning & Landscape Architecture at UW-Madison, recalled that, at a 2016 Joint Campus Area Committee Meeting, a local resident asked then UW-Madison Architect Daniel Okoli, “What are you doing about bird safety?”⁵⁴ Williams admits that, at the time, the issue was not on the university’s radar.⁵⁵ Williams and others saw the potential for wider discussion and learning on the issue of bird collisions at the university, so they organized a symposium with leading regional and national bird experts. Held on April 7, 2017, and accredited by the American Institute of Architects, the symposium explored bird-friendly building design and mitigation strategies. Soon after, with the help of Madison Audubon Society, the university began collecting data on the number of bird strikes on campus during spring and fall migration and using the data to inform mitigation decisions on a building-by-building basis.⁵⁶

Bryan Lenz, American Bird Conservancy



UW Madison's Ogg Hall with Feather Friendly window treatment.

Aaron Williams, University of Wisconsin-Madison



UW-Madison's Ogg Residence Hall features a 2" by 2" grid of white Feather Friendly dots on the outside of the glass, a pattern density shown to significantly reduce bird collisions.

Bryan Lenz, American Bird Conservancy



UW Madison informed residents and visitors in Ogg Hall of the purpose of the Feather Friendly decals.



UW-MADISON
BIRD-WINDOW COLLISION STUDY

Up to one billion birds die every year in North America as a result of colliding with windows. To do our part and serve our institutional mission here at UW-Madison, we have installed these deterrent decals (dots) to help birds recognize the surface of the glass and avoid a fatal collision.



IN PARTNERSHIP WITH:
Department of Forest & Wildlife Ecology
Student Chapter of the Wildlife Society
Green Fund - Office of Sustainability
Facilities Planning & Management
University Housing



CUNA Mutual Group's new headquarters in Madison uses a combination of fritted glazing and terracotta screens, to deter collisions.



One UW-Madison building monitored by Audubon Madison volunteers was a known bird-collision problem: Ogg Residence Hall. A student group and others applied for and received a grant to cover the cost of window treatment on five of six levels at the residence hall's glass connector.⁵⁷ Subsequent monitoring showed a significant decline in the number of bird strikes.⁵⁸ According to Williams, the mitigation project cost approximately \$6 a square foot to implement: "This is not an insignificant number when you're doing thousands of square feet, but . . . what's the value of birds?"⁵⁹ This is both a rhetorical question and a financial query, as some ecologists, conservationists, and policymakers increasingly attempt to assign monetary values to the environmental services provided by birds, which are typically undervalued or not valued at all.⁶⁰

Realizing it was impractical to address bird collisions on a building-by-building basis, Rummel and bird experts at Madison Audubon Society began advocating for a citywide bird-friendly building law. At Madison Audubon Society, Matt Reetz, Executive Director, and Brenna Marsicek, Director of Communications and Outreach, knew that bird-friendly building needed to be a matter of law, not a feel-good measure.

In April 2019 Madison elected a new mayor, Satya Rhodes-Conway, a progressive environmentalist. That year, a first draft of the ordinance was written by Zoning Department staff, in consultation with planners and experts from other cities with bird-friendly building legal standards, like San Francisco. The draft was then revised with input from experts on bird-window

collisions at American Bird Conservancy and Madison Audubon Society.⁶¹ The ordinance received overwhelming support from the public, with some pushback from the real estate and development industries, mainly around concerns over increased costs. A coalition of local environmental groups providing strong support included: American Bird Conservancy, Bird City Wisconsin, Chequamegon Audubon Society, Dane County Humane Society's Wildlife Center, Madison Audubon Society, Northeastern Wisconsin Audubon Society, 1000 Friends of Wisconsin, 1000 Islands Environmental Center, The Urban Wildlands Group, West Great Lakes Bird and Bat Observatory, Wisconsin Metro Audubon Society, and Wisconsin Society for Ornithology.

Madison Audubon Society played a key role in raising public awareness and conducting outreach on the issue,⁶² including by asking their members and the general public to contact their local alder and submit written comments to the City Council in support of the law.⁶³ "Because we track species that our volunteers have documented as victims of window collisions, we could correlate what we're finding with this much bigger problem [of bird population declines]. It definitely strengthened the talking points and I think brought some extra awareness to the problem," said Marsicek.⁶⁴ The group created an information web page responding to concerns and objections raised by the development business community.⁶⁵ The organization shared a social media toolkit with individuals who signed their online petition in favor of the ordinance, so the public could use their own social media channels to share posts. Its website remains a forum where the public and business interests can learn about the different arguments and counter points to bird-friendly building in Madison and elsewhere.

The developer of the Archipelago Village, the project that helped drive public calls for a bird-friendly building law, made changes to the building's proposed design. Now, reducing the amount of glass, the facade will feature naturally bird-friendly red-brown brick with black metal accents. Also, the new headquarters of CUNA Mutual Group, a national insurance company based in Madison, uses bird-friendly design, though approved before MGO § 28.129 took effect.⁶⁶

CHALLENGES AND LIMITATIONS

Madison's adoption of MGO § 28.129 was an important first step toward providing meaningful protections for birds against window collisions in Madison. However, the bill's applicability to only certain facades on a small subset of buildings significantly limits its effectiveness. A more stringent and widely applicable standard is needed to protect birds from being killed or injured in collisions with buildings and structures of all sizes in the city.

Building Size

Madison's bird-friendly building law is mostly limited to buildings over 10,000 square feet in size. While large

development projects in Madison and most buildings at UW-Madison will be captured under the standard, it still leaves a high percentage of buildings in the city without a bird-friendly building requirement. Reportedly, city officials were concerned that including smaller buildings in the regulation would have jeopardized support for passage of the bill.⁶⁷ According to Bryan Lenz, Bird City Network Director and Glass Collisions Program Manager at American Bird Conservancy, “One has to take care when crafting a bird-friendly building ordinance. While it needs to have enough votes to pass, it is also important to make sure that it achieves its goal — saving birds’ lives by preventing collisions. If the law exempts too many buildings or too much glass it may fall short, which is unfortunate given the amount of work it takes to draft and pass such legislation.”⁶⁸

Height Rule

The law mostly applies to the first 60 feet of facade above grade. This standard falls short of American Bird Conservancy’s recommended “first 100 feet above grade.”⁶⁹ Reportedly, city officials and bird experts in setting the height limit reasoned that most bird strikes happen below the tree canopy,⁷⁰ which averages 40-50 feet in most urban environments. However, this is not supported, and a higher threshold could have saved more birds.

Regulates Glass, Not Facades

While glass is certainly the primary cause of bird collisions on most structures, other types of highly reflective building materials can also cause fatal bird collisions. Although less common, highly reflective materials such as polished metal and treated aluminum, can also lure in and kill birds. This explains why most bird-friendly building policies regulate facades and exterior wall envelopes of all types, not just glass.

LESSONS LEARNED

As a growing mid-sized city, Madison faces environmental challenges typical of many American cities, including how to balance development with affordability and how to promote social equity and the preservation of environmental quality. The city’s passage of MGO § 28.129 shows that mid-size cities can pass mandatory bird-friendly building ordinances. Madison’s example also shows that some municipal bird-friendly building policies may face legal challenges, including charges that they conflict with state building codes.

The bill benefited from the support of a coalition of local conservation groups and nonprofits working together for birds. As in other cities with bird-friendly building policies, passage of Madison’s bill required the coordinated efforts of several local conservation groups that used their public standing, expertise, membership base, and communication platforms to launch a successful campaign to pass the law.

Local bird-collision data was relied on to make the case for Madison’s bird-friendly building law, and it was cited in the court decision that preserved the law. This suggests that in some jurisdictions, advocates and community organizers should be prepared to show evidence of local bird collisions, while also providing figures on avian population declines in North America. Citizen science projects like iNaturalist and dBird.org can be valuable tools in these efforts.

Universities that follow bird-friendly building practices can play an important role in influencing city- and state-level bird-friendly building rules. UW-Madison was an early adopter of bird-friendly building practices in Madison, setting the scene for passage of the city’s ordinance. High-collision university buildings that were mitigated and subsequently caused fewer collisions helped to show that bird collision deterrence is effective and doable.

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Case Study » **SAN FRANCISCO, CALIFORNIA**

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City of San Francisco.

Case Study » SAN FRANCISCO, CALIFORNIA

BIRD-FRIENDLY BUILDING POLICY

Adopted: July 14, 2011

Effective: November 6, 2011

Policy Type: Amendment to the Planning Code

Category: Legislation

Scope: New buildings, additions, and certain window replacements. Limited to structures that are inside or within 300 feet of an “urban bird refuge,” defined as open spaces two acres and larger consisting of greenspace or water.

Most residential buildings are exempted.

Voluntary/Mandatory: Mandatory

Vote: Adopted by San Francisco Board of Supervisors, 11-0

Municipal Expense: Cost neutral

CITY STATISTICS

Location: Western; Pacific Flyway

Land Area: 46.91 sq miles

Total Bird Species Identified: 498¹

Human Population: 815,201²

Density: 218,629 people/ sq mi³

Median Household Income: \$119,136⁴

The city of San Francisco is the second most densely populated U.S. city after New York and an early adopter of many green building initiatives. As the largest estuary on the Pacific Coast, San Francisco Bay provides critical habitat for hundreds of bird species, especially migratory shorebirds and waterfowl. In 2011, San Francisco became the first city in the United States to enact bird-friendly building legislation.⁵ The law, passed unanimously by the Board of Supervisors, followed decades of research showing that buildings are a leading cause of bird population mortality in the United States. San Francisco’s pioneering bird-friendly building policy helped to inspire other major US cities to adopt similar laws in the decade that followed.

While San Francisco’s policy was a major breakthrough for bird conservation, bird-friendly building standards have progressed substantially since 2011. Significant updates are needed to make San Francisco’s requirements effective in protecting birds from window collisions.⁶

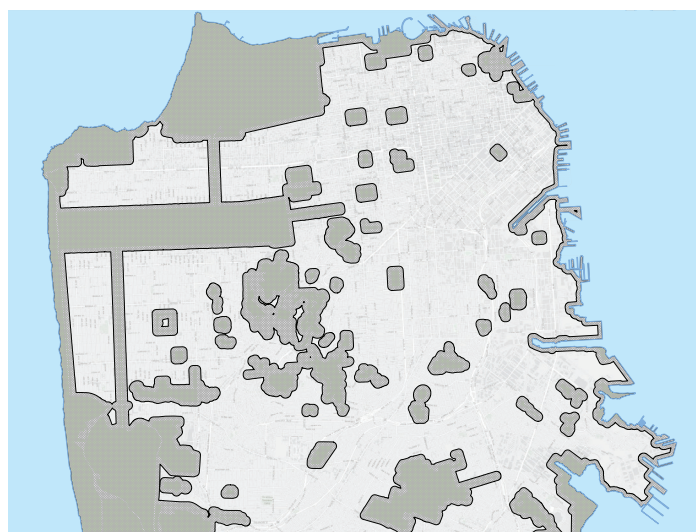
HOW THE POLICY WORKS

San Francisco’s bird-friendly building ordinance is an amendment to the city’s Planning Code, as Section 139, “Standards for Bird-Safe Buildings.”⁷ It also amended Planning Code Section 145.1, which regulates “Street Frontages,” to provide exceptions to the city’s transparency and fenestration requirements for some buildings.⁸ The law does not apply retroactively.

The ordinance establishes bird-friendly requirements for three types of buildings: new construction, additions to existing buildings (with standards applying only to the additions), and major facade renovations that involve replacing 50 percent or more of an existing structure’s glazing.⁹ Historic buildings and city landmarks are generally exempted from the renovation requirements.¹⁰

Buildings covered by the law must use bird-friendly glazing treatments identified and approved by the city, including: “fritting, netting, permanent stencils, frosted glass, exterior screens, physical grids placed on the exterior of glazing or UV patterns visible to birds.”¹¹ When vertical patterns are used, they must follow a maximum of 4-inch spacing, and horizontal elements must follow a maximum of 2-inch spacing. (The new standard to deter smaller song birds like hummingbirds is 2”x2” inches.¹² The “2x2 rule” was also standardized by the U.S. Green Building Council in its LEED “Bird Collision Deterrence” innovation credit.¹³)

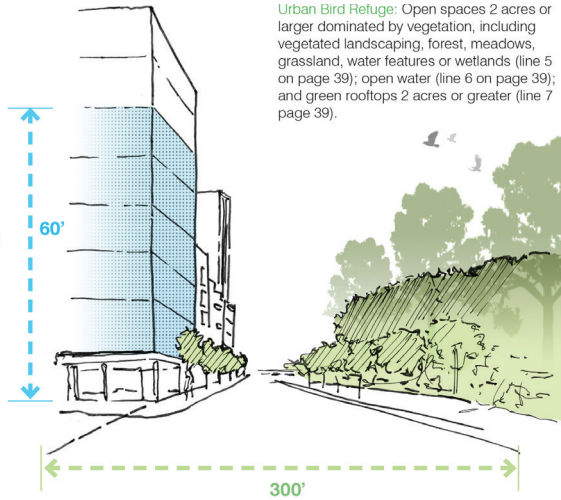
Because San Francisco’s law was adopted before bird-friendly building standards had been standardized by groups like American Bird Conservancy (in its material threat factor rating system) and the U.S. Green Building Council (in its LEED “Bird



San Francisco Planning Department

The law’s location-related hazard requirements apply mainly to non-residential buildings located in or adjacent to city-defined “urban bird refuges,” highlighted in green.

Bird Collision Zone: The portion of buildings most likely to sustain bird strikes. This area begins at grade and extends upwards for 60 feet. This zone also applies to glass facades directly adjacent to large landscaped roofs (two acres or larger) and extending upward 60 feet from the level of the subject roof.



Urban Bird Refuge: Open spaces 2 acres or larger dominated by vegetation, including vegetated landscaping, forest, meadows, grassland, water features or wetlands (line 5 on page 39); open water (line 6 on page 39); and green rooftops 2 acres or greater (line 7 page 39).

Diagram from San Francisco's guidance document, "Standards for Bird Safe Buildings."

Collision Deterrence" credit), San Francisco officials developed their own definitions for bird-friendly building based on the prevailing science of the time. As such, the law identifies two types of "hazards" posing high risk to birds: "location-related hazards" and "feature-related hazards."¹⁴

Location-Related Hazards

The law's location-related hazard requirements apply to buildings located inside an "urban bird refuge," a term created by the city to generally refer to green spaces and bodies of water in the city: "open spaces two acres or larger dominated by vegetation, including vegetated landscaping, forest, meadows, grassland, or wetlands, or open water."¹⁵ The standard also applies to structures sited within 300 feet of a city-defined "urban bird refuge" that has a direct line of sight to a bird-sensitive area.¹⁶ Specially exempted from this control, however, are low-rise residential buildings (under 45 feet tall) in residential districts with an exterior facade comprising less than 50 percent glass.¹⁷ Because residential zoning districts encompass approximately 70 percent of privately owned land in the city, this exception means the majority of buildings in San Francisco are not captured by the ordinance.¹⁸

To satisfy the glazing treatment requirement, at least 90 percent of the facade facing the "urban bird refuge" must be treated from grade to 60 feet,¹⁹ and at least 90 percent of glass facades adjacent to landscaped roofs that are 2 acres or larger must be treated from the roof to 60 feet above grade. Additionally, in order to reduce the threat to bird populations caused by excessive artificial lighting, the law includes mandatory lighting controls for location-related hazards: "minimal lighting" must be used, lighting must be shielded, no "uplighting" is allowed, and event searchlights are prohibited.²⁰ Also, any wind generators on the property must follow strict permitting requirements, including monitoring the impact on wildlife.²¹

Feature-Related Hazards

Requirements apply to structures that include certain "feature-related hazards" for birds, which the city defines as: "free-standing glass walls, wind barriers, skywalks, balconies, and greenhouses on rooftops that have unbroken glazed segments 24 square feet and larger in size,"²² regardless of their location.²³ The law requires property owners to treat 100 percent of glazing on all such feature-related hazards. As AnMarie Rodgers, Deputy Director of Treasure Island Development Authority and former Director of Citywide Policy at the San Francisco Planning Department, explained: "A designer may create their own bird-specific hazard with features like a rooftop park, which they can build as long as they mitigate them with approved treatments."²⁴ Additionally, low-rise residential buildings (under 45 feet tall) with "substantial glass facade" (totalling 24 square feet and larger) must treat 95 percent of all "large, unbroken, glazed segments."²⁵

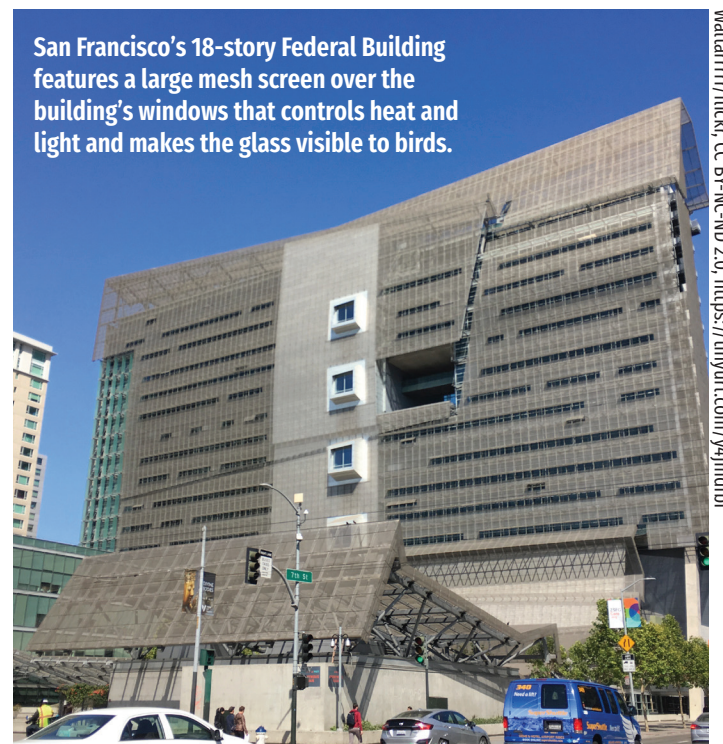
Compliance

San Francisco's Planning Department reviews permit applications to ensure that they meet the city's bird-safe building criteria.²⁶ Because the San Francisco Planning Department does not review lighting, the lighting portion of the ordinance is mandatory but not technically enforceable.

IMPACTS TO DATE

Landmark Legislation

The passage of San Francisco's landmark bird-friendly legislation demonstrated that bird-friendly building policy was a reasonable and achievable means to protect birds in urban environments.²⁷ Several neighboring California cities have since passed similar



San Francisco's 18-story Federal Building features a large mesh screen over the building's windows that controls heat and light and makes the glass visible to birds.

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bird-friendly policies, including: Oakland (2013), Richmond (2016), Mountain View (2018), Alameda (2018), Santa Cruz (2019), San Jose (2019), and Emeryville (2020).²⁸ This has helped to establish a growing regional norm that is vitally needed to provide meaningful protections for birds across California. More than eight other US cities have also adopted mandatory bird-friendly rules, including New York, NY, and Madison, WI. Many of these set a higher standard than San Francisco's policy by applying a much broader range of buildings and defining bird-friendly design requirements more rigorously.

Bringing Clarity to Permitting and Environmental Approval Process

Under the California Environmental Quality Act (CEQA), the Environmental Planning Division of the San Francisco Planning Department reviews building projects for their potential environmental impacts on the city and local residents. In the permit approval process, city officials consider the CEQA environmental review and other inputs to determine the potential impacts of a proposed building project on the environment.

Before the ordinance took effect, bird-friendly design was raised as a potential issue during several entitlement hearings and CEQA review processes, delaying and sometimes blocking approval.²⁹ With the city's bird-friendly building rule in place, developers and architects have had more clarity in the city's permitting process on the need to mitigate against the risk of bird collisions in building project approvals. This helped to lower the possibility that building owners could face costly, last-minute design change requests from the city to address potential bird-collision problems after a project had already cleared the city's design review and approval process, including CEQA. Instead of relying on CEQA, the city's rules now clarify upfront where mitigations against collisions are needed and define the approved glazing treatments. This clarifying function was a stated goal of the law.³⁰ Said Rodgers: "What we've seen is, if developers feel like they won't be held hostage at appeal hearings and pay lots of money at the end of the project [to mitigate for bird collisions], they will comply with the law."³¹

Partnerships with Federal Lands within City Limits

Some tracts of San Francisco's coastal lands are owned by the federal government and therefore fall outside of the city's jurisdiction. Yet, due to their location on the San Francisco Bay, most of these lands would otherwise constitute "urban bird refuges" under the city's definition of "location-related hazards." For example, San Francisco's Presidio, a 1,480-acre national park near the Golden Gate Bridge, has "one of the most diverse bird populations of any urban park in the world," according to the National Park Service.³² Bird sightings at the park on iNaturalist surpass 320 species.³³ Federal lands inside city limits include Alcatraz Island, Fort Point Presidio of San Francisco, Golden Gate National Recreation Area, Juan Bautista de Anza, Presidio

of San Francisco, and the San Francisco Maritime National Historical Park.

Although federal lands are officially exempt from the city's bird-friendly law, city officials have worked closely with federal authorities in areas like the Golden Gate National Recreation Area in the Presidio National Park Site, convincing them to build and retrofit in a more bird-friendly manner and adopt Dark Sky standards.³⁴ For example, Tunnel Tops park in the Presidio incorporates both Dark Sky provisions and bird-safe building rules.³⁵ Such partnerships are a means of providing some protections for birds within city limits across federal parcels.

Incentives for Bird-Friendly Green Building

Through the Bay Area Regional Energy Network (BayREN), the city provides financial incentives to multifamily residential building owners (i.e., owners of multifamily properties with five or more dwellings) to invest in energy-efficiency upgrades, including retrofitting windows with ceramic fritting, which can double as both a "bird collision deterrent" and energy efficiency upgrade.³⁶ Owners can receive rebates of \$500 per apartment served. Given the co-benefits of fritting for both bird collision deterrence and high-performance building (energy efficiency), the BayREN rebate program provides an opportunity for the city to help finance bird-friendly retrofits. Said Rodgers, "Interest in fritting has increased as people become more aware of its thermal-regulating properties and the potential for energy savings, beyond the bird-friendly properties."³⁷

HISTORY OF ADVOCACY EFFORTS

Over the past two decades, San Francisco has helped to lead the way on urban bird conservation. In 2008, it became one of the first US cities to organize a voluntary city-wide program to dim unnecessary artificial lights at night for migratory birds during peak migration.³⁸ The program, which was adopted during the



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2007–2008 global financial crisis, recognized that property owners could save money on energy bills while also saving birds.³⁹

Public awareness and concern about fatal bird-window collisions continued to grow in the city in the late 2000s. In 2009, three beloved juvenile Peregrine Falcons whose fledgling in a nest atop a downtown building had been closely watched died as a result of building collisions.⁴⁰ Reported a blogger, “Our little Peregrine Falcon named Hi — the young tiercel (boy) in the brood — fledged yesterday from the 33rd floor of the PG&E Building in San Francisco. And just hours after he first took flight, he perished tragically in a collision with a high-rise window at Howard and Beale Streets.”⁴¹ Bird-safe design was also raised during multiple entitlement hearings and CEQA reviews for buildings in the city.⁴²

In April 2010, a proposed condominium tower at 555 Washington Street faced public opposition over its design,⁴³ including from the influential Telegraph Hill Dwellers neighborhood group.⁴⁴ The glassy, 38-story high-rise tower would have been sited near the famed parrots of Telegraph Hill. Although the San Francisco Planning Commission certified the CEQA report for the building, advocates who opposed the project claimed it posed significant risks to birds,⁴⁵ and the tower would cast shadows on two public parks, in violation of city laws that protect sunlight in city-owned parks.⁴⁶ Planning Commissioner Christina Olague described the building as a “death trap” for birds.⁴⁷ When the proposal reached the City’s Board of Supervisors (the appellate body), they voted 10-0 to overturn the Planning Commission’s environmental

certification.⁴⁸ One of the main reasons cited was the high potential for bird strikes at the building.⁴⁹ The developers eventually dropped the proposal.

In early 2011, the need for bird-safe building measures came up in at least two other large development proposals, including a major renovation of the Exploratorium museum on Piers 15 and 17. After residents inundated the San Francisco Port Commission with public comments about the building’s likely negative impacts on the environment, the city required the architects to redesign the building to decrease the facade’s transparency without affecting views. In response, the architects added high-performance lined and fritted glass to portions of the building, including the 6,000-square foot Fisher Bay Observatory. “That building became a symbol of what the city needs to consider to protect birdlife,” said Noreen Weeden, former Director of Volunteers and a Board Member of the Golden Gate Audubon Society.⁵⁰ However, late design changes made the alterations more time consuming and expensive,⁵¹ pointing to the need for consideration of bird-friendly building standards early on, in the design process.

Still, some Planning Commissioners and others continued to claim that collisions were “an East Coast problem” and that collisions were not happening at a large scale in San Francisco.⁵² California has lacked in-depth local studies on building collisions and mitigation studies. A big challenge to urban bird conservation on the West Coast has been that the majority of bird collision studies and bird-monitoring programs have been conducted on the East Coast, including by NYC Audubon and City Wildlife in Washington, DC. “There has not been a lot of



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monitoring on the West Coast, so we just don't have the data to be able to know how it differs from other places," explained Glenn Phillips, Executive Director of Golden Gate Audubon Society.⁵³

When the California Academy of Sciences (CAS) inaugurated its new building in Golden Gate Park in fall 2008, CAS staff and visitors noticed bird collisions at the glassy structure surrounded by lush landscaping. The \$550 million, LEED platinum project designed by Renzo Piano was hailed as a masterpiece of sustainable architecture, with vehicle charging stations, a green roof, radiant floor heating, copious bike racks, and more. But the building featured extensive transparent glass panels, allowing views of interior landscaping and reflecting the surrounding tree canopy. Birds began colliding with the building in large numbers. Soon, some CAS scientists working on-site began studying the problem. Their findings, released in 2011 and formally published in 2016, were consistent with other national collision studies: bird strikes dramatically increased during migration.⁵⁴ The report, the first bird-monitoring study in California, established that bird collisions were a problem in San Francisco. CAS scientists found that the number of collisions reduced when the building's existing retractable shades were fully deployed - showing that the building already had an effective collision mitigation solution in place.⁵⁵ This study helped to make the case for the city's need for bird-friendly building measures. "In San Francisco, legislation is not going to happen unless we have the backing and support of science for the issue," said Rodgers. "While most people had a personal story about hearing a bird collision, understanding how this personal experience is magnified into something of biological significance is really hard for most people to understand."⁵⁶

Dr. Christine Sheppard, Director of American Bird Conservancy's Glass Collisions Program, worked with the Golden Gate Audubon Society to help convince the city to adopt new standards. As a draft ordinance came together, the Golden Gate Audubon Society worked alongside the Planning Department and held several joint meetings with architects to iron out the details.

The Planning Department also conducted outreach to private-sector groups, building owners, public agencies, and nonprofits.

The local chapter of the Sierra Club supported the ordinance, along with local groups, such as Nature in the City and the Native Plant Society, and a national nonprofit, Defenders of Wildlife. Initially, the American Institute of Architects (AIA) opposed the ordinance, fearing it would add an expensive and onerous hurdle to the city's building project approval process.

Another concern was that only a handful of collision-deterrence products and technologies were available at the time that were proven effective. The biggest pushback came from high-end residential developers who did not want to obscure views at their properties.⁵⁷ Additionally, some claimed that the state of California already had a process for reviewing environmental risks in CEQA.

To address concerns about costs and aesthetics, proponents brought in architects from other cities who were familiar with bird-friendly building design, like Deborah Laurel, of Prendergast Laurel Architects, in New York. Ultimately, city commissioners felt that any additional costs to install bird-friendly building would be minimal,⁵⁸ and they saw the benefit of requiring developers and building owners to address the risk to birds upfront in the development review process.

At the same time, commissioners were careful to weigh the potential economic impacts of the ordinance in a city with very limited affordable housing stock. After close study, the Planning Department concluded that the proposed amendments would have "no adverse effect on the City's supply of affordable housing."⁵⁹ As Weeden pointed out, "Simple things like insect screens are old technologies, but are inexpensive and certainly products that work."⁶⁰

As advocacy to pass the law increased, local residents and business owners flooded the Planning Department with over 2,200 comments on the draft proposal, the vast majority expressing support.⁶¹ Local resident and documentary filmmaker Judy Irving, who directed and produced the 2003 documentary *Wild Parrots of Telegraph Hill*, attended planning and supervisor meetings and spoke in support of the law. "What made the ordinance really successful, first of all, was that we had activists leading the way," Rodgers said. "San Francisco has a lot of engaged, active, intelligent people – and scientists and bird lovers are included in that. If there was no popular demand for this kind of action, it would never have happened."⁶²

After the ordinance cleared the Planning Commission, the Board of Supervisors, and the mayor's office, the planning code amendment became law. Sheppard said: "San Francisco should be praised because they did it first."⁶³

Directly following passage of the ordinance, bird advocates in the city continued efforts to make San Francisco safer for birds. That same year, in partnership with the San Francisco Department of the Environment, Golden Gate Audubon won

Board of Supervisors approval of a resolution asking retailers to stop carrying anticoagulant rodenticides that cause secondary poisoning of raptors,⁶⁴ and the U.S. Fish and Wildlife Service recognized San Francisco as an Urban Bird Treaty City.

CHALLENGES AND LIMITATIONS

San Francisco's 2011 law should not be used as a model for other cities. While the city of San Francisco should be commended for being the first city in the United States to address the bird collision crisis through legislation, the city's Standards for Bird-Safe Buildings fall short of needed protections. The planning code amendments set a weak precedent for bird-friendly controls, mainly because the law exempts most residential buildings and provides overly narrow definitions of bird hazards. An update of the law is needed.

Low-Rise Residential Building Exemption

The law provides waivers for certain residential buildings in residential districts. Treatment of location-related hazards is not required on low-rise residential-zoned buildings (less than 45 feet tall) with limited glass facade (less than 50 percent glazing). Because most residential neighborhoods in San Francisco are zoned for a 40-foot height limit,⁶⁵ the majority of residential buildings are exempt—unless they are designed with a significant amount of glazing. This falls short of needed standards after a 2014 study showed that 56 percent of bird collision fatalities in the United States occur at low-rise buildings (defined as four to eleven stories), 44 percent at rural and urban residences, and just 1 percent at high-rise buildings.⁶⁶

Narrow Definition of “Bird Hazards”

The city's definition of what structures constitute a “bird hazard” limits the law's reach to a narrow subset of the city's buildings and, in turn, limits the policy's effectiveness at protecting birds from collisions. Today, it is not recommended to limit policies to just those areas immediately surrounding green spaces and waterways (i.e., what the city defines as “urban bird refuges”).

Unfortunately, the law's complex formulation of “location-related hazards” and “urban bird refuges”—and the requirement that only the facade facing an “urban bird refuge” be mitigated—fall short of current understandings of the diffuse threat that collisions pose to birds in urban landscapes. Since the law was passed in 2011, studies on bird collisions and deterrence strategies have shown that collisions can happen at structures throughout a city, suggesting that San Francisco's unique mitigation approach is likely too narrow and complicated to be applied effectively. Bird conservationists have sought to remove such “location-related standards” from other bird-friendly building policies in favor of comprehensive, citywide protections, as in New York City's policy (2019).⁶⁷

Further, the law's focus on siting led to confusion about how the law should be interpreted and implemented by architects



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and designers. Phillips explained, “Designers were under the impression that all they had to do was use bird-safe glass on the Western facade of a building that ‘faces’ the Pacific Flyway. I had to tell them, ‘You don’t understand what the flyway is. There’s no square inch in California that is not in the Flyway.’”⁶⁸ Arguably, the entirety of cities located in avian flyways should be considered vital urban bird habitat.

Meanwhile, San Francisco's efforts to increase vegetation within city limits,⁶⁹ in part, to lower the harmful effects of “heat islands” and to mitigate against the climate crisis, could lead to increased collision-related bird mortalities if effective mitigation measures are not put in place citywide.

Encouragement to Leave Ground Floor Untreated

Under the law's facade requirement, building owners are encouraged to concentrate the permitted 10 percent of untreated transparent glazing on the ground floor and lobby entrances, in order “to enhance visual interest for pedestrians.”⁷⁰ However, on most buildings, the bottom stories (grade to 100 feet) pose the highest hazard to birds because this is where birds commonly forage and nest. Studies have found that glass that reflects vegetation up to treetop height (the first 40 feet in most urban areas) is a prime location of bird strikes, giving the illusion of the shrubs, plants, and trees where birds commonly forage.⁷¹ Reportedly, city commissioners were concerned about

the possibility of deterring business and altering storefronts as the city and building owners rebounded from the 2007-2009 Global Financial Crisis.⁷² To provide effective protections, American Bird Conservancy recommends that 100 percent of glass and other building materials should be bird friendly in the first 100 feet, without exception.

Minimum Spacing for Glazing Treatments

The law's pattern-spacing rule for approved "Bird-Safe Glazing Treatment" is less stringent than American Bird Conservancy's 2"x2" rule, as discussed above.

Glazed Segment Sizing

For "feature-related hazards," the law requires mitigation of uninterrupted glazing sections that are 24 square feet or larger. This is slightly larger than the size of the average door in the United States (21 square feet). A multitude of studies have shown that birds routinely collide with glass panes smaller than 21 square feet. To protect birds from attempting to fly through smaller sheets of glass, the ordinance needs to be amended so that it applies to all glazing, regardless of size.

LESSONS LEARNED

It is important to have early adopters, to kickstart a movement. This has been seen with other innovations in sustainable construction and green building policies globally. For instance, in 2002, Basel, Switzerland, became the first city in the world to mandate green roofs, requiring all new and renovated flat roofs to be "greened" and setting design guidelines.⁷³ Now several cities have passed similar ordinances, including New York in 2019.⁷⁴

San Francisco, by adopting the first bird-friendly building requirements in the country, made a major contribution to advancing bird-friendly building policy and demonstrating that city governments can lead the way on preventing fatal bird-window collisions. At the same time, there are certain risks in going first. Standards and strategies may not be formalized yet and legislators devising the first-ever law might not get it right the first time. Because of this, front-runner cities like San Francisco should be commended for paving the way for other municipalities to follow, and they should regularly review and update their regulations as new solutions and information become available.

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- 71 Yigal Gelb and Nicole Delacretaz, “Windows and Vegetation: Primary Factors in Manhattan Bird Collisions,” *Northeastern Naturalist* 16, no. 3 (2009): 455–70, <http://www.jstor.org/stable/27744581>.
- 72 Noreen Weeden, interview by Meredith Barges, July 11, 2022.
- 73 “Green roofs in Basel, Switzerland: Combining Mitigation and Adaptation Measures,” Climate ADAPT, June 7, 2016.
- 74 New York, Local Law 92 of 2019 and Local Law 94 of 2019, https://www.nyc.gov/assets/buildings/pdf/green_roof_solar_ll92-n-94of2019_sn.pdf.

APPENDIX: COMPARISON OF U.S. BIRD-SAFE BUILDING POLICIES AS OF JULY 2023

Jurisdiction (Year Enacted)	Short Name	Mandatory or Voluntary	What structures does the policy apply to?	What portion of each structure must be "bird-friendly"?	How does the policy define "bird-safe"?	Lighting provision
Forest Preserve District of Cook County, IL (2008)	Forest Preserve District Code 1-16-3, "Bird-Safe Building Materials"	Mandatory	New construction and major renovation projects; existing buildings "when practical."	Not specified.	Defines bird-safe materials and design features as including, but not limited to, those recommended by the City of Chicago's "Bird-Safe Building Design Guide for New Construction and Renovation," the City of Toronto's "Bird-Friendly Development Guidelines," and New York City Audubon's "Bird-Safe Building Guidelines."	
San Francisco, CA (2011)	San Francisco Planning Code Section 139, "Standards for Bird-Safe Buildings"	Mandatory	New buildings, additions, and significant renovations that are within 2 acres of green space or water or that are within 300 ft. of green space or water and have a clear line of sight to it; exempts most residential buildings. Includes hazardous building features.	>90% of the glass in the first 60 ft. above grade must be bird friendly.	"Bird-safe glazing treatment may include fritting, netting, permanent stencils, frosted glass, exterior screens, physical grids placed on the exterior of glazing or UV patterns visible to birds. To qualify as Bird-Safe Glazing Treatment, vertical elements of the window patterns should be at least 1/4 inch wide at a minimum spacing of 4 inches, or have horizontal elements at least 1/8 inch wide at a maximum spacing of 2 inches."	✓
Oakland, CA (2013)	Building Permit Requirements, "Bird Safety Measures"	Mandatory	New construction projects that include glass as part of the exterior and that are adjacent to a substantial body of water, a green space of >1 acre, or other buildings with substantial green roof.	>90% of the glass in the first 60 ft. above grade must be bird-friendly.	Examples of acceptable bird-friendly treatments include the use of opaque glass in window panes instead of reflective glass, covering the interior or exterior of the glass with patterns via film or frits in a density that is no more than 2 inch horizontally and 4 inches vertically, installing paned glass with mullions following 2 by 4 rule, installing insect screens over non- reflective glass, installing UV-patterned glass, decorative grilles, screens, netting, or louvres.	✓
Portland, OR (2013)	Portland Zoning Code 33.510.223, "Bird Safe Exterior Glazing"	Mandatory	New buildings in the Central City Plan District (all façades with ≥30% glazing in the first 60 ft. from grade) and major renovations (all façades where ≥75% of the façade is altered and where the façade has ≥30% glazing in the first 60 ft. from grade). Exempts low-rise residential buildings. Includes hazardous building features.	For facades with 30% or more glazing on the first 60 ft., ≥90% of windows and glazing in the first 60 ft. above grade must be bird friendly.	The city maintains a list of window glazing treatments that will reduce the instances of bird strikes. The list is periodically updated to include new technologies.	
State of Minnesota (2013)	Minnesota B3 Guidelines, S.9: Bird-Safe Building	Mandatory	New state-owned buildings and major renovations of existing state-owned buildings. Includes hazardous building features.	The standard relies on a "Whole Building Threat Factor" (WBTF) calculation, which is similar to the weighted average calculation for LEED Pilot Credit #5 for bird-window collisions. The guidelines require that the WBTF score be ≤ 15 for sites deemed critical and ≤ 45 for other sites.	Bird-safe materials are defined according to American Bird Conservancy's Material Threat Factor rating system. Areas of buildings considered high risk are required to use materials with different maximum Threat Factor ratings.	✓

Jurisdiction (Year Enacted)	Short Name	Mandatory or Voluntary	What structures does the policy apply to?	What portion of each structure must be "bird-friendly"?	How does the policy define "bird-safe"?	Lighting provision
Sunnyvale, CA (2014)	Bird Safe Building Design Requirements	Voluntary	Buildings located within 300 ft. of a body of water of >1 acre or located immediately adjacent to a landscaped area, open space or park of >1 acre. Includes general, less rigorous recommendations for all other buildings.	Not specified.	Not specified. The guidelines include only broad advice on bird-safe design strategies, such as to minimize the use of expansive glass on the first 60 ft. of buildings, to use glass with reflectivity levels of 25% or less, and to avoid glass skywalks and freestanding glass walls.	✓
Richmond, CA (2016)	Richmond Municipal Code 15.04.608.030. "Performance Standards: Bird-Safe Buildings"	Mandatory	New buildings that have >10,000 sq. ft. of floor area, are >2 stories, and are within or adjacent to green spaces or bodies of water of >2 acres. Exempts almost all residential buildings and almost all non-residential buildings (since few buildings meet the applicability standards). Includes hazardous building features.	Only the facade facing open space and deemed most likely to result in collisions is required to be bird-friendly. >80% bird-friendly treatment is required on that facade. Hazardous building structures are required to be 100% bird safe.	"Bird-safe glazing treatment may include fritting, netting, permanent stencils, frosted glass, exterior screens, physical grids placed on the exterior of glazing, or UV patterns visible to birds. To qualify as Bird-Safe Glazing Treatment, vertical elements of the window patterns shall be at least one-quarter inch wide at a minimum spacing of four inches, and horizontal elements at least one-eighth inch wide at a maximum spacing of two inches. No glazing proposed as having a bird-safe treatment shall have a visible light reflectance exceeding 10 percent. Exceptions on the reflectance may be granted by the Zoning Administrator if a surface frit, louvers or nets are used."	✓
Minneapolis, MN (2016)	Minneapolis Code of Ordinances, Chapter 535, Article XIII "Skyways"	Mandatory	New skyways.	>85% of all glazing on new skyways should be bird-friendly.	"Bird-safe glazing" is defined as including facade materials that meet one of of the following: materials with Material Threat Factors less than or equal to 25; physical structures or glass patterns that are visible from the outside with patterns following by the 2" by 4" rule; glass patterns that are white to medium gray, visible from the outside, and meet one of these standards: "Horizontal line patterns shall be one-eighth (1/8) inch wide with two (2) inch on-center spacing; or Vertical line patterns shall be one-eighth (1/8) inch wide with four (4) inches on-center spacing; or Dot patterns with dots one-quarter (1/4) inch wide with two (2) inch on-center spacing each way; or Dot patterns with dots three-eighths (3/8) inch wide arranged in horizontal lines with two (2) inch on-center spacing or vertical lines with four (4) inch on-center spacing."	✓

Jurisdiction (Year Enacted)	Short Name	Mandatory or Voluntary	What structures does the policy apply to?	What portion of each structure must be "bird-friendly"?	How does the policy define "bird-safe"?	Lighting provision
Mountain View, CA (2017)	North Bayshore Area Precise Plan, "Bird Safe Design"	Mandatory	All North Bayshore Area new buildings, additions, and alterations north of Highway 101. Includes hazardous building features.	>90% of facades up to 60 ft. above grade must meet bird-safe design standards.	Examples of bird-friendly glazing treatments include "the use of opaque glass, the covering of clear glass surface with patterns, the use of paned glass with fenestration patterns, and the use of external screens over non-reflective glass." "Bird-friendly glazing treatments must include vertical elements of the window patterns that are at least 1/4 inch wide at a maximum spacing of 4 inches, or have horizontal elements at least 1/8 inch wide at a maximum spacing of 2 inches."	✓
Washington DC (2017)	2017 District of Columbia Green Construction Code	Voluntary	Projects ≥ 10,000 sq. ft. that are either new construction or classified as specific levels of alteration by the city's building code.	Projects that fall under the DC Green Construction Code must achieve a specified number of "site project electives." To receive an elective credit for bird collision deterrence, buildings must be built to LEED Credit SSpc55 Bird Collision Deterrence, including post-construction bird collision monitoring.	Bird-friendly materials are defined according to the referenced LEED pilot credit, which provides a general outline of acceptable building materials and their threat potential.	✓
Alameda, CA (2018)	Code of Ordinances, 30-5.16b, "Performance Standards: Bird-Safe Buildings"	Mandatory	New construction and window replacements on buildings that are >35 ft. in height and that have ≥1 facade with ≥50% glass. For these buildings, bird-safe glazing is only required on windows or unbroken glazed segments of ≥12 sq ft. Includes large hazardous building features, such as glass walls, but only those that include a contiguous glazed segment of ≥24 sq ft. Excludes commercial storefronts.	>90% of the glass of must be bird friendly.	"Bird-friendly" treatments include external screens, light-colored blinds or curtains (note: this is not an effective strategy), opaque glass or window film, paned glass with mullions, patterned glass following the 2" by 4" rule, UV-patterned glass, or other treatments approved by the planning director.	✓
New York City, NY (2019)	Local Law 15 of 2020: Bird-Friendly Building Design	Mandatory	All new buildings in the City of New York, from houses to skyscrapers. Includes auxiliary structures and includes requirements for hazardous features.	"Must use ≥90% bird-friendly materials in the first 75 ft. above grade. Materials other than bird friendly materials shall not exceed an aggregate of 10 sq. ft. feet within any 10 ft. by 10 ft. square area of exterior wall below 75 ft. above grade. "	"A material or assembly that has, or has been treated to have a maximum threat factor of 25 in accordance with the American Bird Conservancy Bird Collision Deterrence Material Threat Factor Reference Standard, or with the American Bird Conservancy Bird-friendly Materials Evaluation Program at Carnegie Museum's Avian Research Center test protocol, or with a relevant ASTM standard." (Note: There is currently no such ASTM standard.) There are two exceptions to the maximum of threat factor of 25. Where ground floor transparency is required, a maximum threat factor of 27 is acceptable. In areas of special flood hazard and shaded X-Zones where flood resistant glazing is proposed and ground floor transparency is required, a maximum threat factor of 36 is acceptable.	

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Santa Cruz, CA (2019)	City of Santa Cruz Bird-Safe Building Design Standards	Mandatory	Projects that require design review and are adjacent to or within 300 ft. of a natural area or waterway.	Requires that >90% of all glazing must be bird friendly in the first 40 ft. above grade.	Glazing treatment shall follow the 2" x 4" rule, with pattern elements at least 1/8" thick. Glazing treatment must include one of the following: bird safe glass or products approved for us by the American Bird Conservancy, fritted or patterned windows, UV patterned window films, window nets, window screens, or alternative measured subject to the discretion of the zoning administrator.	✓
San Jose, CA (2019)	San Jose Downtown Design Guidelines and Standards, Section 4.4.2.b Bird Safety	Mandatory	Buildings that are north of Highway 237 with >50% glazing and that are within 300 ft. of a riparian corridor.	Glass facades that are visible from the riparian corridor must be treated. The policy does not specify percentage treatment requirements. For projects within 300 ft. of a riparian corridor, all glass that is visible from a riparian corridor must receive a bird safety treatment. Bird-safety treatments are also required on the facade of any floor of a building within 15 vertical ft. of the level of and visible from a green roof, including a green roof on an adjacent building within 20 horizontal ft., if the facade has 50% or more glazed surface, as well on areas of glass through which sky or foliage is visible on the other side of parallel planes of glass less than 30 ft. apart (e.g. glass skyways).	A bird-safe pattern is defined as "a pattern on glass intended to reduce bird collisions. The pattern must have circular or square markers at least 0.25" in diameter, spaced at most 4" apart horizontally and 2" apart vertically." Bird safety "treatments may include exterior screens, louvers, grilles, shutters, sunshades, bird-safe patterns, or other methods to reduce the likelihood of bird collisions as suggested by the American Bird Conservancy." Mirrored glass, defined as glass with >30% reflectivity, is not allowed.	✓

Jurisdiction (Year Enacted)	Short Name	Mandatory or Voluntary	What structures does the policy apply to?	What portion of each structure must be "bird-friendly"?	How does the policy define "bird-safe"?	Lighting provision
Arlington County, VA (2020)	2020 Updates to the Green Building Incentive Policy for Site Plan Projects	Voluntary	All site proposals seeking bonus density through the county's Green Building Incentive Program must meet bird-friendly building standards.	Exterior wall envelope, and any associated openings, between 8 and 36 ft. above grade must use bird-friendly materials. Alternatively, a developer may follow the bird-friendly building methodology in the U.S. Green Building Council's LEED Bird Collision Deterrence innovation credit, for which the calculated weighted average of all the Threat Factors of materials on the facade, including non-glass materials, must equal a Threat Factor of 15 or less. Further, materials that are not bird-friendly cannot exceed an "aggregate of 10 sq. ft. within any 10 ft. by ft. square area of exterior wall" in these designated areas.	The policy defines "bird-friendly material" as one that has, or has been treated to have, a maximum threat factor of 30 in accordance with American Bird Conservancy's Bird Collision Deterrence Material Threat Factor Reference Standard or a relevant ASTM standard. (There is currently no relevant ASTM standard.)	✓
Emeryville, CA (2020)	Emeryville Municipal Code, 9-4.8 Bird-Safe Buildings	Mandatory	Projects that require a building permit and that are new construction involving new glass or other rigid transparent materials, replacements of any window, glass door or other rigid transparent materials, or glass structures (e.g., greenhouses, wind barriers, skywalks).	>90% of glazing must be bird-friendly on any window or contiguous glazed segment (area within mullions and/or frames) with an area of ≥12 sq. ft.	"(a) External screens installed permanently over glass such that the glass does not appear reflective. (b) Translucent or opaque glass, or transparent or opaque film applied to glass. (c) Glass covered with patterns such as dots, stripes, images, art, or abstract patterns. Such patterns may be etched, fritted, stenciled, silk-screened, or applied to the glass as films or decals, or another method of permanently incorporating the patterns into or onto the glass. Elements of the patterns must be either at least one-eighth inch (1/8") tall and separated by no more than two inches (2") vertically, or at least one-quarter inch (1/4") wide and separated by no more than four inches (4") horizontally, or both (the two (2) by four (4) rule). (d) Weatherproof grates, netting or cords mounted outside of the glass, near but not touching the glass, meeting the two (2) by four (4) rule. (e) Grooved glass block. (f) Other glazing treatments providing an equivalent level of bird safety and approved by the Planning Director."	✓
Highland Park, IL (2020)	Highland Park Code of Ordinances, Sec. 170.126 Bird-Friendly Construction Requirements	Mandatory	New buildings to be used primarily by the City.	Not specified. Bird-safe building materials should be used "to the greatest extent practical."	Rather than defining bird-safe building materials, the policy references materials described by: (1) The City of Chicago's "Bird-Safe Building Design Guide for New Construction and Renovation;" (2) The City of Toronto's "Bird-Friendly Development Guidelines;" and (3) New York City Audubon's "Bird-Safe Building Guidelines."	✓

Jurisdiction (Year Enacted)	Short Name	Mandatory or Voluntary	What structures does the policy apply to?	What portion of each structure must be “bird-friendly”?	How does the policy define “bird-safe”?	Lighting provision
Madison, WI (2020)	Madison General Ordinance § 28.129	Mandatory	1) all buildings or structures >10,000 sq. ft. (measured in total floor area on above-grade stories); 2) sky-bridges (elevated pedestrian pathways connecting buildings); and 3) at-grade glass features, such as sound walls and glass screens. The law also applies to the expansion of these same existing structures.	For buildings of >10,000 sq. ft., the area of glass requiring bird-friendly treatment depends on the percentage of glass on the building facade. Buildings with facades comprising 50% or more glass on the first 60 ft. above grade must use bird-friendly treatments on at least 85% of the glass. Additionally, all glass within 15 ft. of a building corner must be treated “when see-through or fly-through conditions exist.” For buildings >10,000 sq. ft. with <50% glass on the first 60 ft. above grade, bird-friendly treatments must be installed on at least 85% of continuous or closely placed “glass areas” that are 50 sq. ft. or larger and on all such “glass areas” over 50 sq. ft. within 15 ft. of a building corner. (“Glass areas” are defined as “one continuous panel of glass or other transparent material, or a set of two or more such panels divided by mullions of six inches in width or narrower.”) Additionally, all “glass railings” on buildings >10,000 sq. ft. must be treated, along with all glass on “enclosed building connections” from grade to 60 ft.	The policy offers a suite of possible collision mitigation methods. For example, to meet city requirements, owners may treat qualifying glass with “a pattern of visual markers that are either: a) dots or other isolated shapes that are ¼” in diameter or larger and spaced at no more than a two-inch (2”) by two -inch (2”) pattern; or b) lines that are 1/8” in width or greater and spaced no more than 2” apart.” Certain structural features that cover glass such as fixed solar shading and exterior insect screens may also qualify. Other mitigation strategies may be approved by the city’s zoning administrator on a case-by-case basis, including new technologies as they become available.	
Howard County, MD (2020)	CB11-2020 Bird Friendly Design Standards	Mandatory	New public and commercial buildings that require building permits.	Not specified. Documentation submitted with the building permit must show that the design meets the bird-friendly design standards of the 2011 edition of the LEED pilot credit #55 or meets bird-friendly design standards that the director of the county’s Department of Inspections, Licenses and Permits adopts and that are equivalent to LEED pilot credit #55.	Not specified. The policy refers instead to the LEED pilot credit #55 standards.	✓

Jurisdiction (Year Enacted)	Short Name	Mandatory or Voluntary	What structures does the policy apply to?	What portion of each structure must be "bird-friendly"?	How does the policy define "bird-safe"?	Lighting provision
Cupertino, CA (2021)	Chapter 19.102 Glass and Lighting Standards	Mandatory	New construction and renovations involving glass or transparent features. Exempts certain properties in residential zones, first-floor storefronts, and historic buildings.	Must use ≥90% "treated glass" on surface areas on first 60 ft. above grade and ≥95% on surface areas above 60 ft. Skyways, balconies, freestanding walls, and building corners must use bird-safe treatments.	"The Planning Division may maintain a list of acceptable bird-safe treatments that may be updated from time to time. The list may include, but not be limited to, permanent treatments such as opaque glass, window muntins, exterior insect screens, exterior netting, or special glass treatments such as fritting to provide visual cues and reduce the likelihood of bird collisions. Glass treatments must have high color contrast with the glass and be applied to the outermost surface." Alternatively, property owners/ applicants may comply by proposing an alternative compliance method recommended by a qualified biologist to meet the policy's intent. The alternative compliance method "shall be peer-reviewed by a third-party consultant, paid for by the applicant, and subject to the approval of the Director of Community Development."	✓
State of Illinois (2021)	Public Act 102-0119 (HBo247)	Mandatory	State buildings newly constructed, acquired, or for which more than 50% of the facade is substantially altered.	≥90% of the exposed facade material from ground level to 40 ft., ≥60% of the exposed facade material above 40 ft., and all glass adjacent to atria or courtyards containing attractive bird habitat either must not be composed of glass or must be composed with bird-friendly design/ materials. Transparent passageways and corners are not allowed.	Bird-friendly is defined as either not being composed of glass or being composed of glass employing: "(i) elements that preclude bird collisions without completely obscuring vision, such as secondary facades, netting, screens, shutters, and exterior shades; (ii) ultraviolet (UV) patterned glass that contains UV-reflective or contrasting patterns that are visible to birds; (iii) patterns on glass designed in accordance with a rule that restricts horizontal spaces to less than 2 inches high and vertical spaces to less than 4 inches wide; (iv) opaque, etched, stained, frosted, or translucent glass; or (v) any combination of the methods described in this subparagraph."	✓
State of Wisconsin (2021)	DFD Sustainability Guidelines for Capital Projects, "Bird Collision Deterrence"	Mandatory	State-owned new construction projects and major renovations with facades composed of ≥ 20% glazing.	First two stories above grade or the tree canopy height, whichever is greater, and the glazing of stories level with green roofs.	Bird-deterrent strategies -- "such as properly designed scrim, glazing frit, or specialized coating" -- must be incorporated to reduce non-treated glazing to a maximum of 20% of the first two stories above grade. The guidelines reference American Bird Conservancy's publications for additional potential strategies.	

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Evanston, IL (2022)	Bird-Friendly Building Design Guide	Mandatory	Planned developments, new commercial, multifamily and industrial construction projects and renovations of existing buildings that include the replacement of 100% of the exterior glazing. Excludes detached one- and two-family dwellings, townhouses, and residential buildings of ≤ 3 stories.	Different specified sections of buildings must meet different bird-safe criteria. “High risk” zones such as skywalks and see-through glass corners must use a material with a Threat Factor rating of ≤ 30 . Facade areas up to 60 feet above grade and facades up to 16 feet above a green roof must have a a Building Collision Threat Factor score of ≤ 15 . Facade areas above 60 feet must have a Building Collision Threat Factor score of ≤ 30 .	The Building Collision Threat Factor is a calculated threat rating of a facade zone based on the material threat factor (MTF) of each of its component materials proportional to the amount of area of each material in a given facade zone. A lower threat rating indicates a lower risk of collision. Alternatively, projects that satisfy the LEED Pilot Credit 55: Bird Collision Deterrence are deemed to have met the city’s requirements.	✓
Washington DC (2023)	D.C. Law 24-337. Migratory Local Wildlife Protection Act of 2022	Mandatory	New construction, renovations involving the replacement of $>75\%$ of exterior glazing, and bird-hazard installations for commercial buildings, multi-unit residential buildings, institutional facilities, or District-owned or operated buildings.	Each façade of the exterior wall envelope and any exterior fenestration must be constructed with bird friendly materials up to 100 ft. above grade. Other materials may be used to the extent that they do not exceed an aggregate of 10 sq. ft. within any 10 ft. by 10 ft. sq. area of exterior wall below 100 ft. above grade.	A “bird friendly material” is defined as a material or assembly that has been designed or treated to have a maximum material threat factor of 30 in accordance with American Bird Conservancy’s Bird Collision Deterrence Material Threat Factor Reference Standard.	✓
State of Maryland (2023)	Maryland Sustainable Buildings Act of 2023	Mandatory	State-owned buildings (defined as buildings for which 50% of the money for acquisition, construction, or renovation came from state funds) for which the public work contract is $\geq \$500,000$.	TBD. The Department of General Services will develop standards consistent with the LEED Innovation Credit #55 for reducing bird collisions and with the American Bird Conservancy bird-friendly building design recommendations.	TBD	✓
State of Maine (2023)	LD670: An Act to Protect Birds in the Construction, Renovation and Maintenance of Public Buildings	Mandatory	Public buildings, excluding public buildings that are eligible for inclusion in the National Register of Historic Places.	TBD. This bill requires the Maine Department of Administrative and Financial Services, Bureau of General Services, to develop guidelines for bird-safe buildings for public buildings by December 31, 2024.	TBD	TBD