



Building Safer Cities for Birds

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

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City of San Francisco.

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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

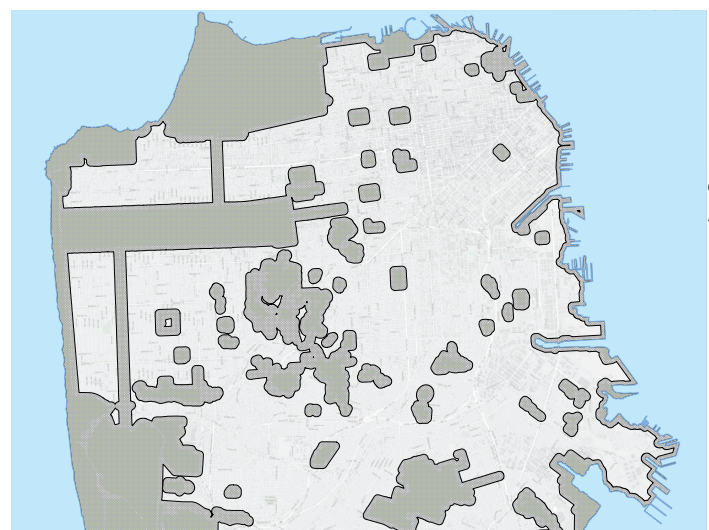
HOW THE POLICY WORKS

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)

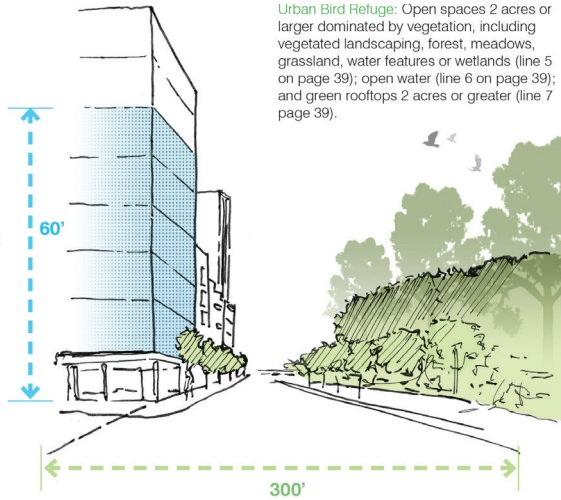
Because San Francisco’s law was adopted before bird-friendly building standards had been standardized by groups like American Bird Conservancy (in its material threat factor rating system) and the U.S. Green Building Council (in its LEED “Bird



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.

Waltarrrr/flickr, CC BY-NC-ND 2.0, <https://tinyurl.com/v4jmdhbr>

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

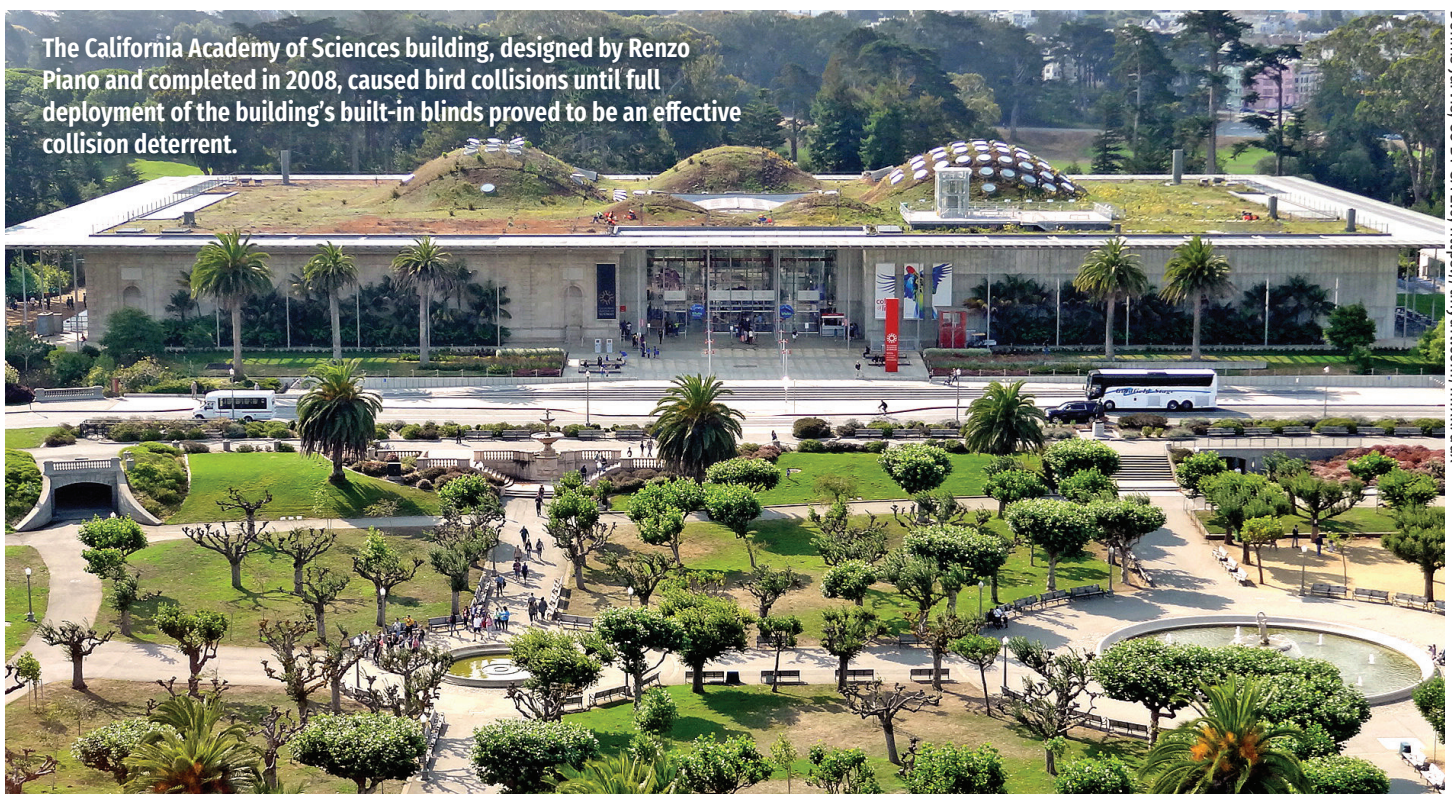
Public awareness and concern about fatal bird-window collisions continued to grow in the city in the late 2000s. In 2009, three beloved juvenile Peregrine Falcons whose fledgling in a nest atop a downtown building had been closely watched died as a result of building collisions.⁴⁰ Reported a blogger, “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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