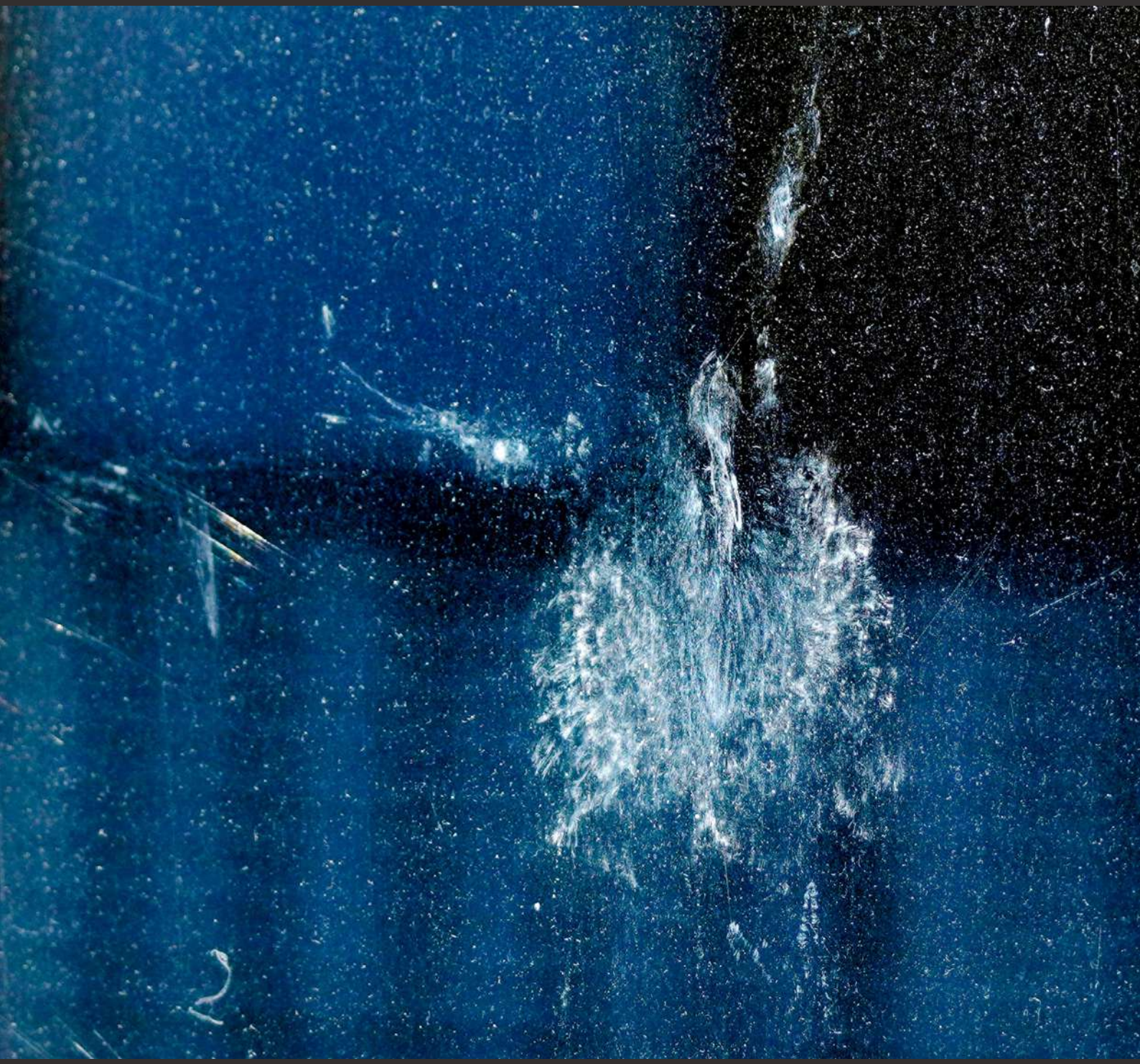
2022–2023

香港鳥撞玻璃報告

Report on Hong Kong Bird–window Collisions



HKBWS
香港觀鳥會

香港觀鳥會成立於1957年，是本港註冊的法定慈善機構，並先後成為國際鳥盟、東亞 —— 澳大利西亞遷飛區伙伴關係，以及國際自然保護聯盟成員。我們一直致力科研、生境管理、教育、環境監察及政策倡議工作，啟發及鼓勵公眾共同欣賞與保護野生雀鳥及其生境，冀達至「人鳥和諧，自然長存」。

The Hong Kong Bird Watching Society (HKBWS) was founded in 1957 and is a public charitable organization in Hong Kong. HKBWS also became a BirdLife International Partner in 2013, a member of The East Asian - Australasian Flyway Partnership in 2020 and a member of International Union for Conservation of Nature and Natural Resources (IUCN) in 2022. HKBWS promotes appreciation and protection of birds and their habitats through research, habitat management, education and conservation advocacy to achieve the vision of “People and birds living in harmony as nature continues to thrive.”

網站 Website： www.hkbws.org.hk
電話 Tel：2377 4387

作者 AUTHOR	黃雪媚、李鍾海、黃樂津 Suet-mei Wong, Chung-hoi Li, Lok-chun Wong
指導 SUPERVISOR	胡明川 Ming-chuan Woo
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香港觀鳥會謹此向超過40位義務調查員、逾50位曾協助報告鳥撞個案的市民和嘉道理農場暨植物園野生動物拯救中心致謝，同時亦感謝所有分享照片和觀察記錄予這份報告的市民。

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1 簡介

本報告整合了本港在2022年9月1日至2023年8月31日期間的「鳥撞玻璃」(下稱鳥撞)數據，並作出分析，旨在提升社會對鳥撞問題的關注，鼓勵公眾和各界參與監察和採取預防鳥撞的行動，推動本港成為鳥類友善的城市。

1 Introduction

This report has compiled Bird-window collisions (referred to as bird collisions below) in Hong Kong from 1 September 2022 to 31 August 2023 and conducted an analysis with the aim of raising public awareness on the issue of bird collisions, encouraging the public and different sectors to take part in monitoring and preventive efforts, and striving for a bird-friendly city in Hong Kong.

1.1 鳥撞玻璃

鳥撞玻璃是指雀鳥無法識別玻璃為障礙物，誤以為可以飛過，因而撞上玻璃結構，使其受傷甚至死亡。

在美國，估計每年有高達10億隻野鳥因鳥撞而死，而南韓則估計每年鳥撞數字為800萬隻。不少外國研究估計，除了生境喪失外，「鳥撞玻璃」奪去的野鳥生命，甚至乎超出電纜、農藥、路殺、風力發電土場等城市陷阱，是導致野生雀鳥非自然死亡的主因之一(Klem 2009, Loss et al. 2014)。

為甚麼雀鳥容易撞上玻璃？首先，鳥類的感官與人類大不同。雀鳥的眼睛大多處於頭部的兩側，令鳥類的單眼視野範圍更闊，但同時雙眼重疊的立體視野範圍就顯然比人類窄很多，令其對距離和空間的判斷力較弱(Martin, 2022, Potier et al., 2020)。此外，雀鳥大多於捕獵或降落時運用立體視覺判斷距離，在飛行時會較留意四周而忽略正前面的玻璃障礙物。再者，部分雀鳥能夠看見人類看不到的紫外光，而某些夜間遷徙的鳥種亦會受藍光等人造光源所吸引從而撞上建築物 (Tan et al., 2024, Lao et al., 2020)。

除了認識雀鳥的身體結構和行為習性，了解以下各種造成鳥撞的人為因素亦極之重要。第一，玻璃能反射自然景象而形成鏡像反射效應，令雀鳥

1.1 Bird-Window Collision

Bird-window collision is defined as a phenomenon where birds fail to recognize glass as a barrier, attempt to pass through and collide with the glass structure in the process. This could result in injury or, in many cases, death.

In the United States, it is estimated that as many as a billion birds die from bird-window collisions, while the number in South Korea has been estimated to be 8 million. Many overseas studies believe bird-window collisions to be one of the leading causes of unnatural death besides habitat loss. The estimated number is even higher than other urban death traps such as power lines, pesticides, roadkills and wind turbines (Klem 2009, Loss et al. 2014).

Why are birds prone to window collisions? First, their senses differ significantly from those of humans. Most birds have eyes positioned at the sides of their heads, which expands the range of their monocular vision but reduces the breadth of their binocular (i.e. three-dimensional) vision compared to humans. Consequently, their perception of distance and three-dimensional space is relatively limited. Birds primarily use binocular vision when hunting for prey or landing, being more attentive to the space around or behind them during flight. This can lead to a failure to recognize glass panes directly ahead as an invisible barrier. Additionally, many birds can perceive ultraviolet (UV) light, which is invisible to humans. Some species, particularly those migrating at night, are attracted to artificial light sources such as blue light and inadvertently collide with buildings as a result (Tan et al., 2024; Lao et al., 2020).

Aside from understanding a bird's morphology and behavioral habits, it is crucial to comprehend the anthropogenic causes behind bird collisions. Firstly, glass reflects natural scenery like a mirror, which can mislead birds into perceiving it as part of the

誤會能夠通過。第二，透明玻璃令雀鳥看見另一面的自然景象而誤會能夠通過。第三，在特定照明條件下令玻璃看起來像能穿過的通道，形成黑洞/通道效應。第四，建築物的燈光在夜間形成燈塔效應，干擾雀鳥在夜間遷徙期間進行定位，導致其迷航甚至誤撞建築物。同時，鳥撞風險亦可能因應各式各樣的因素而有所不同，包括建築物的設計、附近的自然環境、季節、天氣、鳥種等。透過了解鳥撞成因，有助我們尋求減低鳥撞風險的方法。

natural environment. Secondly, birds sometimes fail to recognize transparent glass as a barrier because they can see the natural scenery on the other side. Moreover, specific lighting conditions against glass can create the “black hole effect,” giving birds the impression of a passage where none exists. Additionally, illuminated buildings at night may create a beacon effect that interferes with a bird’s navigation system during migration, leading to confusion and potential collisions with buildings. The risk of bird collision varies under numerous factors, including building design, surrounding natural environment, seasons, weather conditions, taxonomic groups, and species. Therefore, understanding why and how bird collisions occur is crucial to efforts aimed at reducing the risk.

1.2 鳥撞玻璃與公民科學行動

過去，在歐美地區有相對較長歷史和與較多與鳥撞玻璃相關的研究和政策發展。亞洲方面，近年韓國、日本、台灣及中國內地等地區，亦有不同團體展開監察及政策倡議工作。然而在香港，雖有個別民間團體及熱心市民向政府部門舉報零星個案，但鳥撞的監察仍然欠缺持續廣泛的推廣，亦缺乏數據收集和整理，令人無法了解本地鳥撞的情況。

因此，自2021年10月開始，香港觀鳥會響應由FLAP Canada發起的全球關注鳥撞行動，開始在本地宣傳「全球鳥撞地圖」(下稱鳥撞地圖)的應用，鼓勵市民提交懷疑鳥撞個案。首年所接獲的數據雖然不多，但亦有助我們初步辨識出一些潛在鳥撞熱點，以進一步開展定期調查，冀能透過系統地收集詳細鳥撞數據，更深入了解個別地點的鳥撞情況。2022年，我們在本地發起「全民監察鳥撞行動」，除了大幅增加在網上社交平台及本會討論區等媒體的宣傳，亦開始召募義工進行定期鳥撞調查。有賴超過40位義務調查員和超過50位市民的支持，我們在2022年9月1日至2023年8月31日期間透過鳥撞地圖或各種通訊途徑收集到249個報告。

1.2 Bird Collision And Citizen Science

In the past, Europe and America have been recognized for their extensive history and significant amount of research on bird-window collisions. In recent years, various regions in Asia such as South Korea, Japan, Taiwan, and Mainland China have also initiated efforts to monitor and advocate policies on this issue. In the case of Hong Kong, although a few civil organizations and dedicated citizens have reported individual cases to government bodies, there remains a lack of sustained and large-scale promotion of monitoring initiatives and the systematic collection and organization of data, which makes it challenging to evaluate the local situation.

In response to FLAP Canada’s global bird collision awareness campaign launched in October 2021, the Hong Kong Bird Watching Society (HKBWS) heeded the call and began promoting the utilization of the Global Bird Collision Mapper (GBCM) at a local level. This initiative aimed to encourage the public to report bird collision sightings. While the amount of data collected in the initial year was limited, a few potential hotspots were identified for future surveys to systematically gather comprehensive data on bird collisions, and to understand the unique circumstances at each location. In 2022, the Bird Collision Monitoring Campaign was introduced in Hong Kong, intensifying promotion efforts on social media platforms and discussion forums while recruiting volunteers for regular bird collision surveys. With the support of over 40 voluntary surveyors and 50 citizens, a total of 249 reports were received from the GBCM and various other sources.

2
數據收集和分析
DATA COLLECTION AND ANALYSIS

2
數據收集和分析
Data Collection And Analysis

本報告首先透過兩個途徑搜集本港在2022年9月1日至2023年8月31日期間的鳥撞數據，再利用Google Map Pro搜集每個鳥撞建築物的特定環境數據，從而作出基本分析，了解香港全年的鳥撞概況，和探討不同因素對鳥撞的影響。

This report analyzes local bird collision data collected through two different methods from 1 September 2022 to 31 August 2023. Environmental data was then gathered using Google Map Pro for the specific collision sites and buildings. These could facilitate a local understanding of the bird collision in Hong Kong throughout the year and investigate the factors influencing this phenomenon.

2.1 搜集途徑一：定期鳥撞調查
Source 1 : Regular Bird Collision Survey

我們首先從2022年9月前的數據中，篩選出錄得多於1宗懷疑鳥撞個案的地點。2022年至2023年間，我們前後召募並訓練超過60位義工進行定期鳥撞調查。因應義工召募情況，揀選了其中五個潛在鳥撞黑點為調查地點。義務鳥撞調查員在2022年9月至2023年8月，每個月分別在五個指定地點(即美孚、青衣、尖沙咀、中文大學校園、香港大學校園)，按照指定調查路線(約長500至1000米)進行兩至三次鳥撞調查。調查時間設定在早上8時或之前開始，每次調查時長不少於30分鐘。調查範圍包括指定路線所有建築物對外的5米範圍。調查須紀錄所有疑似鳥撞雀鳥個體或拓印(即鳥撞玻璃後在玻璃表面留下的羽粉、羽毛或排泄物等痕跡)的資料，以及相關地理及環境資料，例如GPS位置、天氣、建築物類型、建築物高度、玻璃表面的百分比、反射附近的自然景象等。每條路線平均進行了33次調查，所有鳥撞個體及拓印數據已全數上傳至「全球鳥撞地圖」。

In the initial phase, locations with more than one recorded bird collision case from data collected before September 2022 were selected. Subsequently, 60 volunteers were recruited and trained to conduct regular bird collision surveys from 2022 to 2023. Based on the recruitment condition, five potential hotspots were chosen as survey locations. Between September 2022 and August 2023, our voluntary surveyors carried out 2-3 surveys per month at each transect (approximately 500 to 1000 meters long) of the five specified locations including Mei Foo, Tsing Yi, Tsim Sha Tsui, The Chinese University of Hong Kong (CUHK) campus, and The University of Hong Kong (HKU) campus. The surveys were conducted before 8am in the morning and the survey duration lasted for at least 30 minutes. Areas within 5 metres from facade of all buildings along the transect were also examined during the surveys. Types of data collected included suspected bird collision victims or imprints (i.e. feather dust, feathers, or excrement left on the glass after collision), as well as relevant environmental factors such as GPS location, weather conditions, building type, building height, percentage of glass coverage, and whether the building reflects the surrounding environment. On average, 33 surveys were conducted for each transect, with all suspected cases uploaded to the Global Bird Collision Mapper (GBCM).

2.2 搜集途徑二：「全球鳥撞地圖」資料庫 Source 2 : The Global Bird Collision Mapper Database

「全球鳥撞地圖」是一個全球同步和公開的鳥撞報告平台。本報告從「全球鳥撞地圖」下載所有發生於2022年9月1日至2023年8月31日期間的懷疑鳥撞個案。所有數據須至少具備齊全雀鳥狀態、數目、GPS地點和發現日期的資料，才會被視為有效。換言之一些資料不齊全或重複輸入個數據會被刪除。我們留意到有少部分的數據缺乏具參考性的照片，但考慮報告者所提供的其他資料、描述及其相關經驗，本報告亦會視有關數據為有效。

The Global Bird Collision Mapper(GBCM) is an online, public, and globally synchronized platform where bird collision sightings are documented. This report includes data extracted from the GBCM concerning suspected bird collision incidents from 1 September 2022 to 31 August 2023. Cases were only considered to be valid if they included essential information such as the bird's condition, the number of individuals involved, GPS location, and the date of discovery. Entries with missing data or duplicate sightings were removed. It was noticed that a small percentage of data entries lacked the accompanying photos for reference; however, based on available information, descriptions, or relevant experience, these entries are considered valid in this report.

2.3 搜集環境數據 Collecting Environmental Variables

本報告於Google Map Pro、Google Street View、「Open3Dhk」線上應用平台等公開平台搜集每個鳥撞建築物的相關環境數據，包括建築物高度、建築物玻璃面占比、建築物類型、懷疑撞擊面與對出植被的距離等。當無法透過網上途徑獲取以上環境數據，則會個別進行實地考察。

Utilizing data from public online platforms such as Google Map Pro, Google Street View, and Open3Dhk, the report gathered environmental variables, including building height, glass coverage, building type, and the distance from the suspected point of impact to adjacent vegetation cover. In instances where the required environmental variables could not be obtained from the aforementioned sources, site visits were conducted to collect the necessary data.

2.4 分析數據 Data Analysis

鑑於現時鳥撞玻璃個案的報告量仍未足夠，而且不同地點的調查力度有所不同，每宗個案的資料詳細度亦不統一，未能進行更嚴謹的分析研究。但本報告亦會嘗試採用上面提及有限但珍貴的鳥撞數據，從以下方面初步反映本港鳥撞問題，並探討不同因素可能對鳥撞風險的影響：(i)鳥種、(ii) 季節、(iii)建築物及環境特徵、(iv)鳥撞報告的空間分布。

Given the current insufficient volume of reported cases of bird–window collisions and the varying levels of surveying intensity across different locations, coupled with the inconsistent level of detail provided for each case, a more rigorous analysis could not be conducted. However, this report will seek to utilize the limited yet valuable bird collision data mentioned above to preliminarily address the bird–window collision issue in Hong Kong and explore the potential impact of various factors on the risk of bird collisions from the following perspectives: (i) bird species, (ii) season, (iii) building and environmental characteristics, and (iv) spatial distribution of bird collision reports.

3 結果 RESULTS

3
結果
Results

綜合搜集得來的鳥撞數據，我們共獲得249宗鳥撞報告，包括309隻鳥撞個體，以及69個鳥撞拓印。其中51宗鳥撞報告來自定期鳥撞調查，涉及16隻鳥撞個體及35個鳥撞拓印。

From the collected bird collision data, we had 249 collision cases involving 309 individuals and 69 imprints. Out of these cases, 51 came from our regular bird collision surveys, comprising 16 bird individuals and 35 imprints.

鳥撞拓印即鳥撞玻璃後在玻璃表面留下的羽粉、羽毛或排泄物等痕跡
Bird imprint means the feather dust, feathers or excrement left on the glass after collision

3.1 鳥種 Species

309隻鳥撞個體當中，有284隻死亡，25隻受傷。一共涉及9目，23個科，48種鳥種。當中13種屬於具保育級別物種，數量達88隻，例如全球「極度瀕危」黃胸鵐(IUCN,2022)、屬國家二級保護動物的北鷹鴞及藍喉歌鴝(國家林業和草原局,2021)、在內地列作「近危」的矛斑蝗鶯(蔣志剛等,2016)，以及屬「本地關注」物種的藍歌鴝、小蝗鶯和黑鳽(Fellowes et al., 2002)。

Among the 309 individuals, 284 were found dead, 25 were injured, involving 9 orders, 23 families, and 48 species. This included 13 protected species, accounting for a total of 88 individuals. They are the globally critically endangered Yellow-breasted Bunting (IUCN, 2022), Class II National Protected Species like the Northern Boobook and Bluethroat (National Forestry and Grassland and Administration, 2021), the nationally Near Threatened Lanceolated Warbler (Jiang et al., 2016), and species of Local Concern such as the Siberian Blue Robin, Pallas's Grasshopper Warbler, and Black Bittern (Fellowes et al., 2002).

表格一　在2022年9至2023年8月期間所記錄的鳥撞個體物種及數量。(橙色為保育級別物種)

Table 1　Bird species and numbers recorded in bird collision cases from September 2022 to August 2023. (Protected species highlighted in orange)

目 Order	科 Family	中文名稱 Chinese Name	英文名稱 English Name	學名 Scientific Name	總數 Total
雀形目 Passeriformes (243)	繡眼鳥科 Zosteropidae (109)	栗頸鳳鸝	Indochinese Yuhina	*Staphida torqueola*	71
		暗綠繡眼鳥	Swinhoe's White-eye	*Zosterops simplex*	38
	鵯科 Pycnonotidae (78)	白頭鵯	Chinese Bulbul	*Pycnonotus sinensis*	41
		栗背短腳鵯	Chestnut Bulbul	*Hemixos castanonotus*	30
		紅耳鵯	Red-whiskered Bulbul	*Pycnonotus jocosus*	6
		鵯科	Bulbul sp.	*Pycnonotidae sp.*	1
	鶇科 Turdidae (12)	懷氏地鶇	White's Thrush	*Zoothera aurea*	5
		灰背鶇	Grey-backed Thrush	*Turdus hortulorum*	4
		烏鶇	Chinese Blackbird	*Turdus mandarinus*	1
		烏灰鶇	Japanese Thrush	*Turdus cardis*	1
		白腹鶇	Pale Thrush	*Turdus pallidus*	1
	麻雀科 Passeridae (11)	樹麻雀	Eurasian Tree Sparrow	*Passer montanus*	11
	鶲科 Muscicapidae (9)	北灰鶲	Asian Brown Flycatcher	*Muscicapa dauurica*	2
		藍歌鴝	Siberian Blue Robin	*Larvivora cyane*	2
		藍喉歌鴝	Bluethroat	*Luscinia svecica*	1
		北紅尾鴝	Daurian Redstart	*Phoenicurus auroreus*	1
		紅尾歌鴝	Rufous-tailed Robin	*Larvivora sibilans*	1
		紅喉歌鴝	Siberian Rubythroat	*Calliope calliope*	1
		白眉姬鶲	Yellow-rumped Flycatcher	*Ficedula zanthopygia*	1
	柳鶯科 Phylloscopidae (8)	褐柳鶯	Dusky Warbler	*Phylloscopus fuscatus*	3
		淡腳柳鶯/庫頁島柳鶯	Pale-legged Leaf Warbler /Sakhalin Leaf Warbler	*Phylloscopus borealoides/ Phylloscopus tenellipes*	2
		極北柳鶯	Arctic Warbler	*Phylloscopus borealis*	1
		黃腰柳鶯	Pallas's Leaf Warbler	*Phylloscopus proregulus*	1
		巨嘴柳鶯	Radde's Warbler	*Phylloscopus schwarzi*	1
	蝗鶯科 Locustellidae (5)	小蝗鶯	Pallas's Grasshopper Warbler	*Helopsaltes certhiola*	3
		矛斑蝗鶯	Lanceolated Warbler	*Locustella lanceolata*	2
	鵐科 Emberizidae (4)	黃胸鵐	Yellow-breasted Bunting	*Emberiza aureola*	2
		灰頭鵐	Black-faced Bunting	*Emberiza spodocephala*	1
		小鵐	Little Bunting	*Emberiza pusilla*	1
	梅花雀科 Estrildidae (2)	斑文鳥	Scaly-breasted Munia	*Lonchura punctulata*	1
		白腰文鳥	White-rumped Munia	*Lonchura striata*	1
	噪鶥科 Leiothrichidae (2)	藍翅希鶥	Blue-winged Minla	*Actinodura cyanouroptera*	2
	葦鶯科 Acrocephalidae (1)	東方大葦鶯	Oriental Reed Warbler	*Acrocephalus orientalis*	1

目 Order	科 Family	中文名稱 Chinese Name	英文名稱 English Name	學名 Scientific Name	總數 Total
	樹鶯科 Scotocercidae (1)	鱗頭樹鶯	Asian Stubtail	*Urosphena squameiceps*	1
	花蜜鳥科 Nectariniidae (1)	叉尾太陽鳥	Fork-tailed Sunbird	*Aethopyga christinae*	1
鴿形目 Columbiformes (21)	鳩鴿科 Columbidae (21)	珠頸斑鳩	Spotted Dove	*Spilopelia chinensis*	10
		原鴿	Rock Dove	*Columba livia*	8
		綠翅金鳩	Common Emerald Dove	*Chalcophaps indica*	1
		山斑鳩	Oriental Turtle Dove	*Streptopelia orientalis*	1
		鳩鴿科	Pigeons, Doves	*Columbidae sp.*	1
鴴形目 Charadriiformes (4)	鷸科 Scolopacidae (2)	丘鷸	Eurasian Woodcock	*Scolopax rusticola*	2
	彩鷸科 Rostratulidae (1)	彩鷸	Greater Painted-snipe	*Rostratula benghalensis*	1
	三趾鶉科 Turnicidae (1)	黃腳三趾鶉	Yellow-legged Buttonquail	*Turnix tanki*	1
佛法僧目 Coraciiformes (3)	翠鳥科 Alcedinidae (3)	普通翠鳥	Common Kingfisher	*Alcedo atthis*	3
鵜形目 Pelecaniformes (2)	鷺科 Ardeidae (2)	黑鳽	Black Bittern	*Ixobrychus flavicollis*	1
		黃葦鳽	Yellow Bittern	*Ixobrychus sinensis*	1
鷹形目 Accipitriformes (1)	鷹科 Accipitridae (1)	黑鳶	Black Kite	*Milvus migrans*	1
隼形目 Falconiformes (1)	隼科 Falconidae (1)	遊隼	Peregrine Falcon	*Falco peregrinus*	1
鴞形目 Strigiformes (1)	鴟鴞科 Strigidae (1)	北鷹鴞	Northern Boobook	*Ninox japonica*	1
鵑形目 Cuculiformes (1)	杜鵑科 Cuculidae (1)	噪鵑	Asian Koel	*Eudynamys scolopaceus*	1
不明 Unknown (32)	不明 Unknown (32)	-	-	-	32
				總數 Total	**309**

2022年9月5日，九龍灣發現一隻「極度瀕危」黃胸鵐懷疑在撞玻璃後呆站在地上。

A Critically Endangered Yellow-breasted Bunting was found stunned after suspected window collision in Kowloon Bay on 5 September 2022.

2022年11月，九龍灣發現一隻國家二級保護動物北鷹鴞撞玻璃後重傷不治。
A Class II National Protected Species Northern Boobook died from severe injury after window collision in Kowloon Bay in November 2022.

在美孚港鐵站發現屬國家二級保護動物的紅喉歌鴝。
Class II National Protected Species Siberian Rubythroat was reported at Mei Fu MTR station.

在觀塘有一宗「本地關注」物種黑鳽的懷疑鳥撞報告。
A suspected window collision case of a Black Bittern of Local Concern was reported in Kwun Tong.

接近八成鳥撞個體屬雀形目(243隻)，當中個體數量最多的科為繡眼鳥科和鵯科，分別有109和78隻。錄得最多鳥撞個體的五個鳥種分別為栗頸鳳鸝(71隻)、白頭鵯(41隻)、暗綠繡眼鳥(38隻)、栗背短腳鵯(30隻)和樹麻雀(11隻)。記錄最多的首四個鳥種均會集體遷徙和活動，亦較多出現於集體鳥撞事件(即同一時間發現多於一隻同類鳥種)。

Nearly 80% of the bird collision victims belong to the order Passeriformes (243 individuals), with Zosteropidae and Pycnotidae taking up the largest number with 109 and 78 individuals respectively. The top 5 species in bird collision were the Indochinese Yuhina (71 individuals), Chinese Bulbul (41 individuals), Swinhoe's White-eye (38 individuals), Chestnut Bulbul (30 individuals) and Eurasian Tree Sparrow (11 individuals). The top 4 species are all gregarious with a tendency to migrate together, and more prone to group collision events (i.e. more than one individual of the same species found together at the scene).

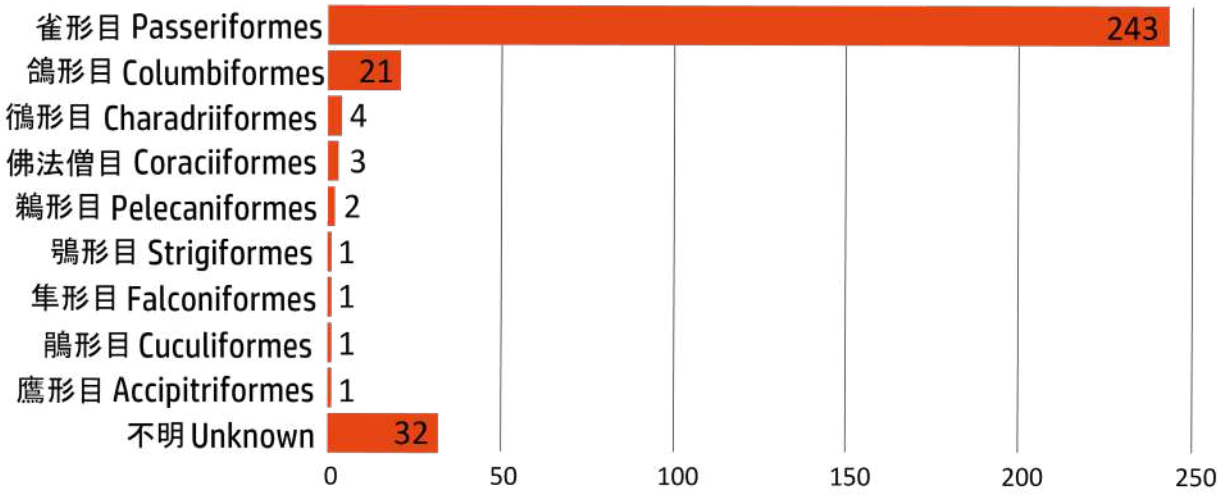
有最近研究指出遷徙候鳥更容易發生鳥撞，從而解釋遷徙季節出現更高的死亡率(Arnold & Zink 2011, Sabo et al. 2016, Hager et al. 2008, Hager et al. 2008)。在北半球發生鳥撞事件所牽涉的物種中，有超過70%屬於候鳥(Loss et al. 2014, Parkins et al. 2006)。根據本報告的記錄，約61.4%的鳥撞個體屬於候鳥，如栗頸鳳鸝、北灰鶲及矛斑蝗鶯；約17.2%個體屬留鳥，如珠頸斑鳩、樹麻雀及紅耳鵯；其餘約21.4%屬留鳥/候鳥，如暗綠繡眼鳥。

Recent studies have pointed out a higher susceptibility of migratory species to collisions, explaining the greater fatality rate during migratory season (Arnold & Zink 2011, Sabo et al. 2016, Hager et al. 2008). Furthermore, over 70% of the bird species involved in collisions in the Northern Hemisphere are in fact migratory (Loss et al. 2014, Parkins et al. 2006). According to our own records, 61.4% of the species we recorded are migratory, such as Indochinese Yuhina, Asian Brown Flycatcher and Lanceolated Warbler; with 17.2% classified as residents, such as Spotted Dove, Eurasian Tree Sparrow and Red-whiskered Bulbul; and the remaining 21.4% either residents or migrants such as Swinhoe's White-eye.

在中文大學邵逸夫夫人樓接駁何善衡工程學大樓的行人天橋玻璃欄杆旁發現栗頸鳳鸝。
An Indochinese Yuhina was found next to the glass railing of the bridge connecting Lady Shaw Building and Ho Sin-Hang Engineering Building.

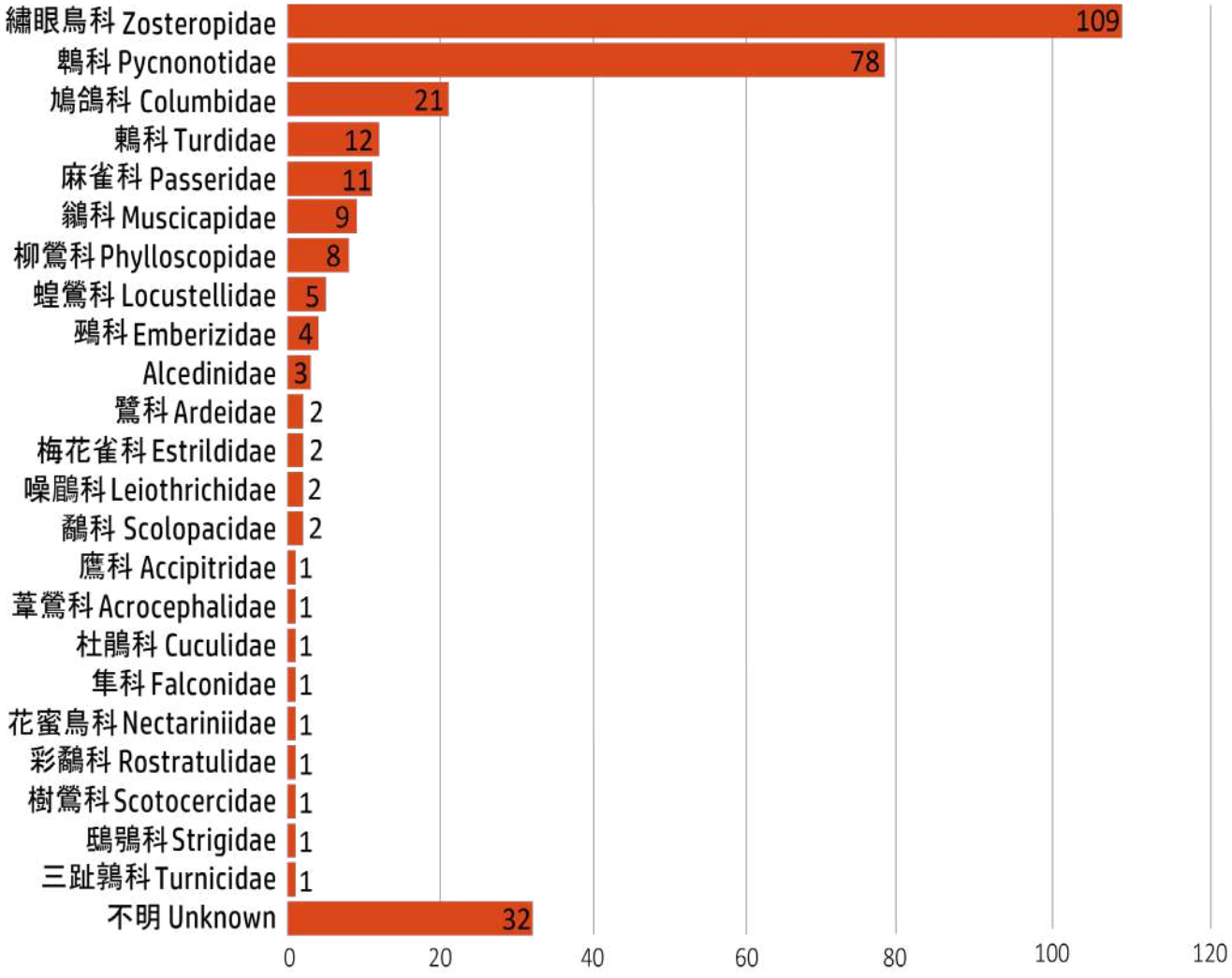
圖表一 2022年9至2023年8月期間記錄的鳥撞個體所屬的目及其數量

Graphic 1 Different orders and numbers of corresponding window collision victims recorded from September 2022 to August 2023



圖表二 2022年9至2023年8月期間記錄的鳥撞個體所屬的科及其數量

Graphic 2 Different families and numbers of corresponding window collision individuals recorded from September 2022 to August 2023



專題一 中文大學圓夢臺案例
BOX 1 Case Study of Terrace of Dreams at CUHK

2022年11月10日在中文大學伍宜孫書院圓夢臺發生一宗集體鳥撞事件，至少35隻白頭鵯懷疑因撞向透明玻璃欄杆而死。值得留意的是玻璃約1米的範圍有矮樹及盆栽，而透明玻璃的後方則是佈滿自然植被的山坡，相信這群白頭鵯為候鳥，在秋季集體遷徙時因看見玻璃後方的自然景象，誤以為能夠穿過而誤撞玻璃致死。

A group collision event occurred in Terrace of Dreams at Wu Yee Sun College, CUHK in November 2022, with at least 35 Chinese Bulbuls found dead after colliding with a row of glass railings. It is worth noting that there are short trees and planters roughly 1 metre away from the glass surface, and a natural hillside right behind the glass. We believed these birds were migrating together as a group during the autumn migration, seeing natural hillside through the glass panes and colliding with the invisible barrier on their way there.

專題二 北角AIA Tower案例
BOX 2 Case Study of AIA Tower in North Point

2022年12月3日，北角AIA Tower錄得10隻栗頸鳳鸝懷疑集體撞玻璃致死。該面大廈採用鏡面玻璃幕牆，距離最近的樹木約20米，因此懷疑牠們於集體遷徙時被反光玻璃所反射的樹或天空所誤導。

On 3 December 2022, 10 Indochinese Yuhina were found dead at AIA Tower, North Point and were suspected related to window collision. The building has reflective glass facades and the nearest trees were only 20 meters away, thus we believed that the birds were migrating together when they were misled by the image of trees or sky in the glass.

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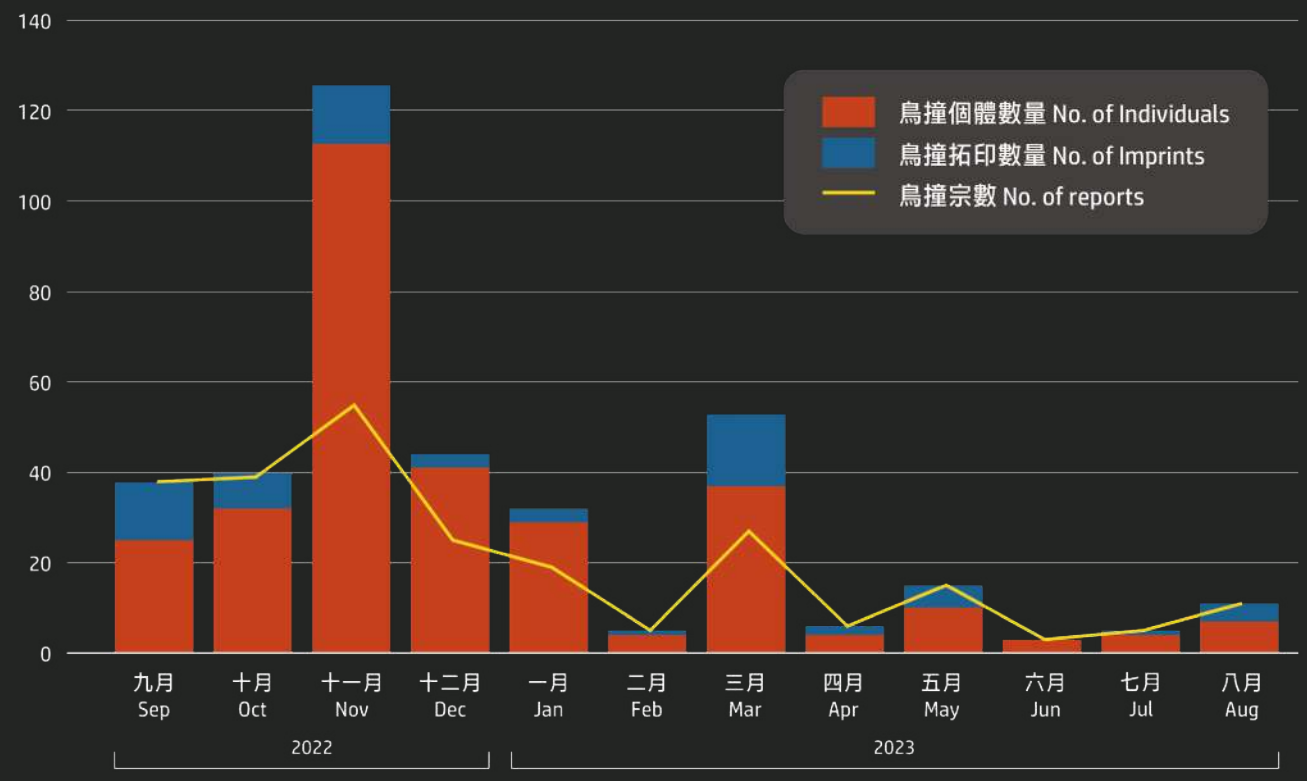
3.2 季節 Season

本報告採用了2022年9月至2023年8月的數據，覆蓋了春秋過境遷徙季、冬季及夏季。當中，11月所錄得的鳥撞個體數字最高，共錄得113隻；其次為12月和3月，分別錄得41隻和37隻。

This report comprises of data collected from September 2022 to August 2023, covering the spring and autumn passage migration, winter and summer. Within the four seasons, the highest number of bird collision victims were recorded in November with 113 birds, followed by December and March with 40 and 37 birds respectively.

圖表三 2022年9月至2023年8月期間每月的鳥撞數字及報告量。

Graphic 3 Number of bird-window collisions and reports recorded each month from September 2022 to August 2023.



2022年11月是錄得最多鳥撞的月份，估計與秋天遷徙季節和度冬季節有關。2022年11月錄得了七宗集體鳥撞玻璃事件，其中三宗更是五大集體鳥撞事件之一：11月10日在中文大學伍宜孫書院圓夢臺的35隻白頭鵯鳥撞事件、11月30日14隻栗頸鳳鸝在觀塘海濱道One Harbour Square懷疑因撞向玻璃幕牆死亡及受傷，以及11月14日有11隻栗背短腳鵯在金鐘太古廣場三座懷疑因撞向玻璃幕牆死亡。

November is the peak month for bird collision records, very possibly related to the autumn migration and wintering season. 7 group collision cases were recorded in November 2022 alone, with 3 of them considered to be the 5 biggest group collision events of 2022. There were 35 Chinese Bulbuls at Wu Yee Sun College, CUHK on the 10th, 14 Indochinese Yuhinas at One Harbour Square, Kwun Tong on the 30th, and 11 Chestnut Bulbuls at Three Pacific Place on the 14th.

12月亦錄有三宗集體鳥撞玻璃事件，分別是炮台山友邦廣場的10隻栗頸鳳鸝、鰂魚涌嘉里中心的6隻暗綠繡眼鳥和屯門V City的5隻栗頸鳳鸝。

Three group collision events were also recorded in December, with 10 Indochinese Yuhinas at the AIA Tower in Fortress Hill, 6 Swinhoe's White-eyes at Kerry Centre in Quarry Bay and 5 Indochinese Yuhinas at V City, Tuen Mun.

2023年3月亦錄有三宗集體鳥撞玻璃事件，其中一宗涉25隻栗頸鳳鸝，發現在沙田香港科學園17W及19W號大樓。

Three group collision events were recorded in March 2023, including a group of 25 Indochinese Yuhinas found at the buildings 17W and 19W at the Hong Kong Science Park, Sha Tin.

栗頸鳳鸝為香港的候鳥，白頭鶇及栗背短腳鶇在香港的居留狀態屬於候鳥或留鳥，牠們均會集體遷徙和活動。

Indochinese Yuhina is a regular migrant to Hong Kong, while Chinese Bulbuls and Chestnut Bulbuls occur in Hong Kong as both residents and migrants. The three above species are all gregarious and have been noted to migrate and forage in flocks.

專題三 觀塘One Harbour Square案例
BOX 3 Case Study of One Harbour Square in Kwun Tong

2022年11月在觀塘駿業街One Harbour Square對出有14隻栗頸鳳鸝，懷疑在集體移動時被反光玻璃反射的影像所誤導而撞向玻璃幕牆。當中有10隻死亡，4隻受傷。這種鳥種喜愛群居及集體活動，是香港常見的冬候鳥。

In November 2022, 14 Indochinese Yuhinas were found dead or injured at Tsun Yip Street, Kwun Tong, just outside One Harbour Square. Possibly misled by an image of the skyline in the reflective glass panes as they were flying as a flock, and ended up colliding with the glass facades. Among them, 10 individuals were found dead with 4 injured. This species is regarded as a gregarious winter visitor in Hong Kong.

3.3 建築物特徵及附近植被 Building Characteristics and the Surrounding Vegetation

有研究認為低矮建築物因為能反射植被而比高樓建築物更容易發生鳥撞玻璃(Loss et al. 2014, Evans Ogden 1996)。根據「全球高層建築和城市人居委員會(CTBUH)」2023年的資料，香港是全球排名第一擁有最多大樓高達150米的城市，有553座之多，超過第二名的深圳(367座)和第三名的紐約(314座)。因此，進一步探討鳥撞在不同建築物高度發生的可能因素，相信更有助回應香港本地情況。

Some studies believe that shorter buildings cause more cases of bird collision because of how they reflect the surrounding vegetation (Loss et al. 2014, Evans Ogden 1996). According to data from the Council of Tall Buildings and Urban Habitat (CTBUH) in 2023, Hong Kong came first in the number of buildings exceeding a height of 150 meters, with 553 of such buildings in total. More than Shenzhen which came second with 367 buildings and New York which has 314. Therefore, exploring the possible factors behind bird collisions at different building heights is undoubtedly more constructive when addressing the situation here in Hong Kong.

本報告透過Google Map Pro、Google Street View、「Open3Dhk」線上應用平台等公開平台，搜集所有涉事建築物的高度、建築物玻璃面占比、建築物類型、懷疑撞擊面與對出植被的距離等環境數據。

Through public online platforms such as Google Map Pro, Google Street View and Open3Dhk, this report collected information on the surrounding environment such as the height of buildings involved, glass coverage, building type, as well as distance between the suspected collision surface and the related vegetation.

在378次懷疑鳥撞(309隻鳥撞個體及69個拓印)中，總共涉及的建構物有超過110個(詳見附錄一建築物清單)。本報告將這些建築物的高度分成三類，包括低矮建築物(即1–3層高)、中層建築物(即4–11層高)和高樓建築物(高於11層)。這三種建築物高度類別分別錄得鳥撞個體及拓印的總數量分別是143、84和151，反映不同建築物高度亦存在鳥撞風險。

More than 110 structures (for details please refer to the list of buildings in Appendix 1) were involved in the 378 suspected bird collision cases (309 individuals and 69 imprints). This report classifies structures into three categories, low–rise (1 to 3 storeys tall), mid–rise (4–11 storeys tall) and high–rise (more than 11 storeys). The numbers of bird collision victims and imprints recorded at these three height profiles are 143, 84 and 151 respectively, which shows buildings of different heights all share a potential risk of bird collision.

表格二 各類建築物高度所接獲的懷疑鳥撞個體及拓印數量

Table 2 The number of suspected bird window collision bird(s) and imprint(s) at different building heights

建築物高度 Building Height	數量 No. of Structure(s)	鳥撞個體數量 No. of individual(s)	鳥撞拓印數量 No. of imprint(s)
低矮建築物（1-3 層高） Low-rise Building（1-3 stories）	26	115	28
中層建築物（4-11 層高） Mid-rise Building（4-11 stories）	29	47	37
高樓建築物（11 層高以上） High-rise Building（above 11 stories）	58	147	4
總數 Total	**114**	**309**	**69**

運用Rstudio將上述環境數據進行多元因子分析(Multiple Factor Analysis)的統計分析後，發現鳥撞會因應不同的建築物高度、與植被的距離、以及玻璃覆蓋率而呈現不同的規律。詳細多元因子分析結果可參閱附錄二。

Data on different environmental characteristics were inputted into RStudio where a Multiple Factor Analysis (MFA) was employed. It is found that bird collisions exhibit different patterns associated with building height, distance to trees, and glass coverage. Refer to Appendix 2 for more details about the MFA results.

綜合結果顯示，高樓建築物及低矮建築物估計分別在兩種情景下引致鳥撞發生。在高樓建築物發生的鳥撞，其撞擊面往往有較高的玻璃覆蓋率，而與對出植被的距離則較遠。在151個涉及高樓建築物的鳥撞記錄中，大多數牽涉的建築物類型為玻璃幕牆。這些與高樓建築物相撞的雀鳥，估計正於香港較高空處進行較為長途的飛行，並將大範圍的玻璃幕牆誤以為是天空或自然景觀的一部分，以致不太受附近的植被狀況影響。

The results suggest that bird collisions at low-rise buildings and high-rise buildings could result from two different scenarios. The collisions with high-rise buildings were associated with higher glass coverage and lower proximity to vegetation. Additionally, among the 151 tall-building collisions, it often associated with glass facades than other types of structures. Birds colliding with high-rise buildings are likely undergoing long-distance flights at greater heights in Hong Kong and mistakenly perceive the large coverage of light-reflecting glass facades as the extensive skyline or landscape, leading to collisions that can occur independently of surrounding vegetation.

專題四 長沙灣時裕中心案例
BOX 4 Case Study of Ardour Centre in Cheung Sha Wan

2022年12月，一隻栗背短腳鵯懷疑在長沙灣時裕中心發生鳥撞玻璃致死。此建築物高於一百米，撞擊面對出50米皆為樓宇建築，並無任何植被，但其外牆有超過八成採用反光玻璃物料，能反射出天空景象，相信雀鳥在較高處飛行時誤以為能飛過而誤撞玻璃致死。

A Chestnut Bulbul was found dead after a suspected window collision, outside Ardour Centre in Cheung Sha Wan in December 2022. The building reaches a height of over 100m, surrounded by buildings and devoid of any vegetation within 50m from the glass surface. However, over 80% of its external surface is reflective glass, and it is believed that birds flying at a greater height mistook the reflected image of the sky and collided with the glass.

表格三　植被與懷疑撞擊面的距離以及其懷疑鳥撞個體和拓印的數量

Table 3 The number of suspected bird window collision bird(s) and imprint(s) when the distance between suspected collision surface and the related vegetation varies

懷疑撞擊面與對出植被的距離 The distance between suspected collision surface and the related vegetation	鳥撞個體數量 No. of individual(s)	鳥撞拓印數量 No. of imprint(s)	總數 Total
1-10 米（metre）	144	55	199
11-20 米（metre）	99	10	109
21-30 米（metre）	7	0	7
31-40 米（metre）	16	1	17
41-50 米（metre）	9	3	12
51 米或以上（metre）or more	34	0	34

反之，在低矮建築物發生的鳥撞，該撞擊面與對出植被的距離往往較近，而其玻璃覆蓋率則相對較低。這些與高樓建築物相撞的雀鳥估計多正於樹叢之間進行短距離低飛。在這情況下，即使該建築物的玻璃面占比不高，一旦該玻璃能夠反射出周圍的樹叢，便會形成誤導雀鳥的假像，導致鳥撞發生。

除了具反射效果的玻璃，一些透明玻璃建構物，例如玻璃天橋、隔音屏障或玻璃欄杆等，都會令雀鳥誤以為能夠穿過而撞上玻璃。

總括而言，不同高度和類型的建築物會對在不同高度飛行的雀鳥構成威脅，因此在城市規劃時慎重考慮建築物的設計和設置對緩減鳥撞風險至關重要。

In contrast, collisions with shorter structures were linked to a closer proximity to vegetation and smaller glass coverage. Birds colliding with low-rise buildings or structures are likely flying low and taking short-distance flights across vegetation. Under this circumstance, a structure with relatively low glass coverage can still create a misleading visual cue for birds and lead to collisions when it reflects images of the surrounding greenery.

Apart from reflective glass, other transparent glass structures, such as glass bridges, noise barriers, or glass railings, can also create see-through images that mislead birds into attempting to pass through.

Overall, buildings of different heights pose collision threats to birds flying at various heights. Therefore, it is crucial to consider building design and placement in urban planning to mitigate bird collisions.

專題五 中文大學校園鳥撞概況
BOX 5 Overview of bird collisions at CUHK campus

中文大學在七個建築物記錄到一共30宗懷疑鳥撞個案，包括42隻個體和28個拓印。這些建築物的高度大致在20米以下，均屬於低矮或中層建築物，分別採用了玻璃欄杆、行人天橋、玻璃窗和幕牆等設計。在懷疑玻璃撞擊面對出20米內均有植被，相信雀鳥在較低處活動時誤撞玻璃致死。

A total of 30 cases of suspected bird collisions were recorded at 7 buildings in CUHK, involving 42 individuals and 28 imprints. These structures were all less than 20 meters tall and were classified as low-rise or mid-rise buildings with glass railings, glass bridges, window panels and glass facades. Vegetation cover was present within 20-meter from the suspected impact surface, and we believed that the birds collided into glass while moving around at lower elevations.

康本國際學術園的透明玻璃欄杆錄得12個鳥撞拓印。
The transparent railing at Yasumoto International Academic Park was recorded with 12 bird imprints.

3.4 鳥撞報告數量的空間分布 Spatial Distribution Of Bird Collision Reports

整合309隻鳥撞個體和69個鳥撞拓印的發現地點，在全港18區中，16個區均有鳥撞記錄分佈。現時公眾隨機報告和定期調查所覆蓋的地方相當有限，而各區的調查力度亦不同，因此無法反映及比較全港各區的鳥撞實況。例如定期調查覆蓋了部分美孚港鐵站、青衣港鐵站及青衣城、尖沙咀彌敦道、中文大學校園及香港大學校園，錄得的鳥撞個體和拓印數量平均佔該地點全年錄得數量的四分之三(詳見表格四)。因此以下內容和圖表只會就不同分區作出初步描述，而非旨在反映全港各區的實際鳥撞分佈。

All 309 bird collision victims and 69 imprints were found in 16 out 18 of Hong Kong's districts. Due to the limited geographic range covered by random public reports and our regular surveys, together with varying surveying intensities in different districts, the number of bird collision cases recorded does not reflect the actual situation in Hong Kong and cannot be compared between districts. For example, around three quarters of bird collision individuals and imprints recorded in Mei Foo MTR station, Tsing Yi MTR station, Nathan Road Tsim Sha Tsui, CUHK campus and HKU campus actually came from our regular surveys (Table 4). Therefore, the following content and table only serve as a snapshot and preliminary description of the distribution, instead of directly assuming the actual distribution in different districts.

表格四 2022年9月至2023年8月，在五個地點分別通過定期鳥撞調查及全球鳥撞地圖公眾報告所收集的鳥撞數字。

Table 4 Total number of individuals and imprints at the five regular survey locations, collected from our regular bird collision surveys and the GCBM from September 2022 to August 2023.

地點 Location	定期鳥撞調查數據 Regular Bird Window Collision Surveys		全球鳥撞地圖數據 Global Bird Collision Mapper	總數 Total
	個體數量 No. of individual(s)	鳥撞拓印數量 No. of bird imprint(s)	個體數量 No. of individual(s)	
美孚 Mei Fu	3	25	5	33
青衣 Tsing Yi	10	4	1	15
尖沙咀 Tsim Sha Tsui	6	4	3	13
中文大學 CUHK	5	28	37	70
香港大學 HKU	7	4	4	15

報告量最多的地區為沙田區(40宗)、港島東區(39宗)及深水埗區(36宗)。沙田區的報告主要來自定期鳥撞調查，佔七成。港島東區及深水埗區的報告則全數來自公眾參與。

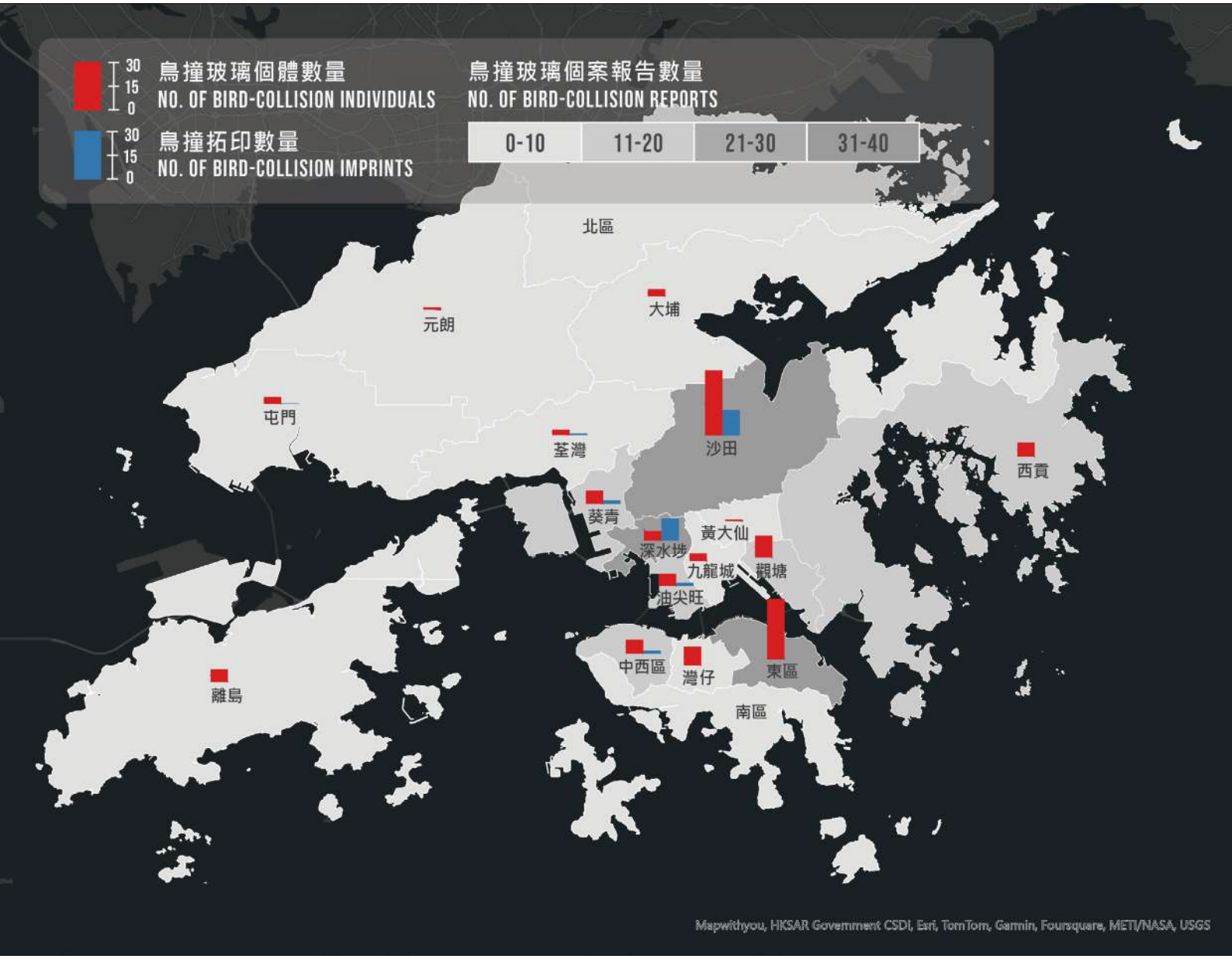
The largest number of reports came from Sha Tin District (40 cases), Eastern District (39 cases), and Sham Shui Po District (36 cases). Most of the reports (70%) in Sha Tin District came from our regular surveys, while the reports from Eastern and Sham Shui Po District all came from public sightings.

錄得最多鳥撞個體和拓印的五個地區分別為沙田區(73隻及29個)、東區(68隻)、深水埗區(11隻及25個)觀塘區(25隻)及灣仔區(21隻)。

The largest number of bird collision victims and imprints came from Sha Tin District (73 individuals, 29 imprints), Eastern District (68 individuals), Sham Shui Po District (11 individuals, 25 imprints), Kwun Tong District (25 individuals) and Wan Chai District (21 individuals).

圖表四 2022年9月至2023年8月期間各區的鳥撞玻璃報告數量及鳥撞數字。地圖上不同地區的灰色愈深色表示其報告數量愈多。地圖上的棒形圖則代表各區記錄鳥撞個體(紅色)和鳥撞拓印(藍色)的數字。

Graphic 4 Number of bird collision reports and counts from various districts from September 2022 to August 2023. A darker shade of grey correlates to a higher number of reports in that certain district. The bar charts represent the number of bird collision victims (red) and imprints (blue) respectively.



除了沙田區及深水埗區分別有在中文大學和美孚地鐵站進行定期調查外，其餘三個最高鳥撞記錄的地區都是來自公眾報告。

Other than Sha Tin and Sham Shui Po Districts where we held our regular surveys in CUHK and Mei Foo station, records from the remaining top 3 districts all came public reports.

沙田區的記錄主要來自中文大學及火炭路兩個地點。除了前述在中文大學的35隻白頭鵯集體鳥撞事件外，在火炭路的隔音屏障亦有5隻栗頸鳳鶥及1隻珠頸斑鳩，於11月懷疑因撞向透明隔音屏障死亡。

Most of the reports in Sha Tin District came from CUHK and Fo Tan Road. Other than the aforementioned 35 Chinese Bulbul group collision case, 5 Indochinese Yuhinas and a Spotted Dove were also found dead at a noise barrier at Fo Tan Road in November, from a suspected collision with the transparent barrier.

東區的記錄則來自多個地點。除了北角AIA Tower的集體鳥撞事件，在一年內亦於鰂魚涌的嘉里中心、天后的百樂商業中心及北角政府合署，分別記錄了22、11和6隻鳥撞個體。

The records in the Eastern District came from a number of places. Aside from the group collision event at AIA Tower in North Point, 22, 11 and 6 bird victims were recorded at Kerry Centre in Quarry Bay, Park Commercial Centre in Tin Hau and North Point Government Offices respectively.

深水埗區的記錄主要來自美孚地鐵站(8隻個體和25個拓印)。其餘三隻個體則在荔枝角至長沙灣一帶商業區發現。

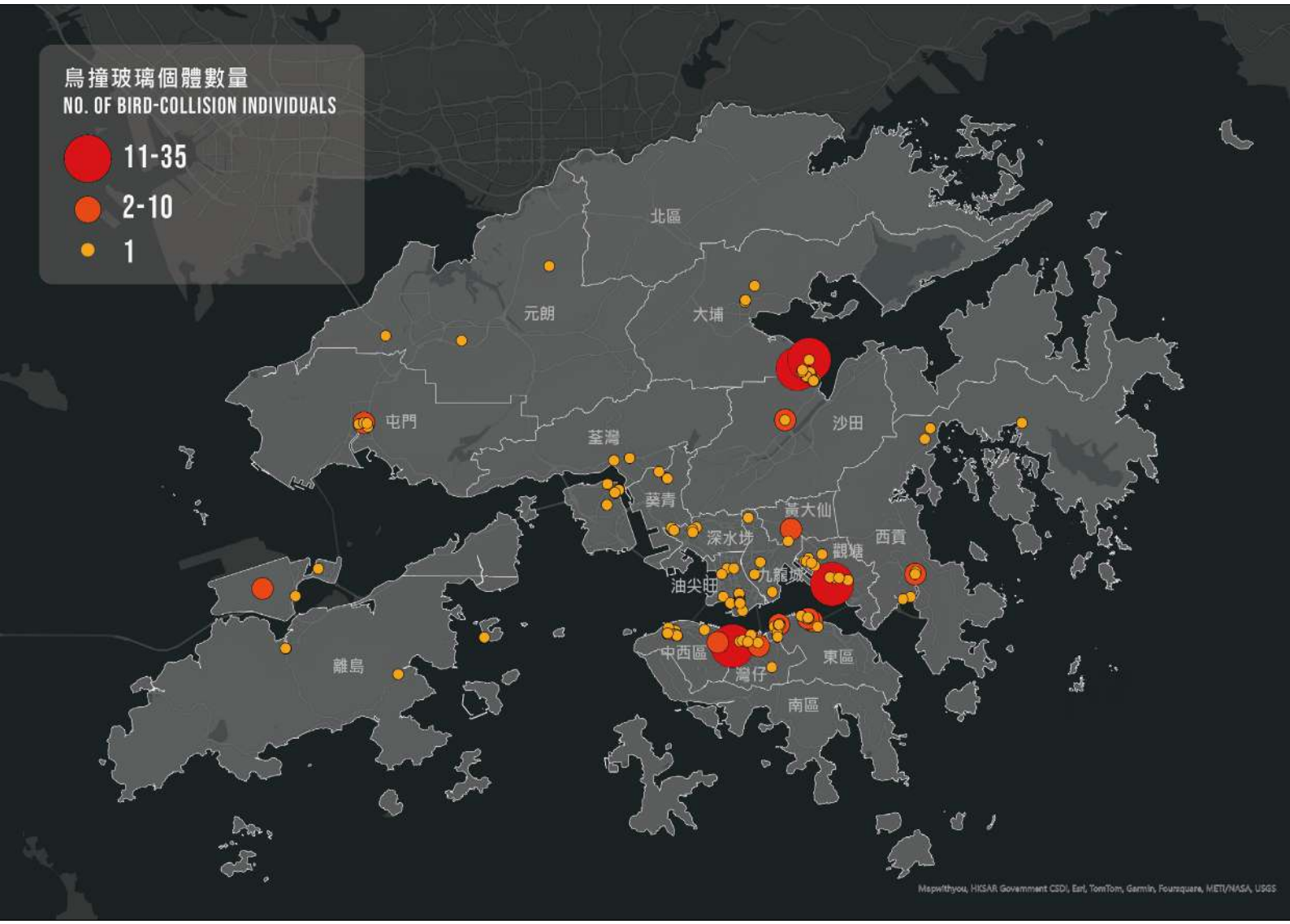
Records in Sham Shui Po District mainly came from Mei Foo MTR station (8 individuals and 25 imprints). The remaining three birds were found in the commercial area spanning across Lai Chi Kok and Cheung Sha Wan.

觀塘區的數據主要來自一宗One Harbour Square的集體鳥撞事件(14隻個體)。其餘11隻分別發現於10座位於九龍灣至觀塘一帶的商業/混合高樓建築物。

Most of the victims in Kwun Tong District came from a group collision case at One Harbour Square (14 individuals), with the remaining 11 birds found at 11 commercial/ mixed-use high-rise buildings around Kowloon Bay and Kwun Tong area.

圖表五 2022年9月至2023年8月期間所記錄的鳥撞玻璃個體分佈。

Graphic 5 Distribution of bird-window collision individuals recorded from September 2022 to August 2023.



表格五 2022年9月至2023年8月間，全港十八區接獲的報告數量及鳥撞數字。

Table 5 Number of bird-window collision cases and their corresponding individuals and imprints reported in 18 districts of Hong Kong from September 2022 to August 2023.

分區 District		報告數量 No. of Report(s)	個體數字 No. of Individual(s)	鳥印數量 No. of bird imprint(s)
沙田區	SHA TIN	40	73	29
東區	EASTERN	40	68	0
深水埗區	SHAM SHUI PO	36	11	25
觀塘區	KWUN TONG	12	25	0
灣仔區	WAN CHAI	8	21	0
中西區	CENTRAL & WESTERN	19	16	4
葵青區	KWAI TSING	19	15	4
油尖旺區	YAU TSIM MONG	18	14	4
西貢區	SAI KUNG	14	16	0
離島區	ISLANDS	10	14	0
九龍城區	KOWLOON CITY	9	9	0
屯門區	TUEN MUN	5	8	1
大埔區	TAI PO	8	8	0
荃灣區	TSUEN WAN	7	6	2
元朗區	YUEN LONG	3	3	0
黃大仙區	WONG TAI SIN	1	2	0
北區	NORTH	0	0	0
南區	SOUTHERN	0	0	0
總數 **Total**		**249**	**309**	**69**

專題六 香港大學主校園案例
BOX 6 Case Study of HKU campus

香港大學主校園位於薄扶林毗鄰龍虎山郊野公園。義務調查員曾於主圖書館發現一隻普通翠鳥因撞向玻璃而死，該位置離荷花池不遠，玻璃幕牆亦能反射周圍樹木的影像。另外，在百周年校園有開放式中庭的設計，綠化庭院被玻璃建築包圍。義務調查員於這地點發現一共5隻鳥撞個體，包括矛斑蝗鶯和暗綠繡眼鳥等雀鳥。

The University of Hong Kong main campus is situated at Pok Fu Lam, adjacent to Lung Fu Shan Country Park. A Common Kingfisher was found dead outside of the Main Library, which is adjacent to a small pond. The glass facades could reflect the surrounding trees. Besides, the Centennial campus has an open atrium which is surrounded by glass facades. A total of 5 individuals including Lanceolated Warbler and Swinhoe's White-eye were reported by our surveyors.

在主圖書館發現的普通翠鳥。
A Common Kingfisher was found at Main Library.

百周年校園的綠化中庭發現矛斑蝗鶯。
A Lanceolated Warbler was found at green atrium in the Centennial campus

專題七 大埔那打素醫院案例
BOX 7 Case Study of the Nethersole Hospital in Tai Po

大埔那打素醫院毗連全安路公園及八仙嶺郊野公園。醫院C座曾發現六隻懷疑鳥撞個體，包括藍歌鴝、極北柳鶯、褐柳鶯等候鳥。醫院C座樓高22米左右，其向西的玻璃幕牆能反射出20米內的樹木和草叢。在通往雅麗氏何妙齡那打素醫院員工中心的玻璃行人天橋下亦曾發現一隻烏鶇懷疑鳥撞死亡。

The Nethersole Hospital in Tai Po is adjacent to Chuen On Road Garden and Pat Sin Leng Country Park. Six suspected window collision victims were found at Building C of the hospital, including migratory birds such as Siberian Blue Robin, Arctic Warbler and Dusky Warbler. This building is about 22m high with west-facing glass facades reflecting the tree and shrubs within a 20m distance. A Chinese Blackbird was also found at the Alice Ho Miu Ling Nethersole Hospital Staff Centre, suspected to have died from a window collision.

在醫院C座附近發現的藍歌鴝(上)和極北柳鶯(下)。
A Siberian Blue Robin (Above) and Arctic Warbler (Below) were found near Block C of the hospital.

專題八 來自救傷機構的記錄
BOX 8 Records from the rescue organization

除了「全球鳥撞地圖」資料庫和定期調查，我們感謝嘉道理農場暨植物園分享一些與鳥撞玻璃的救傷資料。嘉道理農場暨植物園在1994年建立野生動物拯救中心，是香港唯一一家非政府團體擁有漁農自然護理署所發出的特別許可證以進行野生動物拯救。

根據嘉道理農場暨植物園提供的資料，野生動物拯救中心在2022年9月至2023年8月期間，一共接收了162隻疑因撞擊而受傷的雀鳥，但當中能夠透過有效的環境資訊(例如發現地點的環境照片、實際GPS位置或發現者的描述)以確定該雀鳥是因鳥撞玻璃而受傷的只有16隻，當中9隻在治療後成功野放，7隻死亡。這些鳥撞玻璃個體的傷患包括頭部外傷或頭部撞擊導致的神經症狀，身體失去控制能力、眼睛出現腫脹/血腫甚至眼球破裂、翼部/肩部/足部骨折或脫位、喙部骨折、內部創傷導致的內出血氣囊破裂引致呼吸困難、失去飛行能力等。

以上數據顯示雀鳥在撞擊玻璃後所受的傷害可大可小，急需專業診治。因此，市民如發現野鳥懷疑因撞擊而受傷，請盡快聯絡合法的動物救援組織安排動物救援，例如致電愛護動物協會24小時緊急熱線(2711 1000)或漁農自然護理署(1823)，或於自行運送受傷動物到新界大埔林錦公路嘉道理農場暨植物園，他們24小時均會接收動物，辦公時間外接收的動物會被安置到備有供暖和供氧的設施休息，待早上接受復育團隊檢查。

Other than the GBCM database and our regular surveys, we thank the Kadoorie Farm and Botanical Garden (KFBG) for sharing their information about the rescue experiences related to window collisions. The Wild Animal Rescue Centre (WARC) was established by KFBG in 1994, also known as the only non-governmental organization in Hong Kong with a special license issued by the Agriculture, Fisheries and Conservation Department for wildlife rescue.

According to the information provided by KFBG, WARC received a total of 162 birds suspected of being injured due to collisions from September 2022 to August 2023, but only 16 were confirmed as window collision victims based on valid environmental information (such as pictures, exact GPS location or description of where the bird was found). Of which 7 died and 9 were successfully released back into the wild after rehabilitation. Types and symptoms of injuries include neurological symptoms caused by head trauma or head impact, loss of body control, eye swelling/hematoma or even eyeball rupture, wing/shoulder/foot fracture or luxation, beak fracture, internal trauma causing internal bleeding, air sac rupture causing breathing difficulties, loss of flight ability, etc.

The above illustrates the various degrees of injury a bird may suffer after collision, which stresses the urgent need for professional treatment by a trained vet. Therefore, if anyone happens to find any birds that appears to be injured from a collision, please contact an authorized animal rescue organization for assistance, such as calling the 24-hour emergency hotline of the Society for the Prevention of Cruelty to Animals (SPCA) at 2711 1000; or contacting the Agriculture, Fisheries and Conservation Department (AFCD) at 1823; or transporting the injured animal in person to KFBG at Lam Kam Road, Tai Po, New Territories. Animals are accepted 24 hours at KFBG, and animals received after working hours will be placed in facilities equipped with heating and oxygen supply to rest, and will be inspected by the rehabilitation team in the next morning.

雖然只有16隻能確定為鳥撞玻璃個體，其餘146隻受傷雀鳥則無從判斷，但以上資料對於我們了解鳥撞實況亦有幫助。這16隻鳥撞雀鳥涉12種鳥種，當中有四種在「全球鳥撞地圖」資料庫未曾被記錄，包括鳳頭鷹、日本松雀鷹、大擬啄木鳥和家八哥。另外，在16個個案中只有不到兩成個案(3隻)已由市民上載至「全球鳥撞地圖」，而其餘13隻則由於缺乏GPS位置和環境照片而未能上載。這亦顯示本港需要更廣泛的教育推廣，讓更多公民認識且參與報告鳥撞玻璃。

While only 16 birds were identified as victims of bird-window collision and the cause of injury was unknown in the other 146, the above information is extremely helpful for our understanding of the actual situation of bird collision. These 16 birds composed of 12 species, with 4 species previously unrecorded on the GBCM database, namely Crested Goshawk, Japanese Sparrowhawk, Great Barbet and Common Myna. Furthermore, less than 20% of the 16 cases (i.e. 3 individuals) was reported on the GBCM, with the remaining 13 impossible for submission without an exact GPS location and pictures of the surrounding environment. This indicates the need for an extensive education and promotion, allowing more members of the public to learn about bird collisions and participate in monitoring efforts.

4
建議
Recommendations

4
建議
Recommendations

「預防勝於治療」是緩解鳥撞玻璃問題的最佳答案。這原則適用現有建築物和即將出現的新建築物。

The best answer to the problem of bird-window collision would be “prevention is better than cure”, which applies to current buildings and those yet to be built.

4.1 新建建築物 New buildings

對於計劃中的新建築，應在施工前盡早考慮不會對雀鳥構成風險的設計。

第一，應優先考慮避免在現有生態敏感地區興建建築物，例如遷徙鳥熱點、濕地、海岸線、綠化地和生態廊道等。

第二，應避免採用能反射或透射出自然環境(樹木、灌木、水體和天空等)的玻璃設計，例如頂部開放的中庭、毗鄰玻璃窗的庭院、玻璃欄杆、透明屏障等。有研究指出，玻璃不一定與建築物相關才導致鳥類死亡 (Klem 1989, Barton et al. 2017, Mitrus & Zbyryt 2018) ，但當玻璃與建築物有關時，玻璃佔外牆表面的百分比比建築物本身的大小更為重要 (Cusa et al. 2015) 。將大面積玻璃分割成較小塊時會較為安全，鳥撞率亦會較低(Kahle et al. 2016)。因此，不少指引已提出應限制玻璃覆蓋面積不可超出幕牆面積的25–40%(City of Toronto 2016., National Capital Commission 2021)。

For new buildings still in the planning stage, a bird-friendly design should be considered early before construction to lower the bird collision risk.

Firstly, building in ecologically sensitive areas should be avoided at all costs, such as at migratory hotspots, wetlands, along the coastline, green belts or ecological corridors.

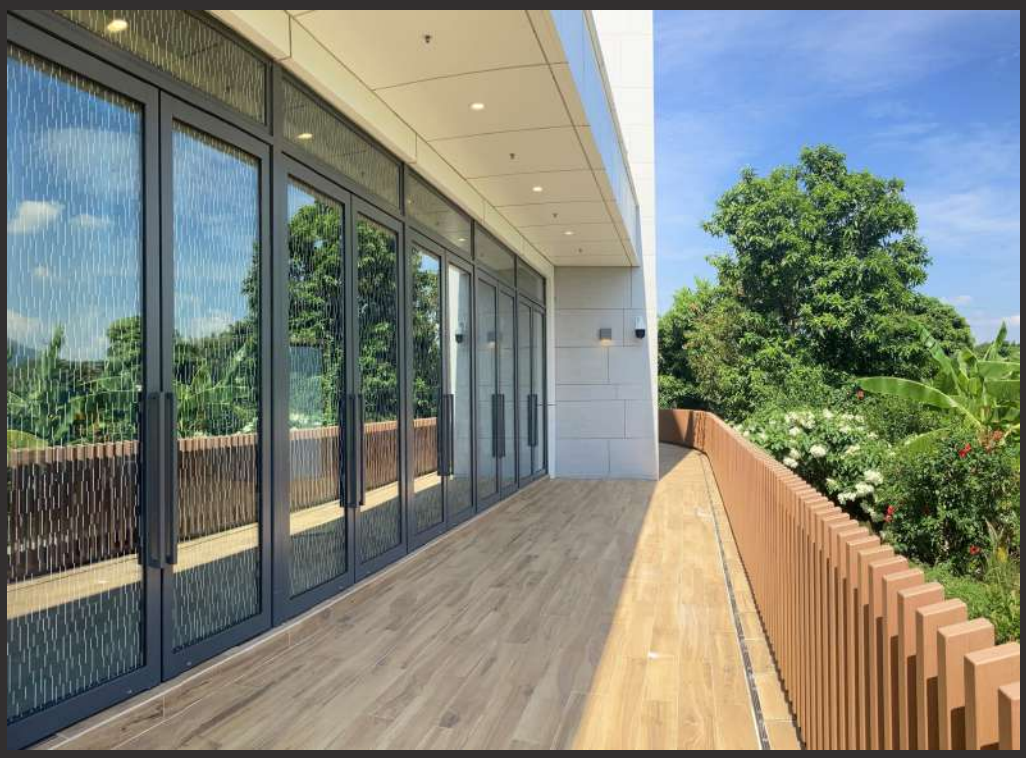
Secondly, glass designs that reflect or show the natural scenery (e.g. trees, shrubs, water bodies, the sky etc.) should be avoided, for example open-air atriums, courtyards with connected windowpanes, glass railing, transparent barriers etc. Previous studies suggested that glass is not necessarily associated with buildings to cause bird deaths (Klem 1989, Barton et al. 2017, Mitrus & Zbyryt 2018), but when it is, the percentage of glass area in relation to the facade area is more important than the size of the building itself (Cusa et al. 2015). Large-area glass could be less dangerous when divided into smaller panels, resulting in lower collision rates (Kahle et al. 2016). Therefore, a few guidelines recommended that glass coverage of building facades should not exceed 25-40% (City of Toronto 2016., National Capital Commission 2021).

第三，如必須使用玻璃物料，應確保所有玻璃已具有防鳥撞效果，則該材料的威脅因數(Threat Factor)符合雀鳥友善的要求。威脅因數是一種透過評估雀鳥在隧道中飛行時對不同模式或玻璃的反應而得出的指標。根據American Bird Conservancy的定義，具有較低威脅因素的產品會導致較少的碰撞，例如當威脅因素在30或以下，這產品在現實情況下相當於減少至少50%鳥撞機率。

Thirdly, if glass material must be used, the glass panes should possess anti-bird-collision effects with a threat factor that meets "bird-friendly" standard. Threat Factor is an index, measuring the relative response to different patterns and different glass builds by songbirds flown in the tunnel. It is defined by the American Bird Conservancy that anti-bird-collision products with lower threat factors yield fewer collisions. For instance, having a threat factor of 30 or below corresponds to a conservative estimated reduction of collisions of at least 50% under real world conditions.

專題九 米埔斯科特訪客中心案例
BOX 9 Case Study of Peter Scott Field Studies Center in Mai Po

米埔自然保護區的斯科特訪客中心曾發現綠翅金鳩鳥撞玻璃門。世界自然基金會香港分會於2023年完成米埔自然保護區設施升級及改善工程，包括重建斯科特訪客中心和翻新教育中心。由於有不少設施採用了玻璃物料，而且位置貼近重要野生雀鳥棲息地，世界自然基金會香港分會在部分玻璃窗戶和欄杆加入了防鳥撞設計，是本地其中一個在新建築中嘗試加入防鳥撞設計的案例。



An Asian Emerald Dove was once found to have collided with the glass doors of the Peter Scott Field Studies Center in Mai Po Nature Reserve. In 2023, the World Wide Fund For Nature Hong Kong (WWF - Hong Kong) finished improving and upgrading their facilities at the reserve, including rebuilding the Peter Scott Field Center and renewing the Education Center. With glass being a common component in their facilities and the proximity to important wild bird habitat, WWF – Hong Kong thus added anti-collision designs to some of their windows and glass railings, which is a local example of implementing bird-friendly designs at newly erected buildings.

4.2 現有建築物 Existing buildings

針對現有建築物，可以循以下兩方面著手，盡量減低鳥撞玻璃風險。

第一，為有鳥撞玻璃風險的玻璃對外表面安裝防鳥撞標記，例如圖案貼紙、鐵欄、垂簾等。所有形式的防鳥撞視覺標記應符合以下條例才能有效減少90%的鳥撞風險：標記應安裝於玻璃對外的表面；視覺標記應為不透明、非反射性及具強烈對比(City of Toronto 2016)；標記的圖案直徑至少為6毫米，其間距不得超過5厘米(American Bird Conservancy 2023)。將室內植物遠離窗戶亦有幫助(National Audubon Society 2024)。

第二，管制燈光的設計和時間。夜間人造光害對遷徙的鳥類可能具有致命影響。這可能會使遷徙雀鳥迷失方向或偏離路線，導致牠們在光亮處盤旋並致耗盡體力，或降落在高鳥撞玻璃風險之處(Evans Ogden 1996, National Audubon Society 2024)。為減低以上情況，市民可在夜間拉上窗簾、遮蔽或百葉窗以防止燈光外洩，並限制室內外的燈光只向下照射，其色溫不超過3,000K，並且只應在需要時開啟(National Capital Commission 2021)。

For existing buildings, there are two main directions which we can take to minimize the risk of bird collisions.

First, apply anti-collision visual markers onto risk-prone glass, such as patterned stickers, steel bars or curtains. All types of anti-collision markers should fulfill the below requirements in order to reduce 90% of bird collision risk: the markers should be installed on the external surface of the glass pane, opaque, non-reflective and looks strongly contrasting (City of Toronto 2016). The patterns should also have a minimum diameter of 6 mm at an interval of no more than 5 cm (American Bird Conservancy 2023). Moving indoor plants away from windows would also help (National Audubon Society 2024).

Second, regulate the design and timing of artificial lighting. Nighttime light pollution could prove deadly for migrating birds, disorienting them and causing them to go off track. This might cause them to fly around in circles around the light source in confusion as they use up their precious energy, or land in dangerous spots with high collision risk (Evans Ogden 1996, National Audubon Society 2024). To reduce this risk, closing curtains and lowering shades or blinds at night would prevent indoor lighting from spilling out. Outdoor lighting should be directed downwards, with a color temperature no greater than 3000K (warm light) and should only be switched on when in need (National capital Commission 2021).

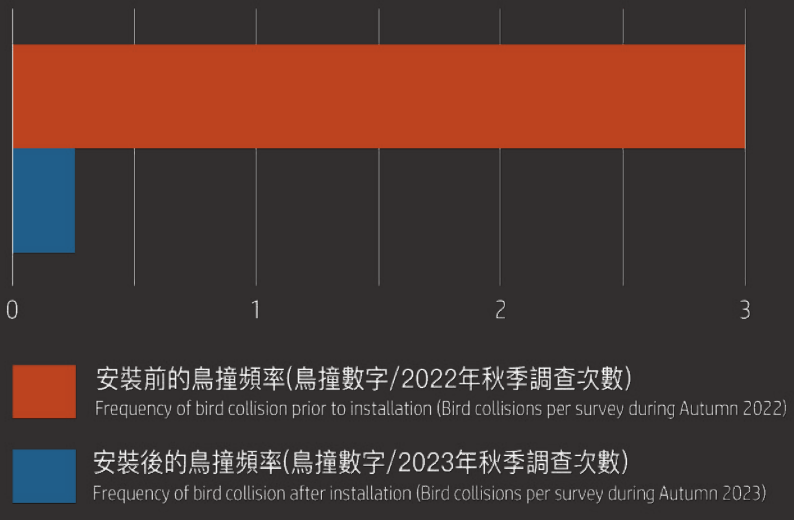
專題十 美孚港鐵站案例
BOX 10 Case Study of Mei Foo MTR station

根據2022年9月至11月內9次的定期鳥撞調查中，美孚港鐵站一共記錄到28宗個案，包括3隻鳥撞個體和25個鳥撞拓印，平均每次調查記錄接近3宗鳥撞。港鐵公司於12月陸續為美孚港鐵站的107塊高風險玻璃貼上防鳥撞貼紙。2023年9月至11月期間進行的8次調查中，美孚港鐵站共錄得兩個鳥撞拓印，即平均每次調查有0.25宗。若將此數字與2022年9月至11月的比較，在防鳥撞措施實施後，鳥撞頻率減低了90%，一方面顯示防鳥撞措施具顯著成效，另一方面亦提示我們在設計及建築前及早減少採用具反射/穿透性玻璃的重要。

According to the 9 regular bird collision surveys from September to November 2022, Mei Foo MTR station recorded a total of 28 cases, with 3 collision victims and 25 imprints giving an average of 3 cases per survey. The MTR Corporation then gradually applied anti-collision stickers on 107 pieces of high-risk glass panes in December the same year. Since then, from the 8 surveys conducted from September to November 2023, Mei Foo MTR station recorded 2 imprints, giving an average of 0.25 cases per survey. Compared to the numbers in September to November 2022, the rate of bird collision reduced by 90% after the implementation of anti-collision measures. This not only shows the success of adopting bird-friendly strategies, but also the importance of reducing the use of reflective or completely transparent glass during the design stage and before construction.

圖表六 在安裝防鳥撞貼紙之前和之後在同一時期(即9月至11月)的鳥撞頻率比較

Graphic 6 Comparison between the frequency of bird-window collision during the same period of the year (i.e. September to November) before and after the installation of anti-collision stickers



4.3 立法 Legislation

在加拿大安大略省，如有建築物因其玻璃設計令雀鳥誤撞致死，該建築物的擁有人可因涉嫌違反《環境保護法》(EPA)或《瀕危物種法》(SARA)而被檢控。美國紐約於2019年通過法案，規定新大樓或翻新建築物在距離地面75英尺(約23米)以下、及綠色屋頂上方12英尺(約4米)的九成外牆或表面，須採用「鳥類友善」設計。芝加哥和伊利諾州等城市和州分亦已相繼通過了相應的法規。韓國環境部在2023年6月修訂《野生動物保護管理法》執行法令，實施規定公共新建建築物的透明或具反射性物料須加入符合標準的圖案以防止鳥撞。

為了由源頭根治鳥撞問題，已有許多歐美甚至亞洲地區的政府已為之立法，強制規定所有新建或翻新建築物須符合「防鳥撞」要求。這些例子和經驗為其他地區提供了參考。香港作為擁有相當高生物多樣性且面向國際的都市，政府有責任和能力開展這方面的立法程序，令日後的新建築物不會為野生雀鳥徒添更多威脅。除了針對新建或翻新建議物立法，政府亦可率先在已知有鳥撞風險的政府建築物(如北角政府合署、何文田政府合署、灣仔稅務大樓等)實施「防鳥撞」措施，為業界以身作則；同時考慮以不同形式，鼓勵業界主動為已建成的高風險玻璃建築物實施「防鳥撞」措施。

In Ontario, Canada, if a bird died after colliding into a building due to the design of its glass panes, the building owner may be prosecuted for violating the Environmental Protection Act (EPA) and Species at Risk Act (SARA). In New York, USA, a law was passed in 2019 where newly constructed or renovated buildings must adopt bird-friendly designs below 75 feet (about 23m) above ground, and for 90% of the outer wall or surfaces 12 feet (about 4m) above green roofs. Cities and states such as Chicago and Illinois have also subsequently passed the corresponding regulations. In Asia, the Korean Ministry of Environment has also revised the Wildlife Protection and Management Act in June 2023, enacting the regulations where transparent and reflective materials in newly built public buildings must incorporate patterns that meet the standard to prevent bird collisions.

To address the root of the issue, many regions and countries in Europe, America and a few in Asia have already enacted laws and regulations where all newly constructed or renovated buildings must meet the anti-collision standards. These examples and experiences serve as a reference for other regions. Hong Kong as an international city with rich biodiversity, the government has the responsibility and ability to start the necessary legislative procedures, to ensure our newly constructed buildings will no longer pose a threat to our wild birds. Aside from targeting the newly constructed or renovated buildings, the government can also implement anti-collision strategies at known government properties (e.g. North Point Government Offices, Ho Man Tin Government Offices, Revenue Tower in Wan Chai etc.) as an example for the industry. At the same time, different forms of incentives can be used to encourage the industry to adopt anti-collision strategies at their own high-risk glass buildings.

4.4 未來研究方向建議 Recommendation for future research directions

人造光害對鳥撞的影響其實也值得深討。上文提及，遷徙鳥種容易被光線吸引而迷失方向。這導致高樓及低矮建築皆出現極高的致命率，當中牽涉即時鳥撞玻璃或及後因力竭身亡的情況其實並不罕見 (Evans Ogden 1996, Avery et al. 1976, Gehring et al. 2009)。香港的光污染情況更被譽為全球最嚴重的城市之一 (Pun 2013)，實在值得就人工照明與鳥撞頻率的因果關聯作出更多的研究。進一步探討各種因素如何影響夜間遷徙(例如鴴類，鶲類，鶇類及八色鶇類等等)及日間遷徙物種(例如鴷類，鳳鶵，日行性猛禽等等)的鳥撞風險的研究亦相當值得考慮。

此外，可參考其他城市的調查方式，改善數據收集的效率，提升數據的質量及相關分析。譬如有效地量化個別大廈的特徵，以了解其相關的碰撞風險，或甚至可以善用問卷來迅速量化鳥撞情況以及有效擴大調查範圍。這些都有助我們尋找本地過往不為人知的鳥撞黑點。

Artificial light is also an important cause for bird collisions. As stated above, migratory species are easily attracted and disoriented by artificial lighting, which results in a prominent level of mortality in both high-rise and low-rise buildings, where immediate collision or subsequent death from exhaustion is not uncommon (Evans Ogden 1996, Avery et al. 1976, Gehring et al. 2009). More research can be done to investigate the effects and correlations between artificial lights on bird collision rates in Hong Kong, one of the cities with the worst light pollution in the world (Pun 2013). A study to further investigate the multiple factors that affect the collision risk for nocturnal (e.g. bitterns, flycatchers, thrushes, pittas etc.) and diurnal migrating species (e.g. bulbuls, yuhinas, diurnal raptors etc.) can be considered.

In addition, the current methodology can be improved through studying the different bird collision surveying methods in other cities, so as to increase the efficiency of data collection and enhance the quality of data for analysis. For example, exploring ways to effectively quantify the characteristics of individual buildings for the analysis of the associated risk, or even using questionnaires to quickly quantify bird collision situations and expand the scope of the survey. These could help identify bird collision hotspots in Hong Kong that the current study cannot cover.

5
總結
Conclusion

5 總結 Conclusion

本報告就香港的鳥撞玻璃問題進行系統監察、記錄和分析。2022年9月至2023年8月的鳥撞數據顯示，全港總共記錄了309隻鳥撞個體(284隻死亡，25隻受傷)，以及35個鳥撞拓印，當中涉及至少48種鳥種，更有13種為具保育級別鳥種。全港16個地區有鳥撞記錄，反映香港多區均存在鳥撞玻璃問題。11月是12個月內發現最多鳥撞個體和拓印的月份。11月記錄了七宗集體鳥撞事件，主要涉及一些會作集體遷徙和活動的野生雀鳥。本報告就每個錄有懷疑鳥撞的建構物進行初步的建構物特徵和環境特徵分析，發現不同高度的建築物會因應不同情況威脅正於不同高度飛行的雀鳥。

總括而言，鳥撞玻璃對香港生物多樣性和受威脅物種保育造成的影響實在不容小覷。

本報告與外國的鳥類友善指引互相呼應，進一步提出在規劃新建築物時，優先考慮選址與雀鳥敏感棲息生境的距離和減少玻璃面占比等措施對緩減鳥撞風險的重要性。

我們期望繼續透過長期持續的數據收集、監測和分析，(1) 提升社會對鳥撞問題的關注及參與、(2) 推動更多防鳥撞措施的實施，以減少不必要的人鳥衝突、(3) 與相關持分者聯繫及商議，長遠推動香港成為鳥類友善城市，締造可持續、生態及雀鳥友善的社區環境。

因此，我們十分需要公民科學的力量，一起持續記錄和監察，共同建築香港的鳥撞玻璃數據庫，為推動防鳥撞政策和措施建立更科學理性的基礎。

The report provides a comprehensive overview of the issue of bird-window collisions in Hong Kong based on systematic monitoring and analysis. Data from September 2022 to August 2023 shows a total of 309 individual victims (284 dead, 25 injured) and 35 imprints, involving at least 48 bird species, with 13 of them are species of conservation concern. 16 districts of Hong Kong have been recorded with bird collisions, indicating that the issue of bird-window collisions persists across Hong Kong. November had the highest number of collision victims and imprints within the 12-month period, with seven group collision events recorded, mainly involving gregarious wild birds that migrate and flock together. The report conducts a preliminary analysis of the building and environmental characteristics of structures suspected to be involved in bird collisions, proposing that buildings with different heights pose a threat to birds flying at various elevations in different scenarios.

In conclusion, the impact of bird-window collisions on local biodiversity and the conservation of threatened species should not be underestimated.

This report aligns with international bird-friendly guidelines, which emphasize the importance of considering certain factors during the planning stage for new buildings, such as the distance from the site to the nearby sensitive bird habitats and the proportion of glass coverage in new constructions to mitigate the risk of bird collisions.

Through long-term and continuous data collection, monitoring and analysis, we hope to (1) raise public awareness and encourage participation in addressing the issue of bird collision, (2) promote the implementation of anti-collision measures to minimize unnecessary human-bird conflict, and (3) connect and discuss with relevant stakeholders, ultimately striving to shape Hong Kong into a bird-friendly city and create a sustainable, ecologically and bird-friendly community environment.

Hence, this report calls for the involvement of citizen scientists to collectively monitor and record bird-window collision incidents, aiming to build a local database for informed decision-making and the development of anti-collision legislation and measures.

6
附錄及參考資料
Appendix and References

附錄一 Appendix 1

2022年9月至2023年8月期間有懷疑鳥撞玻璃記錄的建築物清單 (橙色為2024年8月前獲匯報有施行/局部施行防鳥撞措施的建築物)

List of buildings involved in suspected bird-window collisions from September 2022 to August 2023 (buildings that are reported to have implemented or partially implemented anti-bird-collision measures up to August 2024 are highlighted in orange)

地區 District	建築物名稱 Name of Building	個體數量 No. of individual(s)	拓印數量 No. of imprint	總數 Total No.
沙田區 Sha Tin	香港中文大學伍宜孫書院圓夢臺 Terrace of Dreams at Wu Yee Sun College, CUHK	35	0	35
	香港科技園 17W 及 19W 號大樓 Hong Kong Science Park Building 17W & 19W	25	1	26
	香港中文大學邵逸夫夫人樓接駁何善衡工程學大樓行人天橋 Bridge between Lady Shaw Building and Ho Sin-Hang Engineering Building, CUHK	6	8	14
	香港中文大學康本國際學術園 Yasumoto International Academic Park, CUHK	0	12	12
	香港中文大學陳震夏宿舍行人天橋 Bridge to Chan Chun Ha Hostel, CUHK	0	6	6
	新界沙田區火炭火炭路隔音屏障 Noise barrier at Fo Tan Road	6	0	6
	香港中文大學伍何曼原樓 Wu Ho Man Yuen Building, CUHK	0	1	1
	香港中文大學新亞學生餐廳 New Asia College Student Canteen	1	0	1
	香港中文大學聯合書院胡忠多媒體圖書館 United College Wu Chung Multimedia Library, CUHK	0	1	1
	沙田區 合計 Sub-total	73	29	102
東區 Eastern	嘉里中心 Kerry Centre	22	0	22
	北角友邦廣場 North Point AIA Tower	13	0	13
	百樂商業中心 Park Commercial Centre	11	0	11
	北角政府合署 North Point Government Offices	6	0	6
	北角英皇道 633 號 633 King's Road	3	0	3
	北角英皇道泓富產業千禧廣場 Prosperity Millennia Plaza	2	0	2
	北角嘉華國際中心 K. Wah Centre	2	0	2
	鰂魚涌栢克大廈 Berkshire House	1	0	1
	北角消防局 North Point Fire Station	1	0	1
	友邦香港大樓 AIA Hong Kong Tower	1	0	1
	天后金輪天地 Golden Wheel Plaza	1	0	1
	北角港匯東 Harbour East	1	0	1
	北角萬事昌大廈 Multifield Building	1	0	1
	萬國寶通中心 Citicorp Centre	1	0	1
	電氣道 228 號 228 Electric Road	1	0	1
	天后維多利中心 Victoria Centre	1	0	1
	東區 合計 Sub-total	68	0	68
深水埗區 Sham Shui Po	美孚地鐵站 Mei Fu MTR station	8	25	33
	長沙灣華創中心 CRE Centre	1	0	1
	長沙灣環薈中心 CEO Tower	1	0	1
	長沙灣時裕中心 Ardour Centre	1	0	1
	深水埗區 合計 Sub-total	11	25	36

地區 District	建築物名稱 Name of Building	個體數量 No. of individual(s)	拓印數量 No. of imprint	總數 Total No.
觀塘區 Kwun Tong	觀塘 One Harbour Square	14	0	14
	九龍灣企業廣場二期 Enterprise Square Two	2	0	2
	九龍灣億京中心 Billion Centre	1	0	1
	九龍灣一號九龍 One Kowloon	1	0	1
	九龍灣富臨中心近常怡道 Capital Tower	1	0	1
	九龍灣鴻力工業中心 Proficient Industrial Centre	1	0	1
	友邦九龍大樓 AIA Kowloon Tower	1	0	1
	淘大商場 Amoy Plaza	1	0	1
	觀塘基督教家庭服務中心 Christian Family Service Centre	1	0	1
	觀塘訊科中心 Infotech Centre	1	0	1
	觀塘觀點中心 Kwun Tong View	1	0	1
	觀塘區 合計 Sub-total	25	0	25
灣仔區 Wan Chai	太古廣場三期 Three Pacific Place	11	0	11
	銅鑼灣華懋禮頓廣場 Chinachem Leighton Plaza	4	0	4
	玫林別墅 Moulin Court	1	0	1
	稅務大樓 Revenue Tower	1	0	1
	銅鑼灣金朝陽中心二期 Soundwill Plaza II Midtown	1	0	1
	灣仔中環廣場 Central Plaza	1	0	1
	灣仔聯合鹿島大廈 Allied Kajima Building	1	0	1
	灣仔臨時海濱花園玻璃欄杆 Glass railing at Wan Chai Temporary Promenade	1	0	1
	灣仔區 合計 Sub-total	21	0	21
中西區 Central & Western	香港大學賽馬會教學及逸夫教學樓的綠化中庭建築物 The building surrounds green atrium between Jockey Club Tower and Run Run Shaw Tower, HKU	5	0	5
	中環長江集團中心 Cheung Kong Center	2	0	2
	香港大學嘉道理生物科學大樓 Kadoorie Biological Science Building, HKU	2	0	2
	石塘咀德輔道西均益大廈一期 Kwan Yick Building	1	0	1
	香港大學莊月明文娛中心 Chong Yuet Ming Cultural Centre, HKU	0	2	2
	香港大學訪客中心對出欄杆 Glass railing outside HKU Visitor Centre	0	1	1
	香港大學智華館 Chi Wah Learning Commons, HKU	2	0	2
	香港大學逸夫教學樓 3 樓 Run Run Shaw Tower, HKU	1	0	1
	香港大學鈕魯詩樓與梁銶琚樓之間的天橋 Bridge between Knowles Building and K K Leung Building, HKU	0	1	1
	香港大學圖書館大樓 Main Library, HKU	1	0	1
	新紀元廣場 Grand Millennium Plaza	1	0	1
	薄扶林道 63 號 63 Pokfulam	1	0	1
	中西區 合計 Sub-total	16	4	20
葵青區 Kwai Tsing	青衣城 Maritime Square	10	4	14
	葵涌萬泰中心 Manhattan Centre	2	0	2
	青衣西南體育館 Tsing Yi Southwest Sports Centre	1	0	1
	青衣長發廣場 Cheung Fat Plaza	1	0	1
	葵涌百葵樓圍牆 Wall structure around Pak Kwai House	1	0	1
	葵青區 合計 Sub-total	15	4	19

地區 District	建築物名稱 Name of Building	個體數量 No. of individual(s)	拓印數量 No. of imprint	總數 Total No.
油尖旺區 Yau Tsim Mong	尖沙咀 The ONE	1	1	2
	美麗華廣場一期 Mira Place 1	1	1	2
	彌敦道 238 號 238 Nathan Road	2	0	2
	奧海城接駁奧海公園行人天橋 Bridge between Olympian City and Olympian Park	1	0	1
	九龍圓方 ELEMENTS	1	0	1
	九龍奧海城三期近櫻桃街行人天橋 Bridge to Olympian City 3	1	0	1
	安樂大廈 Comfort Building	1	0	1
	尖沙咀海員之家 Mariners' Club	1	0	1
	尖沙咀中港城 China Hong Kong City	1	0	1
	尖沙咀柏麗購物大道購物中心 Park Lane Shopper's Boulevard	0	1	1
	尖沙咀 THE WAVE	1	0	1
	佐敦恆豐中心 Prudential Centre	1	0	1
	美麗華廣場二期 Mira Place 2	0	1	1
	雅蘭中心 Grand Plaza	1	0	1
	油尖旺區 合計 Sub-total	13	4	18
西貢區 Sai Kung	將軍澳培成路蔚藍灣畔接駁南豐廣場行人天橋 Bridge between Residence Oasis and Nan Fung Plaza	9	0	9
	新界西貢沙角尾村村屋 Sha Kok Mei Village House	2	0	2
	西貢木棉山路村屋 Muk Min Shan Road Village House	1	0	1
	保良局北潭湧渡假營 Po Leung Kuk Pak Tam Chung Holiday Camp	1	0	1
	海翩匯 The Papillons	1	0	1
	將軍澳東港城接駁蔚藍灣畔行人天橋 Bridge between Residence Oasis and East Point City	1	0	1
	藍塘傲 Alto Residences	1	0	1
	西貢區 合計 Sub-total	16	0	16
離島區 Islands	東涌道近滿東樓隔音屏障 Noise barrier near Mun Tung House	5	0	5
	香港國際機場 T1 上落機接駁天橋香港國際機場 Bridge near Airport (Terminal One)	5	0	5
	機場國泰坊 Cathay House	1	0	1
	港珠澳大橋香港口岸旅檢大樓 HZMB Hong Kong Port Passenger Clearance Building	1	0	1
	大嶼山鹿地塘村屋 Luk Tei Tong Village House	1	0	1
	坪洲南灣新村村屋 Nam Wan San Tsuen Village House	1	0	1
	離島區 合計 Sub-total	14	0	14
九龍城區 Kowloon City	何文田政府合署 Ho Man Tin Government Offices	5	0	5
	近筆架山道依利莎伯大廈的隔音屏障 Noise Barrier near Elizabethan Court	1	0	1
	英基英皇佐治五世學校 King George V School	1	0	1
	啟德協調道工業貿易大樓 Trade and Industry Tower	1	0	1
	黃埔花園 11 期 Whampoa Garden Site 11	1	0	1
	九龍城區 合計 Sub-total	9	0	9

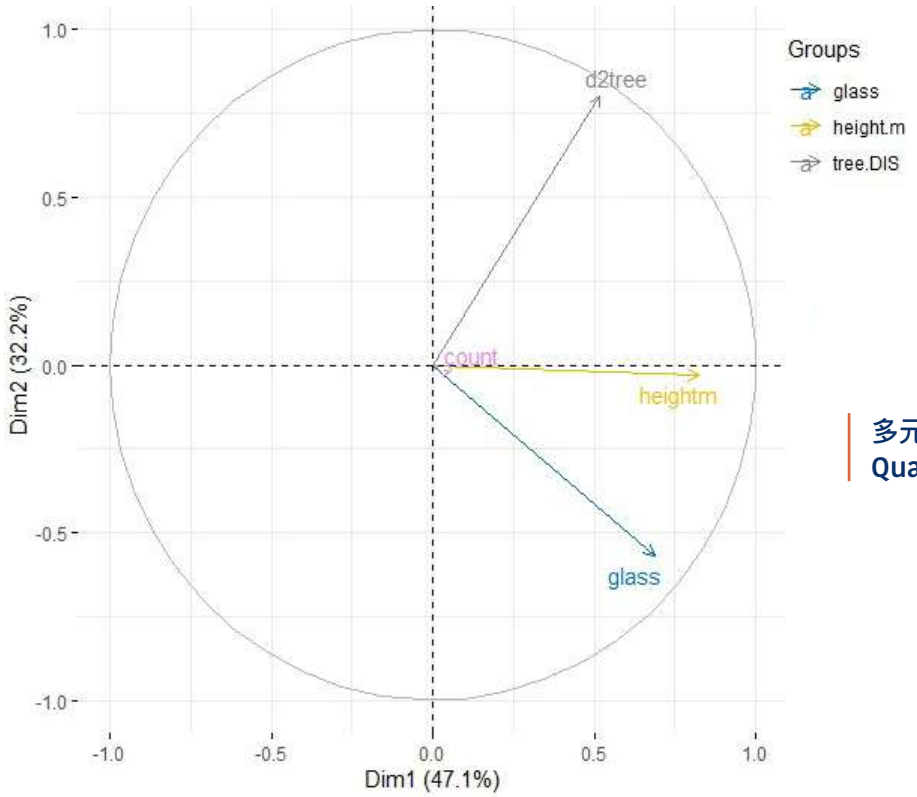
地區 District	建築物名稱 Name of Building	個體數量 No. of individual(s)	拓印數量 No. of imprint	總數 Total No.
屯門區 Tuen Mun	屯門 V City	6	0	6
	屯門時代廣場 Trend Plaza	1	0	1
	匯賢一號·雋峰 One Vista Summit	1	0	1
	錦薈坊 K-Point 接駁屯門市廣場二期行人天橋 Bridge between K-Point and Tuen Mun Town Plaza Phase 2	0	1	1
	屯門區 合計 Sub-total	8	1	9
大埔區 Tai Po	大埔那打素醫院 C 座 Nethersole Hospital Block C	6	0	6
	雅麗氏何妙齡那打素醫院員工中心天橋 Bridge to Alice Ho Miu Ling Nethersole Hospital Staff Centre	1	0	1
	鳳園路嵐山 Mont Vert	1	0	1
	大埔區 合計 Sub-total	8	0	8
荃灣區 Tsuen Wan	柴灣角街國際企業中心一期 International Enterprise Centre	6	0	6
	荃灣站至愉景新城天橋 Footbridge between Tsuen Wan MTR station and Discovery Park	0	2	2
	荃灣區 合計 Sub-total	6	2	8
元朗區 Yuen Long	元朗十八鄉路隔音屏障 Noise barrier of Shap Pat Heung Road	1	0	1
	攸潭尾村攸潭美學校 Yau Tam Mei School	1	0	1
	港深西部公路隔音屏障 Noise barrier of Kong Sham Western Highway	1	0	1
	元朗區 合計 Sub-total	3	0	3
黃大仙區 Wong Tai Sin	新蒲崗萬迪廣場 Maxgrand Plaza	2	0	2
	黃大仙區 合計 Sub-total	2	0	2
	總計 Total	**309**	**69**	**378**

附錄二 Appendix 2

多元因子分析(MFA)的結果
Results of the Multifactor Analysis (MFA)

運用Rstudio將不同環境數據進行多元因子分析(Multiple Factor Analysis)後，結果篩選了兩個主要維度，維度1(Dim 1)和維度2(Dim 2)一共能夠涵蓋總變數的79.3%(兩個維度分別解釋了47.1%和32.3%)，並能在結果圖中展示相關變數的關係以及使用向量來顯示其影響及相關。Dim1主要涵蓋了建築物高度的變數，而Dim2則涵蓋了建築物玻璃面占比以及與樹叢距離的變數。

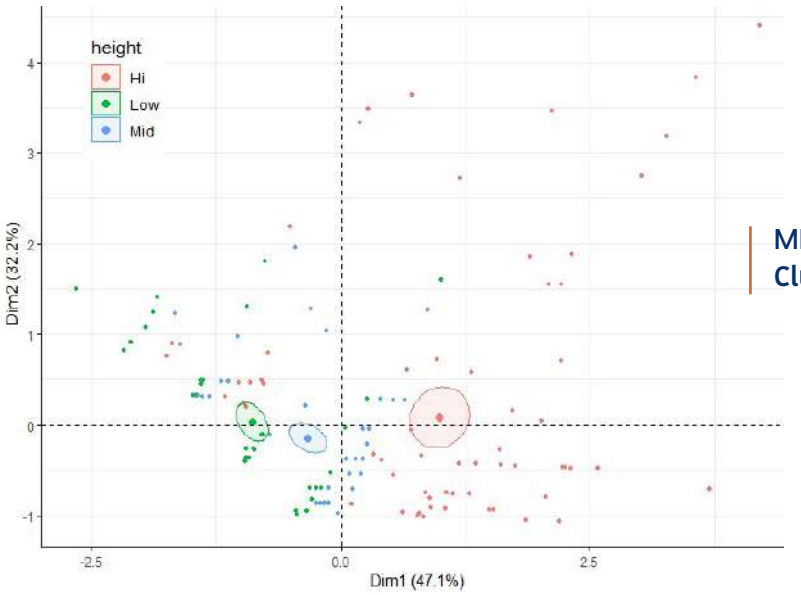
Data on different environmental characteristics were inputted into RStudio where a Multiple Factor Analysis (MFA) was employed. MFA identified two key dimensions, Dimension 1 (Dim1) and Dimension 2 (Dim2), which together explained 79.3% of the total variance (47.1% and 32.2%, respectively). The resulting biplot illustrated the relationships between these variables, with vectors indicating their contributions and correlations. Dim1 (47.1%) primarily captures the variance related to the building height of collision sites. Dim2 (32.2%) captures the variance related to the surface coverage of glass and distance from vegetation.



多元因子分析中的定量變數
Quantitative Variables in MFA

這雙標圖展示了定量變數對MFA的頭兩個維度的影響。Dim1解釋了47.1%的變異，而Dim2則佔32.2%。「建築物高度(米)」、「玻璃覆蓋率」和「與植被距離」的向量代表它們各自的影響。「建築物高度(米)」對Dim1有較大的影響，而「玻璃覆蓋率」和「與植被距離」對Dim2的影響較大。

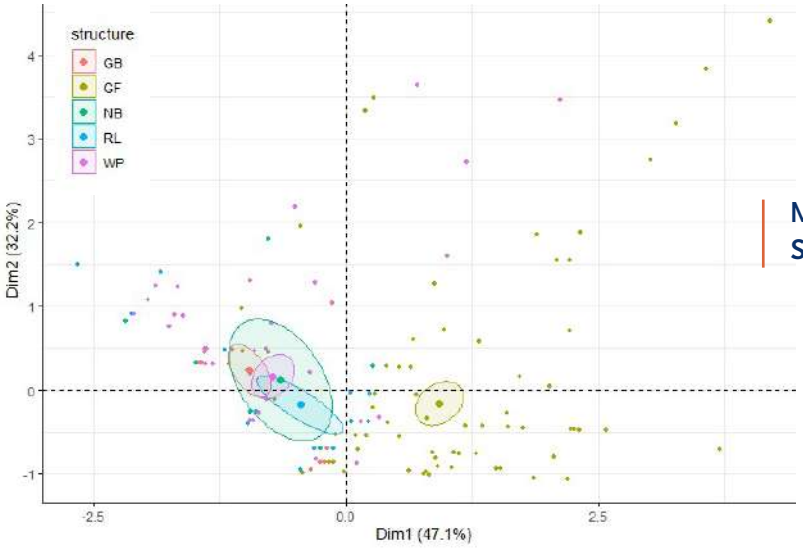
This biplot illustrates the contributions of quantitative variables to the first two dimensions of the MFA. Dimension 1 (Dim1) explains 47.1% of the variance, while Dimension 2 (Dim2) accounts for 32.2%. The vectors for 'height.m', 'glass', and 'd2tree' indicate their respective influences. 'Height.m' shows a stronger impact on Dim1, while 'glass' and 'd2tree' have more influence on Dim2.



MFA因子圖中建築物高度的聚類
Clustering of Building Height in MFA Factor Map

這散佈圖顯示了不同高度類別(高、中、低)在多元因子分析(MFA)的頭兩個維度的聚類情況。每個點依高度類別進行顏色分類：高(紅色)、中(綠色)和低(藍色)。橢圓形顯示數據中的分組，代表分組平均值周圍的95%信賴區間。

This scatter plot illustrates the clustering of different height categories (High, Mid, Low) in the first two dimensions of the Multiple Factor Analysis (MFA). Points are color-coded by height categories: High (red), Mid (green), and Low (blue). Ellipses are drawn around clusters to highlight groupings within the data, representing 95% confidence intervals around the group means.



MFA因子圖中撞擊物類別的聚類
Structure of Collision Surface in MFA Factor Map

這散佈圖顯示了不同撞擊物，如玻璃橋(GB)、玻璃幕牆(GF)、隔音屏障(NB)、欄杆(RL)和窗戶(WP)，在MFA的頭兩個維度的聚類情況。每個點依撞擊物類類別進行顏色分類。橢圓形顯示數據中的分組，代表分組平均值周圍的95%信賴區間。

This scatter plot illustrates the clustering of different structures of the collision surface namely, Glass Bridge(GB), Glass Facades (GF), Noise Barrier (NB), Railing (RL), and Window Panel (WP) in the first two dimensions of the Multiple Factor Analysis (MFA). Points are color-coded according to the structure categories. Ellipses are drawn around clusters to highlight groupings within the data, representing 95% confidence intervals around the group means.

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