BIRD-SAFE CITY BUILDING:
A PROFESSIONAL TRAINING NEEDS ASSESSMENT

PLANNING REPORT

(NATURE IN THE CITY - TORONTO, 2024)

Toronto Metropolitan University

School of Urban & Regional Planning
Faculty of Community Services

ECO/ LOGICAL DESIGN LAB

FLAP CANADA

PLG 720: ADVANCED PLANNING STUDIO II

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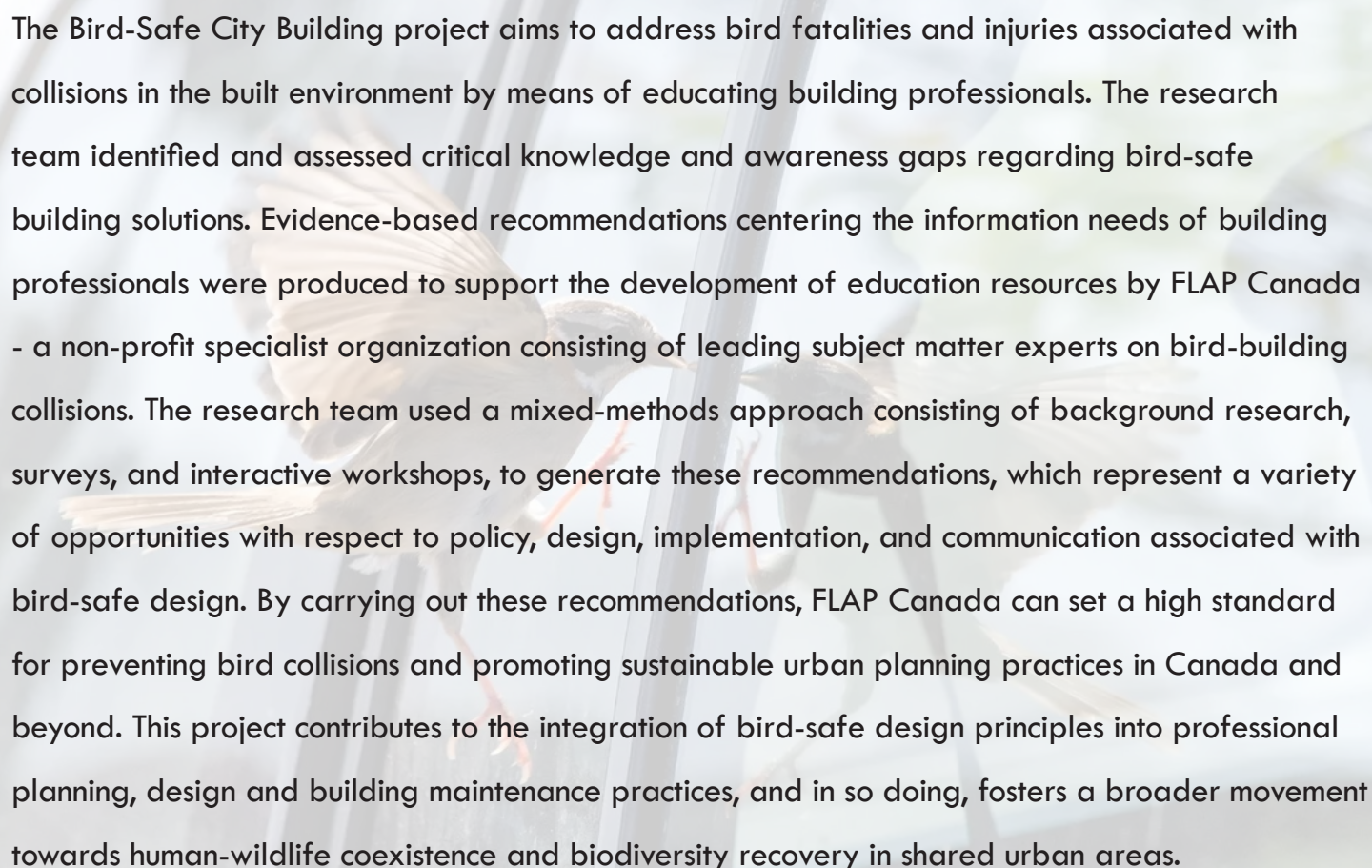
DECEMBER 2024

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EXECUTIVE SUMMARY

The Bird-Safe City Building project aims to address bird fatalities and injuries associated with collisions in the built environment by means of educating building professionals. The research team identified and assessed critical knowledge and awareness gaps regarding bird-safe building solutions. Evidence-based recommendations centering the information needs of building professionals were produced to support the development of education resources by FLAP Canada - a non-profit specialist organization consisting of leading subject matter experts on bird-building collisions. The research team used a mixed-methods approach consisting of background research, surveys, and interactive workshops, to generate these recommendations, which represent a variety of opportunities with respect to policy, design, implementation, and communication associated with bird-safe design. By carrying out these recommendations, FLAP Canada can set a high standard for preventing bird collisions and promoting sustainable urban planning practices in Canada and beyond. This project contributes to the integration of bird-safe design principles into professional planning, design and building maintenance practices, and in so doing, fosters a broader movement towards human-wildlife coexistence and biodiversity recovery in shared urban areas.

(TIEKO, 2012)

WHY SHOULD PLANNING & DESIGN BE BIRD-SAFE?

(QIN, 2024)

Bird-safe planning and design is a critical issue in urban development. When birds encounter glazing on buildings, they are generally unable to recognize it as a barrier they cannot fly through, and may suffer collisions at high speeds. Risk factors associated with bird collisions include but are not limited to sunlight being reflected off and transmitted through glazed surfaces on the exterior of buildings during daytime, the presence of artificial light at night attracting birds towards buildings, and the presence of features such as trees and gardens that attract birds towards buildings.

Leading estimates suggest 16 to 42 million birds are killed by collisions with buildings in Canada each year, representing a leading direct source of bird deaths (Machtans et al., 2013). Within the United States, estimates suggest as many as 1 billion birds are killed by collisions with buildings annually (American Bird Conservatory, 2024). Many bird species that are susceptible to collisions migrate across international borders and play important roles in ecosystems throughout their migratory ranges. Substantial bird population declines cause significant harm to many other species, including humans, that rely upon services and benefits associated with birds. For example, birds provide pest insect control, pollination and seed dispersal services. Exposure to birdsong is positively correlated with human mental health and wellbeing (Whelan, Wenny and Marquis, 2008; Buxton et al., 2024). Consequently, declines in the abundance and diversity of bird species have far-reaching effects, including ecosystem disruption, loss of biodiversity, and food chain breakdown. As ongoing international efforts aim to stabilize bird declines and support population recovery, bird-safe building design measures are being implemented in a growing number of jurisdictions, primarily by becoming embedded into the building development process. Bird-safe building design uses evidence-based techniques and technologies to reduce bird collisions at existing buildings as well as new construction, including but not limited to visual markers and patterned glazing for use on building exteriors, bird-safe architectural features (grilles, shutters, solar shades, etc), dark sky lighting specifications and awareness programs encouraging building owners and occupants to turn off lights at night, such as Lights Out Toronto (Lights out Toronto, 2024).

Many technologies that can help to limit bird collisions are relatively new, and implementing them effectively in building plans requires technical proficiency. However, awareness and adoption of solutions by relevant industry sectors, such as architecture and planning, are limited by a lack of opportunities for industry professionals to receive formal education on the topic. The goal of this research project was to assess gaps in knowledge of bird-safe planning and design solutions, and through this assessment, to identify opportunities for professional training and education to fill those gaps. Through a mixed-methods assessment, the project team provides evidence-based recommendations to address the growing need and demand for bird-safe planning and design in urban areas.

CONTEXT & BACKGROUND

(FLAP CANADA, 2020)

Unsafe conditions for birds are posed by specific aspects of urban landscapes resulting from design and layout, including fly-through conditions, which refer to glass facades that show the sky or trees through a solid barrier. These are some of the largest contributors to bird casualties in municipalities and need treatment to mitigate the decline of avian populations (Klem Jr., 2014).

For one, birds are susceptible to glass collisions as they are unable to perceive image reflections in the glass, typically mistaking them for being a continuation of the skyline (Klem Jr., 2014). Topped with the fact that the growth of urban areas causes natural habitat numbers to decrease and bird hazards to increase, this further exacerbates the issue (City of Toronto, 2016).

Moreover, since migratory birds utilize the moon and the stars to navigate, artificial light emanating from urban centres confuses and disorients them during migration (FLAP, 2014). Migratory patterns and behavioural changes come with these environmental pressures, such as the existence of population declines due to the impacts of climate change, habitat loss and altered migration time with different routes taken during the migratory process (FLAP, 2014). These routes can be attributed to an increased interaction between birds and man-made structures within these urban areas. Through stakeholder identification and gauging professional awareness of the issue surrounding bird-safe design, a plethora of knowledge and implementation gaps were identified during the research process. For example, upon conducting this research there was a lack of awareness regarding the population decline of specific umbrella species by the professionals, such as songbirds (Murphy, 2019). These gaps effectively

reduce the amount of bird-safe designs seen within urban areas, which is why much of the issue resides with relaying information to both the public and developers so that they can expand their knowledge on the issue at hand. It is important to consider that each professional had their own unique perspective on the issue, and while there was plenty of alignment between the observations within their specific field, these differences can cause confusion as there is a varying level of interest related to bird-safe design amongst these groups (Murphy, 2019). Likewise, bird-safe design implementations might not align with the stakeholder or company's budgeting or spend.

Other observable gaps were identified within the policy context, as well as issues with pre-existing policy. There is a lack of policies and evaluations regarding bird-safe planning and design, which leads to improper design implementation and bird collision mitigation. Policies and regulations can help ensure that proper bird-safe planning and design are incorporated within the building context. For example, the Ontario Environmental Protection Act criminalizes the development of buildings in a way which emits reflected light that kills or injures birds, which can cause a plethora of legal issues for developers should they be found liable (Ontario, 2024). While this is a great idea in practice, it is not heavily enforced on developments, and prosecution is seldom.

Having a lack of policies in rural areas and other smaller municipalities coincides with the knowledge gaps amongst developers as it invokes a lesser awareness for those who are in positions of responsibility regarding urban design. It also contributes to a lack of precedent for non-major metropolitan contexts, further inhibiting the uptake by

professional actors that inform decisions through case studies and feasibility analyses.

Understanding the lack of bird-safe design policies within other jurisdictions was critical to furthering the development of this report, serving to illustrate the hierarchy of issues that needed to be addressed within the professional needs assessment. The findings of the identified issues guided the design of the research methods outlined in this report. Research objectives were provided context and focus in a manner that enabled findings to be categorized and analyzed thematically based on the stages of bird-safe implementation and the roles of professional actors involved. The key recommendations presented in this report reflect this initial analysis in their address of key issues requiring attention in the realm of bird safety.

The needs assessment, as informed by insights from professionals, therefore aims to support FLAP Canada (FLAP) in developing professional training resources to achieve actionable outcomes in bird-safe implementation reflect this initial analysis in their address of key issues requiring attention in the realm of bird safety.

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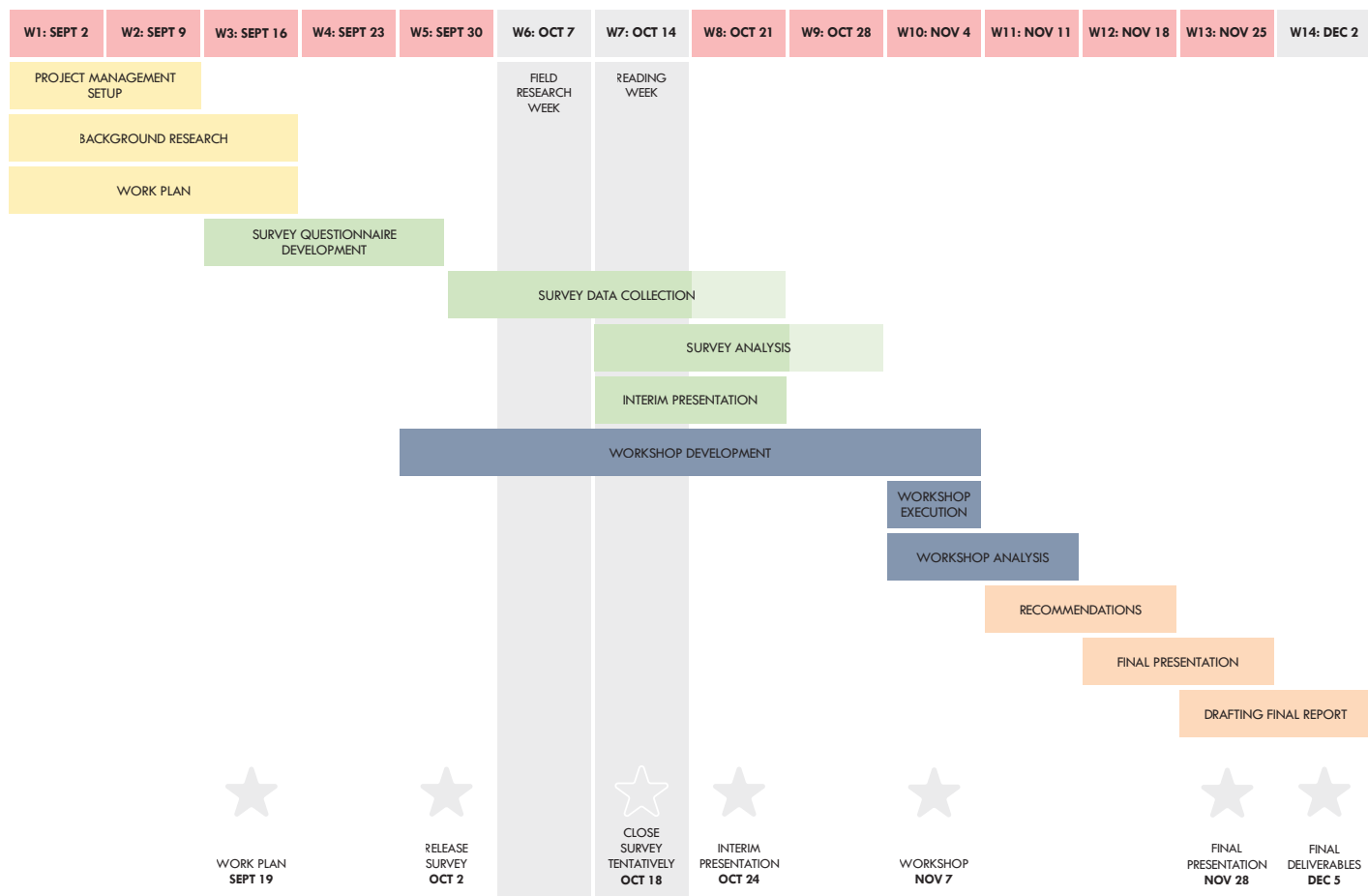
RESEARCH OBJECTIVES
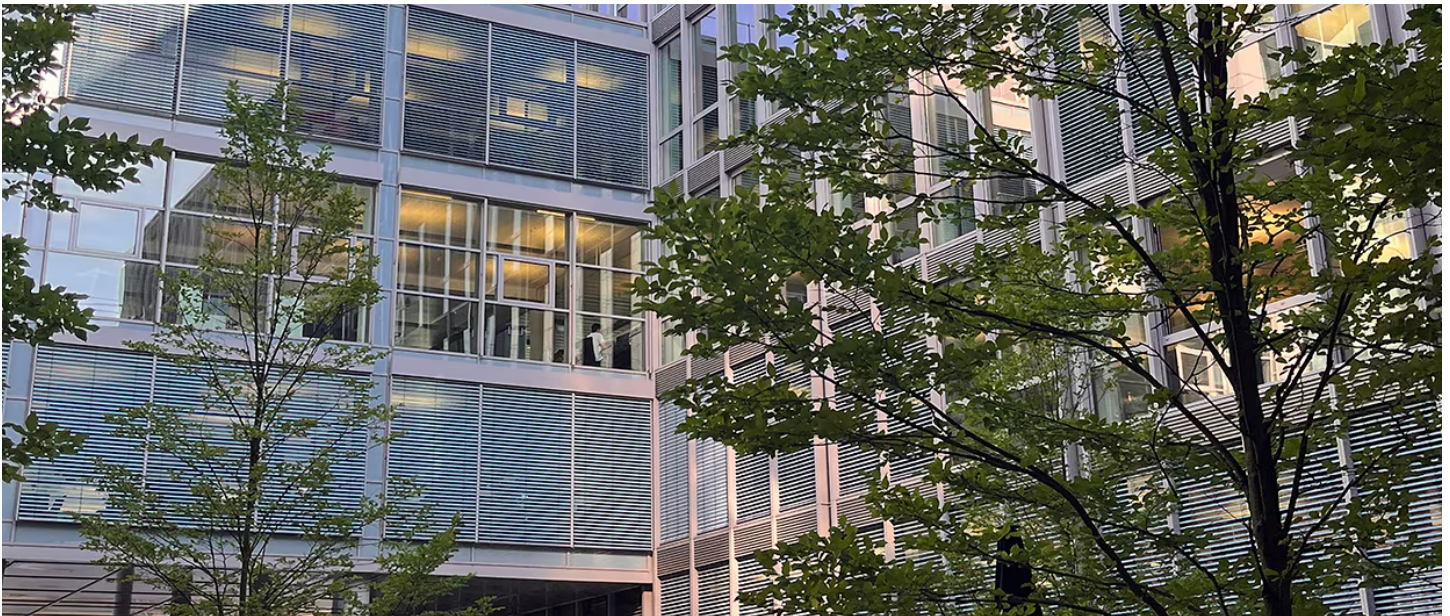
(HOPFAUF, 2024)

PLANNING PROBLEM

The research identified a critical knowledge gap in professional understanding of bird-safe design practices. Using a mixed-methods approach that combined a survey and workshop, the project revealed that many professionals often struggle with interpreting current standards and guidelines. Furthermore, many practitioners are not fully aware of their capacity to implement bird-safe measures within their professional roles, resulting in inconsistent adaptation throughout projects. This perceived gap between policy requirements and practical implementation presents an opportunity to enhance professional development and training initiatives.

RESEARCH OBJECTIVE

The goal of this project is to collect insights and feedback from professionals who interact with bird-safe building design in their practice. This helps to characterize the challenges they face and their information needs. The studio team has synthesized the findings into a report with recommendations for the development of new training resources aimed at improving bird-safe awareness and literacy among professionals. Ultimately, the project seeks to understand how bird-safe building design is applied in practice, pinpoint existing gaps, and determine the information required to address those gaps through professional development.

RESEARCH METHODS

W1: SEPT 2	W2: SEPT 9	W3: SEPT 16	W4: SEPT 23	W5: SEPT 30	W6: OCT 7	W7: OCT 14	W8: OCT 21	W9: OCT 28	W10: NOV 4	W11: NOV 11	W12: NOV 18	W13: NOV 25	W14: DEC 2

PROJECT MANAGEMENT SETUP (W1–W2)

BACKGROUND RESEARCH (W1–W4)

WORK PLAN (W1–W4)

FIELD RESEARCH WEEK (W6)

READING WEEK (W7)

SURVEY QUESTIONNAIRE DEVELOPMENT (W3–W5)

SURVEY DATA COLLECTION (W5–W8)

SURVEY ANALYSIS (W7–W9)

INTERIM PRESENTATION (W7–W8)

WORKSHOP DEVELOPMENT (W5–W11)

WORKSHOP EXECUTION (W10)

WORKSHOP ANALYSIS (W10–W12)

RECOMMENDATIONS (W11–W13)

FINAL PRESENTATION (W12–W13)

DRAFTING FINAL REPORT (W13–W14)

Milestones:
- ★ WORK PLAN — **SEPT 19**
- ★ RELEASE SURVEY — **OCT 2**
- ☆ CLOSE SURVEY TENTATIVELY — **OCT 18**
- ★ INTERIM PRESENTATION — **OCT 24**
- ★ WORKSHOP — **NOV 7**
- ★ FINAL PRESENTATION — **NOV 28**
- ★ FINAL DELIVERABLES — **DEC 5**

1) DELIVERABLES

To achieve the research objective, the team established four successive research stages: (1) secondary research, (2) policy scan, (3) survey, and (4) workshop. These stages informed the professional development recommendations for FLAP to further advance bird safety awareness among professionals. The team utilized a mixed-methods approach throughout the process.

2) SECONDARY RESEARCH & POLICY SCAN

The secondary research aimed to understand the root of bird-building collisions, different types of interventions, and the relevant stakeholders. The policy scan aimed to understand the current policy context of bird-safe planning and building design across Canada. A scan of literature was conducted for the secondary research and policy analysis through the following steps: (1) sifting through all relevant published material and (2) extracting key contents and themes to further analyze in later research modes (Lane, 2023).

3) THE SURVEY

The survey aimed to understand selected professions' (1) awareness, (2) knowledge, (3) involvement in bird-safe planning and building design, and (4) their professional development preferences. The survey used a mixed-methods approach, composed of predominantly quantitative, close-ended questions and fewer qualitative, open-ended questions. The quantitative questions are a means to statistically analyze the relationship between each profession and the identified variables (Ahmad et al., 2019). In contrast, the qualitative questions are a means to capture professionals' unique attitudes and experiences while also generating insights for further exploration during the workshop (Ahmad et al., 2019).

The survey was conducted online via Qualtrics. It was self-administered and unsupervised (Bourque and Feilder, 2003). The target sample of the survey includes the following professionals: planners, architects, landscape architects, engineers, building inspectors/site plan technicians, wildlife removal/pest control service providers, facility managers, building service contractors (e.g. window cleaning), researchers, and environmental consultants practicing across Canada and the United States.

The method of sampling included:
Email Invitations - Invitations to participate were sent to approximately 118 team-identified organizations and professionals that were either (1) part of the target sample or (2) not part of the target sample themselves, but knew of others who were. Recipients were encouraged to circulate the invitation amongst their network or to others who may show interest, as a means to 'snowball recruit' (Strat ton, 2024). According to Stratton (2024), snowball recruiting is prone to selection bias, as initial recipients will likely circulate the invitation to others with similar experiences and opinions.

Social Media Invitations - Instagram posts were made by FLAP (@flapcanada) and the Ecological Design Lab (@ecodesignlabtmu) calling out to the target sample to participate in the survey.

The survey structure began with an initial address outlining the purpose of the research, as well as expectations for time commitment and data privacy. The initial questions establish basic parameters for respondents, focusing on their occupation, professional sector, and regional jurisdiction. Questions were presented to gather insights based on professionals' pre-existing knowledge of bird safety and experience interacting with interventions professionally. The survey continued with questions related to limitations and inefficiencies that professionals have encountered in their work, culminating in questions that directly ask which methods of training material they would prefer to improve their knowledge of bird safety. The survey concludes with invitations to a visioning workshop that aims to further elaborate on themes presented by the survey, invitations to receive further research updates, and a thank you for participation. This questionnaire design reflects the project research objectives by identifying what professionals know, what knowledge gaps exist, and how to fill those gaps through professional development and education.

The survey relied heavily on contingency questions, displaying or omitting questions based on a participant's response to a previous question. There were 2 streams of questions presented to participants, split based on their self-declared experience with bird safety, as indicated in question 6. Respondents are internally split into 2 categories, "Experienced" and "Inexperienced," for the purposes of data analysis. Only those experienced professionals (indicating a score of 4/10 or above) were presented with some questions, typically those that require a very critical level of understanding of the greater context of bird-safe implementation and

policy, to prevent confusion and difficulty completing the survey for inexperienced participants. Null responses were included for questions to prevent respondents from encountering questions that they do not have the professional capacity to answer. For example, respondents who indicate they do not interact with building contexts will not receive questions relating to their experience relating to their experience professionally interacting with bird-safe buildings. Regardless, most questions were marked as voluntary, indicating that respondents could skip them if they were unwilling to answer for whatever reason.

Of the 133 responses logged by Qualtrics, there were 86 valid responses. Valid responses included those that reached question 24 of the survey, omitting those final questions that were not necessary for data analysis (questions related to receiving future research updates, for example).

There were some key limitations in the survey design that should be considered when reviewing the findings. There was no formal verification process to confirm participants' professional credentials, which required a level of trust between the studio team and participants, relying on their genuine intent to provide valid and constructive insights. To mitigate this, the studio team circulated the survey through targeted professional networks via email and broader—but still relevant—social media platforms to engage more professionals interested in the topic. However, as highlighted by Stratton (2024), the use of a snowball sampling approach introduced selection bias.

The survey would typically only be completed by those respondents who were already aware that their work interacted with bird safety, leading to the underrepresentation of some occupations, such as engineers and building managers or facilitators among the survey respondents. The survey was predominantly circulated within professional networks of planners and architects, contributing

to this imbalance. Another noted limitation was the absence of procurement officers and Indigenous perspectives, which should be addressed by FLAP in future research efforts.

Ordinal responses did not use standardized terminology, so statistical analysis should consider this before comparing means across questions. For example, questions asking how often respondents encounter limitations in bird safety (question 14) and incorrect implementations (question 17) have different ordinal scales, indicating that, for example, a mean value of "3" will not refer to the same frequency across questions.

Question 6 asks respondents to self-indicate their experience with bird safety. It has been identified that this form of self-declaration is often underpinned by biases based on race and gender. Specifically, those who identify as white and/ or male will typically self-identify with values higher than those respondents who are non-white and/ or female, for example (Exley, 2019). Although this study does not collect data on the demographic characteristics of respondents, it is worth mentioning the possibility that non-white non-males may be mildly underrepresented in the "Experienced" line of questions and vice versa due to this bias.

4) THE WORKSHOP

The workshop aimed to further understand the statistical relationships discerned from the survey, through first-hand accounts of selected professionals. The focus of the workshop was for professionals to define their successes and limitations in implementing bird safety, as well as disclose their professional development preferences. The workshop itself is classified as qualitative research, composed of open-ended prompts and questions. Open-ended prompts and questions allow participants to verbalise perspectives and experiences in-depth, thereby contextualising the survey data and insights (Ahmad et. al, 2019). Given such, the survey and workshop are "mutually illuminating", together producing research that is "greater than the sum of [it's] parts" (Cheek and Morse, 2024, p. 647). The workshop was conducted on line, via Zoom. Four total activities were conducted, including (1) an icebreaker, (2) a backcast, (3) two discussion questions, and (4) a five-station world café discussion.
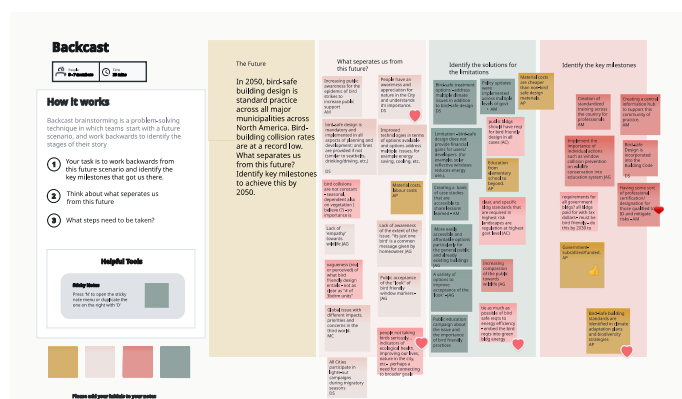
Participants conducted activities in groups of approximately 6 to 8. Each group consisted of a mix of professionals, to vary perspectives. The workshop data was encapsulated in transcripts, which then underwent thematic analysis. The target sample of the workshop was nearly identical to the survey, including planners, architects, landscape architects, engineers, building inspectors/site plan technicians, wildlife removal/pest control service providers, facility managers, building service contractors (e.g. window cleaning), researchers, environmental consultants, and bird-safety product manufacturers practicing across Canada and the United States. The method of sampling was email invitations, to ensure participants were exclusively the target sample. Invitations to participate were sent to approximately 185 organizations and professionals that either (1) identified interest in participating via the survey or (2) the team identified as part of the target sample.

The workshop included 31 participants. One limitation of the workshop was the lack of participation from site plan technicians, who play a crucial role in implementing bird-safe design measures. This gap may have resulted in missed insights that could have strengthened the workshop's findings. Also, the virtual nature of the workshop may have contributed to limited participation. Some of the notable challenges with the implementation of the workshop were limited time for each activity, zoom
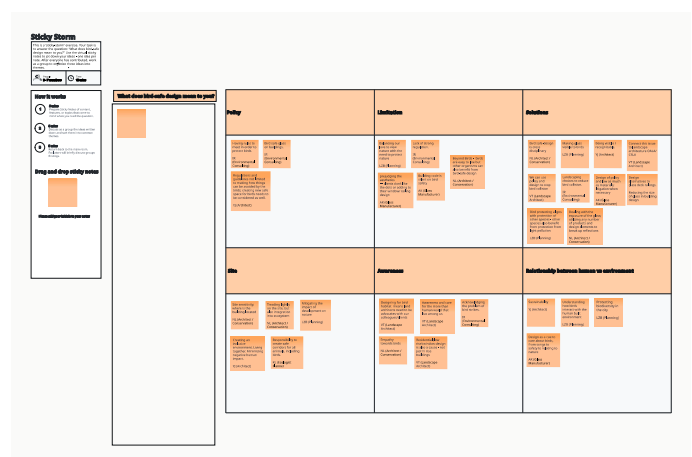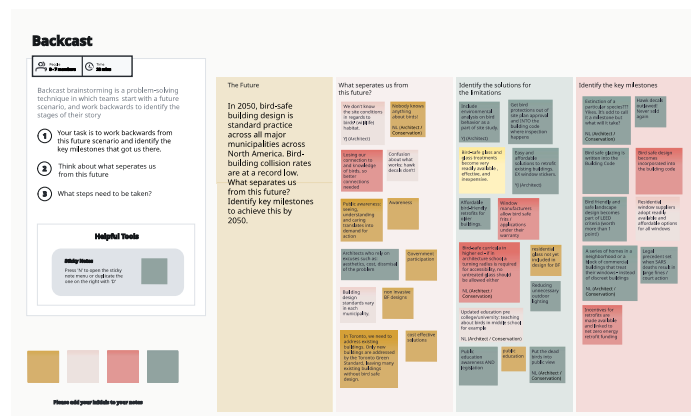
fatigue, and logistical challenges with carrying out the workshop for 31 participants.

Another limitation was the absence of representation from Indigenous groups and engineers. Their involvement could have contributed to context sensitive approaches that respect traditional land use practices and promote natural ecosystem management. The team acknowledged that Indigenous viewpoints could have enhanced project findings and strengthened the final recommendations Indigenous knowledge systems frequently provide profound insights into sustainable initiatives and ecological balance; their noninclusion was a missed opportunity to incorporate culturally informed and environmentally holistic strategies into bird-safe education. Similarly, the absence of engineers, who are essential stakeholders in the design and implementation of buildings, limits the technical feasibility and creativity of suggested bird safety educational resources. Engineers may have provided ideas regarding structural design, material efficiency, and the incorporation of bird-safe interventions into larger systems such as energy or lighting. As a result, more research is required to gather insights and identify gaps of knowledge within professional engineers. This gap highlights the need for future projects to take a more inclusive approach, ensuring that varied skills and perspectives drive instructional tools and bird-safe planning solutions.

SURVEY FINDINGS

RESPONDENTS

Most survey respondents were planners and architects from Ontario, British Columbia, and Nova Scotia. The mixed-methods approach of the survey facilitated the collection of both quantitative and qualitative data through a combination of closed and open-ended questions. To accommodate the target participants, who were primarily practicing professionals, the survey included only a limited number of open-ended questions. This decision was made to minimize the burden on participants, aligning with recommendations in the literature to reduce response fatigue in similar contexts

(Baburajan et al., 2021). The opportunity for in-depth discussions during the workshop further supported this approach. Despite the limited number of open-ended questions, the team was able to derive valuable insights from the responses provided.

WHO?

Environmental Consultant
6

Landscape Architect
6

Engineer
5

Wildlife Removal/Pest Control Service Provider
1

Architect
16

Planner
16

Building Service Contractor
1

Building Inspector/Site Plan Technician
1

Researcher
10

Facility Manager
4

WHERE?

OTHER
2%

YT, NT, NU
1%

NL
2%

BC
15%

AB
6%

SK
3%

MB
1%

ON
55%

QC
9%

PE
2%

NS
20%

NB
5%

US
7%
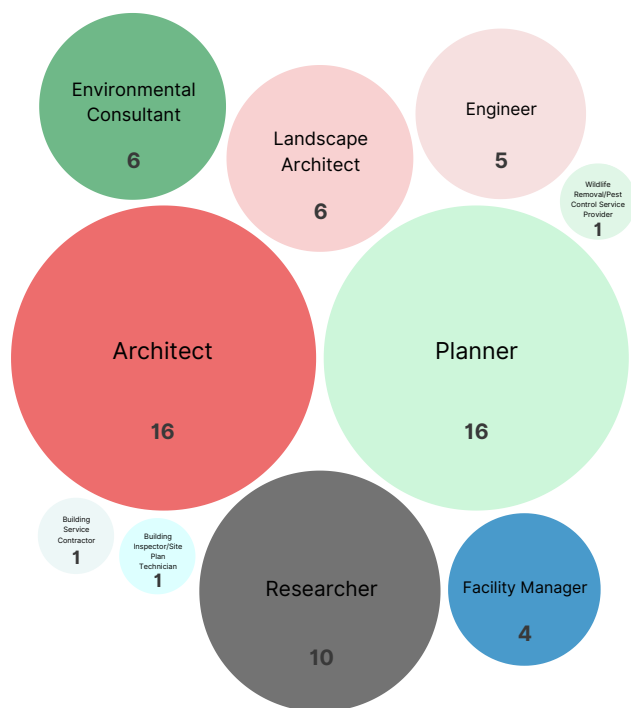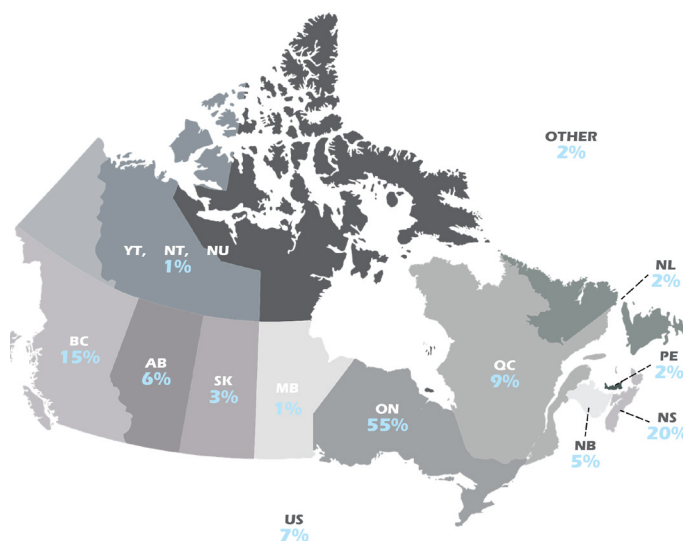
KEY INSIGHTS

Question 15 is one of the aforementioned open-ended questions intended for further discussion during the workshop. It asked participants to identify the barriers they face when implementing bird-safe measures, and the most commonly identified barriers include:

1. Cost:
- The cost of bird-safe implementations is seen as a major deterrent.
- A participant stated that implementing vinyl applications would void the manufacturer's warranty unless undertaken in-house.

2. Lack of Willingness:
- Developers will not adopt bird-safe measures unless they are explicitly mandated.

3. Ineffective policies and lack of government urgency and support:
- Bird safety is typically addressed in voluntary design guidelines rather than enforced regulations.
- Even in cases where policies are mandatory (e.g., the Toronto Green Standard), challenges exist with inspections and ensuring ongoing compliance post-construction.
- The Building Code does not currently include bird-safe policies.
- Government bodies often prioritize other issues over bird safety, leading to limited urgency and support for such initiatives.

4. Lack of awareness:
- Professionals are not sufficiently educated on proper implementation, where to source relevant materials, and the scope of the bird fatality problem due to building design.

RESPONDENT EXPERIENCE

Inexperienced 5%
Experienced 35%
Familiar 60%
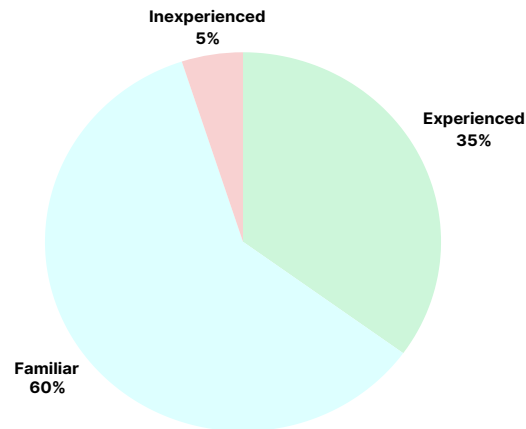
BIRD-SAFETY INVOLVEMENT IN PROFESSIONAL WORK

Rarely Involved/Uninvolved 33.7%
Heavily Involved 34.9%
Somewhat Involved 31.4%
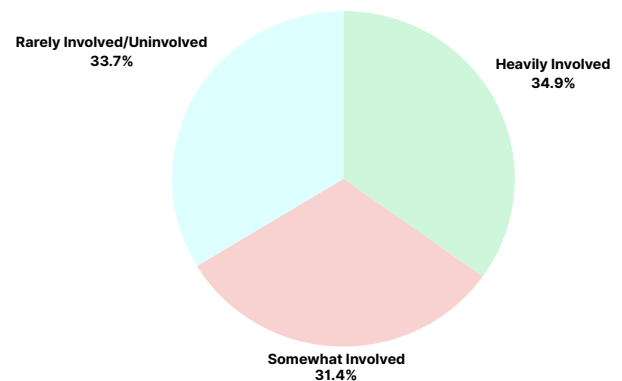
BUILDING CONTEXT: BASED ON YOUR KNOWLEDGE, HOW OFTEN HAS BIRD-SAFE DESIGN BEEN INCORPORATED CORRECTLY INTO BUILDINGS, LANDSCAPING, AND/OR DEVELOPMENTS UNDER YOUR PROFESSIONAL JURISDICTION?

■ Always ■ Very Often ■ Sometimes ■ Not Often ■ Very Rarely
■ Never ■ Unsure

| 1 | 3 | 9 | 8 | 12 | 5 | 12 |

BIRD-SAFE GLASS

70% Involved

BIRD-SAFE SITE PLANNING/LANDSCAPE DESIGN

28% Involved
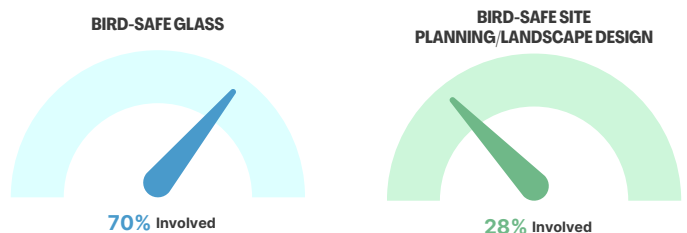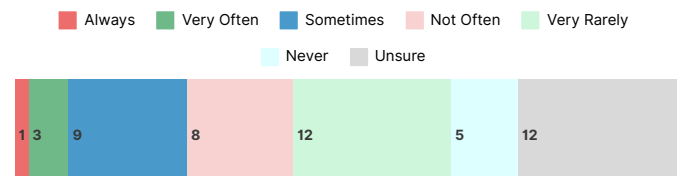
RESPONDENTS

These insights were instrumental in shaping activities 2 (Backcast) and 3 (Roundtable Discussion: Limits) of the workshop. For the Backcast activity, participants were asked to identify key milestones needed to achieve record low bird-building collision rates as a result of bird-safe building design being a standard practice across all major municipalities across North America. The Roundtable activity served as an open-discussion extension of Question 15 from the survey, allowing participants to explore the topic in greater depth and share diverse perspectives. These activities were designed to explore potential solutions and discuss key events necessary to overcome the identified challenges.

CHALLENGES WITH EXISTING BUILDINGS

The survey also reinforced the challenge of addressing bird safety in both new developments and existing buildings (i.e. the need for retrofits). The survey data shows that professionals deal with both types of buildings at similar rates, highlighting the importance of educating bird-safe retrofitting as a key component of professional training.

A NEED FOR TRAINING

A significant finding from Question 20 was that only half of the experienced and inexperienced respondents perceived their profession as bearing significant responsibility for implementing bird-safe practices. This emphasizes the need for further education on professionals' critical role in preventing bird fatalities. As the development process is shared across professionals and jurisdictions, a mistake at any stage can lead to overall failure, underscoring the need for shared responsibility across all professionals involved. This finding informed one of the questions posed during the World Café activity in the workshop. In this activity, the five notetakers rotated through the groups with different questions, with each group having the opportunity to review and build upon the responses provided by previous groups. Participants were asked which profession they believed had the greatest capacity to implement bird-safe measures, which provided insights into where professionals perceive responsibility to lie in the process.

BUILDING CONTEXT: HOW OFTEN DO YOU ENCOUNTER LANDSCAPES AND/OR BUILDINGS THAT ARE MEANT TO BE BIRD-SAFE BUT FALL SHORT?

Always | Very Often | Sometimes | Not Often | Never | Unsure

| 23 | 18 | 4 | 6 | 18 |

RESPONSIBILITY: ON A SCALE OF 1 TO 10, WHERE 1 REPRESENTS MINIMAL INVOLVEMENT, AND 10 REPRESENTS A HIGH DEGREE OF INVOLVEMENT, HOW INVOLVED ARE YOU WITH BIRD SAFETY IN YOUR PROFESSIONAL WORK?

Facility Manager 7 | Landscape Architect 7 | Other 7 | Building Service Contractor 2 | Architect 8 | Environmental Consultant 8 | Building Inspector/Site Plan Technician 4 | Wildlife Removal/Pest Control Service Provider 2 | Engineer 4 | Planner 7 | Researcher 6
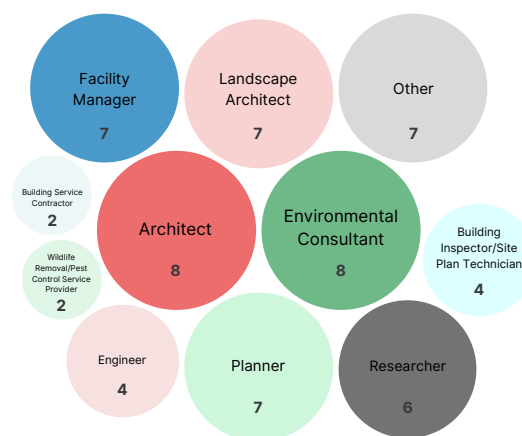
TRAINING NEEDS AND PREFERENCES

Question 22 showed that professionals were most interested in foundational knowledge regarding bird-safe design, such as "landscape and design strategies" and "technical building design guidelines." However, experienced respondents specifically identified "tools to communicate the value to clients and stakeholders" as the most beneficial resource. This likely reflects their awareness that client willingness is a critical factor in implementing bird-safe measures.

This insight inspired another World Café question, where participants were asked how organizations like FLAP could ensure that professionals and their supervisors remain committed to bird safety beyond the training. The goal was to explore comparable priorities that could help frame bird safety as an equal priority alongside other professional concerns.

TRAINING FORMATS

Question 23 revealed that professionals preferred more convenient training formats, such as reference materials and online modules. Guest lectures were also considered a desirable method. In contrast, "departmental or on-the-job training" and "in-person course based instruction" were the least favoured methods. This data directly informed another question in the World Café activity, where the team aimed to reconcile preferred training methods with those that professionals had identified to be most effective. These insights guided the recommendations for future approaches to training.

CONCLUSIONS

The survey highlighted a significant need for professional training in bird safety. Many respondents were only familiar with basic strategies, such as bird-safe glass and light reduction, and lacked the knowledge to assess the effectiveness of these interventions or policies. There was also considerable uncertainty in their responses, which suggests a gap in both practical knowledge and policy understanding.

The survey affirmed that non-governmental organizations like FLAP are the most trusted organizations to spearhead educational efforts, as many respondents already consider them to be their primary source of bird safety information.

EDUCATIONAL: WHAT RESOURCES OR ADDITIONAL INFORMATION WOULD MOST BENEFIT YOUR UNDERSTANDING OF BIRD SAFETY?

Tools to communicate value to clients and stakeholders	61
Bird-safe landscape and design strategies	57
Technical building design guidelines	54
Logistic information regarding specific interventions	52
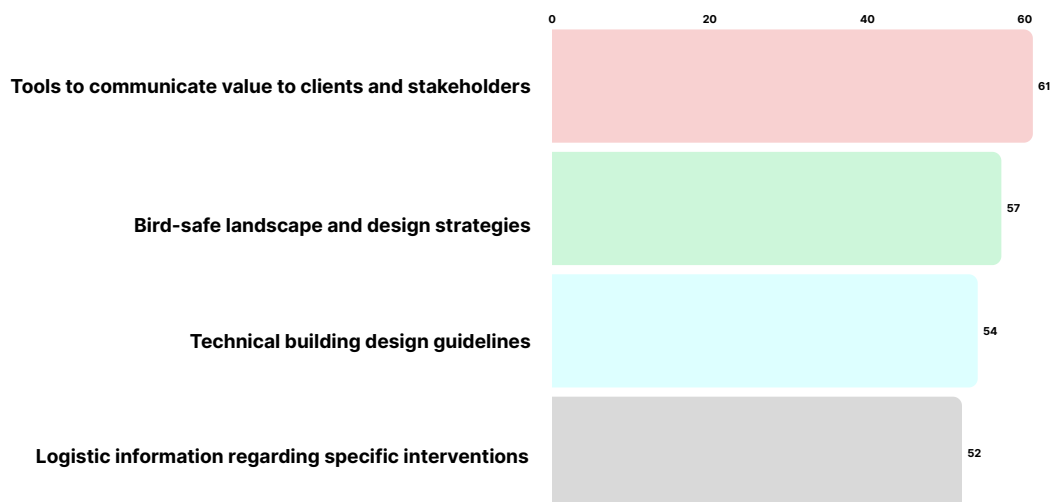
WORKSHOP FINDINGS

RESPONDENTS

The purpose of the visioning workshop was to investigate further the role and knowledge of professionals whose work interacts with the planning, design, and maintenance of buildings and urban landscapes that affect birds. The needs assessment workshop focused on professionals engaging with planning, design and maintenance of built form. In the workshop, the team utilized various facilitation techniques developed by EDL in the facilitators' toolkit.

These workshop activities include a backcasting scenario, open discussions and sticky storm to facilitate meaningful discussions across different expertise. To gather information on bird-safe design implementation, policies and guidelines, and limitations in the current application of bird-safe design. The goal of the team was to create scenarios for future implementation of bird-safe design and what would contribute to this successful outcome envisioned. The questions in the workshop were built on survey findings and were designed to elicit ideas, experiences and insights to identify common themes, challenges, and opportunities related to the implementation of bird-safe interventions and to help generate actionable recommendations for FLAP.

The workshop was designed as an interactive and collaborative session to help professionals define the bird-safe design and identify key milestones, success, limitations, and professional training needs. The workshop participants included 31 professionals from different fields whose work, in some capacity, interacted with bird-safe design. To gather more robust and rich data, these professionals were pre-assigned to their respective breakout rooms to ensure productive dialogue between participants and gain insights from industries outside their professional scope.

The workshop was conducted online to maximize participation and ensure flexibility for attendees. Initially, an in-person format was considered which was later transitioned to an online setting due to limited projected attendance. The online format scheduled through Zoom was considered to be the best fit as it allowed for a diverse group of participants.

This approach ensured a robust exchange of insights from professionals across various fields. Participants in the workshop included architects and landscape architects, planners, wildlife and ecology experts, conservation specialists, advocacy and nonprofit leaders, and glass service specialists.

The workshop was scheduled as a virtual engagement session to facilitate the participation of professionals from different parts of Canada and to create a more en riched environment by gathering a cross-regional perspective on the issue and advancing the framework of bird-safe design.

SUMMARY OF FINDINGS

The workshop findings were predominantly qualitative data analyzed through a rigorous thematic analysis. This process involved extracting information from the workshop transcripts and notes recorded by designated note-takers for each breakout room. Using qualitative data analysis software (Delve), statements were coded to identify patterns, similarities, and differences within the data, which informed the final themes. These themes provided meaningful insights that informed the development of the final recommendations and outcomes.

LOCALIZED LIGHT POLLUTION ATTENUATION STRATEGIES

44% Involved

WORKSHOP FINDINGS

BARRIERS

Identifying and addressing barriers/challenges are essential to implementing effective bird-safe solutions.

- Policy and Regulation Needs
- Addressing Cost Barriers
- Bridging Knowledge Gaps and Learning Needs

OPPORTUNITIES

Leveraging opportunities fosters innovation and promotes widespread adoption of bird-safe measures.

- Innovation/Retrofits
- Education and Awareness
- Training Programs
- Professional Engagement

PRACTICAL INSIGHTS

Practical insights bridges the gap between theory and application, ensuring bird-safe solutions are feasible and effective.

- Design and Materials
- Visibility and Coexistence
- Stakeholder Influence

(SMITHSONIAN, N.D.)

SUCCESSES

The workshop findings highlighted several key areas of success in promoting and implementing bird-safe design practices. A broader focus on environmental and sustainability goals has influenced the successful implementation of bird-safe designs by increasing awareness about environmental issues and cultural recognition of biodiversity. As such, Western University has adopted bird-safe designs in its sustainability framework to achieve broader sustainability goals. One of the key areas of success has been the effective utilization of existing methods, such as mandatory bird-safe design standards that require the intervention to be applied on the first surface. Deliberate design choices that mediate and reduce the need for bird-safe decals on windows, such as the UBC building with printed quotes on glass, aligning with educational and aesthetic goals which also serves as a creative and functional approach to bird-safe design.
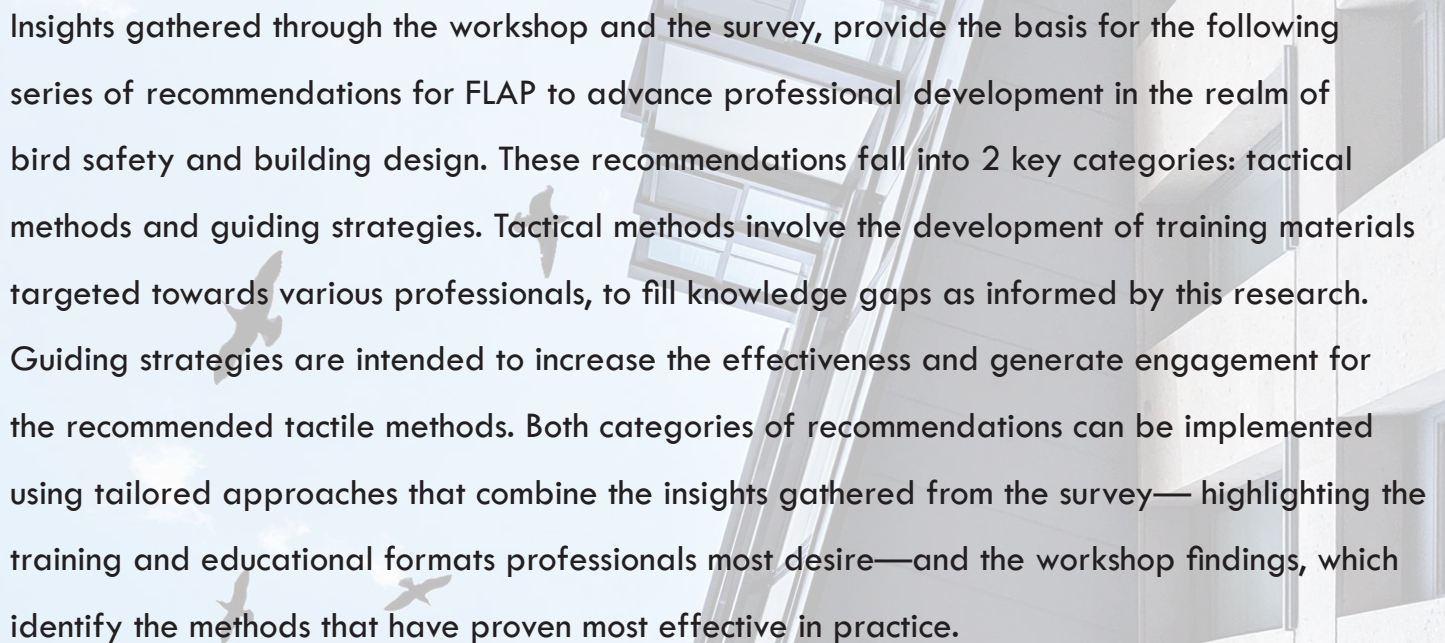
Consistent monitoring and evaluating strategies are key successes in guiding effective intervention methods. Monitoring allows for determining the effectiveness of bird-safe designs, which provides vital information for architects and community leaders about where and how to implement bird-safe designs. The participants also identified public education as a key role in adapting bird-safe design practices, specifically for single-family residential homes where the current guidelines do not apply. The targeted approaches by the municipalities and bird rehabilitation centers offer an opportunity for local communities and municipalities to gain more insights and promote bird-safe practices at the local and municipal levels.

LIMITATIONS

The workshop findings highlighted several key areas of limitations faced when implementing bird-safe designs. More than 95% of the professionals identified that financial resources significantly impact smaller projects where funding can't be allocated to implementing bird-safe designs. This issue is particularly pronounced in municipalities with competing financial priorities and a limited budget for retrofits. Additionally, gaps in knowledge and misinformation among industry professionals about bird-safe materials' impact on glass warranties contribute to the lack of implementation of bird-safe glass. Furthermore, a lack of communication before the start of the project results in poor implementation of bird-safe glass. As identified by professionals, reliance on outdated solutions such as hawk decals impedes the goal of bird-safe buildings. Research has shown that hawk decals are ineffective and contradict their intended purpose.

Participants also identified voluntary compliance with bird-safe strategies as a barrier to creating sustainable communities. Mandatory compliance ensures that bird-safe measures are part of building design and construction. Participants also identified knowledge gaps across professions, particularly due to a lack of centralized education on bird safety, resulting in an inconsistent understanding of relevant policies and design guidelines. To improve a consistent understanding of policy, participants noted that difficulty in understanding and applying the CSA A460 Bird Friendly Building Design standard has been a common barrier to applying the standards set by the CSA to practical applications.

RECOMMENDATIONS

Insights gathered through the workshop and the survey, provide the basis for the following series of recommendations for FLAP to advance professional development in the realm of bird safety and building design. These recommendations fall into 2 key categories: tactical methods and guiding strategies. Tactical methods involve the development of training materials targeted towards various professionals, to fill knowledge gaps as informed by this research. Guiding strategies are intended to increase the effectiveness and generate engagement for the recommended tactile methods. Both categories of recommendations can be implemented using tailored approaches that combine the insights gathered from the survey— highlighting the training and educational formats professionals most desire—and the workshop findings, which identify the methods that have proven most effective in practice.

(ACCESS PROTECTION SOLUTIONS, N.D.)
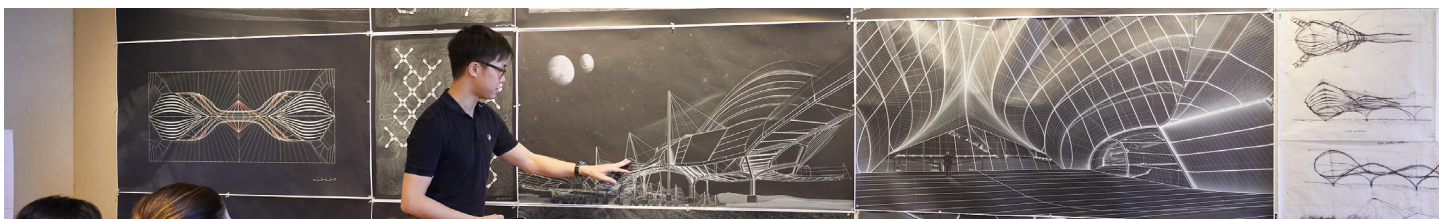
(UNIVERSITY OF TORONTO, 2024)

RECOMMENDATION 1: FOUNDATIONAL COURSE

Currently, there is no standardized formal education regarding bird safety and building design. Survey participants most commonly cited 'non-governmental organizations' (60.5%) and 'reading guidelines and standards' (57%) as their learning source(s) for bird safety. While these sources can be useful, their self-sufficient, research-intensive nature can give rise to gaps in professional knowledge. Such gaps in professional knowledge are evident throughout the research. Workshop participants cited the lack of accurate knowledge among professionals as a major barrier to implementing bird-safe interventions, across disciplines.

Professionals from all relevant disciplines shall benefit from the first recommendation: a foundational course that provides base-level knowledge of bird safety and building design. The curriculum of this course shall include context on the issue of bird-building collisions, relevant legislation, CSA standard basics, building and site design principles, etc. By equipping professionals with the base-level knowledge, they can implement bird safety accurately in their professional work. The larger the pool of well-informed professionals, the greater the presence of bird safety across jurisdictions.

The foundational course is conceived to be offered in two formats. The first format is a synchronous online webinar, held weekly over the course of a month. The second format is a one-day in-person workshop, available in large metropolitan areas only. The variation in formats is informed by the research. Survey participants preferred online (45%) over in-person (29%) course-based instruction, whereas

LIMITATIONS

workshop participants favoured interactive, in-person instruction. The online webinar maximizes reach, as it can be accessed regardless of jurisdiction. The in-person workshop is incentivized by its shorter timeline for completion. FLAP Canada should consider charging a fee for the course, to offset all incurred costs.

RECOMMENDATION 2: CSA A460 BIRD FRIENDLY BUILDING DESIGN STANDARD TRANSLATION

Various workshop participants cited difficulty understanding the CSA A460 Bird Friendly Building Design standard. Also, workshop participants cited the lack of consistent bird-safe criteria as confusing—referring to the variances across municipal guidelines/site-plan controls. Such challenges can lead to misconceptions and incorrect implementations. As a solution, 63% of survey participants cited 'technical building guide- lines' as a means to improve their understanding of bird safety. Building and policy professionals shall benefit from the second recommendation: reference-material that translates the CSA Standard for Bird-friendly Building Design into easily-interpretable, actionable guidelines.

Particularly, the CSA Standard shall be translated to an accessible reading-level, with use of charts and diagrams for clarity. Such reference-material shall eliminate accessibility barriers, especially for professions that rarely encounter or are unfamiliar with technical language (e.g. facility managers, building service contractors, etc.). The reference-
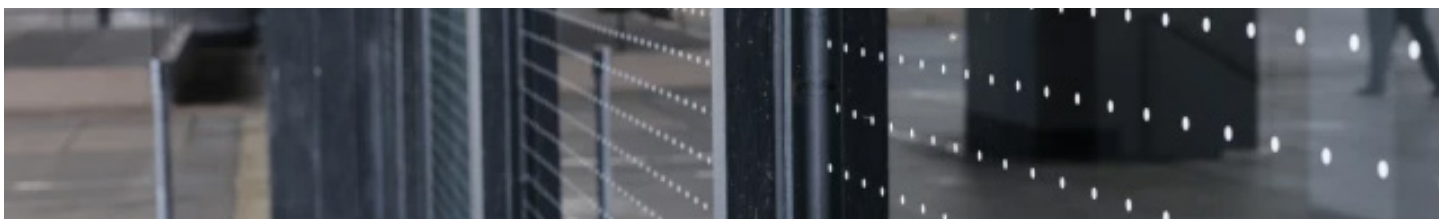
(VAZQUEZ, 2024)

material shall be freely-available online, and updated alongside the CSA Standard. Note that the CSA standard is taught in the foundational course to an informative level, however the reference-material provides a detailed deconstruction of each individual standard.

RECOMMENDATION 3: ADVANCED DESIGN COURSE FOR BIRD-SAFE DESIGN STRATEGIES

Development of an advanced design course for professionals that focuses on comprehensive bird-safe design strategies is recommended to build on the basic course. The design course should teach participants how to incorporate bird safety into a variety of architectural features other than typical glass treatments, allowing them to balance aesthetic, practical, and ecological factors. The proposal is based on data from workshops and surveys, which underlined the need for targeted training and resources to overcome challenges in implementing bird-safe practices.The recommendation is supported by key findings that highlight the broad scope of bird-safe design, which extends beyond glass alterations. Strategies such as reducing nighttime illumination, landscaping changes, and increasing building spacing are under-utilized but beneficial. Despite the potential of these measures, many professionals remain unaware of non-glass options, emphasizing the need for targeted education. The workshop and survey also revealed a common challenge for professionals: balancing bird safety with other design needs.

The primary objective of this training is to broaden experts' awareness of bird-safe design beyond

traditional glass solutions such as dots or patterns. The training will provide a comprehensive approach, including methods to reduce nocturnal bird collisions by addressing light pollution through effective lighting design. It will also focus on integrating landscaping and building spacing to minimize risks, exploring alternative glass applications that promote bird-safe adaptations, and utilize innovative materials and techniques to create glazing designs that are both functional and visually appealing. The course is intended for professionals working in building design and planning, such as architects, urban planners, and construction managers. The course's goal is to embed bird-safe principles into conventional design methods by targeting stakeholders who have influence over architectural decisions.

The course will use a multi-faceted, interactive approach to enhance learning and practical application. Participants will engage in hands-on training, where they will construct bird-safe designs and experiment with various glazing and material options to develop practical solutions for their projects. Guest lectures by experts in bird-safe glass production and non-glass collision avoidance techniques will introduce innovative concepts and address concerns about balancing functionality and aesthetics. Additionally, a comprehensive toolkit will be provided, offering immediate references and up-to-date guidelines to help professionals seamlessly integrate bird-safe features into their design processes. Bird-safe design goes well

(ACCESS PROTECTION SOLUTIONS, N.D.)

beyond typical glass treatments. Given that many professionals are aware of glass variations such as etched or patterned glass, they are less familiar with other key tactics such as light attenuation and landscaping changes. The survey indicated that professionals frequently struggle to balance bird safety, design aesthetics, and practical requirements. By demonstrating a variety of choices, this workshop will eliminate resistance and misconceptions regarding bird-safe measures, proving that attractive, practical buildings may also be bird-safe.

While foundational concepts will be introduced in a basic course, this recommendation emphasizes an intensive course in practical design, combining skill-building with interactive workshops. Through hands-on learning and exposure to real-world examples, participants will build confidence in implementing bird-safe techniques without losing creativity. This program is an important step in reducing bird collisions and promoting eco-friendly architecture in the built environment.

RECOMMENDATION 4: CONSULTATIONS FOR SERVICE PROVIDERS TO EXPAND BIRD-SAFE SERVICES

To address gaps in bird-safety services in underserved areas, the research team recommends that FLAP conduct targeted consultations with service providers. This program seeks to incorporate bird-safety measures into their existing services, enhancing the supply chain and assuring a wider reach for implementing bird-safe solutions. This advice aims to increase the accessibility and effectiveness of the bird-safe service network by educating service providers about interventions, prospective collaborators, and market prospects. The recommendation stems from several key findings that highlight the critical role service providers can play in bird-safety retrofits for existing buildings. Expanding the market for bird-safe solutions addresses critical gaps in overlooked jurisdictions. Service providers who integrate bird-safe measures into their services stand to tap into substantial revenue potential. Additionally, the majority of bird collisions occur within the first four storeys of buildings, emphasizing the importance of targeting small enterprises and suburban homeowners, as the key contributors to this issue.

The primary goal of this recommendation is to improve the availability of bird-safety services by allowing service providers to incorporate these precautions into their operations. The program will guide service providers on bird-safety interventions, including retrofitting procedures, material selection, and adherence to recognized standards such as CSA guidelines. It will also strengthen local supply chains by fostering collaboration among material suppliers, service providers, and other stakeholders. Furthermore, the program will emphasize the market potential for bird-safe solutions, including financial incentives and rising demand as municipalities implement bird-safe requirements. The initiative is intended for building service providers, such as window film installers, window cleaners, and other contractors, who can include bird-safety measures into their services. These providers are a critical component of the market that can operationalize retrofitting and maintenance for existing structures.

To achieve these goals, FLAP will establish an open consultation network, offering one-on-one

(SAITO, N.D.)

consultations to interested service providers. These sessions will guide providers through various bird-safe interventions, including window film treatments, collision-reducing procedures, and light attenuation techniques. The program will also connect providers with suppliers, allowing them to gain resources and effectively collaborate to grow the market for bird-safe outcomes. Additionally, consultations will highlight financial opportunities by using market analysis to demonstrate providers' revenue potential in this expanding industry. To assure compliance and credibility, FLAP will define industry standards and best practices for bird-safe retrofitting and maintenance.

Consultations with service providers will help to develop a more accessible and diverse market for bird protection measures. FLAP can ensure the widespread availability of bird-safe services across jurisdictions by promoting education, collaboration, and funding opportunities. This program not only solves important supply chain gaps, but it also contributes to the larger goal of reducing bird collisions through long-term and successful solutions.

RECOMMENDATION 5: CLIENT COMMUNICATION WORKSHOP FOR ADVOCATING BIRD-SAFE DESIGNS

To address the challenge of persuading clients to use bird-safe designs, the research team recommends hosting a client communication workshop for professionals engaged in the planning, design, and construction sectors. This training will provide professionals with the skills and tools they need to effectively argue for bird-safe measures, with

a focus on environmental responsibility, legal obligations, and the long-term advantages of these designs. The session will have a ripple effect, increasing adoption of bird-safety measures and contributing to a more sustainable built environment. The recommendation is based on workshop findings where professionals identified barriers in client communication. One architect stated that buildings were unsafe not because of his designs, but because he struggled to persuade clients to invest in bird-safety measures. Legal and financial risks associated with bird collisions were identified as strong motivators for clients when effectively communicated. Advocacy efforts that extend beyond professional responsibilities can help raise awareness among clients, small business owners, and the broader public. Throughout the planning process, stakeholders such as architects, contractors, and developers have significant opportunities to influence client decisions. The main objective of this training is to equip professionals with the tools they need to successfully communicate the relevance of bird-safe designs to clients, resulting in greater implementation. The workshop will teach advocacy and negotiation techniques tailored to client interactions, providing strategies for explaining liability considerations, including the legal and financial risks associated with bird collisions.

Participants will also receive reference materials designed to highlight the benefits of bird-safe designs and the consequences of neglecting these safeguards. To encourage adoption, the training will focus on appealing to important client interests such as aesthetics, cost-effectiveness, sustainability, and corporate social responsibility. The workshop is designed for professionals involved in client interactions during the planning and construction
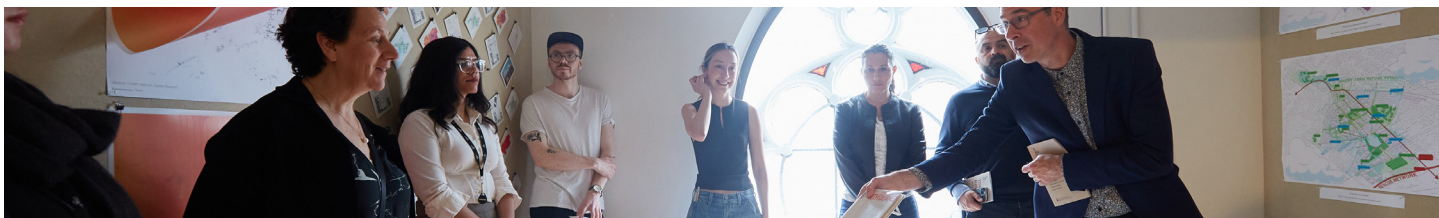
(UNIVERSITY OF TORONTO, 2024)

process, including architects, contractors, builders, glass and material suppliers, and urban planners. Architects, as the initial point of contact in the design process, play a crucial role in advocating for bird-safe designs from the outset. Contractors and builders, key stakeholders in the implementation phase, can high- light the practical benefits and ease of integrating bird-safety measures. Glass and material suppliers contribute by informing clients on various bird-safe materials and their cost-effectiveness. Urban planners and developers, by promoting bird-safe policies during zoning and planning, can drive community-wide adoption, ensuring bird-safe practices are embedded throughout the development process.

The client communication workshop will use a comprehensive approach to equip professionals with the skills needed to effectively advocate for bird-safe designs. It will include advocacy training, teaching professionals how to frame bird-safe measures in terms of client priorities such as legal compliance, brand reputation, and sustainability goals. Participants will also learn negotiation techniques to address concerns and find common ground with clients focused on aesthetics, cost, or convenience. The workshop will provide education on liability and risks, using real-world examples to illustrate the legal consequences of neglecting bird-safety measures.

Additionally, practical tools such as case studies, graphic representations of bird-safe designs, and key discussion topics will be shared to support client engagement. The workshop will emphasize presenting bird-safety measures as practical, cost-effective solutions that maintain design quality and functionality, ensuring professionals are well-prepared to communicate their value effectively.

Bird-safe designs frequently fail to be implemented, not due to a lack of expert understanding, but because professionals struggle to persuade clients to embrace these precautions.

A workshop on client communication bridges this gap by empowering professionals to advocate successfully. Educating professionals can reach a larger network of clients, stakeholders, and volunteers, greatly increasing knowledge and adoption of bird-safe practices. This recommendation will promote an advocacy culture by focusing on key stakeholders in the planning process, ensuring that bird-safe designs become routine considerations in architectural and building processes.

RECOMMENDATION 6: MANAGERIAL TOOLKIT

Workshop participants cited the cost of bird-safe building design as a significant, recurring issue. Also, various workshop participants cited difficulties retrofitting existing buildings in a manner that aligns with standard building operation models. Retrofitting buildings is extremely important, given the sheer amount of existing non-bird-safe buildings.

Professionals with oversight of building operations, such as building owners, managers, and supervisors, shall benefit from the sixth recommendation: a managerial toolkit that relays information on operationalizing bird safety successfully within existing buildings. The toolkit shall include: feasibility metrics, the availability and cost of interventions, and strategies for cost efficiency during implementation, such as through governmental rebates and coordinated retrofits during renovations.
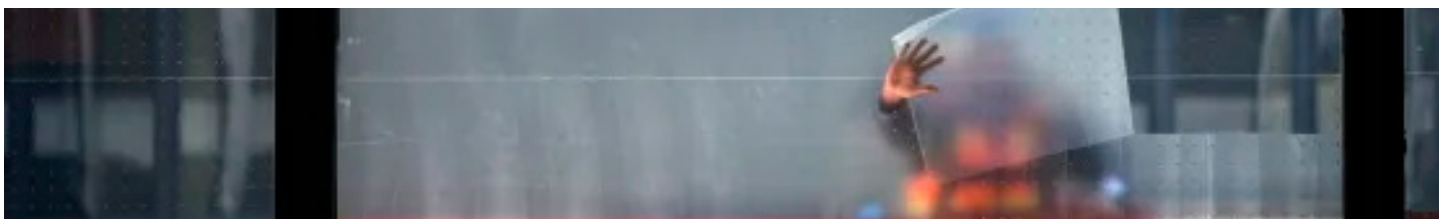
(MCCLEARN, 2024)

Further, the toolkit shall be informed by the CSA standard, to provide information of effective (e.g. correctly-spaced markers) and ineffective (e.g. bird silhouette decals) bird-building collision interventions. The intended outcome of the toolkit is to make critical retrofitting implementation knowledge more easily accessible.

The toolkit shall be freely-available online as a reference-material, and updated annually to reflect the latest availability and cost of interventions, as well as new governmental rebates. The toolkit should be offered by FLAP to the targeted building professionals upon request, so FLAP may follow-up to answer any questions or further clarify the toolkit materials. FLAP should also consider drafting of a more palatable, simplified variant that can inform homeowners of the same retrofitting information

RECOMMENDATION 7: POLICY DEVELOPMENT SESSIONS

Survey participants, particularly environmental consultants and planners, cited that understanding 'the policy context and policy development' in regards to bird-safe building design would be beneficial. Educating environmental consultants and planners is important, as they play an essential role in regulating bird-safe planning and building design.

All policy actors shall benefit from the seventh recommendation: sessions that provide information on bird-safe policy contexts and policy development tools. The sessions shall include information on relevant provincial and federal legislation, based on the jurisdiction where the session is taking place, and examples of successful policy implementations. Further, the sessions shall outline understood issues

in relevant bird policy (e.g. enforcement of bird protections under the Migratory Bird Convention Act and Ontario's Environmental Protection Act).

The use of case law shall be imperative in the sessions, to illustrate cases where policy can serve as a corrective tool for non-bird-safe buildings. Also, as in other recommendations, the CSA standard will be held to utmost regard, as compared to the guidelines/site-plan controls of any particular municipality. The objective of these sessions is to improve policy outcomes for bird safety and building design, by equipping those with the capacity for policy change with accurate and actionable information.

The sessions shall be offered synchronously online, with prioritization of facilitator-attendee dialogues, given the complexity of the content. Facilitators should be sourced from external sources, such as academic and policy-related occupations, to ensure the content is of sufficient quality. FLAP should consider charging a fee for the sessions, to offset all incurred costs.

RECOMMENDATION 8: STRATEGY 1 – REITERATING PROFESSIONAL RESPONSIBILITY

This first strategy relates to the framing of FLAP's educational content. Workshop findings indicated that professionals generally do not cite their own profession as having the greatest capacity to implement bird-safe design. Additionally, survey findings indicate that a significant proportion of professionals are unable to determine whether or not they encounter limitations to bird-safe
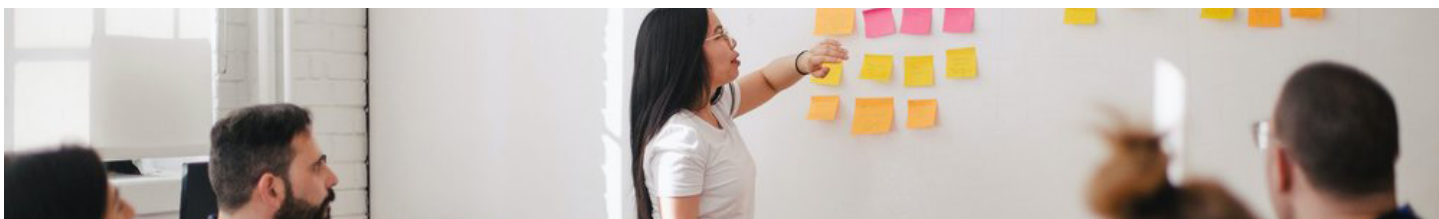
(MUNICIPAL SOLUTIONS, N.D.)

implementation in their work or in buildings under their jurisdiction. It is currently unclear whether there is a lack of awareness regarding their capacity to implement bird safety or a lack of professionals seeing it as their obligation, leading to lacking proficiency. Regardless, FLAP should address both of these concerns by reiterating the responsibility and capacity of professionals. When addressing learning content to specific professions, it is important to use consistent language when describing the role of the profession in bird safety. For example, the learning content should not be framed as some auxiliary topic to learn, but rather a responsibility of the professionals' occupations.

In practice, this could be deployed as scripting or written content in training modules and speaking sessions. One such example of profession-oriented language could be training materials aimed toward planners and architects that reference their requirement of upholding sustainability as entrenched within their code of ethics, tying in the concept to their professional duties. In line with this sort of language, training materials should clearly outline the relevance of the trainee within the realm of bird safety, both to entrench the ideals and to address the lack of personal responsibility typically expressed by professionals. The ways in which their occupation interacts with stages of the bird-safe process, whether through policy, design, compliance, or other, should be conveyed to the professional trainee. Demonstrating to professionals how their occupational duties are or can be, reflected in the bird-safe process will improve their understanding of their own capacity to implement bird-safe design, leading to a greater degree of professional engagement.

RECOMMENDATION 9: STRATEGY 2 - CASE STUDIES

It was indicated in the workshop that grounding learning content to the implementation stage is important to ensure that professionals actually retain the information. To reflect this, it is recommended that case studies be a pivotal part of FLAP's educational materials for all professionals. Although a vast proportion of environmental organizations include a case study section on their websites, these resources are often only accessed by those actively seeking information, missing a large proportion of individuals actually involved in bird safety. The active embedding of case studies within learning content will ensure that the information is given context as part of the curriculum, and should be specified with greater detail for profession-oriented learning.

Experiential learning methods such as design workshops should include precedents and site visits where possible. Policy Development tutorials should include comparative examples of successful policies and environmental case law. The core training course should ideally include both positive and negative case studies, outlining correct and incorrect implementations of bird safety. Survey findings can be used to identify topics in which a given profession is most interested in learning, allowing FLAP to tailor case studies for profession-based training materials. For example, planners and architects would benefit from site planning case studies, researchers and environmental consultants would benefit from policy-based case precedents, etc. Strategically implementing case studies into training methods will improve the engagement and knowledge retention of professionals, ensuring that topics learned are actually given context and understood.
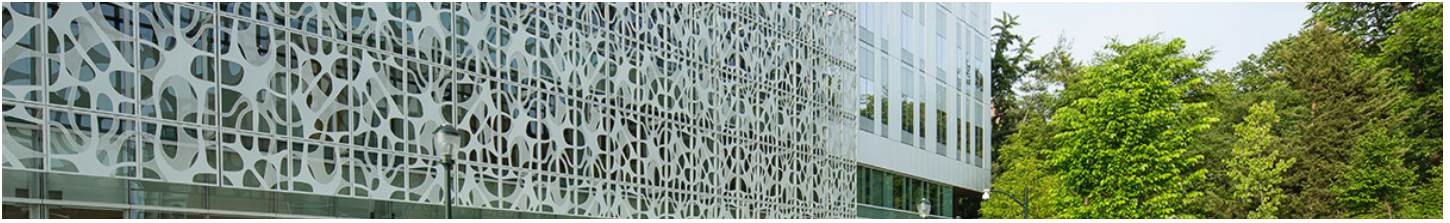
(BENSON, 2019)

RECOMMENDATION 10: STRATEGY 3 – PROFESSIONAL ASSOCIATION PARTNERSHIPS

The final strategic recommendation is for FLAP to partner with relevant associations. In this case, FLAP should establish partnerships with associations that deal with specific professions related to bird safety, such as the Ontario Association of Architects, the Canadian Institute of Planners, the Canadian Society of Landscape Architects, etc. This accomplishes four things.

First, partnerships with these associations provide FLAP with an avenue of attendance at relevant conferences. Partnerships of this nature improve FLAP's ability to coordinate and deliver lectures and guest speaking sessions related to bird safety, oftentimes followed up with networking sessions where exhibitors (such as, potentially, glass manufacturers) have the opportunity to connect with potential clients and partners, improving interprofessional connections, which was a key theme in the workshop. A participant provided the Buildex Vancouver conference as a potential example where this could be accomplished. Another benefit of this kind of partnership is the ability for FLAP to engage in more hands-on, critical training methods, such as workshops and in-person sessions. Associations like these commonly enact these types of engagements and are more suited to do so, considering their large membership and resource base. In this sense, these professional associations become an avenue for FLAP to disseminate these recommended training methods to the intended target audiences.

Building on this benefit, these associations provide an avenue to implement bird safety through online, continued education, in addition to offline, in-person engagements. Associations like these typically require a set number of required learning hours for continued membership, licensing, or certification, as is seen with Planners as mandated by the PSB, for example. Incorporating FLAP's bird-safe training as eligible learning for these required hours gives a greater level of credence to the training materials, as they will be more readily sought out by professionals and officially recognized by professional associative bodies.

The final benefit and perhaps the penultimate goal of all these training methods is the potential for FLAP to develop a bird-safe certification for professionals to pursue. A dedicated accreditation for bird safety endorsed by professional associations creates a massive impetus for professionals to seek out FLAP's training resources by incentivizing them to seek education, which was cited as a major factor in improving professional engagement from the workshop. Through professional associative partnerships, FLAP can pursue a greater presence at conferences, deploy more critical learning methods, entrench themselves in continuing education, and seek endorsement for an established bird-safe certification.

CONCLUSIONS

The Bird-Safe City Planning and Design project emphasizes the critical importance of addressing bird fatalities caused by urban surroundings through professional education and training. The research identifies important knowledge gaps and hurdles and makes actionable, evidence-based suggestions for FLAP to improve bird-safe practices in urban planning and building design.

These guidelines highlight the necessity of incorporating bird-safe principles into professional training, policy, and implementation procedures in order to offset the effects of urbanization on bird populations. This project helps to create safer urban settings by raising awareness and providing professionals with realistic tools and techniques that balance ecological sustainability with human needs.

The findings identified a shared responsibility among professionals, policymakers, and stakeholders to guarantee the continuous and effective implementation of bird-safety measures. Increased collaboration, education, and policy enforcement will prevent bird collisions, support biodiversity recovery, and position FLAP as a pioneer in bird-safe urban design.

This initiative establishes the groundwork for further integration of bird-safe principles into urban construction in Canada and abroad, protecting bird populations while contributing to sustainable and resilient urban ecosystems. By implementing these recommendations, FLAP can help to create substantial change toward human-wildlife cooperation in urban environments.

EXPECTED OUTCOMES

The research team hopes to achieve several essential outcomes that enhance bird-safe design in practice by implementing the recommended guidelines.

First, the team hopes to enhance the knowledge and competence of experts from all disciplines to include bird-safe procedures into their regular responsibilities. Training programs and educational resources will prepare architects, planners, contractors, and service providers to confidently and consistently apply appropriate bird-safety methods.

Second, the team expects a transition from voluntary to systemic adoption of bird-safe practices, aided by policy drafting sessions and collaboration with professional associations. This would create a regulatory environment that requires bird-safe design while also offering incentives such as subsidies and certifications to encourage compliance. Third, the team intends to increase the availability of affordable, effective bird-safe solutions by improving local supply chains and addressing misconceptions about material costs and feasibility. Finally, the guidelines seek to effect a cultural shift in how bird safety is seen, elevating it from a secondary concern to an essential component of sustainable urban development. These goals will not only reduce bird collisions, but will also help to foster a larger sense of ecological responsibility in the planning process.

ACKNOWLEDGEMENTS

The Bird-Safe City Building Studio Team would like to express our sincerest gratitude to the following people. Our studio would not have been successful without their help.

PROFESSOR NINA-MARIE LISTER
MCIP, RPP, HON ASLA

This project would not have been possible without Professor Nina-Marie Lister who, as our supervisor, provided immense guidance and support. We sincerely thank her for stimulating our critical thinking, offering thoughtful feedback, and providing endless inspiration and encouragement.

BRENDON SAMUELS
RESEARCH COORDINATOR;
REPRESENTATIVE FOR FLAP
CANADA

As the representative of our community partner, FLAP Canada, Brendon went above and beyond to ensure that the project was well-informed and supported at all stages. His contributions to the research design and project deliverables elevated the findings to a professional calibre, for which we are extremely grateful.

ALEX MEEKER
GEOPROCESS RESEARCH
ASSOCIATES

Our mentor, Alex Meeker, was pivotal in the development of our questionnaire and workshop. We thank her for her contributions as an active supporter throughout the project, which provided us with valuable insights into the project direction, laying the foundation for a thorough analysis to inform the recommendation report.

SHAYNA STOTT
CITY OF TORONTO
ENVIRONMENTAL PLANNING

Shayna Stott, our mentor from the City of Toronto, aided us with expanding the professional reach of the survey and providing critical feedback on the survey design. We'd like to thank her for enriching our data through her comments and recommendations.

We would also like to thank all of the **professionals who participated in both our survey and our workshop.** The invaluable contributions they provided offered critical insights into bird-safe city planning and building, laying the foundation for the professional development recommendations outlined in this report. Their expertise will play a pivotal role in driving meaningful improvements to bird-safe planning and design.

REFERENCES

Ahmad, S., Wasim, S., Irfan, S., Gogoi, S., Srivastava, A., & Farheen, Z. (2019). Qualitative v/s. Quantitative Research- A Summarized Review. Journal of Evidence Based Medicine and Healthcare, 6(43), 2828–2832. https://journals.indexcopernicus.com/api/file/viewByFileId/916903.pdf

American Bird Conservancy (2021). American Bird Conservancy Prescriptive Rating Guidelines for Bird-friendly Materials. https://abcbirds.org/wp-content/uploads/2021/05/Prescriptive-rating-for-LL15-3.pdf

American Bird Conservancy. Glass Collisions: Preventing Bird Window Strikes: https://abcbirds.org/glass-collisions/

As birds fly south, windows are getting in the way. (2024). CBC News. https://www.cbc.ca/newsinteractives/features/bird-strikes

Axelson, Gustave (2019). Vanishing: More Than 1 In 4 Birds Has Disappeared In The Last 50 Years. The Cornell Lab: All About Birds. https://www.allaboutbirds.org/news/vanishing-1-in-4-birds-gone

Baburajan, V., e Silva, J. de A., & Pereira, F. C. (2021). Open-Ended Versus Closed-Ended Responses: A Comparison Study Using Topic Modeling and Factor Analysis. IEEE Transactions on Intelligent Transportation Systems, 22(4), 2123–2132. https://doi.org/10.1109/TITS.2020.3040904

Beatley, Timothy (2020). The Bird Friendly City: Creating Safe Urban Habitats. Island Press. Overview and lecture: https://www.biophiliccities.org/bird-friendly-city

Beatley, Tim (2021). LECTURE: The Bird Friendly and Biophilic City. Hosted by Birds on the Niagara, Feb. 13, 2021. https://www.youtube.com/watch?v=LIX7i8QMkFk

Biophilic Cities Network (n.d.). https://www.biophiliccities.org

Bird Friendly Certified Cities - Google My Maps. (2021). https://www.google.com/maps/d/u/0/viewer?mid=1D5RvFDD9RoIOZC3MwmlXYIWO8JtHQ8e1&femb=1&ll=53.353614077487606%2C-113.70628213712448&z=14

Bird-Friendly Guidelines. (2017, September 7). City of Toronto. https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/design-guidelines/bird-friendly-guidelines/

BirdSafe.ca (2022). https://birdsafe.ca/

BirdWatching Daily (2022). Study: Being around birds boosts mental health. BirdWatching Daily. BLOG: https://www.birdwatchingdaily.com/news/birdwatching/study-being-around-birds-boosts-mental-health/

BirdCast: Lights Out: https://birdcast.info/science-to-action/lights-out/

BirdCast: Migration Monitoring Platform: https://birdcast.info/

Birds Canada (2023). Ontario Breeding Bird Atlas 3.0. Birds Canada, Environment and Climate Change Canada, Ontario Field Ornithologists, Ontario Nature, and Ontario Ministry of Natural Resources and Forestry. https://www.birdsontario.org/

Bourque, L. B., & Fielder, E. P. (2003). Overview of self-administered questionnaires. In How to Conduct Self-Administered and Mail Surveys (2 ed., pp. 2-26). SAGE Publications, Inc., https://doi.org/10.4135/9781412984430

Bracey, A. M., Etterson, M. A., Niemi, G. J., & Green, R. F. (2016). Variation in bird-window collision mortality and scavenging rates within an urban landscape. Wilson Journal of Ornithology, 128, 355–367. https://doi.org/10.1676/wils-128-02-355-367.1

Brown, J. D., & Fink, Helen (2022). Planning for Biophilic Cities. A Report of the American Planning Association, PAS Report 602. https://www.planning.org/publications/report/9255203/

Cheek, J., & Morse, J. M. (2022). The Power of Qualitative Research in Mixed Methods Research Designs. In U. Flick (Ed.), The SAGE Handbook of Qualitative Research Design (Vol. 1, pp. 636-651). SAGE Reference. https://link-gale-com.ezproxy.lib.torontomu.ca/apps/doc/CX8699000055/GVRL?u=rpu_main&sid=bookmark-GVRL&xid=96fd04a3

City of Ottawa. (2022). Bird Safe Guidelines. https://documents.ottawa.ca/sites/documents/files/birdsafedesign_guidelines_en.pdf#page=15

City of Toronto (2021). Toronto Green Standard (current v4). https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/toronto-green-standard/

Cusa, M., Jackson, D. A., & Mesure, M. (2015). Window collisions by migratory bird species: Urban geographical patterns and habitat associations. Urban Ecosystems, 18, 1427–1446. https://doi.org/10.1007/s11252-015-0459-3

Environment and Climate Change Canada (2022). Government of Canada announces certification of fourteen new bird-friendly cities. https://www.canada.ca/en/environment-climate-change/news/2022/12/government-of-canada-announces-certification-of-fourteen-new-bird-friendly-cities.html

Environment and Climate Change Canada (2023). Status of Bird Populations. https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/trends-bird-populations.html

Exley, C. L., & Kessler, J. B. (2019). The Gender Gap in Self-Promotion (Working Paper 26345). National Bureau of Economic Research. https://doi.org/10.3386/w26345

Fatal Light Awareness Program, FLAP Canada (2022). https://flap.org/

Feather Friendly. https://www.featherfriendly.com/

FF CSA Blog. https://www.featherfriendly.com/blog/enjoy-free-access-to-the-csa-bird-friendly-building-design-standard#:~:text=The%20CSA%20A460%3A19%20standard,scale%20to%20reduce%20bird%20deaths.

FLAP Canada (2018). Bird-Safe Standard for Federal Government Buildings: A Synthesis of Bird-Friendly Guidelines and Standards. https://flap.org/wp-content/uploads/2020/06/SYNTHESIS-STANDARD-FLAP-CWS-2018.pdf

FLAP Canada (2022). FILM: When Worlds Collide. https://www.youtube.com/watch?v=eWcE2YM-rbl

FLAP Canada (2022). Why Do Birds Hit Buildings? https://flap.org/why-do-birds-hit-buildings/

FLAP Canada Review of Municipal Green Development Standards (2024). https://docs.google.com/spreadsheets/d/1OXXt_VqZnPHTy4NrHmRdfebBsqFOUhpS2zg8giD9Ms/edit?usp=sharing

Globe & Mail. (2021). Countermeasures being installed at TD Centre to reduce bird-building collisions. https://www.theglobeandmail.com/business/article-countermeasures-being-installed-at-td-centre-to-reduce-bird-building/

Global Bird Collision Mapper (2022). https://www.birdmapper.org/

Harvard Campus. (2023). The Harvard Crimson. https://www.thecrimson.com/article/2023/6/18/animal-law-bird-letter/

Katz, Brigit. (2019). New York Is Poised to Require Bird-Friendly Glass on All New Buildings. Smithsonian Magazine. https://www.smithsonianmag.com/smart-news/new-york-poised-require-bird-friendly-glass-all-new-buildings-180973760/

Klem, Daniel. (2014). Landscape, legal, and biodiversity threats that windows pose to birds: A review of an important conservation issue. Landscape, 3(351–361). https://doi.org/10.3390/land3010351

Klem, Daniel. (2015). Bird–Window Collisions: A Critical Animal Welfare and Conservation Issue. Journal of Applied Animal Welfare Science. https://journals-scholarsportal.info.proxy1.lib.trentu.ca/details/10888705/v18isup1/s11_bcacawaci.xml

Lallensack, Rachael. (2019). North America has lost nearly 3 billion birds since 1970. Smithsonian Magazine. https://www.smithsonianmag.com/science-nature/north-america-has-lost-nearly-3-billion-birds-180973178/#:~:text=Since%201970%2C%20North%20America%20has,than%20one%20in%20four%20birds.

Lane, J. (2023, September 6). Academic writing: What is a literature review?. SFU Library. https://www.lib.sfu.ca/about/branches-depts/slc/writing/assignments/lit-review

Lee, Michael & Zaidi, Deena. (2022). Canadian urban skies turn lethal for migratory birds. CTV News. https://storymaps.arcgis.com/stories/25328cfaded4444aaf01cb09c90705a3

Leffer, Lauren. (2022). 6 Unexpected Ways Birds Are Important for the Environment (and People). National Audubon Society. https://www.audubon.org/news/6-unexpected-ways-birds-are-important-environment-and-people

Loss, Scott., Will, Tom., Loss, Sara., & Marra, Peter. (2013). Bird–building collisions in the United States: Estimates of annual mortality and species vulnerability. The Condor. https://www.jstor.org/stable/90008043

Machtans, Craig., Wedeles, Christopher., & Bayne, Erin. (2013). A First Estimate for Canada of the Number of Birds Killed by Colliding with Building Windows. Avian Conservation and Ecology. http://dx.doi.org/10.5751/ACE-00568-080206

Michigan Audubon. (n.d.). Bird-window Collisions. https://www.michiganaudubon.org/bfc/bird-window-collisions/

NCC (National Capital Commission). Bird-Safe Design Guidelines. https://ncc-website-2.s3.amazonaws.com/documents/NCC_BirdSafe_Guidelines_EN_Mar26.pdf#page=10

National Audubon Society. (2023). Prevent Bird Deaths from Building Collisions. Audubon Action Centre. https://act.audubon.org/a/bird-safe-buildings-act-2023

Panlasagui, S., Spotswood, E., Beller, E., & Grossinger, R. (2021). Biophilia Beyond the Building: Applying the Tools of Urban Biodiversity Planning to Create Biophilic Cities. Sustainability, 13(5): 2450. https://doi.org/10.3390/su13052450

Policy 1: Best Practices for Bird Safe Glass. (2017). https://www.toronto.ca/wp-content/uploads/2017/08/8d1c-Bird-Friendly-Best-Practices-Glass.pdf

Policy 2: Best Practices for Bird Safe Lighting. (2018). https://www.toronto.ca/wp-content/uploads/2018/03/8ff6-city-planning-bird-effective-lighting.pdf

Rosenberg, Kenneth., Dokter, Adriaan., Blancher, Peter., Sauer, John., Smith, Adam., Smith, Paul., Stanton, Jessica., Panjabi, Arvind., Helft, Laura., Parr, Michael., & Marra, Peter. (2019). Decline of the North American avifauna. Science. https://www.science.org/doi/10.1126/science.aaw1313

Saha, Purbita. (2017). Lights Out for the Texas Skyscraper That Caused Hundreds of Songbird Deaths. Audubon. https://www.audubon.org/news/lights-out-texas-skyscraper-caused-hundreds-songbird-deaths

Samuels, Brendon. (2022). The Winding Path of Advocating for Bird Friendly Buildings. FLAP Canada. https://flap.org/winding-path-advocating-bird-friendly-buildings/

Sheppard, Christine., & Lenz, Bryan. (2019). Birds Flying Into Windows? Truths About Birds & Glass Collisions from ABC Experts. American Bird Conservancy. https://abcbirds.org/blog/truth-about-birds-and-glass-collisions/

Standards Council of Canada. (2019). Canadian Standards Association CSA A460:19. Standards Council of Canada. https://www.scc.ca/en/standardsdb/standards/29805

Stratton, S. J. (2024). Purposeful Sampling: Advantages and Pitfalls. Prehospital and Disaster Medicine, 39(2), 121–122. https://doi.org/10.1017/S1049023X24000281

Sustainable SITES Initiative. https://sustainablesites.org/

The Cornell Lab: All About Birds. Why Birds Hit Windows—And How You Can Help Prevent It. https://www.allaboutbirds.org/news/why-birds-hit-windows-and-how-you-can-help-prevent-it

The New York City Council. (2020). A Local Law to amend the administrative code of the city of New York and the New York City building code, in relation to bird-friendly materials. The New York City Council. https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3903501&GUID=21B44B73-D7E1-4C55-83BD-1CA254531416&Options=&Search=

The Warblers by Birds Canada. (2022). PODCAST: The Bird Friendly City. https://thewarblers.buzzsprout.com/1784269/10288117-the-bird-friendly-city

Van Doren, Benjamin. (2021). A new publication on drivers of fatal bird collisions in Chicago. BirdCast. https://birdcast.info/news/a-new-publication-on-drivers-of-fatal-bird-collisions-in-chicago/

Wetzel, Corryn. (2021). Turning Off Lights at Night Could Halve Bird Deaths On Chicago's Lakeshore. Audubon. https://www.audubon.org/news/turning-lights-night-could-halve-bird-deaths-chicagos-lakeshore

IMAGES

Access Protection Solutions. (n.d.). What You Should Know About Emerging Bird Deterrent Building Window Film Laws [Photograph]. https://accessprotection1.com/blog/safety-films/about-bird-deterrent-building-window-film-laws/

Benson, G. (2019, September 9). Bird-Friendly Building Design: Coming to a City Near You! [Photograph]. American Bird Conservatory. https://abcbirds.org/blog/bird-friendly-design-coming-soon/

FLAP Canada. (2020, February 13). The terrible toll of bird collisions with modern buildings [Photograph]. https://www.irishtimes.com/news/science/the-terrible-toll-of-bird-collisions-with-modern-buildings-1.4161584

Hopfauf, A. (2024, August 5). Measures for more bird protection [Photograph]. Krones Magazine. https://www.krones.com/en/company/press/magazine/backstage/measures-for-more-bird-protection.php

Mcclearn, M. (2021, June 16). Making buildings bird friendly: New measures at Toronto's TD Centre aim to reduce bird-building collisions [Photograph]. The Globe and Mail. https://www.theglobeandmail.com/business/article-countermeasures-being-installed-at-td-centre-to-reduce-bird-building/

Municipal Solutions. (n.d.). Municipal Solutions [Photograph]. https://www.municipalsolutions.ca/

Nature in the City - Toronto. (2024, January 5). Fun facts about Toronto's feathered friends for #NationalBirdDay. There are 410 documented species of birds in the GTA and 369 in Toronto... [Art]. Facebook. https://www.facebook.com/photo. fbid=726170176287268&id=100066828759674&set=a.280055084232115

NYC Bird Alliance. (2024, August 7). New Study Confirms Building Collisions Kill Over One Billion Birds Annually in U.S [Photograph]. https://nycbirdalliance.org/blog/new-study-confirms-building-collisions-kill-over-one-billion-birds-annually-in-u-s

Qin, W. (2024, August 7). New Study Confirms Building Collisions Kill Over One Billion Birds Annually in U.S [Photograph]. NYC Bird Alliance. https://nycbirdalliance.org/blog/new-study-confirms-building-collisions-kill-over-one-billion-birds-annually-in-u-s

Satio, A. (n.d.). How to: not make an architecture magazine — Neighbours of Architecture at CCA workshop residency [Photograph]. Arkitekturen Sgrannar. https://arkitekturensgrannar.se/

Smithsonian. (n.d.). Ovenbird [Photograph]. https://nationalzoo.si.edu/animals/ovenbird

Tieko, L. (2012, September 2). Sparrow looking at its own reflection on a car window [Photograph]. Alamy. https://www.alamy.com/sparrow-looking-at-its-own-reflection-on-a-car-window-image439938872.html

University of Toronto. (2024, November 24). 22.11.24 - Daniels Faculty Fall 2024 Reviews (December 6-19) [Photograph]. https://www.daniels.utoronto.ca/news-tags/urban-design

Vazquez, A. (2024). McCormick Place installs bird-safe film to deter migrating birds from hitting its windows [Photograph]. Chicago Sun Times. https://chicago.suntimes.com/environment/2024/07/22/mccormick-place-lakeside-center-bird-safe-collisions-migration-nature-environment-city-hall-innovation

APPENDIX A: SURVEY QUESTIONNAIRE

Kindly note that questions marked ALL are for all respondents. Questions marked EXPERIENCED or INEXPERIENCED are for their respective category of respondent, as indicated by their self-identified experience level in Question 6. MANDATORY questions will be marked as such, otherwise, questions are entirely optional. Logic parameters for contingency questions are highlighted in red, as is their respective response in prior questions (if applicable). Selecting ⊗ prevents the selection of other responses. Thank you.

This survey is collecting feedback from professionals who interact with various aspects of bird safety in buildings in North America, focusing primarily on Canadian jurisdictions. Data collected by the survey will inform the development of educational resources aimed at supporting professionals with implementing effective strategies to mitigate bird collisions with buildings.

Students from Toronto Metropolitan University (TMU) are leading this research project with the Fatal Light Awareness Program (FLAP) Canada, under the supervision of Professor NM Lister, Director of the Ecological Design Lab at TMU.

This survey is intended to be filled out by professionals who interact with bird safety in buildings including (but not limited to) architects, planners, building managers, pest control service providers, construction professionals, and industrial designers. If you do not interact with bird-safe buildings in your professional work, please do not fill out the survey. However, you may wish to circulate the survey to professionals in your network who would be interested.

This survey has 24 questions and is estimated to take approximately 10 to 15 minutes to complete. Please answer the questions to the best of your knowledge.

All information collected by this survey will be kept anonymous and will not be used for purposes outside of the research. If you have any questions or require any assistance, please contact us at [EMAIL REDACTED].
Thank you for your participation!

F L A P
C A N A D A

Q1: ALL | Mandatory

Which of the following best describes your professional work? (Select all that apply.)

- ☐ Planner (1)
- ☐ Architect (2)
- ☐ Landscape Architect (3)
- ☐ Engineer (11)
- ☐ Building Inspector/Site Plan Technician (4)
- ☐ Wildlife Removal/Pest Control Service Provider (5)
- ☐ Facility Manager (6)
- ☐ Building Service Contractor (e.g. window cleaning) (7)
- ☐ Researcher (8)
- ☐ Environmental Consultant (9)
- ☐ Other (please specify) (10) _____

Q2: ALL | Mandatory

In which sector(s) do you primarily work? (Select all that apply.)

- ☐ Public (1)
- ☐ Private (2)
- ☐ Non-profit (3)
- ☐ Academic (4)

Q3: ALL | Mandatory | Displays if Q2 = "Public"

At which level(s) of government do you work? (Select all that apply.)

- ☐ Municipal (1)
- ☐ Provincial (2)
- ☐ Federal (3)

Q4: ALL

In which of the following regional jurisdictions do you primarily work? (Select all that apply.)

- ☐ Alberta (1)
- ☐ British Columbia (2)
- ☐ Manitoba (3)
- ☐ New Brunswick (4)
- ☐ Newfoundland and Labrador (5)
- ☐ Nova Scotia (6)
- ☐ Ontario (7)
- ☐ Prince Edward Island (8)
- ☐ Quebec (9)
- ☐ Saskatchewan (10)
- ☐ Territories (Northwest Territories, Nunavut, Yukon) (11)
- ☐ United States (12)
- ☐ Other (please specify) (13) _____

Q5: ALL

If applicable, in which municipality(ies) do you primarily work?

_____

Q6: ALL | Mandatory

On a scale from 1 to 10, where 1 is inexperienced, and 10 is very experienced, how would you rate your interactions with and knowledge of planning, building and landscape design and policies relating to bird safety (e.g., mitigation of bird-building collisions)?

o   1: Inexperienced (1)

o   2 (2)

o   3 (3)

o   4 (4)

o   5 (5)

o   6 (6)

o   7 (7)

o   8 (8)

o   9 (9)

o   10: Very experienced (10)

Q7: EXPERIENCED | Mandatory | Displays if Q6 ≥ 4

How did you learn what you know about bird safety? (Select all that apply.)

- Reading guidelines and standards (1)
- Non-governmental organizations (e.g. FLAP Canada) (2)
- Departmental or on-the-job training (3)
- Professional training (e.g. American Institute of Architects credit) (4)
- Conferences and/or guest speaker sessions (5)
- Information provided by the Government of Canada (6)
- Academic research involvement (7)
- University/College program (8)
- Recreational birding/general interest in birds (10)
- Other (please specify) (9) _____

Q8: INEXPERIENCED | Mandatory | Displays if Q6 < 4

How did you learn what you know about bird safety? (Select all that apply.)

- Reading guidelines and standards (1)
- Non-governmental organizations (e.g. FLAP Canada) (2)
- Departmental or on-the-job training (3)
- Professional training (e.g. American Institute of Architects credit) (4)
- Conferences and/or guest speaker sessions (5)
- Information provided by the Government of Canada (6)
- Academic research involvement (7)
- University/College program (8)
- Recreational birding/general interest in birds (11)
- ⊗I do not have any prior knowledge or training in bird safety (9)
- Other (please specify) (10)

Q9: ALL | Mandatory | Displays if Q6 ≥ 4

Which of the following interventions have you heard of previously? (Select all that apply.)

- Bird-safe glass (e.g. window film, etched glass, etc.) (1)
- Municipal light pollution attenuation strategies (e.g. municipal "Lights-Out" programs) (2)
- Localized light pollution attenuation strategies (e.g. DarkSky-compliant lighting fixtures) (3)
- Bird-safe site planning/landscape design (4)
- Bird-friendly landscaping (8)
- Bird-safe building design guidelines (5)
- Relevant provincial/federal legislation (e.g. Environmental Protection Act 1990, Migratory Birds Convention Act 1994, etc.) (6)
- ⊗None of the above (7)

Q10: ALL | Mandatory |
Which of the following interventions have you previously interacted with as part of your professional work? (Select all that apply.)

▢   Bird-safe glass (e.g. window film, etched glass, etc.) (1)
▢   Municipal light pollution attenuation strategies (e.g. "Lights-Out" programs, skyglow minimization policies) (2)
▢   Localized light pollution attenuation strategies (e.g. Darksky-compliant lighting fixtures) (3)
▢   Bird-safe site planning/landscape design (4)
▢   Bird-friendly landscaping (8)
▢   Bird-safe building design guidelines (5)
▢   Relevant provincial/federal legislation (e.g. Environmental Protection Act 1990, Migratory Birds Convention Act 1994, etc.) (6)
▢   ⊗None of the above (7)

Q11: ALL
On a scale of 1 to 10, where 1 represents minimal involvement, and 10 represents a high degree of involvement, how involved are you with bird safety in your professional work?

o   1: Minimal involvement (1)
o   2 (2)
o   3 (3)
o   4 (4)
o   5 (5)
o   6 (6)
o   7 (7)
o   8 (8)
o   9 (9)
o   10: High degree of involvement (10)

Q12: ALL
Which of the following best describes the nature of your involvement with bird safety in your work? (Select all that apply.)

▢   Reviewing or approving building designs (1)
▢   Installing mitigation or preventative devices (2)
▢   Creating building designs including bird safety components (e.g. glazing, lighting) (3)
▢   Landscaping and habitat around buildings/developments (4)
▢   Conducting environmental studies and reviews (5)
▢   Implementing programs focused on ecological health, restoration, conservation, etc. (6)
▢   Researching or reviewing bird-safe practices/policies (7)
▢   Implementing bird-safe practices/policies (8)
▢   Other (please specify) (9) _____

Q13: EXPERIENCED | Mandatory |
Are there processes you interact with in your professional work that limit the overall effectiveness of bird-safe policies and/or interventions? (e.g. organizational inefficiency, funding constraints, general lack of awareness, etc.)

○ Yes (1)

○ No (2)

○ Unsure (3)

Q14: EXPERIENCED | Mandatory | Displays if Q6 ≥ 4 and if Q13 = "Yes"
How often do you encounter these limitations when interacting with bird safety as part of your work?
o   Minimally (1)
o   Sometimes (2)
o   Often (3)
o   Very Often (4)
o   Always (5)

Q15: EXPERIENCED | Displays if Q6 ≥ 4 and if Q13 = "Yes"
Please provide a brief description of your understanding of the specific pressures or constraints that limit the effectiveness of bird-safe design and/or mitigation of bird collisions in buildings.

_____

Q16: ALL
Which landscape and/or building contexts do you interact with in your work? (Select all that apply.)
▢   Existing buildings undergoing maintenance and/or renovations (1)
▢   Site plan approvals (2)
▢   Secondary plan approvals (10)
▢   Urban design (11)
▢   Recently completed new buildings (3)
▢   Commercial and industrial buildings (4)
▢   Campus institutional buildings (5)
▢   Residential buildings (6)
▢   Transit infrastructure (7)
▢   ⊗I do not interact with building contexts as part of my work (8)

Q17: EXPERIENCED | Displays if Q6 ≥ 4, Skipped if Q16 = "I do not interact with building contexts as part of my work"
Based on your knowledge, how often has bird-safe design been incorporated correctly into buildings, landscaping, and/or developments under your professional jurisdiction?
o   Never (1)
o   Very Rarely (less than 20% of buildings/developments) (2)
o   Not Often (less than 40% of buildings/developments) (3)
o   Sometimes (less than 60% of buildings/developments) (4)
o   Very Often (less than 80% of buildings/developments) (5)
o   Almost Always (less than 100% of buildings/developments) (6)
o   Always (7)
o   Unsure (8)

Q18: EXPERIENCED | Displays if Q6 ≥ 4
How often do you encounter landscapes and/or buildings that are meant to be bird-safe but fall short? (e.g. not in compliance with applicable requirements and/or using practices or materials that are substandard).
o   Never (1)
o   Not Often (2)
o   Sometimes (3)
o   Very Often (4)
o   Always (5)
o   Unsure (6)

Q19: ALL
Within your regional jurisdiction(s) (municipal, provincial, etc.), how effective do you believe that bird-safe requirements and/or guidelines are at reducing bird collisions with buildings?
o   Ineffective (1)
o   Not very effective (2)
o   Somewhat effective (3)
o   Neutral (4)
o   Effective (5)
o   Very effective (6)
o   Unsure (7)
o   N/A (8)

Q20: ALL
On a scale from 1 to 10, where 1 represents no responsibility at all, and 10 represents highly responsible, what degree of responsibility does your profession have to protect birds from window collisions?
o   1: No responsibility at all (1)
o   2 (2)
o   3 (3)
o   4 (4)
o   5 (5)
o   6 (6)
o   7 (7)
o   8 (8)
o   9 (9)
o   10: Highly responsible (10)

Q21: ALL
On a scale from 1 to 10, where 1 is entirely unaware, and 10 is highly aware, how would you rate the awareness of professionals in your sector regarding bird-safe planning policies and design strategies (e.g. for landscapes and related solutions for preventing bird collisions and solutions for preventing bird collisions?
o   1: Entirely unaware (1)
o   2 (2)
o   3 (3)
o   4 (4)
o   5 (5)
o   6 (6)
o   7 (7)
o   8 (8)
o   9 (9)
o   10: Highly aware (10)

Q22: ALL
What resources or additional information would most benefit your understanding of bird safety? (Select all that apply.)
▫   Relevant organizations and/or initiatives (1)
▫   Legislative frameworks and/or case law precedents (2)
▫   Technical building design guidelines (3)
▫   Logistic information regarding specific interventions (e.g., availability of products, costing, feasibility, etc.) (4)
▫   Recent scholarly publications and statistics (5)
▫   Bird-safe landscape and design strategies (6)
▫   Bird-safe site planning (11)
▫   Policy context and how to develop a new policy or standard (7)
▫   Strategies to identify and address non-compliance with standards (10)
▫   Tools to communicate value to clients and stakeholders (9)
▫   Other (please specify) (8) _____

Q23: ALL
What formats of information or training would you find most helpful? (Select all that apply.)
- ▢   Departmental or on-the-job training (1)
- ▢   Course-based instruction (online modules) (2)
- ▢   Course-based instruction (in-person) (3)
- ▢   Guest speaker lectures (4)
- ▢   Design-based training exercises (5)
- ▢   Guides and reference materials (7)
- ▢   Other (please specify) (6) _____

Q24: ALL
Would you be interested in attending a half-day workshop (virtual and in-person options) on bird-safe design and planning for practicing professionals, and/or receiving future updates regarding the output of this research project? (Select all that apply.)
- ▢   Yes, interested in attending a half-day workshop (1)
- ▢   Yes, interested in receiving future research updates (2)
- ▢   ⊗Not interested (3)

Q25: ALL | Displays if Q24 = ONLY "Yes, interested in attending a half-day workshop"
Since you expressed interest in attending a half-day workshop on bird-safe design and planning, please share your email address for more information. Note that your email address will be kept confidential.

_____

Q26: ALL | Displays if Q24 = ONLY "Yes, interested in receiving future research updates"
Since you expressed interest in receiving future updates regarding the output of this research project, please share your email address for more information. Note that your email address will be kept confidential.

_____

Q27: ALL | Displays if Q24 = BOTH "-half-day workshop" and "-research updates"
Since you expressed interest in attending a half-day workshop on bird-safe design and planning, and receiving updates on future research, please share your email address for more information. Note that your email address will be kept confidential.

_____

APPENDIX B: WORKSHOP ACTIVITY BRIEF

Virtual session Activity Brief

Logistics: 1:30 PM to 4:00 PM EDT on November 7th, Zoom videoconferencing platform
Working Group Structure: 1 Facilitator, 1 Supporter, 6-8 participants of varied professions
Roles: Facilitators guide participant activities. Supporters handle Zoom logistics and support verbally where necessary.

Introduction and Icebreakers
➔ The programming commences with a land acknowledgement and introductions to the team and community partners. The workshop's purpose is outlined and related to the overall project methods. Participants are briefly introduced to topics related to bird safety, including design, policy context, and interventions, as a review to prime them for discussion. Professionals are split into working groups, incorporating a mix of different professions in each room. Each room has a designated Facilitator and Supporter from the team. Participants then share their names and discuss the following questions:
◆ How did you become familiar with bird-safe design?
◆ How do you interact with bird-safe design in your work/profession?

Discussion/Activity One: Sticky-note Brainstorming
➔ Within their working groups, participants are provided with a Zoom Whiteboard. They are instructed to think divergently, providing responses on virtual sticky notes to the following question:
◆ What does bird-safe design mean to you?
➔ Respondents take time to reflect on each other's notes and group them into themes where applicable. Upon completion, working groups return to the main room to discuss findings and key notes of interest as a collective. This activity aims to introduce participants to the virtual functionality while priming them for new perspectives and ideas through divergent thinking.

Discussion/Activity Two: Backcasting
➔ Within their working groups, participants are provided with a Zoom Whiteboard and a scenario related to bird safety. They are instructed to reflect upon the scenario provided and formulate responses that retroactively achieve the desired outcomes in the scenario. They were prompted with the following question:

◆ In 2050, bird-safe building design is standard practice across all major municipalities across North America. Bird-building collision rates are at a record low. What separates us from this future? Identify key milestones to achieve this by 2050.
➔ Participants reflect upon the answers collaboratively. Upon completion, working groups return to the main room to discuss key narratives and milestones that were outlined. This activity inquires participants to think critically about the present context of bird safety, and where improvements could be made. The framing of the question encourages participants to think about how to accomplish tangible objectives for bird safety as a whole.

Discussion/Activity Three: Roundtable 1
➔ Within their working groups, participants are provided with a question, and are not provided with a Zoom Whiteboard, unlike previous activities. They are prompted to have an open discussion with each other relating to the following question:
◆ In your experience, have you observed any successful implementation of bird-safe building design? If so, what do you attribute this positive experience with bird-safe design to?
➔ This question aims to evaluate the successes of bird safety, specifically what aspects of their professional activities are able to foster positive results, providing insight into what is effective in the current context. To garner more in-depth qualitative responses, this activity is designed with a narrative-driven, open-discussion style organization in mind, given the retrospective nature of the question.

Discussion/Activity Four: Roundtable 2
➔ Within their working groups, participants are provided with a question, and are not provided with a Zoom Whiteboard, similar to the previous roundtable discussion. Their open discussion relates to the following question:
◆ Are there aspects or processes you interact with that limit the effectiveness of bird-safe policies and/or interventions overall? And have these limitations ever originated from interactions with other occupations?
➔ This question aims to complement the previous discussion by evaluating concepts antagonistic to previously outlined narratives. Whereas the previous discussion outlined successes, this discussion delves into limitations and barriers to bird safety that professionals have experienced in their duties. This question provides a qualitative context to complement the survey question from which it was derived. After this discussion, participants return to the main room to discuss the themes that arose and points of disconnection between participants.

Discussion/Activity Five: World Cafe

- ➔ For the final activity, participants are presented with a question and a Zoom Whiteboard. This activity is unique in that it elicits a degree of collaboration between different working groups for a total of 5 different questions. Participants will be presented with a question, and have an opportunity to provide their thoughts on virtual sticky notes. After a contemplation period, the dedicated Supporters in each working group will rotate to the next, presenting the next question in the lineup. Participants will be able to see previous groups' responses and are encouraged to add to or disagree with them. After another deliberation period, the Supporters rotate again, and the cycle continues. By the end of the activity, participants will have been allowed to answer the questions constructively utilizing other groups' responses. Presented in no particular order, the questions for this activity are as follows:
    - ◆ A) Are there aspects of bird-safe buildings and preventing bird collisions you would like to understand better to support your professional work?
    - ◆ B) Which profession do you believe has the greatest capacity to implement bird safety? Which profession do you believe has the least agency or encounters the most barriers?
    - ◆ C) How would you work with other professions to better implement bird safety? What sort of knowledge or tools would you require for this partnership to be successful?
    - ◆ D) How can we ensure that professionals from your field are leaving the professional training engaged and invested in the content?
    - ◆ E) In your professional work, were there any situations where you had to receive information/training on a specific subject? If so, how did you learn? Is there anything that worked or didn't work?
- ➔ This activity pertains to addressing gaps in knowledge through professional development, directly informing FLAP's efforts to mobilize knowledge of bird safety within the professional realm. Question A directly provides insight into the knowledge needs of professionals. Question B provides avenues for reflection on the role of professionals and creates opportunities for misconceptions about their roles in bird safety to be addressed by each other. Question C provides information on improving bird-safe collaboration across disciplines, specifically referencing the tools that professionals would find beneficial. Question D provides information on strategies and education methods that promote audience engagement and knowledge retention, strategically improving FLAP's training methods. Question E provides information on those training methods that professionals have already found effective or ineffective. The end of the World Cafe marks the end of the scheduled programming for the visioning workshop, concluding with closing remarks and gratitude for the patience and time of participants.

Sticky Storm

This is a 'sticky-storm' exercise. Your task is to answer the question: 'What does bird-safe design mean to you?' Use the virtual sticky notes to jot down your ideas - one idea per note. After everyone has contributed, work as a group to organize these ideas into themes.

People 3 - 7 members **Time** 15 mins

How it works

1. **5 mins** Prepare Sticky Notes of content, features, or topics that come to mind when you read the question.

2. **5 mins** Discuss as a group the ideas written down and sort them into common themes.

3. **5 mins** Return back to the main room. Facilitators will briefly discuss groups findings.

Drag and drop sticky notes

Please add your initials to your notes

What does bird-safe design mean to you?

Theme 1: Design

- A building that kills will never be sustainable
- 100% markings
- MC
- bldg and site design that reduces bird strikes right away (AC)
- less glazing (AC)
- Having the knowledge to comment on what a 'well-designed' building can look like. - AM
- facade materials that reduce reflections (AC)
- Having the tools necessary to communicate the benefits of bird safe design to clients to increase buy-in. AM
- reducing reflective glazing/breaking up reflectivity of surfaces.
- Planning human structures while reducing the risk of bird injuries - JAG
- Design more accessible options for home-owners and 'retro-fitting' JAG
- Considering the risk of collisions, entrapment, entanglement, etc. and planning human structures - JAG
- using window treatments as a last resort - avoiding the need through better design and bldg features (AC)
- incorporating habitat and ecological features that support birds, and thus other elements of biodiversity (AC)
- reducing design traps: minimal disruption to habitat; design architecture to reduce reflective materials DS
- Reducing the impacts to SAR birds to move towards a reduction in biodiversity loss - AM

Theme 2: Policy

- Needs to be included in Building Codes and for all buildings including houses MC
- Having the appropriate policies necessary to make bird-safe design mandatory and enforceable. - AM
- A proper standard for rating the effectiveness of the glass treatment needs to be developed MC
- Mandatory - not optional
- Openly received and accepted by all members of the development/planning community
- bird-safe treatments is applied to residential developments DS

Theme 3: Operational Practices

- lighting is reduced at night
- Reducing human -bird conflict during construction as well - disturbance during nesting, birds nesting on unfinished sstructures JAG
- creating suitable habitat that supports all life stages of birds while reducing their threats DS
- appropriate landscaping and spacing adjacent to buildings DS

Theme 4

Theme 5

Theme 6

Sticky Storm

This is a 'sticky-storm' exercise. Your task is to answer the question: 'What does bird-safe design mean to you?' Use the virtual sticky notes to jot down your ideas - one idea per note. After everyone has contributed, work as a group to organize these ideas into themes.

People 3 - 7 members **Time** 15 mins

How it works

1. **5 mins** Prepare Sticky Notes of content, features, or topics that come to mind when you read the question.

2. **5 mins** Discuss as a group the ideas written down and sort them into common themes.

3. **5 mins** Return back to the main room. Facilitators will briefly discuss groups findings.

Drag and drop sticky notes

Please add your initials to your notes

What does bird-safe design mean to you?

- Creating a safe built environment for migratory birds. mm
- protection of birds from the built environment - sk
- Safe passage for birds through our cities
- protecting birds and ensuring the survival of the next generation of the species - KR
- Preventing bird injury and death caused by the built environment (GS)
- Creating habitat for birds in the built environment (GS)
- design that considers its environment - does not harm / keeps birds + environments safe - NLT
- seems like a no brainer to save bird PM
- bird safe design is a practical and effective strategy that we can incorporate into building design to help address the biodiversity emergency PM
- Lissa -designing glass to be visible for birds, with etchings -designing buildings to incorporate down

Theme 1 **Theme 2** **Theme 3**

Theme 4 **Theme 5** **Theme 6**

Sticky Storm

This is a 'sticky-storm' exercise. Your task is to answer the question: 'What does bird-safe design mean to you?' Use the virtual sticky notes to jot down your ideas – one idea per note. After everyone has contributed, work as a group to organize these ideas into themes.

People
3 - 7 members

Time
15 mins

How it works

1. **5 mins**
Prepare Sticky Notes of content, features, or topics that come to mind when you read the question.

2. **5 mins**
Discuss as a group the ideas written down and sort them into common themes.

3. **5 mins**
Return back to the main room. Facilitators will briefly discuss groups findings.

Drag and drop sticky notes

Please add your initials to your notes

What does bird-safe design mean to you?

	Theme 2	Theme 3			

Bird safety design means having non-reflective glazing with fritted patterns that birds will perceive as barriers. Generally, this strategy is required for any glazing up to 4 storeys above grade or within the height of the adjacent tree canopy. R C architect

lighting and glazing controls to limit impacts / attractants to birds JM

Feather Friendly

Window markers / tempera paint / soap

String / tape as long as it is 2" by 2"

Fritting? Acid Etch? AJ

Designing a building that is safe to migrating birds but requires minimal maintenance from building managers over time. - Mags R

I think we need to ensure engagement with the professionals bodies, at their association

Building design that incorporates ways t reduce threats from both glass collision and lighting issues Mags R.

Bird safe design means having properly designed facade that limits the death and collision of birds using visual markers (frit) and patterns on glazing, and visual reflective glass. Using CSA Guidelines for Bird-Safe glass (A460) Nicolette Francis – Environmental Planner

I think it means the design buildigs to care for the birds VT

Bird-safety to me means preventing as much bird fatality as possible within the built environment - both rural & urban. It is one simple way to help save many bird lives from the biodiversity crisis. AJ

Theme 6

Sticky Storm

This is a 'sticky-storm' exercise. Your task is to answer the question: 'What does bird-safe design mean to you?' Use the virtual sticky notes to jot down your ideas – one idea per note. After everyone has contributed, work as a group to organize these ideas into themes.

People
3 - 7 members

Time
15 mins

How it works

1. **5 mins**
Prepare Sticky Notes of content, features, or topics that come to mind when you read the question.

2. **5 mins**
Discuss as a group the ideas written down and sort them into common themes.

3. **5 mins**
Return back to the main room. Facilitators will briefly discuss groups findings.

Drag and drop sticky notes

Please add your initials to your notes

What does bird-safe design mean to you?	**When you think of a bird-safe building, what specific design features come to mind?**	**How would you define a successful bird-safe design in terms of aesthetics and functionality?**	**How does bird-safe design balance environmental responsibility with the needs of human occupants?**
Considering the negative impacts infrastructure, buildings, lighting etc. can have on birds. -LB	Using outdoor lighting that is shielded, pointed downward, and warm toned.	Limit visibility, and allow for transparency. Compliment not overpower the building design — A successful design for bird-friendly is one in which the visual markers are integral to the overall design; in other words, bird-friendly is NOT an afterthought JRC	the birds come first! JRC — It acknowledges the need for development while considering ways it can sustainably co-exist with the natural world.
Designing buildings in a way that considers the well-being of birds. -LB	Glazing markers, reducing glass reflections of natural environment, reducing light pollution		
Designing the enclosure of building (primarily glazing to better protect birds from collisions	st markings/ patterns , ideally high contrast, spaced in the range of 2x2 inches / 5x5 cm. Minimal, dark	A design that compliments the structure (or is barely visible), while minimizing collision risk. Views from the inside out minimally impacted. No light spillover.	Human views are optional, bird lives are irreplaceable. Working to ensure human vision isn't triggered is important though - harsh lighting with bold stripes can cause migraines/seizures, so corridors should probably stick to horizontal elements.
Bare minimum: not killing birds.			
Optimistically: being beneficial to birds, not just not-killing them.			
Theme 1 - Visibility	**Theme 2 - co-existence**	**Theme 3 - successful design**	

Sticky Storm

This is a 'sticky-storm' exercise. Your task is to answer the question: "What does bird-safe design mean to you?" Use the virtual sticky notes to jot down your ideas - one idea per note. After everyone has contributed, work as a group to organize these ideas into themes.

People	Time
5 - 7 members	13 mins

How it works

1 — **5 mins**
Prepare Sticky Notes of content, features, or topics that come to mind when you read the question.

2 — **5 mins**
Discuss as a group the ideas written down and sort them into common themes.

3 — **5 mins**
Return back to the main room. Facilitators will briefly discuss groups findings.

Drag and drop sticky notes

Please add your initials to your notes

What does bird-safe design mean to you?

Policy

Having rules to meet in order to protect birds.
IR (Environmental Consulting)

Bird safe glass on buildings.
IR (Environmental Consulting)

Regulations and guidelines not limited to making how things can be avoided by the birds; creating new safe space for birds needs to be considered as well.
YJ (Architect)

Limitation

Balancing our love to view nature with the need to protect nature
LZB (Planning)

Lack of strong regulation.
IR (Environmental Consulting)

Beyond Birds - birds are easy to like but other organisms can also benefit from bird-safe design
NL (Architect / Conservation)

prejudicing the aesthetics — clients don't like the dots or adding to their window/ railing design
AK (Glass Manufacturer)

Building code is silent on bird safety
AK (Glass Manufacturer)

Solutions

Bird safe-design is cross disciplinary
NL (Architect / Conservation)

Making glass visible to birds
LZB (Planning)

Being visible / recognizable.
YJ (Architect)

Connect this issue to landscape architecture OALA/ CSLA
VT (Landscape Architect)

We can use policy and design to stop bird collision
VT (Landscape Architect)

Landscaping choices to reduce bird collision.
IR (Environmental Consulting)

Design of policy and law as much as materials; litigation when necessary
AK (Glass Manufacturer)

Design alternatives to glass deck railings.
Reducing the size of glass in building design

Bird protecting aligns with protection of other species - other species also benefit from protection from light pollution
LZB (Planning)

Dealing with the exposure of the glass; utilizing any number of products and design elements to break up reflections
NL (Architect / Conservation)

Site

Site sensitivity; where is the building located
NL (Architect / Conservation)

Treading lightly on the site, but also integration into ecosystem
NL (Architect / Conservation)

Mitigating the impact of development on nature
LZB (Planning)

Creating an inclusive environment. Living together. Minimizing negative human impact.
YJ (Architect)

Responsibility to create safe corridors for all animals, including birds.
KL (Ecologist Planner)

Awareness

Designing for bird habitat means land architects need to be advocates with our colleagues/clients
VT (Landscape Architect)

Awareness and care for the more than human world that live among us
VT (Landscape Architect)

Acknowledging the problem of bird strikes.
IR (Environmental Consulting)

Empathy towards birds
NL (Architect / Conservation)

Residential (low rise) window design is also a cause - not just hi rise buildings
VT (Landscape Architect)

Relationship between human vs environment

Sustainability
YJ (Architect)

Understanding how birds interact with the human built environment
LZB (Planning)

Protecting biodiversity in the city
LZB (Planning)

Design as a cue to care about birds, from songs to safety to relating to nature
AK (Glass Manufacturer)

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Backcast

People 3 - 7 members   **Time** 20 mins

How it works

Backcast brainstorming is a problem-solving technique in which teams start with a future scenario, and work backwards to identify the stages of their story

1. Your task is to work backwards from this future scenario and identify the key milestones that got us there.

2. Think about what seperates us from this future

3. What steps need to be taken?

Helpful Tools

Sticky Notes

Press 'N' to open the sticky note menu or duplicate the one on the right with 'D'

Please add your initials to your notes

The Future

In 2050, bird-safe building design is standard practice across all major municipalities across North America. Bird-building collision rates are at a record low. What separates us from this future? Identify key milestones to achieve this by 2050.

What seperates us from this future?

- Increasing public awareness for the epidemic of bird strikes to increase public support AM
- People have an awareness and appreciation for nature in the City and understands it's importance. DS
- bird-safe design is mandatory and implemented in all aspects of planning and development; and fines are provided if not (similar to seatbelts, drinking/driving, etc.) DS
- Improved technologies in terms of options available and options address multiple issues, for example energy saving, cooling, etc.
- bird collisions are not constant - seasonal, dependent also on vegetation I believe (?) - so importance is
- Material costs, labour costs AP
- Lack of 'empathy' towards wildlife JAG
- Lack of awareness of the extent of the issue. "its just one bird' is a common message given by homeowner JAG
- vagueness (real or perceived) of what bird friendly design entails - not as clear as "# of 3bdrm units"
- Public acceptance of the "look" of bird friendly window markers - JAG
- Global issue with different impacts, priorities and concerns in the third world. MC
- people not taking birds seriously... indicators of ecological health, improving our lives, nature in the city, etc - perhaps a need for connecting to broader goals
- All Cities participate in lights-out campaigns during migratory seasons DS

Identify the solutions for the limitations

- Bird-safe treatment options - address multiple climate issues in addition to bird-safe design DS
- Policy updates were implemented across multiple levels of govt • AM
- Material costs are cheaper than non-bird safe design materials. AP
- Limitation - bird-safe design does not provide financial gains for users/ developers (for example, solar reflective windows reduces energy use,),
- public bldgs should have reqt for bird friendly design in all cases (AC)
- Creating a bank of case studies that are accessible to share lessons learned - AM
- Education from elementary school to beyond. AP
- More easily accessible and affordable options particularly for the general public and already existing buildings JAG
- clear, and specific bldg standards that are required in highest risk landscapes are regulation at highest govt level (AC)
- A variety of options to improve acceptance of the 'look' - JAG
- Increasing compassion of the public towards wildlife JAG
- Public education campaign about the issue and the importance of bird friendly practices
- tie as much as possible of bird safe reqts to energy efficiency - embed the bird reqts into green bldg energy

Identify the key milestones

- Creation of standardized training across the country for professionals AM
- Creating a central information hub to support this community of practice. AM
- Implement the importance of individual actions such as window collision prevention on wildlife conservation into education system JAG
- Bird-safe Design is incorporated into the Building Code DS
- requirements for all government bldgs? all bldgs paid for with tax dollars - must be bird friendly - do this by 2030 to
- Having some sort of professional certification/ designation for those qualified to ID and mitigate risks - AM
- Government-subsidized/funded. AP
- Bird-Safe building standards are identified in climate adaptation plans and biodiversity strategies AP

Backcast

People 3 - 7 members   **Time** 20 mins

How it works

Backcast brainstorming is a problem-solving technique in which teams start with a future scenario, and work backwards to identify the stages of their story

1. Your task is to work backwards from this future scenario and identify the key milestones that got us there.

2. Think about what seperates us from this future

3. What steps need to be taken?

Helpful Tools

Sticky Notes

Press 'N' to open the sticky note menu or duplicate the one on the right with 'D'

Please add your initials to your notes

The Future

In 2050, bird-safe building design is standard practice across all major municipalities across North America. Bird-building collision rates are at a record low. What separates us from this future? Identify key milestones to achieve this by 2050.

What seperates us from this future?

- A provincial government that gives a hoot - KR
- informed public + clients on the issue - NLT
- being more informed. Mandated rules - sk
- Competing priorities (understandably) eg. accessibility, affordability
- municipality advocacy on the issue - NLT
- Only groups associated with birds/bird work educate the public on these issues. Info must come from Municipalities/ conservation authorities too L.D
- More bird (and wildlife rehabilitation centres)
- "teeth" to enforce compliance
- retrofits of existing buildings

Identify the solutions for the limitations

- reduction of the use of all glass building design anyways - already major climate implications -NLT
- cost effective glass specifications with bird glass already "built in" - NLT
- design options / alternatives for those focused on aesthetic - NLT
- High fines for non-compliance
- reduction of high reflective surface as a building material,. More opaque surfaces. Better lighting strategies - sk
- awareness of aesthetic design solutions (beyond markers), more creativity in design. Through increased work in this area.
- Regional funding pot for retrofits
- PM Our research shows awareness of the issue is very low. so multiple campaigns to increase
- PM development in the window industry is needed. many residential suppliers will not include bird

Identify the key milestones

- Building retrofit strategy by region including funding
- Mandatory development requirements
- municipal bylaw implementation - design guidelines -NLT
- make policy more understandable and language that is approachable for design use incremental policy PI
- rebates / incentives for existing homes to incorporate bird-friendly - KR
- bird -friendly design included in the building code - KR
- changing philosophy on ground floor design. - sk
- Cities receiving bird friendly status will be a standard. L.D
- High financial penalties for non-compliance
- I think we could make policy simpler and nuanced

Backcast

People 3 - 7 members **Time** 20 mins

How it works

Backcast brainstorming is a problem-solving technique in which teams start with a future scenario, and work backwards to identify the stages of their story

1. Your task is to work backwards from this future scenario and identify the key milestones that got us there.

2. Think about what seperates us from this future

3. What steps need to be taken?

Helpful Tools

Sticky Notes
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Please add your initials to your notes

To implement green standards as they relate to bird-safe design, take securities at the site plan stage to ensure such measures are implemented.
Revise official plans to identify Bird safe design
Nicolette F

The Future

In 2050, bird-safe building design is standard practice across all major municipalities across North America. Bird-building collision rates are at a record low. What separates us from this future? Identify key milestones to achieve this by 2050.

What seperates us from this future?

Awareness Lack of knowledge VT

Lack of appropriate legislation such as municipal bylaws and applicable non-negotiable standards for bird collision prevention.
Also, willingness on the part of building owners and tenants to accept these strategies. RC

Lack of government urgency, no incentives for implementation

Many municipalities say

BS - People who design buildings need to understand what bird safety is, and what is expected of them

BS - Ignoring bird deaths at buildings is socially unacceptable

BS - Lack of financial incentives for bird collisions mitigation

BS - Strong examples of specific use cases and applicability of different solutions for different buildings to achieve co-benefits, like reducing energy consumption

Identify the solutions for the limitations

Updated Technology and materials for solutions VT

The building code needs to be updated to include bird-safe design Nicolette Francis

Tax rebates or incentives for new building construction to be bird safe - Mags R

Solutions are part of a larger issue surrounding care for all creation. Humans need to re-examine their relationship to more than human an species appreciating their intrinsic value. RC

BS - Integrate collisions mitigation into existing and new building renovation grants, etc.

BS - Awareness of the social costs of bird-building collisions (e.g., impacts to occupant health, reputation of the architect and building owner)

BS - Documentation of existing applications, the materials used, benefits provided, provided in communications for designers. Consider pros/cons of different materials

Identify the key milestones

A transformational shift in worldview that embraces the intrinsic value of all species. RC

Public outreach campaigns to help more people understand the issue so the general public demands safer buildings. This would be adding voices to the issue which would hopefully in turn put pressure on updating building codes and design. - Mags R

BS - Lawsuits over failure to mitigate collisions

BS - Development of a framework to support investments in mitigation at particular buildings, adoption by funding agencies

BS - Competency in bird safe design is a requirement for licensing of professionals who design buildings

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Backcast

People 3 - 7 members **Time** 20 mins

How it works

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1. Your task is to work backwards from this future scenario and identify the key milestones that got us there.

2. Think about what seperates us from this future

3. What steps need to be taken?

Helpful Tools

Sticky Notes
Press 'N' to open the sticky note menu or duplicate the one on the right with 'D'

Please add your initials to your notes

The Future

In 2050, bird-safe building design is standard practice across all major municipalities across North America. Bird-building collision rates are at a record low. What separates us from this future? Identify key milestones to achieve this by 2050.

What seperates us from this future?

Patchwork of policies, regulations, and requirements

Operation and Maintainance of existing building stock is not governed by municipal development standards. Improvements to existing buildings are voluntary

Policy changes mandating bird-friendly design

Higher cost of some bird-friendly design solutions

the insertion of MANDATORY bird-friendly measures for all ne w construction in to the Building Code; and, incentivized programmes for mandatory retrofits.

The way for the retrofits is led by Gov't for all their buildings, and by institutions such as TMU.

International bird conservation policy, enforced.

Identify the solutions for the limitations

Create a framework for improvements to existing buildings (70-80% of the buildings in 2050 already exist today)

Align requirements across municipalities & provinces, including within building codes

Prioritizing the environment in all levels of governmental decisions and policy development

International collaboration re: species conservation . Tax incensitves?

Identify the key milestones

Alignment of governing bodies, building codes for new construction and existing buildings

Enforcement of existing protections, passing of bird safe building codes at state levels. Tax incentives?

Backcast

People 3 - 7 members	Time 20 mins

Backcast brainstorming is a problem-solving technique in which teams start with a future scenario, and work backwards to identify the stages of their story

1. Your task is to work backwards from this future scenario and identify the key milestones that got us there.

2. Think about what seperates us from this future

3. What steps need to be taken?

Helpful Tools

Sticky Notes

Press 'N' to open the sticky note menu or duplicate the one on the right with 'D'

Please add your initials to your notes

The Future

In 2050, bird-safe building design is standard practice across all major municipalities across North America. Bird-building collision rates are at a record low. What separates us from this future? Identify key milestones to achieve this by 2050.

What seperates us from this future?

We don't know the site conditions in regards to birds' (wildlife) habitat.

YJ (Architect)

Nobody knows anything about birds!

NL (Architect / Conservation)

Losing our connection to and knowledge of birds, so better connections needed

Confusion about what works: hawk decals don't!

Public awareness: seeing, understanding and caring translates into demand for action

Awareness

Architects who rely on excuses such as: aesthetics, cost, dissmisal of the problem

Government participation

Building design standards vary in each municipality.

non invasive BF designs

In Toronto, we need to address existing buildings. Only new buildings are addressed by the Toronto Green Standard, leaving many existing buildings without bird safe design.

cost effective solutions

Identify the solutions for the limitations

Include environmental analysis on bird behavior as a part of site study.

YJ (Architect)

Get bird protections out of site plan approval and INTO the building code where inspection happens

Bird-safe glass and glass treatments become very readily available, effective, and inexpensive.

Easy and affordable solutions to retrofit existing buildings. EX window stickers.

YJ (Architect)

Affordable bird-friendly retrofits for older buildings.

Window manufacturers allow bird safe frits / applications under their warranty

Bird-safe curricula in higher ed - if in architecture school a turning radius is required for accessibility, no untreated glass should be allowed either

NL (Architect / Conservation)

residential glass not yet included in design for BF

Reducing unnecessary outdoor lighting

Updated education pre college/university: teaching about birds in middle school for example

NL (Architect / Conservation)

Public education awareness AND legislation

public education

Put the dead birds into public view

NL (Architect / Conservation)

Identify the key milestones

Extinction of a particular species??? Yikes. It's odd to call it a milestone but what will it take?

NL (Architect / Conservation)

Hawk decals outlawed! Never sold again

Bird safe glazing is written into the Building Code

Bird safe design becomes incorporated into the building code

Bird friendly and safe landscape design becomes part of LEED criteria (worth more than 1 point!)

Residential window suppliers adopt readily available and affordable options for all windows

A series of homes in a neighborhood or a block of commercial buildings that treat their windows – instead of discreet buildings

NL (Architect / Conservation)

Legal precedent set when SARS deaths result in large fines / court action

Incentives for retrofits are made available and linked to net zero energy retrofit funding

APPENDIX E: "WORLD CAFE" WHITEBOARDS

World Cafe

How it works

Participants rotate to different tables to engage in multiple rounds of quick discussion. Each table focuses on a question or topic and has a designated host who summarizes the ideas from the previous group, that the participants then continue to build upon

1. Read the question
2. Answer the question using sticky notes
3. Challenge or build upon what others wrote

Helpful Tools

Sticky Notes

Press 'N' to open the sticky note menu or duplicate the one on the right with 'D'

Please add your initials to your notes

Are there aspects of bird-safe building and collision prevention that you would like to understand better to support your professional work?

Round 1	Round 2	Round 3	Round 4	Round 5

World Cafe

How it works

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Helpful Tools

Sticky Notes

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Please add your initials to your notes

Which profession do you believe has the greatest capacity to implement bird-safety? Which profession do you believe has the least agency or encounters the most barriers?

Round 1	Round 2	Round 3	Round 4	Round 5

World Cafe

How it works

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Helpful Tools

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Please add your initials to your notes

> How would you work with other professions to better implement bird safety? What sort of knowledge or tools would you require for this partnership to be successful?

Round 1	Round 2	Round 3	Round 4	Round 5
municipalities may be reluctant to implement bird safety	The only other design team professional I can imagine having to consult with would be the building envelope consultant. Other professionals would be the authorities having jurisdiction who establish bylaws and require retrofit of existing buildings. Teaching trades how to apply retrofit bird		Speak up when bird safety is discussed in project settings.	
working with building professionals to see how they can implement bird safety into their existing services	Educational opportunities: Offer workshops/webinars to municipalities, member of public, schools and designers etc with incentives to participate		through eductional presentations	
	Ensure they understand the issue. Point them to a national standard.		Knowledge of teh rules and reasons for the importance of bird safety	
	ensuring all parties are aware of the problem at hand.		-Work with building designers to implement effective design -Require provincial national bird safety standards.	
	advocate for bird safe design from the design side of the conversation - to the client or user. NLT		FLAP /ABC should visit trade shows ... construct canada	
	start the education early - architecture students, planning students, environmental studies etc. NLT		Work with FLAP and ABC to further educate design professional ...architects, engineers	
			Collaboration between architects and building management professionals to collect post-occupancy data and refine design elements	
			Policy makers - ecologist To improve guidelines with critical information	

World Cafe

How it works

Participants rotate to different tables to engage in multiple rounds of quick discussion. Each table focuses on a question or topic and has a designated host who summarizes the ideas from the previous group, that the participants then continue to build upon

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Helpful Tools

Sticky Notes
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Please add your initials to your notes

> It's been established that knowledge and training on bird safety are lacking in our professional sectors, limiting implementations of bird-safe interventions. To assist FLAP in their development of professional training resources, we'd like to understand →
> • How can we ensure that professionals from your field are leaving the professional training engaged and invested in the content?

Round 1	Round 2	Round 3	Round 4	Round 5
Maybe a certification? Or some sort of exit exam for the absolute basics? I wish I knew - hc	Give people places to go for further information and update a certification system	Moral and ethical issue so emphasize the importance of birds and connecting them to sustainability		
	Ensuring that bird safety knowledge becomes part of LEED, BREAM, SITES and other existing certification systems that are already part of building science, design and materials work	In-person training = more engaged municipal workers. (Not virtual) AP		
	providing clear direction to resolve myths/ ineffective meths. AM	Newsletters to keep the community up to date with latest tech and opportunities to celebrate wins AM		
	I am not sure that anything has been missed towards convincing us to be more proactive and committed to ensuring bird protection is implemented in new buildings. The bigger issue will be convincing existing building owners to retrofit their buildings without the existence of financial incentives. PC	Provide resources they can then used to educate others or share with their colleagues JAG		
		Certificates for training = most municipal workers require a min. amount of training for their job.	Multiple opps for people to gather throughout the year digitally and in person to keep the top of mind and engage more folks. AM	
	Collecting feedback from the beginning and the end of the session to gauge progress	Give examples of success stories or result from follow up studies. How effectives were measures taken JAG		
		How it would affect them personally (not just in their job).		
	Explore opportunities f	Discussions for training purposes with multi-municipalities with a variety of departments. To learn from each other and to not feel like "they are the only one." AP	Indirect ups, "re-certification" AP	
		Don't be afraid to share what hasn't worked	Give people the tools they need to be communication champs in their own circles not just technical specs. AM	
		Resources to educate public, raise awareness JAG		

World Cafe

How it works
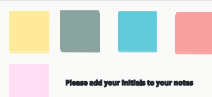
Participants rotate to different tables to engage in multiple rounds of quick discussion. Each table focuses on a question or topic and has a designated host who summarizes the ideas from the previous group, that the participants then continue to build upon

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Helpful Tools

Sticky Notes

Press 'N' to open the sticky note menu or duplicate the one on the right with 'D'

Please add your initials to your notes

It's been established that knowledge and training on bird safety are lacking in our professional sectors, limiting implementations of bird-safe interventions. To assist FLAP in their development of professional training resources, we'd like to understand →
In your professional work, were there any situations where you had to receive information/training on a specific subject? If so, how did you learn? Is there anything that worked or didn't work?

Round 1	Round 2	Round 3	Round 4	Round 5
Elimination of collisions with buildings.	Identify co-benefits for things like energy efficiency from reduced glazing and other bird-friendly design elements. JM	Climate change mitigation OAA minimum hours	Learning by doing	
For matters of policy change I have learned through shared information in emailed documents.	Build new presentation would be really helpful, products can	Implementing the knowledge or the learning – not all is used. VT (Architect)	Lunch and learn – with accredited OAA / AIA hour incentives (architecture)	
I have taken training for bat monitoring through an individual led zoom session. It was series of workshops over a month. It was effective as the teacher had a specific curriculum.	Received information from Environment and Climate Change Canada bird expert, and able to ask questions, get policy review PM	Education on where and how are acquired materials is a big aspect for architects		
I have taken free online courses.	CSA standard is very informative basing policies on this PM	The PIB (for Planners) requires CPLs (continuous learning) and does so a variety of formats. Definitely need bird safe training as a specific outcome (and it could be argued we are required under our Code of Ethics to work towards sustainability)		
Site visits	LEED could help educate and be far reaching PM	CSA Standard webinar or best practices for creating bird-safe design guidelines, bylaws etc.		
Case studies with precedents + site visits		How to convince mandatory standards as opposed to voluntary standards.		
		The CSLA (landscape architects) should provide mandatory training under their Code of Ethics which speak specifically to LAs to protect, restore and conserve landscapes and habitats (under sustainability). These trainings could take several formats but an exam and certificate would be helpful to show achievement		
workshop method – like this	Having visual examples is very helpful. And resolving conflicting standards directly is helpful to clarify pros/cons and practical solutions. JR	Mutti-scaling of climate change and biodiversity crises through bird safe design		
Informative sessions (talks, workshops)		AJ (Conservation NGO)		
Attended conference where common bird friendly design materials were discussed. Presented using easy to understand language.	AIA credits from glass association, actually not very helpful HT (Glass industry)	Learning formats for bird safety should be diverse but essential, and arguably included in professional licensing exams		
		Least desired training method is an online course		
		Site visits as training! NML		
		On the ground training face-to-face with bird-safe installers (and bring in the developers to learn about compliance!) AJ (Conservation			
		On the ground training would help with process clarity and demystifying the process		
		Modes of training include in-person hands-on, and webinar training		

APPENDIX F: PROJECT TERMS OF REFERENCES

PLG720 Advanced Planning Studio II

Bird Safe City Building: A Professional Training Needs Assessment

Image credits: (L) Charley Harper Art Studio, 2022, (R) NM Lister with FLAP, 2023

Professor: Prof. Nina-Marie Lister, MCIP RPP Hon ASLA

Office Hours: Thurs. 2-4 or by appointment at nm.lister@torontomu.ca

Weekly Team Meetings: Thursday 10-12 with afternoon studio sessions according to workplan

Client: FLAP Canada: Brendon Samuels, Research Coordinator, bsamuel2@uwo.ca
Ken Glasbergen and/or Alex Meeker, GeoProcess Research Associates (TBC)

Mentor: Shayna Stott, City of Toronto Environmental Planning, Shayna.Stott@toronto.ca

Field work: Students will be encouraged to join Prof. Lister on weekly building patrols to collect and rescue birds that have collided with buildings on the TMU Campus. (Details and dates to be discussed at the first studio meeting.)

Project Goal: *The goal of this studio is **to understand how bird safe design is being implemented in practice, what gaps exist, and what information is needed to fill those gaps through professional development.** The studio team will undertake a cross-sectoral needs assessment of planning and design professionals' literacy in and capacity for bird-safe planning and design. The assessment will be undertaken through a background literature review, survey analysis, and planning workshop. The purpose of this assessment and analysis is to build the foundation for a professional training course to be delivered by the client and delivered to planners, landscape architects, architects and environmental consultants licensed and working in the building industry.*

Problem Context

During the peak of fall and spring migration periods in North America, billions of birds must navigate thousands of kilometres, including through cities as they make their way south from their northern breeding grounds to their southern overwintering grounds and back again. In addition to the many natural hazards encountered during migration, urban areas pose a particularly deadly risk to birds in the prevalence of large expanses of window glass, which birds cannot see or recognize as a barrier. **Between 365 and 988 million birds in the US and 16 to 42 million birds in Canada will die enroute following a collision with a building**[1].

Jurisdictions across North America are adapting existing and new buildings to reduce their risk of causing bird-glass collisions. There is growing demand for bird safe design solutions across planning contexts and professional disciplines. Bird safe building design is a shared responsibility across all three levels of government in Canada.

In terms of municipal responsibility, the City of Toronto was the first municipality in the world to regulate bird safe design in 2007 through the Bird-Friendly Development Guidelines in the Toronto Green Standard (TGS). The City of Toronto is currently updating these guidelines as part of the TGS V4, in part based on a Bird Safe Design Planning Report and the Bird Safe City Toolkit, completed by TMU graduate students through the Ecological Design Lab at SURP. Since the first iteration of the guidelines in 2007, over two dozen municipalities in Ontario and a few in other provinces adopted various specifications for bird safe building design into local planning policy, such as official plans and site plan control by-laws. Under the Ontario Planning Act, municipal site plan control applies to certain types of buildings (e.g., commercial, industrial, multi-unit residential with 10 or more units) but excludes the most numerous types of building on the landscape (e.g., detached and semi-detached residential buildings). This has severely limited the effectiveness of municipal regulatory measures to mitigate bird collisions.

In 2023 a private members' bill was tabled in the Ontario legislature aiming to incorporate the CSA A460:19 Bird-Friendly Building Design standard into the province of Ontario's Building Code, which subject matter experts insist is necessary to effectively protect bird populations. Most political parties in the province have expressed support for this change, which suggests bird safe design could eventually enter provincial regulation. Meanwhile, the Ontario government has retrofitted some of its buildings. Bird safe designs are currently regulated through the City of Toronto's TGS (but restricted to applicable building types) and are also being used in certain new provincial projects such as transportation infrastructure and the Ontario Place redevelopment. Various other planning bodies have adopted bird safe design standards such as higher education campuses, Metrolinx and other regional transit authorities in London and York Region.

The government of Canada committed through the Greening Government Strategy to "manage its operating practices where operational requirements permit to minimize the impacts of air, land and marine activities on species, including … by taking steps to minimize bird strikes into [federally-owned] buildings". The federal government is currently developing permitting and enforcement mechanisms under the Migratory Bird Regulations (2022) which prohibit incidental take (i.e., killing) of

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[1] Bracey et al., 2016, Machtans et al., 2013, Loss et al., 2013, Klem, 2015.

migratory birds, including when buildings kill birds, whether intentional or not. The Canadian Wildlife Service is actively receiving complaints about offending buildings from the public and nonprofit organizations, which could result in future enforcement action. In theory, a building owner may be able to avoid litigation over contravening the Regulations if they demonstrate a due diligence response to being made aware of their building killing birds, such as by applying sufficient measures to mitigate the risk of causing further bird deaths.

Project Overview

The City of Toronto published the world's first municipal Bird-Friendly Development Guidelines in 2007. The purpose of these guidelines was to make buildings safer for migratory birds and to reduce the number of birds killed by colliding with windows. These guidelines have since prompted other North American municipalities to adopt similar guidelines, and in some cases, regulatory standards. Now part of the Toronto Green Standard, the guidelines have evolved into two separate **best practices** for bird friendly glass and effective lighting. Both documents provide specific techniques to support two performance measures, "Bird Collision Deterrence" and "Light Pollution", both of which are required as part of Tier 1 of the TGS v4. As Toronto's original guidelines have evolved, there has been a surge in this area of research and considerable development around bird safe building technologies, planning policies and regulations, including advances in legislation. Notably, there are still gaps in protection however, as landscape and site design are not currently considered under the Bird-Friendly Development Guidelines nor the TGS, despite clear evidence that bird collisions are also related to specific landscape factors in combination with reflective windows and lighting.

As more cities recognize the need to protect bird populations, bird safe design is now part of mainstream planning and development, and an emerging component in climate resilience strategies. With growing interest in conserving biodiversity under Canada's 2030 Nature Strategy, and adoption of bird safe building design standards into regulations, there is a mounting need to equip professionals with knowledge to support them facilitating applications of bird safe design through the planning process, as well as through the regulation, construction, maintenance and renovation of buildings.

The Ecological Design Lab at TMU previously published the Bird Safe City Toolkit (2023) which provides professional planners with resources to understand the problem of bird-building collisions, their legal and environmental context, and how to apply mitigation. FLAP Canada has published similar resources to support planners and decision makers in government, such as the report Synergies and Tradeoffs: Bird Safety in Climate Resilient Buildings (2024) focussing on interactions between climate change adaptation measures and the risk of bird collisions.

While these resources are broadly useful, they provide mostly high-level information about a very complex set of problems. In the United States, courses are offered to architects through the American Institute of Architects (AIA) Continuing Education system.[2] However, various other professionals

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[2] Courses are available on an ongoing basis to architects practicing in the United States under the AIA such as from Vitro Architectural Glass and Guardian Glass / BNP Media. Various regional and local organizations such as BuildGreenCT and NYC Bird Alliance have offered individual sessions to architects. Walker Glass offered an individual session for architects in 2020 that covers some aspects of the Canadian context; it was offered again in 2022.

besides architects interact with bird collisions differently in their practice, such as environmental consultants, planners, building inspectors, law enforcement officers, building managers and pest control companies. These professionals require access to a nuanced understanding of how to deploy mitigation effectively within the parameters of their role.

For instance, while an architect needs to predict how the bird collision prevention methods they choose for their designs will perform in buildings, planners need to understand how to write specifications for bird safe design into by-laws that architects follow. A landscape architect needs to consider how vegetation and other bird attractants around the building influences the risk of collisions. A municipal building inspector needs to be able to identify whether or not a newly constructed building has complied with applicable standards for bird safety. A building manager needs to understand how to assess risk of collisions on their property and to deploy mitigation (e.g., for due diligence) as appropriate. A pest control technician or other property maintenance professional needs to be aware of best practices where they observe collisions at buildings they service.

Image credits: B Samuels

Two common examples of bird collision mitigation applied incorrectly. Left: a grid of dots are applied on an interior surface of the window, not on the exterior surface as required by standards, reducing their visibility to birds. Right: A single visual marker on a window uses incorrect marker spacing; birds will simply fly around and hit the untreated part of the glass. Practitioners need to understand how to identify and remedy such errors early in the planning process.

Industry professionals typically access technical information about topics like this through professional development or continuing education courses that are supported by licensing bodies. Presently, no such courses are offered in Canada on the topic of bird safe buildings. For a new course to be created, it would be important to begin by understanding the information needs of the professionals who will ultimately take the course and apply its lessons in their respective practices.

Consultation with professionals may reveal how existing bird safe design implementation can be improved, barriers faced during the implementation, and gaps in understanding among relevant industries.

Goal

This project will collect insights and feedback from professionals who interact with bird safe building design in their practice to characterize challenges they face and their information needs. The aim is to synthesize this assessment of needs into a report that will provide recommendations for the development of new training resources by the client to improve awareness and literacy among professionals. The overall goal is to **understand how bird safe building design is being implemented in practice, what gaps exist, and what information is needed to fill those gaps through professional development.**

Key Tasks

The **Bird Safe City Building: A Professional Training Needs Assessment** project will involve designing an **online survey** and hosting an hybrid (in-person/online) **visioning workshop** with professionals who interact with bird safe building design in various contexts within Canada. The studio team will work with the client and participating partners to produce survey questions, circulate the survey and analyze the data. The team will also host the workshop and co-lead discussion activities with the client to collect feedback from participants about topics related to the needs assessment. Information collected through the survey and the visioning session will be **analyzed** and **synthesized** into a report to be provided to the client and published through the Ecological Design Lab website as an expansion to the Bird Safe City toolkit (2023).

Image credit: NM Lister
Left: Window collision victim, a Veery (Catharus fuscescens). Right: Correct installation of bird-safe window treatment, dot pattern on film applied to the exterior surface of windows which meets the CSA requirement (film by Feather Friendly, installation by 3M Decozi Inc).

Deliverables (for preliminary guidance and discussion)

In the context of the key objectives and tasks above, the deliverables for this project will include the following content (to be determined in consultation with the Client):

1. Develop a **methodological framework** including specific research instruments to facilitate further, broader research to determine extent and success of bird safe policies, design provisions both in terms of adoption (frequency) and improvements (outcomes) as they relate to the information needs of practicing professionals. This framework will include
   a. Planning and running **a visioning workshop** for practising professionals from landscape architecture, urban planning, architecture, and environmental consulting;
   b. Designing and undertaking **an online survey** delivered to practising professionals (as above);
2. Prepare a report on insights and analysis of the visioning session and survey so as to inform the overall scope and deliverables of an eventual professional course. The report should include:
   a. an **overview** of the problem and history of bird safe building design in the Canadian planning context;
   b. the **background** identifying the stakeholders who interact with bird safe building design
   c. a robust content **analysis** of difficulties associated with current regulations and industrial applications of bird safe design;
   d. a critical **assessment** of consulted stakeholders' information needs;
   e. a set of **recommendations** for the development of future professional development (e.g. specific topics for a training course) about bird safe building design for planners, architects and other practitioners, as appropriate.
3. An **oral and visual presentation** of analysis, findings and recommendations to be made for and shared with the Client, mentors and relevant community members.

Key Dates
(In addition to the course syllabus which lists all important dates and assignment deadlines.)

- Launch meeting: Thursday September 5, 1-2pm
- Visioning Workshop: Thurs. Oct 31 **OR** Nov. 7 (TBC)
- Interim Studio Presentations and Reviews: Thursday October 24 (time TBC)
- Final Studio Presentations and Reviews: Thursday November 28 (time TBC)
- Final deliverables submitted: Monday December 1

Key References

We expect these to be consulted and cited as relevant to the deliverables.

American Bird Conservancy, Glass Collisions: Preventing Bird Window Strikes: https://abcbirds.org/glass-collisions/

Axelson, Gustave (2019) *Vanishing: More Than 1 In 4 Birds Has Disappeared In The Last 50 Years.* The Cornell Lab: All About Birds.
https://www.allaboutbirds.org/news/vanishing-1-in-4-birds-gone

Beatley, Timothy (2020) *The Bird Friendly City: Creating Safe Urban Habitats.* Island Press.
Overview and lecture: https://www.biophiliccities.org/bird-friendly-city

Birds Canada (2023) *Ontario Breeding Bird Atlas 3.0.* Birds Canada, Environment and Climate Change Canada, Ontario Field Ornithologists, Ontario Nature, and Ontario Ministry of Natural Resources and Forestry.
About: https://www.birdsontario.org/
Storymap: https://www.birdsontario.org/storymap/

Biophilic Cities Network (n.d.): https://www.biophiliccities.org

BirdSafe.ca (2022): https://birdsafe.ca/ (a project of FLAP Canada)

BirdWatching Daily (2022) *Study: Being around birds boosts mental health.* BirdWatching Daily.
BLOG: https://www.birdwatchingdaily.com/news/birdwatching/study-being-around-birds-boosts-mental-health/

Brown, JD and Fink, Helen (2022) *Planning for Biophilic Cities.* A Report of the American Planning Association, PAS Report 602. Available at https://www.planning.org/publications/report/9255203/

Environment and Climate Change Canada (2022) *Government of Canada announces certification of fourteen new bird friendly cities.* Government of Canada.
https://www.canada.ca/en/environment-climate-change/news/2022/12/government-of-canada-announces-certification-of-fourteen-new-bird-friendly-cities.html

Fatal Light Awareness Program, FLAP Canada (2022): https://flap.org/

FLAP Canada (2022) *Why Do Birds Hit Buildings?* FLAP Canada.
https://flap.org/why-do-birds-hit-buildings/

Global Bird Collision Mapper (2022): https://www.birdmapper.org/

Lallensack, Rachael (2019) North America has lost nearly 3 billion birds since 1970. *Smithsonian Magazine.* Sept. 19. https://www.smithsonianmag.com/science-nature/north-america-has-lost-nearly-3-billion-birds-180973178/#:~:text=Since%201970%2C%20North%20America%20has,than%20one%20in%20four%20birds.

Leffer, Lauren (2022) *6 Unexpected Ways Birds Are Important for the Environment (and People).* National Audubon Society.
Benefits of Birds: https://www.audubon.org/news/6-unexpected-ways-birds-are-important-environment-and-people

Michigan Audubon (n.d.). Bird-window Collisions:

https://www.michiganaudubon.org/bfc/bird-window-collisions/

National Audubon Society (2023) *Prevent Bird Deaths from Building Collisions.* Audubon Action Centre.
Fast Action: https://act.audubon.org/a/bird-safe-buildings-act-2023

Panlasagui, S., E. Spotswood, E. Beller, and R. Grossinger. (2021). "Biophilia Beyond the Building: Applying the Tools of Urban Biodiversity Planning to Create Biophilic Cities." *Sustainability.* 13(5): 2450. doi:10.3390/su13052450. https://www.mdpi.com/2071-1050/13/5/2450/

Sheppard, Christine., Lenz, Bryan. (2019) *Birds Flying Into Windows? Truths About Birds & Glass Collisions from ABC Experts.* American Bird Conservancy.
https://abcbirds.org/blog/truth-about-birds-and-glass-collisions/

The Cornell Lab: All About Birds, *Why Birds Hit Windows—And How You Can Help Prevent It.*
https://www.allaboutbirds.org/news/why-birds-hit-windows-and-how-you-can-help-prevent-it

Science & Standards

American Bird Conservancy (2021) *American Bird Conservancy Prescriptive Rating Guidelines for Bird-friendly Materials.* American Bird Conservancy.
https://abcbirds.org/wp-content/uploads/2021/05/Prescriptive-rating-for-LL15-3.pdf

BirdCast: Migration Monitoring Platform: https://birdcast.info/
BirdCast: Lights Out: https://birdcast.info/science-to-action/lights-out/

Bracey AM, Etterson MA, Niemi GJ, Green RF (2016) Variation in bird-window collision mortality and scavenging rates within an urban landscape. *Wilson Journal of Ornithology* 128: 355–367. https://doi.org/10.1676/wils-128-02-355-367.1

City of Toronto (2021) *Toronto Green Standard* (current v4). https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/toronto-green-standard/

Cusa M, Jackson DA, Mesure M (2015) Window collisions by migratory bird species: urban geographical patterns and habitat associations. *Urban Ecosystems* 18: 1427–1446. https://doi.org/10.1007/s11252-015-0459-3

Environment and Climate Change Canada (2023) *Environment and Climate Change Canada Status of Bird Populations.* Environment and Climate Change Canada.:
https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/trends-bird-populations.html

Feather Friendly: https://www.featherfriendly.com/
FF CSA blog:
https://www.featherfriendly.com/blog/enjoy-free-access-to-the-csa-bird-friendly-building-design-standard#:~:text=The%20CSA%20A460%3A19%20standard,scale%20to%20reduce%20bird%20deaths.

FLAP Canada (2018) *Bird-Safe Standard for Federal Government Buildings A Synthesis of Bird-Friendly Guidelines and Standards.* FLAP Canada.
https://flap.org/wp-content/uploads/2020/06/SYNTHESIS-STANDARD-FLAP-CWS-2018.pdf

Klem, Daniel (2014) Landscape, legal, and biodiversity threats that windows pose to birds: a review of an important conservation issue. *Landscape* 3: 351–361. https://doi.org/10.3390/land3010351

Klem, Daniel (2015) Bird–Window Collisions: A Critical Animal Welfare and Conservation Issue. *Journal of Applied Animal Welfare Science.*
https://journals-scholarsportal-info.proxy1.lib.trentu.ca/details/10888705/v18isup1/s11_bcacawaci.xml

Loss, Scott., Will, Tom., Loss, Sara., Marra, Peter. (2013) Bird–building collisions in the United States: Estimates of annual mortality and species vulnerability. *The Condor.*
https://www.jstor.org/stable/90008043

Machtans, Craig., Wedeles, Christopher., Bayne, Erin. (2013) A First Estimate for Canada of the Number of Birds Killed by Colliding with Building Windows. *Avian Conservation and Ecology*
http://dx.doi.org/10.5751/ACE-00568-080206

NCC (National Capital Commission), Bird-Safe Design Guidelines.
https://ncc-website-2.s3.amazonaws.com/documents/NCC_Bird-Safe_Guidelines_EN_Mar26.pdf#page=10

Rosenberg, Kenneth., Dokter, Adriaan., Blancher, Peter., Sauer, John., Smith, Adam., Smith, Paul., Stanton, Jessica., Panjabi, Arvind., Helft, Laura., Parr, Michael., Marra, Peter. (2019) Decline of the North American avifauna. *Science.*
https://www.science.org/doi/10.1126/science.aaw1313

Standards Council of Canada (2019) *Canadian Standards Association CSA A460:19.* Standards Council of Canada.
https://www.scc.ca/en/standardsdb/standards/29805
Free view-only access: https://www.featherfriendly.com/csa-building-standards

Sustainable SITES Initiative (for landscaping standards): https://sustainablesites.org/

Van Doren, Benjamin (2021) *A new publication on drivers of fatal bird collisions in Chicago.* BirdCast.
https://birdcast.info/news/a-new-publication-on-drivers-of-fatal-bird-collisions-in-chicago/

Policies & Regulations

City of Ottawa (Bird Safe Guidelines, Dec 2022):
https://documents.ottawa.ca/sites/documents/files/birdsafedesign_guidelines_en.pdf#page=15

City of Toronto (Bird Safe Design Guidelines 2007, updated into TGS):
https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/design-guidelines/bird-friendly-guidelines/

FLAP Canada Review of Municipal Green Development Standards (2024). Available at:
https://docs.google.com/spreadsheets/d/1OXXt_VqZnPHTy4NrH-mRdfebBsqFOUhpS2zg8giD9Ms/edit?usp=sharing

Policy 1: Best Practices for Bird Safe Glass 2017:
https://www.toronto.ca/wp-content/uploads/2017/08/8d1c-Bird-Friendly-Best-Practices-Glass.pdf
Policy 2: Best Practices for Bird Safe Lighting 2018:
https://www.toronto.ca/wp-content/uploads/2018/03/8ff6-city-planning-bird-effective-lighting.pdf

Harvard Campus: https://www.thecrimson.com/article/2023/6/18/animal-law-bird-letter/

The New York City Council (2020) *A Local Law to amend the administrative code of the city of New York and the New York City building code, in relation to bird friendly materials.* The New York City Council.
https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3903501&GUID=21B44B73-D7E1-4C55-83BD-1CA254531416&Options=&Search=

Media

Beatley, Tim (2021) LECTURE: *The Bird Friendly and Biophilic City.* Hosted by Birds on the Niagara, Feb. 13, 2021.
https://www.youtube.com/watch?v=LIX7i8QMkFk

Biophilic Cities, The Bird-Friendly City:
https://www.biophiliccities.org/bird-friendly-city

FLAP Canada (2022) FILM: *When Worlds Collide.* FLAP Canada.
https://www.youtube.com/watch?v=eWcE2YM-rbI

Globe & Mail, 2021:
https://www.theglobeandmail.com/business/article-countermeasures-being-installed-at-td-centre-to-reduce-bird-building/

Katz, Brigit (2019) *New York Is Poised to Require Bird-Friendly Glass on All New Buildings.* Smithsonian Magazine.
https://www.smithsonianmag.com/smart-news/new-york-poised-require-bird-friendly-glass-all-new-buildings-180973760/

Lee, Michael and Zaidi, Deena (2022) *Canadian urban skies turn lethal for migratory birds.* CTV News.
https://storymaps.arcgis.com/stories/25328cfaded4444aaf01cb09c90705a3

Saha, Purbita (2017) *Lights Out for the Texas Skyscraper That Caused Hundreds of Songbird Deaths.* Audubon.
https://www.audubon.org/news/lights-out-texas-skyscraper-caused-hundreds-songbird-deaths

Samuels, Brendon (2022) *The Winding Path of Advocating for Bird Friendly Buildings.* FLAP Canada.
https://flap.org/winding-path-advocating-bird-friendly-buildings/

The Warblers by Birds Canada (2022): PODCAST: *The Bird Friendly City.*
https://thewarblers.buzzsprout.com/1784269/10288117-the-bird-friendly-city

Wetzel, Corryn (2021) *Turning Off Lights at Night Could Halve Bird Deaths On Chicago's Lakeshore.* Audubon.
https://www.audubon.org/news/turning-lights-night-could-halve-bird-deaths-chicagos-lakeshore