農業部林業及自然保育署主管林業發展計畫
114年度計畫結束報告表

計畫名稱：猛禽研討會暨臺灣猛禽保育現況分析計畫　　填報單位：國立臺灣師範大學生命科學系
計畫編號：114林發-08.3-保-26　　填報人：林思民
執行機關：社團法人台灣猛禽研究會
主辦人：林思民
本年度執行期限：　自　114年2月1日　至　114年12月31日
實際執行期限：　　自　114年2月1日　至　114年12月31日

一、計畫目標：

(1)台灣猛禽近年受到棲地開發、農藥威脅及窗殺風險之中，但也在國內生物多樣性主流化與環境教育的努力之下，減緩猛禽遭遇的可能風險，本案擬彙整台灣近年猛禽研究、救傷案例予主管機關作為保育策略參考。
(2)本會於1995年開始舉辦第一屆台灣猛禽生態研討會，為國內唯一以猛禽為主題召開的學術研討會，廣獲學術界、民間及政府之肯定。今年擴大規模聯合亞洲猛禽保育聯盟一同舉辨第13屆亞洲猛禽保育聯盟暨第七屆台灣猛禽研討會，透過會議蒐集亞洲各國的猛禽研究現況，從中汲取經驗，作為台灣保育工作的範例。

二、重要設備：

無

三、執行成果/研究結果：

(一)研討會辦理情形：

本次猛禽研討會除了為台灣每五年舉辦一次的台灣猛禽研討會，另還結合了亞洲保育聯盟每兩年辦理一次的亞洲猛禽研討會，因此參與的人員除了國內猛禽愛好者，更擴大邀集亞洲地區的猛禽研究保育之士，報告內容從國內跨大至亞洲地區。本會議共有16個國家323位與會者，來自香港、印度、印尼、日本、馬來西亞、尼泊爾、菲律賓、韓國、新加坡、泰國、澳洲、玻利維亞、加拿大、美國及德國等地。

研討會時間為3日，前2日為會議、第3日為工作坊與國外貴賓訪台行程。共有3篇主題演講，53篇口頭發表及32篇海報發表展示。開幕主題演講由美國德州理工大學自然資源學系Dr. Clint W. BOAL帶來台灣保育中非主流的研究與主題：訓練猛禽進行野外研究，從不同文化實踐角度--馴鷹，探討美國獵場如何永續經營管理。至於如何實際運用呢？演講中的其中一項研究為評估獵物面對猛禽捕抓威脅時的逃逸反應，這將對獵場未來植栽、障礙物的清除與治理建議。第二場主題演講由馬來西亞博特拉大學潘忠良教授強調猛禽的價值與威脅。亞洲尚有許多猛禽仍缺乏研究，特別是留棲及夜行性猛禽，透過填補基礎生物學及族群現況的資訊落差，我們才能有效的保育猛禽，潘教授在本次研討會中接任亞洲猛禽保育聯盟主席之位。他因有感於保育工作經常人力不足，體認串聯研究單位、政府機關、公民團體及跨國合作的重要，過去他也曾在台灣進行猛禽研究，也將與台灣維繫國際的猛禽保育工作。壓軸的閉幕演講，則由孫元勳教授帶來台灣熊鷹20年的研究成果與精華故事，包含熊鷹繁殖、聲學、行為學、棲地生態，以及排灣與魯凱族使用熊鷹羽毛的民族生態學之研究，為了應對熊鷹族群量下降之問題，並且讓熊鷹羽毛文化得以維持，孫老師與在地部落合力建立熊鷹羽毛庫，並推廣仿真熊鷹羽毛。

-草稿-

本次為國際研討會，報名頁面、會議宣達均採用中英雙語設計，提供即時資訊發布服務，涵蓋報名辦法、徵稿規定、議程安排等重要訊息。會議結束後已將摘要集上傳至網站開放下載，確保研究成果能持續對外傳播，供關心猛禽生態保育之學術界及公眾取用。會議後將活動精華照片上傳至社群平台，供與會人士回顧也讓無法參與或是想參與會議者能了解會議形式，刺激未來與會的可能性。主視覺選用本會創會理事長、知名鳥類版畫藝術家何華仁先生的版畫作品《林鵰育雛》。該作品不僅是藝術家生涯代表作，亦象徵林鵰研究在台灣猛禽保育中的重要里程碑與深遠貢獻，成功賦予會議高度的文化與學術象徵意義。

(二)研討會議程摘錄

發表類別分別是為「國家報告」、「遷徙猛禽」、「留鳥猛禽」、「猛禽與人類」、「族群生態學」「猛禽保育」、「聲學與遺傳學」、「猛禽威脅」八個主題。以下為摘錄：

1. 國家報告：

臺灣：現有37種日行性猛禽和13種夜行性猛禽，同樣面臨棲地喪失問題，並受到流浪動物衝突、窗殺、狩獵陷阱、農藥及殺鼠藥的威脅。在保育措施上，除了政府部門提供政策支持之外，許多非營利組織長期投入於猛禽研究、救傷、復健及追蹤工作。民間企業也積極參與保育行動，例如緯創人文基金會長期資助猛禽教育推廣、紀錄片製作與救傷研究，全聯則採購友善黑鳶紅豆並推出「老鷹紅豆」系列產品，遠雄人壽則推動「守護憶隻鴞」計畫，設置棲架與人工巢箱。由此可見，臺灣的猛禽保育已形成政府、非營利組織、學術界與企業跨界合作的模式。

日本以當地猛禽面臨的威脅：鉛中毒，因食用帶有鉛彈碎片的動物屍體，導致虎頭海鵰、白尾海鵰和金鵰等猛禽鉛中毒；棲地喪失，草澤濕地環境開發對東方澤鵟造成影響，農地廢耕或開發使得灰面鵟鷹數量下降；再生能源發展，風力發電興建於金鵰棲地；太陽能發電佔用濕地和草原，直接影響灰面鵟鷹和蒼鷹。其中，金鵰是目前處境較危急的物種，繁殖成功率持續下降，若情況不變，可能在2050年滅絕。

韓國的猛禽研究集中於獸醫、生態與自然史領域，其中最重要的保育進展是白尾海鵰首次於首爾西南方約40公里的始華湖成功繁殖，這是該物種在內陸的首次繁殖紀錄，以往僅在黑山島周邊離島繁殖，具有重要的里程碑意義。此外，以赤腹鷹與灰面鵟鷹為主的台韓合作研究也持續推進，2024年7月雙方研究團隊在韓國展開為期十天的調查，進行發報器裝設及小型座談會。國家生物資源研究所（National Institute of Biological Resources, NIBR）則持續收集多種猛禽的追蹤資料。

菲律賓擁有35種猛禽，但除了菲律賓鵰（Pithecophaga jefferyi）外，其餘物種的系統性研究仍有限。菲律賓猛禽觀察聯盟自2013年起聚焦於17種常見於遷徙期間易遭獵捕的猛禽，並以社區為核心推展保育行動。在呂宋島北部的Sanchez Mira，過去曾有大規模傳統獵捕灰面鵟鷹的行為，經過多年教育推廣後，社區已自主執行保育行動，地方政府也在春季遷徙前推動自然保育宣導。2024年，團隊與政府簽署合作備忘錄，加速教育與保育工作，並展開灰面鵟鷹的分子生物學基因研究與衛星追蹤，制定完整保育策略。在民答那峨南部的Sarangani，菲律賓第一個同時設有春季和秋季猛禽監測的計畫已啟動，未來期望建立通往婆羅洲的重要遷徙廊道資訊。

印尼由逾1.7萬座島嶼組成，孕育高度猛禽多樣性，共有130種日行性與夜行性猛禽，其中42種為特有種，包括留棲與遷徙性物種。根據IUCN評估，印尼猛禽中有2種極危、4種瀕危、5種易危及22種近危。爪哇鵰鷹（Nisaetus bartelsi）與弗洛勒斯鵰鷹（Nisaetus floris）是最受關注的物種。政府自1998年起開展爪哇鵰鷹復育計畫，並於2013-2022年推行保育行動，其後於2021-2030年為弗洛勒斯鵰鷹制定類似方案。在亞洲遷徙猛禽中，56種有25種在印尼被記錄，使印尼成為遷徙猛禽的重要路線與度冬地，未來加強在蘇門答臘、爪哇、峇厘島及蘇拉威西的監測工作。

尼泊爾記錄59種日行性猛禽與23種貓頭鷹，其中近半數為受威脅或近危物種，另有4種資料不足，顯示其猛禽面臨更嚴峻的挑戰。過去保育工作高度集中於禿鷲，因1990年代末至2000年代初獸醫用藥雙氯芬酸（diclofenac）造成二次中毒而瀕臨滅絕。雖然目前雙氯芬酸問題已大幅改善，但其他藥物、中毒誘餌、棲地流失、迫害及電力線仍構成威脅。除禿鷲外的猛禽保育研究投入仍不足，目前僅有小規模專家團隊進行遷徙監測、道路調查、個體追蹤、繁殖研究與社區教育。未來需加強能力培育、資源投入與跨國合作，以減緩猛禽族群衰退。

2.族群生態學：本主題的研究揭示了猛禽族群在環境變遷下的動態與適應性。以台灣為例，林鵰在過去二十年間於低海拔甚至鄉鎮郊區的紀錄顯著增加，反映其對人為地景的適應能力提升。推測此現象與牠們避開台灣獼猴干擾、有效利用人工環境中的獵物資源，以及逐漸適應人類活動等因素相關。此外，黑翅鳶與東方蜂鷹在台灣的族群近年均呈現穩定上升，亦再次驗證猛禽對人為地景的適應性。

3. 猛禽威脅：台灣的救傷資料顯示，在106筆檢體中，逾六成個體檢出多重老鼠藥殘留，且多達92%屬於毒性較高的第二代抗凝血劑，凸顯毒物暴露仍為猛禽生存的主要威脅之一，本研究也展示出毒物分布的範圍不僅在過去認知的農地，都市亦為毒物威脅的地區。都市中的風險亦有窗殺，衝擊於都市型猛禽鳳頭蒼鷹與領角鴞，兩者的受傷型態具有差異：前者以後肢癱瘓較為常見，而後者則以眼部損傷為主。另外，菲律賓的Pinsker’s Hawk-Eagle救傷資料顯示，因為人類活動造成的傷害包括闖入雞舍追捕衝突、盜獵與槍傷等情形，突顯開發區域中猛禽所面臨的高風險狀況。自然災害方面，颱風對草生地的擾動也造成明顯的生態壓力。以2024年凱米颱風為例，其大幅改變嘉南平原東方草鴞的棲息環境，導致棲地淹水或被泥沙覆蓋，調查發現個體向河口集中，繁殖期延後的現象。機場鳥擊風險一直是各國飛安重要議題，印尼已將機場鳥擊風險納入國家行動計畫，其中栗鳶與遊隼被視為高風險種，未來將透過馴鷹或圈養方式協助減少鳥擊事件。

4.遷徙猛禽：遷徙猛禽的研究成果顯示國際合作在資料整合與生態理解上具有不可或缺的角色。韓國的研究指出，灰面鵟鷹在繁殖地與度冬地所使用的棲地差異甚大，顯示其具有高度的棲地彈性。台灣與韓國自2019年起合作赤腹鷹衛星追蹤計畫，整合2021年泰國與中國以及2016-2019年台灣的追蹤資料，赤腹鷹遷徙路徑除已知的海洋與陸地路線外，在海洋路徑上呈現相當彈性的模式。台灣猛禽研究會分析墾丁30年間的監測資料，赤腹鷹與灰面鵟鷹於2016年呈現數量上升的趨勢，可能與菲律賓自2005年起改善獵捕有關。魚鷹與遊隼的數量同樣呈增加趨勢，配合北美、歐洲及日本的數據呼應，顯示這兩種猛禽可能逐漸從20世紀DDT造成的族群滅絕中恢復，並且越來越適應都市環境。

5.留棲性猛禽：自動相機調查提供了過去難以取得的生態資訊。例如，大冠鷲被觀察到具高比例捕食外來種非洲大鍋牛，此結果因傳統觀察法難以辨識而長期被忽略，顯示多元監測技術可補足生態研究的盲點。透過佔據模型分析，台灣熊鷹自2019年起族群呈現上升趨勢，尤以北部最為明顯，未來需結合繁殖監測以進一步釐清族群擴張的原因。

6.猛禽與人類：在農業管理方面，台灣推動「猛禽棲架」以促進自然捕鼠，減少農藥使用，讓猛禽成為生態友善農業的重要元素。馬來西亞亦藉由倉鴞巢箱協助農民控制鼠害，並積極推動將倉鴞從西馬引入婆羅洲後的生物防治計畫；目前調查結果顯示社會大眾普遍對倉鴞持正面態度，有助生態方案的長期推行。

7.聲學與遺傳學：聲學監測逐漸成為夜行性猛禽研究的重要工具。草鴞鳴叫頻率與繁殖期具有明顯的相關性，並以一般活動區域的鳴叫量變化最為顯著。對鵂鶹、角鴞、褐鷹鴞等物種的聲學研究亦顯示其鳴叫頻度受月相、氣候條件影響，且多集中於日落後與日出前的活動高峰，顯示聲學資料可作為未來長期監測的重要依據。不僅如此，馬來西亞對大冠鷲的研究辨識出七種不同叫聲型態，且鳴叫在10時最為頻繁、十二月顯著較四月更為活躍，可能與繁殖行為相關，再次突顯被動聲學技術的潛力。日本研究則以分子技術分析熊鷹在繁殖期的食性，結果呈現獵物來源多樣，且巢材樣本的保存性與DNA穩定性優於其他檢體來源。此外，基因分析顯示

東北亞熊鷹族群的遺傳差異：本州與北海道族群高度相似、九州較為獨立，而台灣族群則具有高遺傳雜合性，其中台東與其他區域的差異尤為明顯，顯示可能存在外來基因交流的情形。

8.猛禽保育：全球保育策略方面，遊隼基金會正以「區域加權的演化獨特與滅絕風險指數（weighted Evolutionary Distinctiveness and Global Endangerment，wEDGE）」為指標，重新評估全球與區域的猛禽保育物種優先順序，並與各國政府、專家合作規劃後續行動。本次會議現場也有多篇報告呼應此指標，例如保護僅分布於印度Maharashtra的林斑小鴞，以及印度與尼泊爾的各種兀鷲的復育與族群重建計畫。印尼更是呈現爪哇鷹鵰25年來的研究精華、移地復育與保育行動，並提出後續將焦點轉向費氏鷹鵰，以及啟動尋找自1866年後未再出現紀錄的斯歐角鴞計畫。台灣方面，黑鳶的長期監測已累積超過二十年的資料。研究結果顯示，農藥與老鼠藥造成的二次中毒是導致族群急遽下降的核心原因。透過繁殖巢位調查與全台族群監測，我們得以掌握黑鳶數量的變化趨勢。隨著禁用特定高風險農藥的政策與友善農業逐步落實，黑鳶族群從2010年約250隻，回升至2024年的945隻，顯示保育措施已產生明確成效。然而，為確保族群能持續穩定成長，後續仍需強化監測、持續管制農藥使用並推廣生態友善農業。

9. 窗殺工作坊：旨在推動國際間對鳥類窗殺（Workshop: How to Effectively Promote the Concept of Preventing Bird Window Collisions）議題的認知與防治技術交流，共有7個國家32名參與。探討鳥類窗殺的科學原理與台灣的發生現況，包括猛禽與各類鳥種的撞擊數據。接著介紹台灣在鳥類友善建築與玻璃設計方面所推動的倡議與實施案例。隨後進行國際經驗交流，台灣、韓國與新加坡在窗殺監測與防撞措施以及衍生應用相對是較領先的國家。而菲律賓則處於開始萌芽階段，馬來西亞、尼泊爾、玻利維亞等國代表則表示會將本次工作坊的相關議題與防治方式帶回國內，啟動後續的政策與研究討論。室內討論外，使用陽明山國家公園管理處菁山自然中心進行布置窗殺改善實作。加深參加者對窗殺防治的核心原則掌握，也是本次國際會議的一項重要里程碑：成功匯聚跨國力量，將學術交流轉化為具體的環境改善行動。

(三)台灣猛禽保育現況報告：整合2025年舉辦的「第13屆亞洲猛禽研究保育聯盟暨第7屆台灣猛禽研討會」中，臺灣發表內容含括21種物種：魚鷹、黑翅鳶、東方蜂鷹、大冠鷲、熊鷹、林鵰、灰面鵟鷹、東方澤鵟、灰澤鵟、鳳頭蒼鷹、赤腹鷹、黑鳶、草鴞、領角鴞、黃嘴角鴞、鵂鶹、短耳鴞、褐鷹鴞、紅隼、燕隼和遊隼。另蒐集各物種近十年在社群平台、雜誌及文獻上發表過的內容，論述物種2025年為止的研究概況。

四、檢討與建議：

本次會提供中英文發表選項，亦有安排全程翻譯，但在國際交流氛圍驅使下，幾乎所有報告者皆以英文報告，以尋求國際接軌，為此可能讓國內部分研究受到語言障礙的關聯而未能發表。之後可以考慮明確增設中文報告時段，不讓語言隔閡成為分享交流的門檻。

本次會議時間定於4月台灣春過境猛禽遷徙期，原意是讓外國與會者能同時觀察台灣留棲性猛禽與遷徙猛禽行為，兼顧學術與生態價值。此時為各國留棲猛禽的繁殖期，多位國外猛禽研究者因研究工作忙碌不克與會。若學術參與度為優先考量，未來可將研討會時間調整至猛禽行為較單調的7-8月，能避開大部分留鳥的繁殖高峰期，提高研究人員的參與度。

雖然來自16個國家參與，但如蒙古、印度、尼泊爾等國家，因至台灣的旅費負擔較重，未能參與此次會議。未來可考慮設置獎助機制，吸引更多發展中國家的學者、研究人員及保育工作者參與。擴大國際參與，還能加強這些地區之間的學術交流與合作，讓全球猛禽保護工作更加包容和普遍。

首次設立學生發表競賽，刺激學生參與會議發表，也提高學生參加未來猛禽保育工作的信心，本次競賽獎項為口頭發表與海報發表，未來可增加研究以外的保育工作相關獎項，激發學生創意以拓展未來猛禽保育視角。另也能規劃學生職涯論壇等，增加交流機會。

台灣猛禽研究保育現況盤點

族群趨勢：目前台灣18種中有15種留棲性猛禽的族群趨勢被發表，其中14種猛禽是依據2011-2021年的繁殖鳥類調查結果分析，黑翅鳶和東方蜂鷹族群有上升的趨勢；黑鳶則是依據2013年持續至今的全台黑鳶黃昏聚集同步調查，以夜棲地計數監測黑鳶族群趨勢，族群目前是穩定成長。其他留棲猛禽的族群量看似持平，但因為猛禽繁殖相對難以偵測，透過繁殖鳥類調查能否呈現實際情況，還需要設計猛禽用的調查法驗證。瀕危的草鴞和易危的熊鷹則正應用佔據模型方式發展長期族群監測。目前易危等級的黃魚鴞尚無族群監測的相關行動。遷徙猛禽的族群趨勢以墾丁國家公園長期監測結果，近幾年灰面鵟鷹和赤腹鷹通過台灣的數量有增長。

受脅因子：透過救傷案例分析猛禽受脅因子，對於多數猛禽造成危害的有車禍、滅鼠藥農藥、重金屬中毒、窗殺等，但具體對於族群造成多嚴重的衝擊，受限目前多無特地地區的族群量監測，還難以量化對族群的衝擊程度。特定物種被發表關鍵受脅因子，草鴞受到遊蕩犬隻、草生地消失的危害、熊鷹受到非法盜獵的壓力大於其他猛禽。但風力設備、太陽能光電等人工設施對於猛禽的影響目前在台灣還無相關的研究發表。

繁殖行為研究：台灣多數留棲性猛禽的繁殖月份、窩卵數等資訊都有觀察紀錄發表，但對於親鳥配對模式、繁殖巢位的選擇因子等研究較少。冬候猛禽大鵟在2023年被觀察到營巢行為，過去即有遷徙鳥種發現有留棲族群出現的案例，遊隼、褐鷹鴞等，隨著物候改變是否會有其他遷徙猛禽出現繁殖行為，如何產生改變的，是值得作為物種演化過程的研究材料。

遷徙路徑/活動範圍：隨著發報器從衛星傳訊轉利用基地台訊號，發報器的價格門檻降低，另也隨著國內猛禽救傷系統增加，透過癒後猛禽追蹤，累積多種猛禽的遷徙路徑，台灣有遷徙黑鳶通過也是透過癒後猛禽追蹤的方式發現。以遷徙猛禽而言：灰面鵟鷹、赤腹鷹的路徑較為明朗；遷徙性黑鳶、灰澤鵟、紅隼和短耳鴞有一條完整的遷徙路徑，魚鷹和燕隼僅有部分路徑，其他遷徙猛禽則無資料。而留棲性猛禽的部分，熊鷹、草鴞、黑鳶和東方蜂鷹有較多的追蹤資訊、黃魚鴞為無線電追蹤資料、鳳頭蒼鷹和大冠鷲有無線電追蹤結果，以GPS追蹤後尚無累積完整年度資料。

分子生物學應用：分子生物學研究可應用於物種鑑識、辨識相似物種、物種演化的進程或是公母鳥辨識等工作。近年台灣猛禽分子生物相關研究：留棲性東方蜂鷹的演化、以分子生物技術確認黑鳶亞種、台灣大冠鷲的族群地理和性別分子辨識、台灣熊鷹的系統分類、黑鳶的族群地理及族群遺傳結構、蘭嶼角鴞的應用分子生物技術鑑驗親鳥配對關係和族群遺傳結構研究、台灣留棲性與遷徙性褐鷹鴞的族群遺傳學。遊隼、黑翅鳶的擴散，其他留棲猛禽的族群地理及遺傳結構，特有亞種的系統分類則是未來可以進行的方向。

填報單位： 國立臺灣師範大學生命科學系

單位主管：

填報人及聯絡電話： 林思民

填表日期： 115年1月29日

附錄 1、活動照片及說明

一、報到、與會情形

圖一、報到台

圖二、外賓報到台

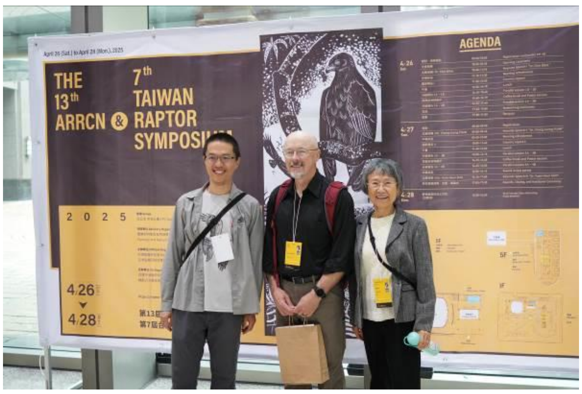
圖三、台灣與會者簽到

圖四、外國與會者簽到

圖七、印尼學者團

圖八、韓國學者團

圖九、台灣猛禽研究會歷任理事長



圖十、Dr.Clint W. BOAL(中)

-草稿-

二、開幕式

圖十一、開幕表演戴曉君

圖十二、林業及自然保育署張岱副署長致詞

圖十三、亞洲猛禽保育暨研究聯盟山崎亨主席致詞

圖十四、台灣猛禽研究會理事長吳建龍致詞

三、Keynote Speakers 演講

圖十五、主持人 Dr. Jo-Szu TSAI

圖十六、Keynote Speaker: Dr.Clint W. BOAL

圖十七、主持人 Dr. Lucia Liu SEVERINGHAUS

圖十八、Keynote Speaker: Dr. Chong Leong PUAN

圖十九、主持人 Dr. Shiao-Yu HONG

圖二十、Keynote Speaker: Dr. Yuan-Hsun SUN

四、口頭發表報告

圖二十一、國家報告：台灣

圖二十二、國家報告：日本

圖二十三、國家報告：韓國

圖二十四、國家報告：菲律賓

圖二十五、國家報告：馬來西亞

圖二十六、國家報告：尼泊爾

圖二十七、國家報告：新加坡

圖二十八、國家報告：印尼

圖二十九、國家報告：澳太地區

圖三十、台灣猛禽研究會救傷站報告

圖三十一、台灣黑鳶保育報告

圖三十二、草鴞保育工作報告

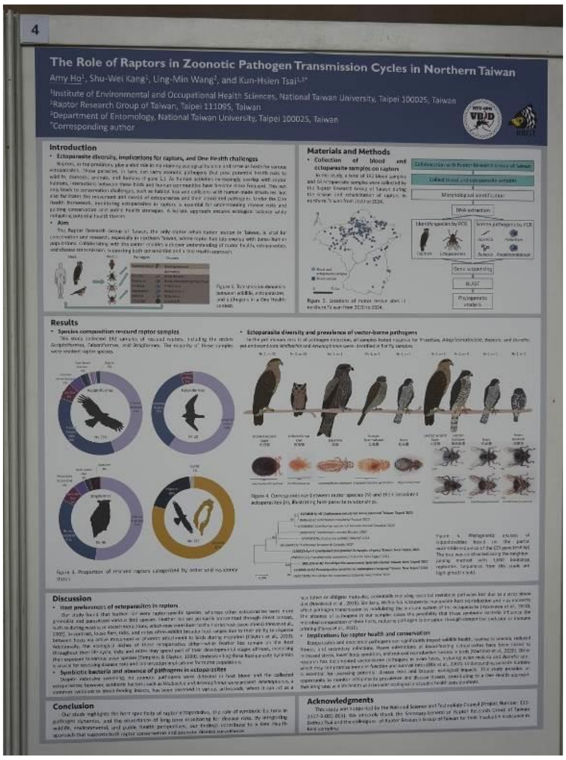
五、頒獎、閉幕儀式

圖三十三、學生競賽口頭與海報發表得獎者與 ARRCN 山崎亨主席合照。

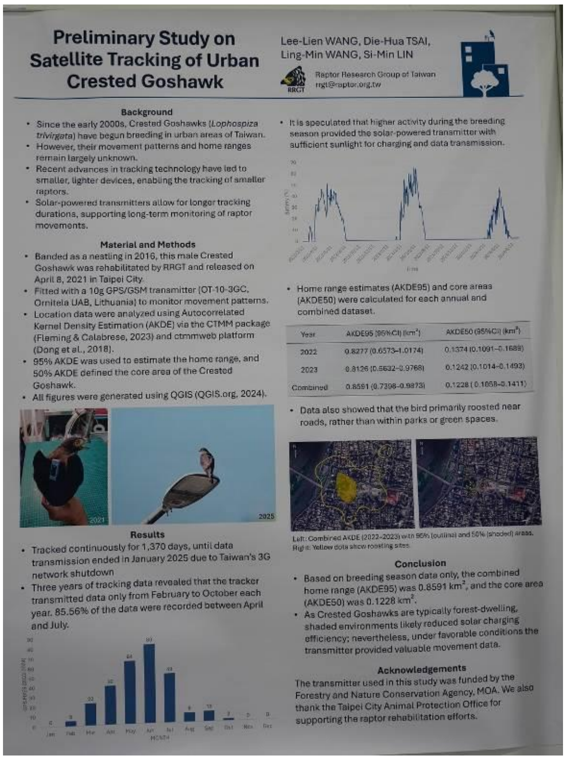
圖三十四、亞洲猛禽研討會主辦交接儀式，台灣與尼泊爾代表。

六、海報

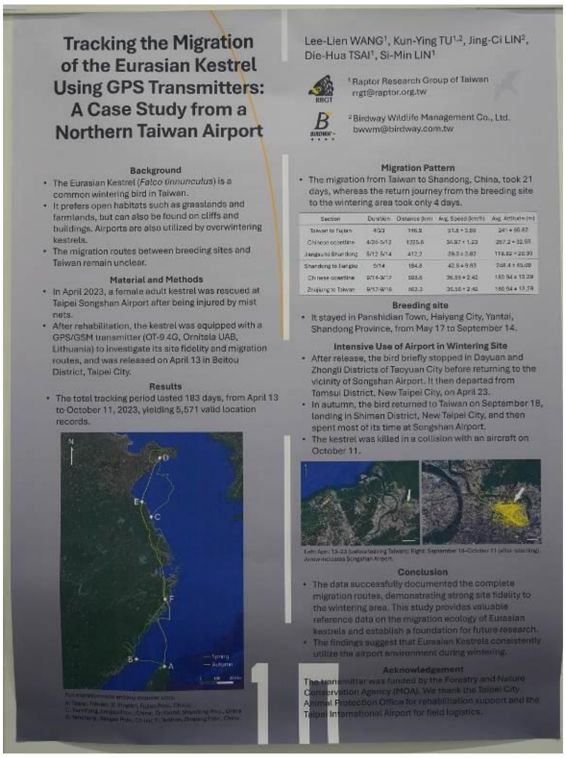
圖三十五、海報展示區



圖三十六、本會發表海報



圖三十七、本會發表海報



圖三十八、本會發表海報

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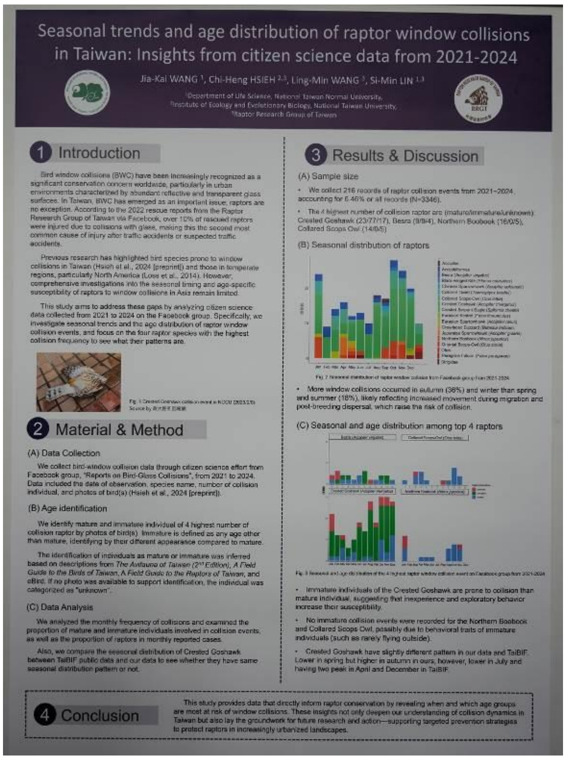

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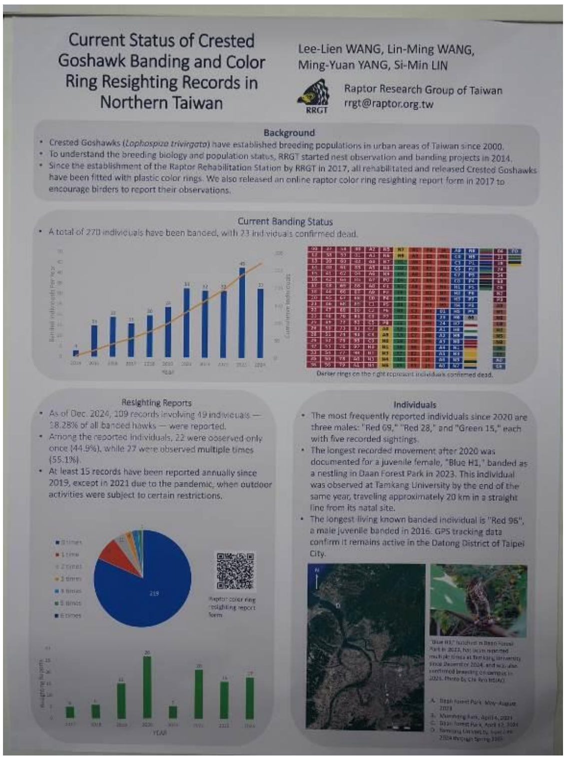

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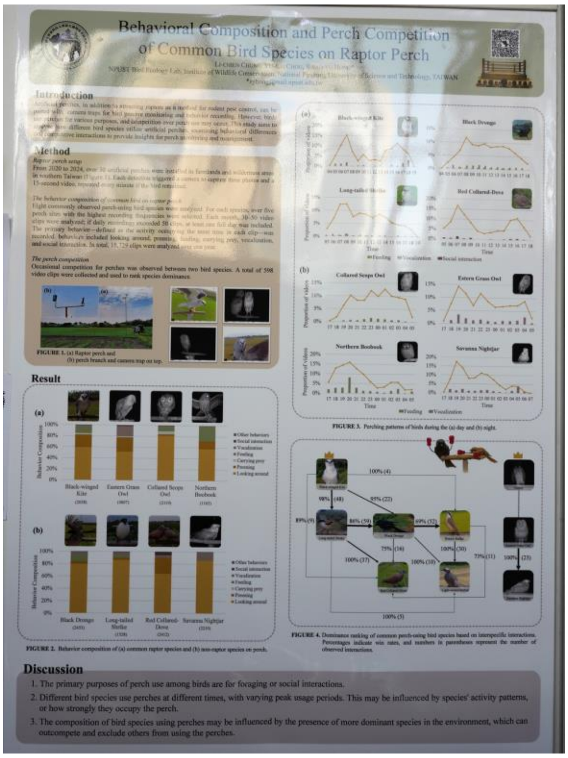
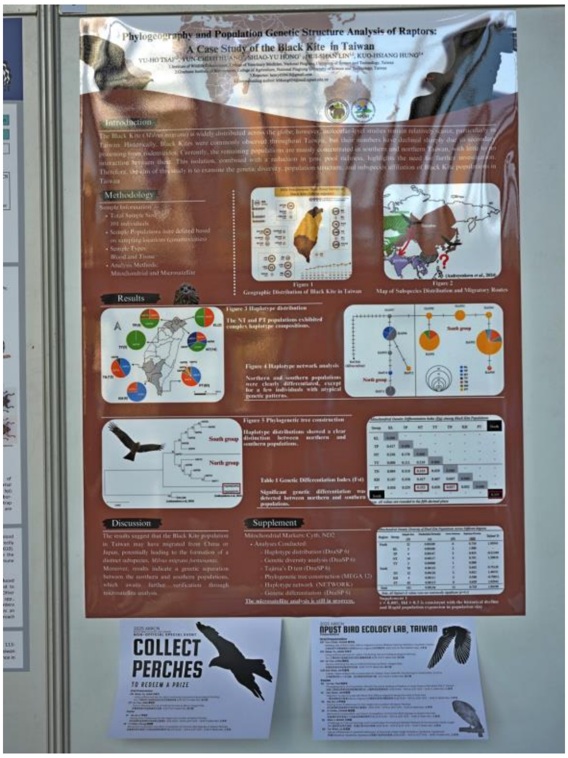


圖四十一、學生競賽海報優勝



圖四十二、學生競賽海報佳作

七、會後參訪、工作坊

圖四十三、觀音山賞鳥

圖四十四、參訪觀音山猛禽館

圖四十五、窗殺工作坊

圖四十六、窗殺防治實作

八、其他

圖四十七、主會場

圖四十八、布條布置

圖四十九、次會場

圖五十、主視覺

圖五十一、友善農作點心

圖五十二、經典台式點心

圖五十三、茶敘交流時間

圖五十四、茶敘交流時間

圖五十五、猛禽市集

圖五十六、攤位

圖五十七、美國遊隼基金會攤位　　圖五十八、工作人員合照

附錄 2、研討會簽到表

-草稿-

-草稿-

附錄 3、工作坊議程與簽到

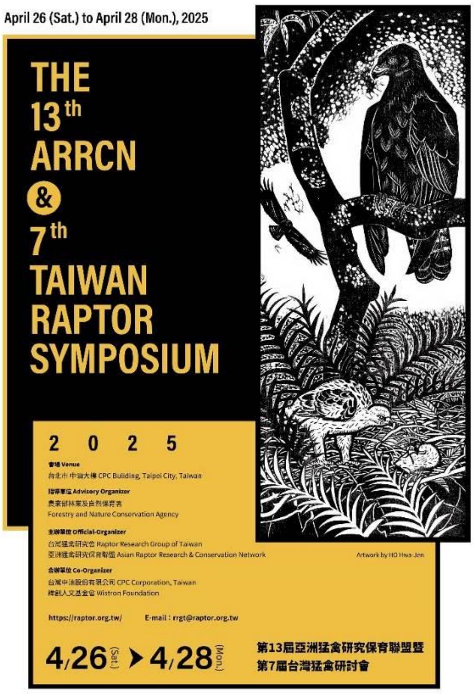
WORKSHOP/ How to Effectively Promote the Concep of Preventing Bird Window Collisions

Workshop content	Time	Location
Lunch time (foreign participants only)	12:00-13:15	2F Meeting Room
Workshop registration	13:15-13:30	2F Meeting Room
Introduction to bird-window collision in Taiwan	13:30~14:00	2F Meeting Room
Sharing and discussing the current situation in each country or region (report after group discussion)	14:00~15:00	2F Meeting Room
Low-cost methods for preventing bird window collisions	15:00~15:30	2F Meeting Room
Bird-window collision prevention hands-on practice	15:30~16:30	1F Practice Area
Take bus to Taipei Main Station (foreign participants only)	16:30	Tour bus

-草稿-

附錄4、研討會文宣

主視覺：海報輸出

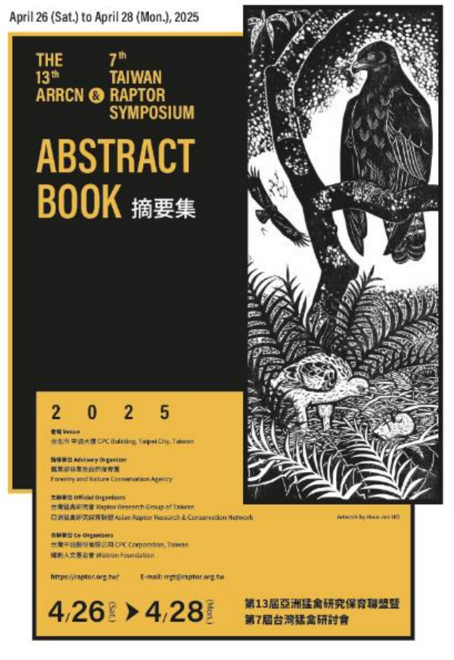


主視覺：大圖輸出

研討會布條

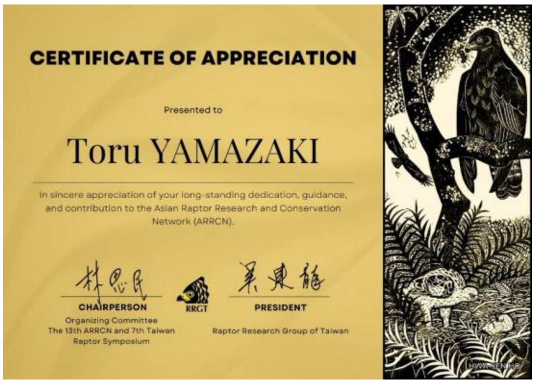
-草稿-

研討會摘要集封面

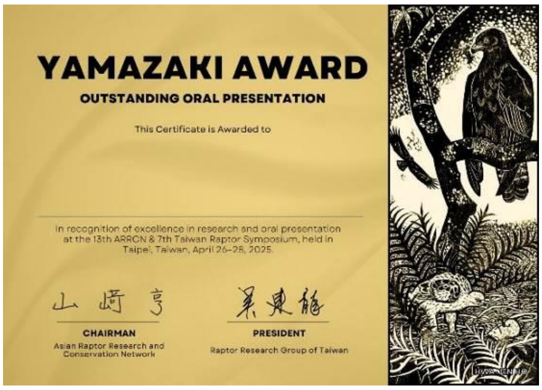


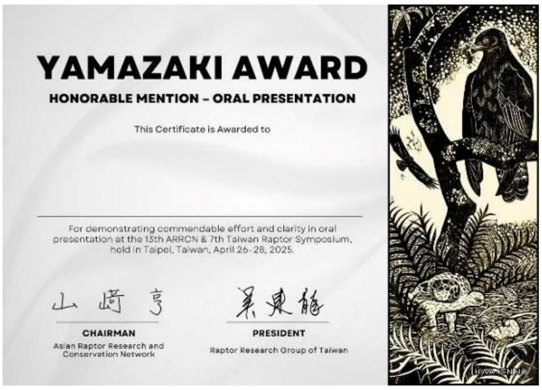
識別證：與會者(黃)、工作人員(藍)

獎狀：特別感謝獎



獎狀：口頭發表優勝、佳作





台灣尼泊爾交接手牌

-草稿-

April 26 (Sat.) to April 28 (Mon.), 2025

THE 13th ARRCN & 7th TAIWAN RAPTOR SYMPOSIUM

ABSTRACT BOOK 摘要集

Artwork by Hwa-Jen HO

2 0 2 5

會場 Venue
台北市 中油大樓 CPC Buliding, Taipei City, Taiwan

指導單位 Advisory Organizer
農業部林業及自然保育署
Forestry and Nature Conservation Agency

主辦單位 Official Organizers
台灣猛禽研究會 Raptor Research Group of Taiwan
亞洲猛禽研究保育聯盟 Asian Raptor Research & Conservation Network

合辦單位 Co-Organizers
台灣中油股份有限公司 CPC Corporation, Taiwan
緯創人文基金會 Wistron Foundation

https://raptor.org.tw/ **E-mail: rrgt@raptor.org.tw**

4/26 (Sat.) ▶ 4/28 (Mon.)

第13屆亞洲猛禽研究保育聯盟暨
第7屆台灣猛禽研討會


TAIWAN
Tâi-uân
Ictinaetus malaiensis

Hwa-Jen HO

1958-2021

Hwa-Jen HO is a renowned bird artist from Taiwan and the founding president of the Raptor Research Group of Taiwan. He has long used his art and network to promote the development of the organization. His detailed and passionate works have not only attracted attention to raptors but also encouraged more people to advocate for raptor conservation.

In his later years, Hwa-Jen HO focused his observations on the Black Eagle—a raptor with a wingspan of up to 180 cm, known for its graceful flight and secretive life history. He created numerous artworks of the Black Eagle, and the visual theme and commemorative T-shirt for this conference are both designed using artwork from his printmaking series. Hwa-Jen HO's Black Eagle paintings are not only an important representation of his artistic career but also a significant contribution to the Raptor Research Group of Taiwan.

WELCOME MESSAGE

I am very happy to hold the 13th ARRCN Symposium in face-to-face after the 11th Symposium in Bali, Indonesia. I sincerely regret the perfectly arranged the 12th ARRCN Symposium planned in Borneo had been changed to the Virtual Symposium due to the pandemic of COVID-19, which many members had prepared to make their presentations.

However, I was very happy to know so many ARRCN members relating Raptor research and conservation in Asia had been continuing their own activities same as before. As a result, through the perfect management of the organizing committee, we could have a great meeting to step up our next challenges to conserve Asian Raptors related to local communities.

In addition, the 12th ARRCN Symposium was a historical milestone for ARRCN to expand our activities to a global perspective through strong relationship with the Raptor Research Foundation. Although "Nature Positive" has become an important issue in the world, "Nature Positive" has been a fundamental concept of our life in Asia and we have been challenging to conserve Asian Raptors based on strong relationships with local communities. Therefore, I am sure this Symposium must be a new stage for our activities to promote Raptor research and conservation activities with a global perspective on Earth.

In addition, although the importance of Raptors for nature conservation is becoming common sense, we cannot understand their correct role in the ecosystem with a short-term and limited research them. Therefore, a long-term study on Raptors in each country is necessary not only to know the real ecology of each species, but also to understand the current situation of Raptors according to environmental changes such as climate change.

I have noticed the Symposium has an important role to stimulate ARRCN members to keep everyone connected and updated on field studies to discuss the challenges and future plans for research and conservation on Raptors in each country. The 13th ARRCN Symposium in Taiwan must be an irreplaceable face-to-face opportunity together to encourage each other and share updated information to proceed a new stage of ARRCN for Raptor and nature conservation on Earth.

I sincerely hope that this Symposium would be an opportunity for all participants to open the new stage of ARRCN and reconsider the important role of Raptors within unique and rich culture in Asia.

Sincerely,

Toru YAMAZAKI 山崎 亨

Chairman
Asian Raptor Research and Conservation Network

WELCOME MESSAGE

On behalf of the Raptor Research Group of Taiwan, I am delighted to extend a warm welcome to all of you for the 13th Asian Raptor Research and Conservation Network (ARRCN) and 7th Taiwan Raptor Symposium. It is a great pleasure to bring together researchers, conservationists, and raptor enthusiasts from 15 countries to share our passion for raptors and their conservation.

Taiwan's unique location makes it a key stopover for migratory raptors and a home to many resident species. This symposium is a great opportunity for us to exchange knowledge, discuss challenges, and explore new ways to protect these incredible birds across Asia and beyond.

We would like to express our deepest gratitude to our co-organizers—ARRCN, CPC Corporation Taiwan, Wistron Foundation, and the Forestry and Nature Conservation Agency—for their invaluable support in making this event possible. Their commitment to conservation is deeply inspiring.

During this symposium, we will have the opportunity to explore a variety of topics, including raptor behavior and ecology, conservation strategies, and the latest research. We invite you to actively participate, ask questions, and engage in meaningful discussions. Above all, let us take this opportunity to build lasting connections and strengthen our collective efforts to protect raptors and their habitats.

We hope that this symposium will not only enhance our understanding of raptors but also strengthen our collective efforts to protect these magnificent birds and their habitats. We wish you a productive and enjoyable symposium!

Sincerely,

Jian-Long WU

President
Raptor Research Group of Taiwan

Content

Full Symposium Schedule

4/26 Sat.	Main Hall (1F)	Secondary Hall (5F)
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10:00-10:30	Opening Ceremony	
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11:15-11:30	Morning refreshments	
11:30-12:50	Country report I	
	C1 Beyond Government: Private Sector and NGO Contributions to Raptor Conservation Si-Min LIN	
	C2 Status and Conservation of Raptors in Japan Atsuki AZUMA	
	C3 Country Report: Raptor Research, Monitoring and Conservation updates from Republic of Korea Hankyu KIM	
	C4 Philippines Country Report Alex TIONGCO	
12:50-14:10		Lunch
14:10-15:40	Parallel session 1A	Parallel session 1B
	O1 Breeding Home Range and Habitat Use of the Chinese Sparrowhawk (*Accipiter soloensis*) in Korea Jongbin GO	O7 Breeding Ecology of Flores Hawk-eagle (*Nisaetus floris*) in Ende Regency, Flores, Indonesia Oki HIDAYAT
	O2 Testing Niche Conservatism in the Grey-Faced Buzzard (*Butastur indicus*), a Migratory Raptor Species Breeding in Korea Hyeok-Jun CHOI	O8 Monitoring of Reproductive Performance of Javan Hawk Eagle (*Nisaetus bartelsi*) in the Rehabilitation Center Using Closed Circuit Television (CCTV) Wardi SEPTIANA
	O3 Loop Migration of the Chinese Sparrowhawk (*Accipiter soloensis*) along the East Asian Flyway Jo-Szu TSAI	O9 Model Choice for Habitat Prediction of Vulture Species Studied in Northern India Radhika JHA
	O4 Long-Term Monitoring of Migratory Raptors in Taiwan: Population Trends and Conservation Implications Yi-Hua TSAI	O10 Nestling Diet of Black Kites (*Milvus migrans*) across different Nesting Habitats in Southern Taiwan Yun-Chieh HUANG
	O5 A Note on Annual Raptor Migration Watch at Mt. Sega, Bali - Indonesia Luh Putu Eswaryanti Kusuma YUNI	O11 Landscape influence on diet composition of Australasian Grass-Owl (*Tyto longimembris*) in Southern Taiwan: Insight from pellet analysis Chih-Yi LU
	O6 A Framework for Setting Global and Regional Raptor Conservation Priorities Evan BUECHLEY	O12 The Central Sierra Madre Expeditions and the Discovery of the First Active Philippine Eagle Nest in Mt. Mingan, Luzon Island, Philippines Rowell L. TARAYA
15:40-16:10	Coffee break and Poster session	
16:10-17:40	Parallel session 2A	Parallel session 2B
	O13 Using Artificial Perches for Raptor Monitoring and Promoting Ecological Farming Shiao-Yu HONG	O19 Population Expansion and Adaptation to Suburban Habitats of the Black Eagle in Taiwan Wen-Horn LIN
	O14 A Cultural Keystone Species Undergoing Overexploitation-Ethnobiology of the Mountain Hawk-Eagle for the Paiwan People in Taiwan Yung-Kun HUANG	O20 Satellite Tracking and Habitat Use of Australasian Grass-Owl Jo-Szu TSAI
	O15 Navigating an Urban Matrix - Home Range and Resource Use of Resident Raptors in Singapore Malcolm Chu Keong SOH	O21 Assessing Population Trends of the Mountain Hawk-Eagle in Taiwan Using Occupancy Modeling Lee-Lien WANG
	O16 A Study on the Perception and Tolerance of Malaysians Towards Barn Owls (*Tyto javanica javanica*) Shakinah RAVINDRAN	O22 Estimating the Population Size of Crested Honey Buzzards (*Pernis ptilorhynchus orientalis*) Using the Photographic Mark-Resight Method in Yangmingshan, North Taiwan Yi-Hua TSAI
	O17 Factors Affecting the Use of Artificial Perches by Black-winged Kites Le-Yun CHEN	O23 The Populations of Only Two Breeding Raptor Species of Taiwan Have Grown in Recent Decades Da-Li LIN
	O18 Discussing Stakeholders' Perspectives towards Existing Payment for Ecosystem Services Schemes in Taiwan, Taking Raptor Conservation for example Chung-Ping KUO	O24 Invasive Species as Breakfast: Predation on the Giant African Snail (*Lissachatina fulica*) by the Crested Serpent-Eagle (*Spilornis cheela*) Yu-Cheng HSU
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19:00-21:00		Banquet

4/27 Sun.	Main Hall (1F)	Secondary Hall (5F)
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09:45-10:00	Morning refreshments	
10:00-11:40	Country report II	
	C5 Raptors in Malaysia: Current Status and Research Amera Natasha Mah Muhammad Adam MAH	
	C6 Country Report - Singapore Gim Cheong TAN	
	C7 Country Report: Conservation Efforts on Raptors Communities in Indonesia Nunu ANUGRAH	
	C8 State of the Worlds Raptors Vol. 1: Austral-Pacific Region Christopher MACCOLL	
	C9 Country Report: Conservation Status of Raptors in Nepal Tulsi R. SUBEDI	
11:40-13:00		Lunch
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	O25 Raptor Conservation in Northern Southeast Asia Tulsi R. SUBEDI	O30 Assessing Vocal Activity Pattern of Crested Serpent-Eagle (*Spilornis cheela malayensis*) in a Lowland Forest in Peninsular Malaysia: A Pathway for Long-term Monitoring of Tropical Raptors Amirul Mukminin Shamsul MIZA
	O26 State of the World's Raptors: Indonesia Zaini RAKHMAN	O31 Collared Owlet Moonlit Songs: Vocalization Patterns under Lunar Cycle Dynamics Shih-Hung WU
	O27 Investigating the Importance of Glass Collision Injuries in Raptors: A Retrospective Analysis of Raptor Rescue Cases from 2017 to 2024 in the Raptor Rehabilitation Station in Taiwan Ling-Min WANG	O32 Seasonal Activity Patterns of the Australasian Grass-Owl (*Tyto longimembris*) Revealed Through Passive Acoustic Monitoring Chia-Hao CHANG
	O28 Projected Impacts of Climate Change on Raptor Distributions: A Case Study of the Migratory Oriental Honey-Buzzards and the Endemic Javan Hawk-Eagle in Indonesia Syartinilia	O33 DNA-based dietary analysis and evaluation of sampling methods for The Japanese Mountain Hawk-Eagle during the nestling period Hiromichi ICHINOSE
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	O36 Neotropical Raptor Network: A Model for Raptor Conservation in the Americas Marta CURTI	O41 I Know Places: Identifying Threats and Mapping Occurrences of the Globally Endangered South Philippine Hawk-eagle (*Nisaetus pinskeri*) Through Citizen Science Approaches Tristan Luap P. SENARILLOS
	O37 Ecology and Conservation of Endangered Flores Hawk-eagle Nisaetus floris in Nusa Tenggara Island, Indonesia Usep SUPARMAN	O42 Raptors and Airports in Indonesia: State, Risk, and Opportunity Raden Achmad SADIKIN
	O38 Impact of Urbanization on the Nesting Materials of Black Kite Breeding in Pokhara Valley, Central-west Nepal Sandesh Gurung	O43 Preliminary Study on Secondary Poisoning of Raptors by Rodenticides in Northern Taiwan Ling-Min WANG
	O39 Twenty Years of Black Kite Conservation in Taiwan: From Scientific Monitoring to Conservation Actions Hui-Shan LIN	O44 Risks of avian collision at the Pokhara Regional International Airport, Nepal Hemanta DHAKAL
16:00-16:15	Awards review period	
16:15-17:00	Keynote Speech III Mountain Hawk-Eagle, a Feathered Hundred Pacer, in Taiwan. Yuan-Hsun SUN	
17:00-17:30	Award Presentation, Closing Remarks, and Handover Ceremony	

4/28 Mon.		
06:30-12:30	Field trip	
13:30-16:30	Bird-Friendly Glass Workshop	

K1

The Use of Trained Raptors in Field Research

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Humans have held a unique relationship with birds of prey over the course of millennia. The hunting sport of falconry resulted in the development of countless techniques for the training and husbandry of various raptor species; it also resulted in some of the earliest wildlife management practices and laws. Some of these techniques, such as captive rearing, were used for recovery efforts for species such as peregrine falcons and osprey, and studies of toxicology and physiology. However, the application of falconry methods to experimental field studies is rare. I will review the few studies using trained raptors in field research to better understand aspects of prey selection. I will then present an overview of my use of trained raptors for multiple lines of research. These include assessing prey animal escape behavior and habitat use in response to predation threats, the handicapping influence of radio transmitters on prey species, the efficacy of captive rear-and-release programs for game birds and species of conservation concern, and assessing the role of parasitic infections of prey influencing raptor predation and the implications for management efforts. I will close with my thoughts on the potential benefits of using trained raptors in research to better inform conservation and management efforts for both raptors and their prey, the unique challenges of using trained raptors for research, and the legal and permitting aspects of such application.

K2

Connecting Stories, Resources and Generations: Building Long-term Strategies and Capacity for Asian Raptor Conservation

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Raptors in different biomes interact with their respective ecosystems in many ways. Losing raptors would have a cascading effect either locally or regionally in the case of migratory species. In tropical Asia, such interactions are more complex and the same goes to the associated ecological impacts. From an anthropogenic perspective, Asian raptors present diverse images and receive varying levels of attention, both positive and negative, across human generations. This is influenced by cultural, spiritual, economic and/or scientific values. Considering high diversity and endemism, raptor conservation in the Southeast Asian region requires prompt actions, albeit its actualization and progress being often tied to political pressure, economic priorities, traditions and social influences. Successful conservation works have been achieved through local or international efforts via research, capacity building, community engagement and government support. Despite high concentration of species, measures to preserve, protect and study raptors in Asia can be more challenging with respect to financial support, disparity in research advancements, knowledge gaps, as well as discrepancy in research findings in reaching conservation actions. Frequently due to limited resources, sustaining raptor conservation workforce and researchers remains difficult in this region. Such attempts are also skewed towards diurnal species particularly accipiters. Over the past three decades, most publications pertaining to raptors come from academic institutions, followed by NGOs, and citizen science. These publications have been increasing (two- to four-fold), primarily focused on behavioural studies, before the COVID-19 pandemic hit, as with research on other taxa. Raptor research methods that incorporate modern technologies like AI coupled with multi-disciplinary approaches such as economic valuation and acoustic assessment, can be further developed and explored. A global, adaptive, long-term conservation partnership to address resource shortages while strengthening the necessary capacity is required. This along with past knowledge and experiences that link success stories coming from generations of raptor enthusiasts, continue to be relevant and are a way forward to support conservation of Asian raptors.

Keywords: citizen science, integrative raptor research, internet of things, raptor conservation measures, stakeholder involvement

K3

Mountain Hawk-Eagle, a Feathered Hundred-Pacer, in Taiwan

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Mountain Hawk-Eagle (*Nisaetus nipalensis*) weights about 2200 g in male and 3000 g in female on average. They are sighter heavier for middle-elevation individuals. Mountain Hawk-Eagle is found on Taiwan island wide, breeding in elevation ranging from about 500 m in the northern and eastern Taiwan to about 2,300 m in the central of the island. As in other areas, they mainly inhabit in forest on the island. Adult birds occupied home range of 17-126 km2, while subadults have large home range up to 933 km2. The breeding density of two watersheds of the species is about 1 pairs/9.5 km2, and with this, it is estimated that 1,200 adults and 400 subadults inhabit in Taiwan.

Male and female Mountain Hawk-Eagle barely roost or perch together (<8%) and they spend about 1 hour aloft at daytime according to satellite-tracking data. Mountain Hawk-Eagle mostly hunt in late morning and afternoon (e,g., killing live prey at the trapping sites) which may explain why they spent most time building nest in early morning during November-January. Female took most part of nest-building with supplemental feeding by male. Eight calls of Mountain Hawk-Eagle have been identified such as territory call, alarm call, mating call, female's and chick's begging calls, and male call female or chick to get the food, chick cover the food brought to the nest by wings with calls.

Mountain Hawk-Eagle mainly lays one egg every year during early and mid-February. Heavy rain causes low nest success in Ilan area where 4 out of 6 nests failed in the spring of 2024. After about 49 days the egg will hatched during late March-early April. In general, the nestling's main diet consists of two species of flying squirrels (*Petaurista grandis* and *Petaurista lena*) (30%-40%). Normally Mountain Hawk-Eagle eaglets fledged (without sleeping at the nest) in July and then start to disperse away from their natal sites. On dispersal during January-March 30-40 km next year. They not only explored low-elevation area but also wander to high-elevation mountain up to 3,400 m a.s.l. Regarding the hunting skill development of young Mountain Hawk-Eagle, the swooping speed of their first two calendar years was below 80 km per hour; afterwards it increased up to around 100 km and more after the 5th calendar year.

Among the nine diurnal raptors that breeding in Taiwan, the Mountain Hawk-Eagle is most connected with indigenous culture such as Paiwan cultures in that the primary feather of young Mountain Hawk-Eagle has similar triangle pattern as that of the sacred creature-Hundred-paced serpent and it symbolizes the leadership of the Paiwan tribes. In addition, the Mountain Hawk-Eagle feather will be given to warriors by the Lukai leader for their bravery in defending the tribe from enemy. Traditionally, Paiwan tribe has strict rule of wearing headdress with Mountain Hawk-Eagle feathers; nowadays, the rule has been loosening since World War II, resulting in greater amount of feathers trade and price in the black market, especially in south Taiwan. At present most illegal hunting come from eastern Taiwan where the Mountain Hawk-Eagle is most common seen on the island.

An artificial feather has been created by an artist who is also a member of Kaohsiung Wild Bird Society in 2017. About 50% of Rukai leader family members and 40% of Paiwan leader family members accept the idea of raptorfriendly feather. During 2018-2023, workshops have been held at local tribes and a total of some three hundred students attended and learned the skill of making artificial feathers.

C1

Beyond Government: Private Sector and NGO Contributions to Raptor Conservation

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Taiwan currently has 37 diurnal raptor species and 13 nocturnal raptor species listed in the 2023 TWBF Checklist of the Birds of Taiwan. The Golden Eagle (*Aquila chrysaetos*) and the Common Buzzard (*Buteo buteo*) are newly recorded in Taiwan. Among the 9 diurnal and 8 nocturnal resident raptor species, the population of the Eastern Grass-Owl (*Tyto longimembris*) is the most critically endangered. Meanwhile, thanks to various conservation efforts, the Mountain Hawk-Eagle (*Nisaetus nipalensis*) has been reclassified from Endangered (EN) to Vulnerable (VU). The Black Kite (*Milvus migrans*) has shown a gradual increase in population, currently estimated at around 900 individuals across Taiwan, as the threats from pesticides and rodenticides have been better controlled. Since 2004, the autumn migration raptor survey in Kenting has tracked various species. Since 2019, the Chinese Sparrowhawk (*Tachyspiza soloensis*) population has remained stable, while the Gray-faced Buzzard (*Butastur indicus*) population has been increasing since 2016. The Eurasian Hobby (*Falco subbuteo*) has declined in average numbers compared to the first decade of the survey, whereas the Eastern Marsh Harrier (*Circus spilonotus*) has increased significantly. Both species exhibit notable population fluctuations. Taiwan's raptors continue to be threatened by habitat loss, as well as stray dogs and cats, bird-window collisions, hunting traps, pesticides, and rodenticides. The central competent authority, the Forestry and Nature Conservation Agency, promotes conservation actions for endangered species and collaborates with the Taiwan Biodiversity Research Institute to publish the Red List of the Birds of Taiwan, regularly assessing the status of raptor populations. At the same time, many nonprofit organizations are also involved in the rescue, rehabilitation, and tracking of raptors, accumulating important data such as migration routes and activity ranges. Community groups also contribute by sharing raptor-related information, encouraging greater participation in citizen science. With government support and growing interest from the private sector, businesses have also become actively involved in raptor conservation. The Wistron Foundation supports raptor education and promotion in Taiwan, assisting in the development of the Grass-Mountain Raptor Center. It has sponsored the production of several raptor documentaries, including *Fly, Kite Fly*, *Night Hunters: Taiwan Grass Owls*, and the upcoming film on the Mountain Hawk-Eagle. Additionally, the foundation supports medical research exploring heavy metal accumulation in raptors and the threats posed by rodenticide exposure to urban raptors. The CCYS Group has long been focused on the ecology of the Black Eagle (*Ictinaetus malaiensis*). Its contribution led to the publication of the world's first academic paper on the movement patterns of the Black Eagle, which was published in the *Journal of Raptor Research*. PX Mart has partnered with the conservation-friendly Black Kite Red Beans, developing various eco-friendly agricultural products such as Eagle Adzuki Bean, Black-winged Kite Rice, and Owl Pineapple. These products allow consumers to actively support conservation efforts. Meanwhile, the Farglory Life Insurance has launched the "Protecting Every Owl" project, which involves setting up field perches and artificial nest boxes, and working closely with communities to create ecological restoration bases, protecting the biodiversity of agricultural lands. Raptor conservation in Taiwan, initiated with government support, has been fortified over time through collaboration with nonprofit organizations and academic institutions. More recently, the inclusion of businesses has united industry, government, and academia, fostering conservation initiatives tailored to Taiwan's specific needs.

Keywords: citizen science, corporate social responsibility, population trend, raptor rescue, RRGT, Taiwan

C2

Status and Conservation of Raptors in Japan

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Twenty-four species of Accipitriformes in 12 genera have been recorded in Japan (Ornithological Society of Japan 2023). Of these, 13 species in 11 genera are breeding (Osprey, Oriental Honey Buzzard, Crested Serpent Eagle, Mountain Hawk-Eagle, Golden Eagle, Japanese Sparrowhawk, Northern Goshawk, Eurasian Sparrowhawk, Eastern Marsh Harrier, Black Kite, Marsh Harrier, Black Kite, White-tailed Eagle, Steller's Sea Eagle, Grey-faced Buzzard and Common Buzzard), and in recent years the breeding population of the Black-winged Kite, which is believed to have settled on Ishigaki Island, has been increasing.

The Japanese archipelago stretches approximately 2,200 km in a straight line from Yonaguni Island (24°27' N latitude) in the south to Etorofu Island (45°33' N latitude) in the north, allowing both southern hawks such as the Crested Serpent Eagle and northern hawks such as the Steller's Sea Eagle and the White-tailed Eagle to inhabit the area. In addition, since 68% of the country is forested, there are many forest raptors such as golden eagles and mountain hawk eagles. In addition, the country is surrounded by oceans, has many islands, and has diverse environments such as wetlands and Satoyama, which provide habitats for a wide variety of raptors.

Many birds of prey are endangered in Japan. Deer and wild boar are increasing throughout Japan, causing serious damage to crops. To control their population, they are hunted and killed. Steller's sea eagles, white-tailed sea eagles, golden eagles, and mountain hawk eagles have all died from lead poisoning caused by eating lead shot shells along with pieces of meat when eating shot corpses. The Ministry of the Environment aims to reduce the incidence of avian lead poisoning from lead ammunition to zero by FY2030. Wetlands that provide excellent habitat for the Eastern Marsh Harrier have been lost to reclamation and land development. As the number of farmers has declined, rice paddies, fields, and other cultivated land have been abandoned or developed, and the number of Satoyama has declined, resulting in a decline in the number of gray-faced buzzards.

The Golden Eagle is the most endangered species. There are only about 500 birds and 200 pairs in the entire country. The breeding success rate (existing pairs only) by decade shows a steady decline: 44% from 1981 to 1990, 25% from 1991 to 2000, 26% from 2001 to 2010, and 17% from 2011 to 2020. Some simulate that if this situation continues, the Golden Eagle will be extinct in Japan by 2050.

A recent threat to raptors has been the development of renewable energy. Japan aims to become carbon neutral by 2050 and plans to increase the share of renewable energy generation to 40-50% by 2040, according to the latest Basic Energy Plan. Wind power generation is best suited to mountain ridges with good wind conditions, which are suitable habitats for golden eagles and mountain hawk eagles. Forests are being cut down for construction, and mountains are being destroyed by road construction. Offshore wind power is also increasing dramatically in Hokkaido and Tohoku. Wind power not only destroys nature, but also kills many birds of prey through bird strikes. Solar power is being built in Japan's few remaining wetlands and semi-natural grasslands, such as the Kushiro Marshlands and the foot of Mt. Aso, as well as on abandoned farmland. The gray-faced buzzard and the northern goshawk have been severely affected. Japan is already number one in the world in the ratio of solar power generation area per land area and is already saturated. The transition to renewable energy, which is being built by cutting down forests that absorb and fix carbon dioxide and destroying farmland and coastal areas that serve as food bases, must stop now, and the ARRCN must speak out.

Keywords: carbon neutral, lead poisoning, renewable energy, Satoyama, solar power, wind power

C3

Country Report: Raptor Research, Monitoring and Conservation updates from Republic of Korea

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In the past two years since the 12th ARRCN meeting in Malaysia, there have been several updates in raptor conservation and monitoring in South Korea. To summarize these activities, we gathered information from peer-reviewed papers, news articles, grey literatures and unpublished research and conservation activities from ourselves and colleagues working with raptor conservation and research. Based on Google Scholar and Korean Journal of Ornithology(KJO) search, the peer-reviewed research topics were similar to the past years, a combination of vetenerary science, ecological research and natural history research reports. Among these, two breeding biology studies were published in KJO, including studies on Black Kites and Eurasian Goshawks. In terms of raptor conservation, greatest news is probably the new successful breeding record of a pair of White-tailed Sea-eagles in Sihwa Reservoir, located about 40 kilometers southwest from Seoul. This is a first known record of breeding of this species on inland, and may be a significant first step for the species' breeding population recovery in Korea. Which is known to be the southernmost breeding range of the species, at least in East Asia. Before this discovery, the species was known to only breed in islands around Heuksan-do area in the southwest of Korean Peninsula. Collaborative research with Taiwan on migratory breeding raptors (Chinese Sparrowhawk and Gray-faced Buzzard) is continued, with a new focus on Gray-faced Buzzards. In July 2024, a team of researchers from National Chiayi University, Raptor Research Group of Taiwan, Seoul National University and Kyeong Hee University conducted a 10-day fieldwork and held a symposium, deploying transmitters on these raptors and sharing research and conservation plans and experiences. Additional raptor tracking data collection was coducted by National Institute of Biological Resources(NIBR) and its collaborators, collecting tracks of Upland Buzzards, Rough-legged Buzzards, Hen Harriers, Gray-faced Buzzards and Chinese Sparrowhawks. NIBR also confirmed a migration case of Eastern Buzzard subspecies, Japanese Buzzard (*Buteo japonicus japonicus*) using molercular methods.

Keywords: *Accipiter soloensis*, *Butastur indicus*, *Buteo hemilasius*, *Buteo japonicus*, *Buteo lagopus*, *Haliaeetus albicilla*, international collaboration, long-distance migration

C4

Philippines Country Report

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The Philippines has 35 species of raptors, and other than the Great Philippine Eagle, which is being extensively studied and conserved by the Philippine Eagle Foundation, not much systematic studies so far, have been made on the other 34 species of raptors.

Our emphasis is on the migratory raptors which are about 17 species because they are most commonly seen during migration times and therefore easy for show and tell stories to the communities. They are also the ones most commonly persecuted.

Since the start of our project in 2013, Raptorwatch has made some significant successes. We must emphasize that since our aim is for community empowerment, the success is attributed solely to the communities which are pursuing these projects.

In Sanchez Mira, a small community in Northern Philippines, which is a spring roosting site for migrating Grey-faced Buzzards on their way to their breeding areas, and where massive traditional community harvesting is practiced.

After a few years of intensive educational tours, the community decided to adopt our conservation programs. The local government has, on their own, continued the educational caravan to promote nature awareness and conservation before the start of spring migration each year.

Sanchez Mira is a great example of a community which is able to beat their swords of hunting and environmental degradation into ploughshares of conservation.

In Nueva Vizcaya, our new study site located 120 miles southeast of Sanchez Mira, traditional hunting still is practiced. To move faster with the Raptorwatch awareness and educational programs, a Memorandum of Agreement was signed in 2024 with the Provincial Governor, the Provincial State University and the Department of Environment and Natural resources for cooperation on the protection of wildlife.

Based on the memorandum, the ARRCN, JSPB, NACS-J will conduct DNA studies and satellite tagging of the Grey-faced Buzzards in the Philippines to determine their migratory routes and roost and breeding areas in aid of a comprehensive conservation plan in the Philippines.

In Sarangani, Southern Mindanao, after a long hiatus caused by the pandemic, the Provincial Governor has decided to continue Raptorwatch projects, this time spearheaded by the Provincial Environment and Natural Resources Office (PENRO).

The sustainable community livelihood reforestation program at Mt. Taltak is now aligned with the Reforestation Development Project which aims to plant 1 million trees in 3 years.

After initial investigation and confirmation of persistent reports from communities of raptors on spring migration, the Sarangani Raptor team has set up a 5-year full season Spring Migration Monitoring, - the first study area in the Philippines to have both the Spring and Autumn raptor monitoring program.

Expansion Plans

To establish the important raptor migratory flyway link to Borneo, this year we intend to open study areas in Zamboanga and Palawan. Liaison with groups in these places are being initiated to accelerate accessibility.

Keywords: community empowerment, raptor migration, sustainable livelihood reforestation, traditional hunting

C5

Raptors in Malaysia: Current Status and Research

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Malaysia recorded 68 raptor species, comprising of 47 diurnal and 21 nocturnal species, although detailed research on their ecology remains limited, particularly for forest, migratory, and Malaysian Bornean raptors. Recent taxonomic updates include the addition of Collared Scops-owl (*Otus lettia*), following a study on vocal leapfrog patterns within the Collared Scops-owl complex (formerly *O. bakkamoena*), which replaced the Sunda Scops-owl (*O. lempiji*) in Peninsular Malaysia. Similarly, Barn Owl (formerly *Tyto alba javanica*) has been revised to Eastern Barn-owl (*T. javanica*), separating it from the Western Barn-owl (*T. alba*) which is now restricted to western Asia. The genus for two *Bubo* species in Malaysia has also been revised to *Ketupa* (Barred Eagle-owl *K. sumatrana* and Dusky Eagle-owl *K. coromanda*). Recent molecular phylogenetic study had reclassified five *Accipiter* species in Malaysia into two genera, *Tachyspiza* (Besra *T. virgata*, Chinese Sparrowhawk *T. soloensis*, Japanese Sparrowhawk *T. gularis*, and Shikra *T. badia*) and *Lophospiza* (Crested Goshawk *L. trivirgata*). An examination on Oriental Honey-buzzard (*Pernis ptilorhynchus*) uncovered two new species of ectoparasites. The deployment of artificial hunting perches in an oil palm plantation in Pahang revealed the use of such structure by raptors. Bioacoustics approach had facilitated the study on vocal activity patterns of diurnal and nocturnal raptors in the lowland forests of Peninsular Malaysia. Eastern Barn-owl remains the most widely studied owl species with research on its breeding behaviour, prey selection, and population management in oil palm plantation as well as impact of secondary poisoning in captivity. For migratory raptors, the annual migration monitoring has continued at the primary count site, namely Tanjung Tuan, Melaka during the northbound migration. An effort to assess visitors' behaviour towards biodiversity conservation during the migration count was conducted. Additionally, a short survey in Tanjung Piai, Johor had documented both migratory and resident diurnal raptor counts. Other publications and reports related to the Malaysian raptors are presented. With the steady increase in research and surveys, there is a dire need of more ecological research and related publications on Malaysian raptors in the future.

Keywords: bioacoustics, citizen science, forest raptors, migration count, taxonomic revision

Country Report - Singapore

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In Singapore, a total of 47 raptor species occur - 36 diurnal and 11 nocturnal. Considering the size and state of development of the country, this level of biodiversity is impressive. There are 6 diurnal, 7 nocturnal resident raptor species, and another 2 species that occur both as residents and non-breeding visitors. The majority occur as non-breeding visitors - 28 diurnal and 4 nocturnal raptor species. Many of these are rare in the immediate neighbouring areas, but have been recorded in Singapore due to two main reasons. One is geography, as Singapore is located at the southeast tip of the Asian continent, the other is the relatively large number of observers in a small area. This oral report will cover the status and abundance, and other pertinent info regarding the raptor species that occur in Singapore.

Keywords: raptor, Singapore

C7

Country Report: Conservation Efforts on Raptors Communities in Indonesia

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Indonesia is an archipelago country consisting of more than 17,000 islands, a geographical configuration that has fostered high levels of both biodiversity and endemism. The country is home to 130 species of diurnal and nocturnal raptors, 42 of which are endemic. These raptors include both sedentary and migratory species. Many diurnal raptors, as well as several nocturnal species, are protected under Indonesian regulations (Permen LHK No. 106/2018). This report examines the current status of raptors in Indonesia, focusing on their conservation status and the role of the government in their conservation. Among the raptors in Indonesia, two species are classified as Critically Endangered, four as Endangered, and five as Vulnerable, with 22 species listed as Near Threatened on the IUCN Red List. Of particular concern are the Javan Hawk-Eagle (JHE; *Nisaetus bartelsi*) and the Flores Hawk-Eagle (FHE; *Nisaetus floris*), both designated as primary conservation targets. The Indonesian government has actively supported the conservation of high-profile raptor species, particularly the JHE. In 1998, a recovery plan was implemented for the JHE to bolster conservation efforts, followed by the establishment of the Strategy and Conservation Action Plan for 2013–2022 (Permenhut No. 58/2013). Since then, these efforts have yielded considerable success in protecting this endangered species. Building on the success of JHE conservation, similar initiatives have been extended to other species, i.e. the FHE, with the development of a Strategy and Conservation Action Plan for 2021–2030 (Permen LHK No. 77/2022). Over the past two decades, the Indonesian government, with support from NGOs and conservationists, has implemented various rehabilitation, release, and breeding programs, especially for high-profile species. Monitoring of migratory raptors has also intensified, with activities conducted in Sumatra, Java, Bali, and Sulawesi. Indonesia serves as a critical route and wintering destination for migratory raptors, with 25 of the 56 species migrating across Asia recorded within the country.

Keywords: conservation effort, raptor communities in Indonesia, strategic and conservation action plan

State of the Worlds Raptors Vol. 1: Austral-Pacific Region

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The island biogeography of the Austral-Pacific region supports unique species and ecosystems, including many island- endemic raptors. There is also a conspicuous absence of several species that are otherwise globally distributed, such as vultures and Buteo hawks. This pattern gives the Austral-Pacific raptor community a distinct composition, with unique phylogeny, and very little connectivity to migratory populations from Asia despite the water-crossing abilities of highly abundant species such as the Chinese Sparrowhawk (*Accipiter soloensis*).

Raptor conservation programs are largely confined to the more affluent nations of Australia and New Zealand, with the small island nations comprising Melanesia, Polynesia, and Micronesia having less capacity and resources to identify and address raptor conservation challenges. Consequently, the region forms a global knowledge gap for bird taxa including several raptor species with no available scientific literature or even basic documentation (i.e. "lost species" such as the Slaty-backed Goshawk [*Accipiter luteoschistaceus*] and New Britain Sparrowhawk [*Accipiter brachyurus*]).

These information gaps are confounded by a lack of raptor conservation prioritisation in the Austral-Pacific, including the jurisdictions which support them. *State of the Worlds Raptors: Volume 1* addresses this need by providing an objective framework to rank raptor species and places in order of conservation need by incorporating aspects of their evolutionary distinctiveness, conservation status, and proportion of geographic range contained within each biopolitical region. Moreover, it identifies the most critical conservation measures needed to support local raptor populations based on known threats (e.g. deforestation) and habitat requirements (e.g. forest dependency).

Accordingly, this work identifies the highest priority raptors and jurisdictions for conservation in the Austral-Pacific region for the first time. At the species level, the Papuan Eagle (*Harpyopsis novaeguineae*), Red Goshawk (*Erythrotriorchis radiatus*), and Golden Masked-Owl (*Tyto aurantia*) emerge as the most significant raptors in need of conservation efforts. At the national scale, Australia, Papua New Guinea, and Solomon Islands are the most significant countries, whilst East New Britain, West New Britain, and Queensland are the most important sub-national regions for raptor conservation.

Keywords: Austral-Pacific, conservation, Oceania, Papuan Eagle, raptors, Red Goshawk

C9

Country Report: Conservation Status of Raptors in Nepal

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Raptors are the apex aerial predators that play a unique role in ecosystem services, these include carcass disposal, and maintaining ecosystem balance through population control of other species including agriculture pests. Despite these benefits, in recent years variety of anthropogenic factors threatened the majority of raptors in the world. In Nepal, a total of 59 species of diurnal raptors and 23 species of owls are known to occur. Among them, the population of many raptors is declining. Nearly 50% (40 out of 82 species) are either nationally threatened or near-threatened and four species are listed as Data Deficient (DD). The number of nationally threatened raptors that occur in Nepal is three times higher (37 species) than compared to globally threatened raptors (12 species). This illustrates that Nepal raptors are facing more challenges than the global average.

Despite these threats, raptor conservation efforts are highly skewed as more attention has been given to Critically Endangered Gyps vultures. In the late 1990s to early 2000s AD three species of Gyps vulture nearly extinct due to the secondary poisoning of veterinary drug diclofenac. Therefore, conservation efforts of many organizations (government, I/NGO and CBOs) mostly focused on these vultures through research, population and habitat monitoring, captive breeding, education and engagement of local communities. Now the era of veterinary diclofenac is almost over, however many challenges are growing. These include veterinary use of other drugs (Nimesulide, Ketoprofen, Aceclofenac etc.), habitat conversion and loss, unintentional poison baits, persecution and powerlines.

Factors other than drugs affect all other raptors, however, the government and other conservation organizations made a minimum effort to protect these raptors. However, a small team of dedicated raptor experts has been working on the population monitoring of several species through migration count (Thoolakharka watch site), road transect survey (entire southern Nepal), movement study of a few species (Himalayan Vulture, Bearded Vulture, Egyptian Vulture, Mountain Hawk-eagle and Indian Spotted Eagle), breeding study (Black Kite, Mountain Hawk-eagle, Indian Spotted Eagle, Egyptian Vulture), training/education, community engagement and support. These efforts are running on a small scale but in the future need to expand through capacity development, networking, resource allocation, and national and international collaboration to protect raptors from extinction.

Keywords: capacity development, poisoning, powerlines, research, threats, vulture

O1

Breeding Home Range and Habitat Use of the Chinese Sparrowhawk (*Accipiter soloensis*) in Korea

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Understanding habitat use and home range dynamics is essential for determining species' ecological requirements, identifying critical habitats, and designing conservation strategies that mitigate habitat loss. Despite being the most common breeding raptor in Korea, the Chinese Sparrowhawk (*Accipiter soloensis*) faces population declines presumably due to habitat loss, yet studies on its habitat use and spatial ecology remain limited. We deployed GPS transmitters on 40 Chinese Sparrowhawks in Yeoncheon and Paju, Gyeonggi Province, South Korea, during July 2023 and July 2024 to investigate their habitat use. Breeding home ranges of 31 individuals were analyzed using the autocorrelated kernel density estimation (AKDE) method, yielding median values of 20.4 ha (interquartile range or IQR: 14.0–30.6 ha) for 95%, 10.0 ha (IQR: 6.3–12.7 ha) for 75%, and 4.5 ha (IQR: 2.9–6.6 ha) for 50% utilization distributions. The minimum convex polygon (MCP) method yielded a median home range of 22.2 ha (IQR: 15.5–26.6 ha). These findings are similar to the home range estimates reported in the 2012 study using direct observation methods, which were 19.0 and 26.2 ha (n=2). While relatively small, these values are significantly larger than the 1975 study's median home range of 2.7 ha (IQR: 2.4–3.4 ha, n=8). This may indicate that environmental degradation has forced individuals to expand their home ranges to secure sufficient resources. Analysis of the habitat composition within the 95% AKDE home ranges of the Chinese Sparrowhawk showed that forest and cropland (including rice paddies) accounted for approximately 90% of the total area. K-means clustering further indicated that all Chinese Sparrowhawks exhibited a consistent pattern of habitat composition across individuals, regardless of home range size.

Breeding sites were consistently located at forest edges adjacent to rice paddies, where forests provide nesting and roosting sites, and rice paddies serve as primary foraging areas. Given their small home ranges, the species' reliance on specific habitat features highlights the need to conserve small rice paddies in lowland forest valleys. Conservation of these habitats is critical to their breeding success and the conservation of this declining population of the migratory raptor.

Keywords: *Accipiter soloensis*, autocorrelated kernel density estimation (AKDE), Chinese Sparrowhawk, habitat use, home range

O2

Testing Niche Conservatism in the Grey-faced Buzzard (*Butastur indicus*), a Migratory Raptor Species Breeding in Korea

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Long-distance migrants experience two distinct habitats throughout their annual life cycle: breeding and non-breeding habitats. If migrants use breeding and non-breeding sites with similar environmental conditions due to niche conservatism, they can minimize the costs associated with seasonal niche shifts required for adapting to different environments, ensuring fitness in new habitats, and ultimately offsetting the costs of long-distance migration. Therefore, determining whether a species exhibits niche conservatism is crucial for understanding how species would respond to environmental changes by climate and land use change. In this study, we examine whether niche conservatism is exhibited between the breeding and non-breeding habitat of grey-faced buzzards (*Butastur indicus*), a migratory raptor that breeds in temperate East Asia and winters in Southeast Asia. Given the seasonal climatic characteristics of their breeding and non-breeding range, we predicted that environmental differences between these habitats are buffered, leading grey-faced buzzards to exhibit niche conservatism. To test this, we constructed and compared ecological niche models based on species occurrence data and environmental variables from both breeding and non-breeding sites. To identify specific breeding and non-breeding sites, we tracked GPS-tagged individuals captured in Korea, confirming all migrated to the Philippines. We then collected occurrence records from public databases, selecting data from Korea for the breeding period and the Philippines for the non-breeding period. A comparison of occurrence distributions along mean temperature and precipitation gradients revealed that the climatic niche breadth in non-breeding sites was broader than that in breeding sites. In the next step, we will compare ecological niches between breeding and non-breeding seasons using multivariate analysis and Random Forest models to quantitatively evaluate whether the grey-faced buzzards exhibit niche conservatism. This analysis is particularly

important for migratory raptors, whose annual life cycles are often subject to significant knowledge gaps. The insights derived from this study will enhance predictions of potential habitat distributions and responses to environmental change, thereby facilitating the development of effective conservation and management strategies for Asian migratory raptors.

Keywords: niche overlap, niche stationarity, niche tracking, Oceanic Flyway, species distribution

Loop Migration of the Chinese Sparrowhawk (*Accipiter soloensis*) along the East Asian Flyway

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The Chinese Sparrowhawk (*Accipiter soloensis*) is one of the East Asia's most abundant diurnal raptors, yet its migration ecology remains poorly understood, with most studies focusing on continental routes. To address this, we deployed satellite transmitters on 41 individuals in Korea from 2019 to 2024, of which 22 (53.7%) provided at least one complete southbound or northbound migration track. The tracking data revealed a loop migration pattern with distinct seasonal routes. In autumn, individuals departed from Korea in mid to late September, later than their continental counterparts, and undertook two long-distance sea crossings of 700–1,400 km, requiring both diurnal and nocturnal flight. Among 26 southbound tracks from 22 individuals, only 5 passed through Taiwan (19.2%), while 20 (76.9%) flew east of Taiwan, stopping in the Ryukyu Islands (12 in Okinawa, 8 in the Miyako Islands) before continuing south to the Philippines and Indonesia. One individual deviated to China, likely due to Typhoon Krathon. These results suggest that raptor counts in Kenting National Park, southern Taiwan, may represent only a small portion of the Korean breeding population. In spring, 7 northbound tracks from 6 individuals followed a continental route, avoiding major water crossings. Birds traveled through China, with 6 crossing the Yellow Sea and one via North Korea. This asymmetry suggests that seasonal wind patterns and stopover habitat availability influence route selection. Favorable northeasterly winds may facilitate the autumn sea crossings, while spring migration depends on terrestrial thermals and refueling sites. These findings underscore the importance of conserving both oceanic and inland stopover habitats along the East Asian Flyway.

Keywords: *Accipiter soloensis*, Chinese Sparrowhawk, East Asian Flyway, loop migration

Long-Term Monitoring of Migratory Raptors in Taiwan: Population Trends and Conservation Implications

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Taiwan is located along the East Asian raptor migration route, where many raptors breeding in northeastern Asia, the Korean Peninsula and Japan pass through Taiwan while traveling to and from their wintering grounds in the Philippines and Indonesia. The fragmented terrain of East Asia results in migratory raptors having life histories that span a wide latitudinal range and multiple countries, making it challenging to assess population risks and conservation effectiveness. Migration raptor counts provide a cost-effective method for monitoring population changes. The Kenting Autumn Migration Raptor Count is conducted on the Hengchun Peninsula at the southern tip of Taiwan. Initially established as part of conservation efforts for the Grey-faced Buzzard, the survey has evolved into a long-term monitoring program tracking species composition and population trends along the migration route. It plays a crucial role in assessing changes in raptor numbers and passage timing along the East Asian Oceanic Flyway, with over 30 years of data collected since 1989. The counting station, Skyward pavilion in Sheding Nature Park, was occupied by two observers who scan the sky with 10 x 42 binoculars daily except in adverse weather conditions. All raptor species with reasonable fly direction and altitude were recorded and identified to species level. The results indicate that the two major species of the East Asian Oceanic Flyway, the Grey-faced Buzzard *(Butastur indicus*) and the Chinese Sparrowhawk (*Tachyspiza soloensis*), show a population growth trend. Notably, the Grey-faced Buzzard population has increased by 45% compared to the first decade of the survey, with a significant rise since 2016, and the migration period has been delayed by approximately two days. The numbers of Peregrine Falcons and Ospreys have also increased by 18% and 51%, respectively, compared to the early years of the survey. In contrast, the numbers of Eurasian Hobbies and Eastern Marsh Harriers fluctuate significantly between years without a clear trend. We discuss potential reasons for the population change observed in Grey-faced Buzzards, Ospreys, and Peregrine Falcons and propose the possibility of irruptive migration events in harriers. The findings from the count reflect the long-term effectiveness of conservation strategies and provide insights into the migratory ecology and behaviors of raptors.

Keywords: East Asia Oceanic Flyway, Grey-faced Buzzard, raptor migration count

O5

A Note on Annual Raptor Migration Watch at Mt. Sega, Bali - Indonesia

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Mt. Sega in the eastern part of Bali Island has been known as an ideal site for raptor migration watch in Bali. Every second week of October, we conducted a one-day raptor migration watch involving university students, as well as public participants. Here we report the result of our counting in the past two years, in 2023 and 2024. We divided the participants into four groups, such way enable us to cover all directions. We set virtual lines to determine the counting area for each group to avoid double counting for the individuals. One week prior to the counting date, we conducted a workshop to all registered participants that cover the method for species identification and the counting technique. In each group, we ensured that there was at least one to two experienced birdwatchers to assist with the species identification and the counting. In 2023, we counted 2.293 raptors in total consisting of 110 Oriental Honey Buzzard *Pernis ptilorhynchus*, 1.931 Chinese Sparrowhawk *Accipiter soloensis*, 249 Japanese Sparrowhawk *Accipiter gularis*, and 3 Peregrine Falcon *Falco peregrinus*. In 2024, however, we only counted 528 individuals consisted of 294 Oriental Honey Buzzard, 139 Chinese Sparrowhawk, 17 Japanese Sparrowhawk, and 74 *Accipiter* spp. Not only the difference in the number of individuals counted between 2023 and 2024 was found, but also on the species arrival. In 2023 the species was mostly the Chinese Sparrowhawk whereas in 2024 the species was mostly the Oriental Honey Buzzard. Besides the migrant raptor species, we also recorded the sedentary raptor species that appeared during the counting. We recorded 4-6 individuals the Crested Serpent Eagle *Spilornis cheela* and the Spotted Kestrel *Falco moluccensis* both in 2023 and 2024. Additionally, we recorded the presence of the Javan Hawk-eagle *Nisaetus bartelsi* flying over the counting site in 2024. This individual was recorded flying over twice, in one occasion the individual was flying alone and in the other occasion was flying in pair with the Crested Serpent Eagle, looked like in an agression mode. The presence of the Javan Hawk-eagle in Mt. Sega had been previously reported by several observers during the migration months. Regular annual migration watch in Mt. Sega will always be conducted to provide the continuous data set, as well as to promote biodiversity conservation among the young generations.

Keywords: *Accipiter*, migration, monitoring, raptor, sedentary

O6

A Framework for Setting Global and Regional Raptor Conservation Priorities

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Twenty percent of raptors are threatened with extinction and 57% are experiencing global population declines. Despite our broad understanding of many threats to raptors, substantial knowledge gaps exist, and these gaps affect conservation of these iconic species. To address this information need, The Peregrine Fund conducted a global survey of the conservation status of raptors. We engaged the broader raptor conservation community with experts at the regional level to help focus our attention on identifying priorities for conservation action. We used EDGE scores to rank raptor species globally for conservation action based on evolutionary distinctiveness and extinction risk. Although global resources should be mobilized for conservation of raptors, conservation action ultimately must happen locally. Regional perspectives are thus imperative to address global raptor conservation priorities. Accordingly, we divided the Earth into international raptor conservation regions and examined priorities for conserving raptors within each region. Analysts from The Peregrine Fund compiled draft lists of regional priorities by weighting global EDGE scores with the proportion of species ranges within each region. These regionally weighted EDGE scores (i.e. wEDGE scores) inform the species, places, threats, and conservation actions that we determine to be priorities for each region. These draft conservation priorities were then shared with regional experts for verification, criticism, and commentary. This strategy of incorporating local knowledge and global perspectives is imperative for conservation success. This presentation will provide an overview of The Peregrine Fund's methodology for identifying raptor conservation priorities at both the global and regional level. This talk will provide context for additional symposium presentations that will discuss regional conservation priorities, as identified by this framework, within Asia.

Keywords: birds of prey, conservation prioritization, EDGE, raptors

O7

Breeding Ecology of Flores Hawk-eagle (*Nisaetus floris*) in Ende Regency, Flores, Indonesia

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The Flores Hawk-Eagle (*Nisaetus floris*) is an endangered raptor endemic to the Lesser Sunda Islands. Its biological and ecological information remains limited, with only a few breeding records reported to date. This study aims to describe the breeding behavior of the Flores Hawk-Eagle in Ende Regency, Flores Island, East Nusa Tenggara, over a period from 2014 to 2023. Observations indicate that the breeding cycle of the Flores Hawk-Eagle spans 8–9 months. The cycle begins with nest building in December, followed by pair-bonding from January to March. Egg-laying and incubation occur from April to late May, lasting approximately 44–48 days, with hatching in late May. The parental care period extends from May to August. The hawk-eagles utilized three tree species for nesting: *Alstonia scholaris*, *Paraserianthes falcataria*, and *Aleurites moluccana*, along with one unidentified species locally known as the "namu tree." Five nesting trees were identified in total. Several natural factors influenced breeding success, including weather conditions, migratory raptors, and competition with other resident raptors.

Keywords: breeding, ecology, Flores, nest, *Nisaetus floris*

Monitoring of Reproductive Performance of Javan Hawk Eagle (*Nisaetus bartelsi*) in the Rehabilitation Center Using Closed Circuit Television (CCTV)

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The reproductive performance of the endangered Javan Hawk Eagle (*Nisaetus bartelsi*) in rehabilitation center is still not widely reported. The objective of the research is to observe reproductive performance by utilizing Closed Circuit Television (CCTV). Two Javan Hawks have been matched in enclosures with cage sized 20 x 10 x 15 m at the Rehabilitation Center, Pusat Suaka Satwa Elang Jawa, Mt. Halimun Salak Nasional Park. The cage was equipped with a nest made of natural materials and CCTV was also in place for monitoring. Pairing the eagles took place in March, during the breeding season. The reproductive performance that was monitored by CCTV involved mating activity, approaching the nest, taking fresh branches, laying eggs, incubating, and caring for the eaglets. The eagles successfully produced five fertile eggs during a four-year period from 2020 to 2023. These eggs were naturally incubated by both the female and male eagles, with the incubation period varying between 46 and 55 days. Monitoring the reproductive performance of the eagles and their readiness to be released into the wild is made easier by using CCTV in the cage. One of the five eaglets has been released into the wild and has a GPS Tag attached to it.

Keywords: CCTV, Javan Hawk Eagle, rehabilitation center, reproductive performance

O9

Model Choice for Habitat Prediction of Vulture Species Studied in Northern India

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Though vulnerable throughout the world, vulture species in India are critically endangered to near threatened. For their effective conservation, managers need to know the habitat details possible through species distribution modelling (SDM). Several SDMs are available but their predictive results are not uniform for a particular species. Therefore, we used a suite of popular SDMs (ANN, CTA, GBM, GLM, MARS, MaxEnt, RF, SVM) to find out whether they vary in prediction and which SDM is appropriate for which vulture species. All the models were run at default setting in R using the SSDM package. Three model evaluators (AUC, TSS, Kappa) and field verification along with expert opinion were used as model selection criteria. The hypothesis "Different SDMs produce different results for the same species" was proven correct. However, we found that all the SDMs were not appropriate for a particular species, neither a particular SDM was good for all the species. Classification Tree Analysis, ANN, GBM, RF andSVM were the successful models for vultures in UP. Species wise suitability was: CTA, GBM, RF and SVM (White-rumped); CTA and GBM (Indian); RF (Slender-billed); CTA, GBM, RF and SVM (Red-headed); RF and SVM (Egyptian); ANN, CTA, GBM, RF and SVM (Cinereous); GBM (Eurasian Griffon); and CTA, GBM, RF and SVM (Himalayan Griffon). In general, GBM, RF and SVM were the most suited SDMs. Our results could be a useful guide for the researchers to assess them elsewhere and/or use them for habitat modelling of vultures in other areas of subtropical region.

Keywords: evaluation matrices, habitat suitability prediction, model evaluators, species distribution models, subtropical conditions

O10

Nestling Diet of Black Kites (*Milvus migrans*) across Different Nesting Habitats in Southern Taiwan

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Black kites (*Milvus migrans*) are facultative scavengers that thrive in diverse habitats and can be easily spotted in small numbers above farmlands, scattered forests, riverbanks, fish farms and ports. However, from early winter to early summer, breeding pairs tend to defend their territories and become less social, making it difficult to observe their diet during the breeding season. Traditional methods of studying nestling diets include direct observation and collecting leftovers and pellets from nests. However, these methods are often considered either too costly or too disruptive due to frequent visits to the nests. To address this issue, we installed trail cameras by 18 nests of 16 different breeding pairs in southern Taiwan during the breeding seasons of 2020-2023, collecting data on 2,223 prey items in total. On average, 123.5±39 prey items were recorded per nest, with parents delivering 2.5±0.7 prey items to nest per day. Prey composition vary greatly between different habitats. Overall, birds were the most common prey group, accounting for nearly half of the recorded prey items in average (49.9±15.7%), followed by fish (30.2±14.9%) and mammals (10.4±5.9%). Nests located near bodies of water had a higher proportion of fish as nestling diet, while nestlings of Columbidae (pigeons and doves) are frequently brought back to nests in both forested and farmland areas. The heavy predation on granivorous birds may explain the dramatic decline in black kite populations in Taiwan following the widespread use of carbofuran in farmlands during the 1980s. The variation in nestling diets across different habitats indicate the versatile nature of this species and how small populations managed to survive despite the threat of secondary poisoning, and recover steadily along with the promotion of eco-friendly agricultural practices.

Keywords: breeding ecology, feeding habit, prey composition, trail-camera

O11

Landscape Influence on Diet Composition of Australasian Grass-Owl (*Tyto longimembris*) in Southern Taiwan: Insight from Pellet Analysis

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Pellets containing prey remains are a valuable tool for studying the raptor diet. However, little is known about the Australasian Grass-Owl (*Tyto longimembris*) due to its rarity. This study explores the owl's dietary composition and how landscape features influence its dietary patterns in southern Taiwan. Pellets were collected between 2019 and 2023 from 12 sites across four areas. We used rarefaction and extrapolation curves to assess sample completeness and prey diversity while determining differences in prey composition among areas with Chi-square tests. Finally, we used redundancy analysis (RDA) to examine the relationship between prey composition and landscape features within a 1 km radius of each site. Analysis from 234 pellets revealed four rodent genera, two shrew genera, and unidentifiable frogs, insects, and birds. Small mammals dominated the diet, constituting 98.4% of the total. Prey diversity varied among areas, as shown by rarefaction curves, and the chi-square analysis confirmed differences in prey composition ($\chi^2 = 176.98$, $p < 0.05$). The RDA revealed species-specific preferences for particular landscape features: *Apodemus* preferred forests, *Mus* preferred farmlands, and *Crocidura* preferred bushes and bare lands. Our findings support the hypothesis that the Australasian Grass-Owl is an opportunistic predator that adjusts its prey selection based on landscape conditions. We recommend that future research incorporating GPS tracking in future studies could further illustrate prey availability across diverse landscapes, providing insights for conservation planning.

Keywords: feeding ecology, landscape, pellet analysis

O12

The Central Sierra Madre Expeditions and the Discovery of the First Active Philippine Eagle Nest in Mt. Mingan, Luzon Island, Philippines

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The population status, biology, and ecology of the IUCN Critically Endangered Philippine Eagle (*Pithecophaga jefferyi* Ogilvie-Grant, 1896) on Luzon Island remain poorly understood. Most of the available information about the species on the island stems from sporadic sightings and rescue incidents. Although the oldest record of the Philippine Eagle on Luzon dates back to 1907, the first active nest was documented only in 2015 in Calanasan, Apayao, within the Cordillera Mountain Range, highlighting significant knowledge gaps. Despite numerous reports of Philippine Eagles in the Sierra Madre Mountains, including Mt. Mingan, no active nest had been confirmed in this region until this study. To address this gap, we conducted two separate field expeditions in the Central Sierra Madre from July 30 to August 8, 2024, and from October 1 to 18, 2024, for 28 fieldwork days. Using the standardized "Look and See" method, we surveyed the area and constructed six tree platforms across the study site for field observers to document raptor activity. Our efforts culminated in a significant discovery: during the first expedition, we photographed an adult eagle, and on October 4, we documented a ~7-month-old Philippine Eagle chick and its nest. The nest was located on a Bagtikan (*Parashorea malaanonan*) tree with a diameter at breast height (DBH) of 70 cm. The nest tree was built atop a large ball of epiphytic fern (*Drynaria* cf. *rigidula*) measured 11.22 m in height, with dimensions of 196 cm (length), 167 cm (width), and 86 cm (thickness). Measurements for all nest parameters fall within the range known for the species, except nest tree height, which is way lower than the average nest tree height recorded so far. The nest location was situated in the forest interior of a lowland dipterocarp forest at an elevation of 500–800 meters above sea level, within a nationally protected area. This discovery marks the second active nesting site of the Philippine Eagle on Luzon Island. Moving forward, we will continue monitoring this population to better understand its ecological and behavioral characteristics. Additionally, as part of our on-site conservation efforts, we trained and deputized 20 forest guards including members of Indigenous communities to protect the species and its habitat. This collaborative approach underscores the importance of local community involvement in safeguarding the Philippine Eagle and its ecosystems.

Keywords: conservation, critically endangered, Luzon Island, nest discovery, Philippine Eagle

O13

Using Artificial Perches for Raptor Monitoring and Promoting Ecological Farming

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Setting up artificial perches in open environments can attract raptors. In recent years, combining perches with camera traps enabled the recording of raptor species and their captured prey, providing diverse applications in raptor research. Perch monitoring methods were developed in Taiwan starting in 2017, recording over 20 raptor species and more than 70 non-raptor bird species for now. In plains and farmlands, the raptors most frequently using perches were the Black-winged Kite (*Elanus caeruleus*), Collared Scops Owl (*Otus lettia*), and Brown Hawk-Owl (*Ninox scutulata*), with thousands of recorded preys. Both the Black-winged Kite and Collared Scops Owl primarily fed on rodents, while the Brown Hawk-Owl mainly consumed insects, providing pest control services in agricultural fields. Beginning in 2020, our team used perches to monitor the Eastern Grass Owl (*Tyto longimembris*). Due to its low population and secretive behavior, ecological data on this owl had been extremely scarce, making it the most highly protected level of owl species in Taiwan. However, by installing perches in suitable environments, the chances of detecting Eastern Grass Owls significantly increased. Camera traps even captured images of leg bands, allowing individual identification. Historically, rodenticides were heavily used in Taiwan's farmlands for rodent control, which was proven to cause secondary poisoning in Eastern Grass Owls and many other raptors. To promote ecological farming, the Taiwanese government introduced an ecological payment policy in 2022. Farmers within the distribution range of the Eastern Grass Owl installed perches for free and received financial reward. By 2024, there were over 100 perches installed in southern Taiwan. Initially, many farmers were skeptical about raptors appearing in their fields, but 75% of the perches recorded any raptor species within three months. Artificial perches demonstrated great potential for automated raptor monitoring and served as an excellent tool for promoting ecological farming.

Keywords: automatic raptor monitoring, bird ecosystem service, ecological agriculture, raptor perch

A Cultural Keystone Species Undergoing Overexploitation- Ethnobiology of the Mountain Hawk-Eagle for the Paiwan People in Taiwan

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Bird feathers have traditionally been used by Paiwan Indigenous communities in Southern Taiwan to adorn their headdresses. Among various species, the feathers of the Mountain Hawk-Eagle (Nisaetus nipalensis), known as *qadis* or *adis* in the Paiwan language, hold particular significance. This paper seeks to explore the connection between the Paiwan and the *qadis*, as well as the development of knowledge, practices, and beliefs surrounding *qadis* feathers throughout history. We explored Paiwan feather culture by analyzing legends, vocabulary, stories, accounts of feather use, and the transformations in modern society. Interviewees shared the names of different feathers, their connection to social identities, and how they are worn. We visited 44 villages and interviewed 123 Paiwan elders and tribal chiefs to gather the local names of the feathers and of the various anatomical parts of *qadis*. We also documented the taboos, restrictions, rituals, and traditional ecological knowledge (TEK) related to *qadis* hunting. Traditionally, the *qadis* is considered a sacred bird, and its feathers on a headdress represent the elevated status of a tribal chief, noble, or hero. We applied our findings to help scientists understand feather culture and to find better conservation strategies that are responsive to local culture. In 2017, the Institute of Wildlife Conservation (NPUST) organized the forum titled "Revival of the Paiwan's Traditional *Qadis* Culture - Tribal Leaders Forum." During the forum, participants completed a closed-ended questionnaire on a family basis. Forty-four questionnaires were collected in total and analyzed quantitatively to assess the interviewees' perceptions of previously designed conservation strategies. The results of the questionnaires and interviews show that most participants believed that the identity of applicants for "The Mountain Hawk-Eagle Feather Repository" and the wearing of imitation feathers should conform to traditional norms. The acceptance rate of Mountain Hawk-Eagle imitation feathers was higher than in previous studies, but a significant portion of those who accept them do so only under certain conditions. Sixty-two percent of respondents rejected the idea of giving imitation feathers as wedding gifts. It is recommended that, before establishing The Mountain Hawk-Eagle Feather Repository and promoting imitation feathers, the details and implementation process be further discussed with the Rukai and Paiwan communities. Before proceeding, it is essential to obtain fully informed consent. It is hoped that the findings of this research will contribute to striking a balance between honoring Indigenous cultural

practices and achieving better conservation of the Mountain Hawk-Eagle.

Keywords: ethno-ornithology, feather, indigenous headdress, *Nisaetus nipalensis*, Paiwan

O15

Navigating an Urban Matrix - Home Range and Resource Use of Resident Raptors in Singapore

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Singapore, a small island city-state with a population density of nearly six million, balances its urban landscape with carefully preserved green spaces. These areas provide essential ecosystem services, regulating temperature, promoting residents' well-being, and conserving biodiversity. In line with its vision to become a 'City in Nature', Singapore has committed to planting a million new trees between 2020 and 2030, expanding nature reserves, and creating green corridors to facilitate wildlife movement between parks. Whilst the adaptation of passerine bird communities to green spaces in urban environments is well-documented, less is known about how resident raptors respond spatially to highly developed cities, particularly in Southeast Asia. Our study aimed to address this knowledge gap by tracking 11 rehabilitated and released raptors, comprising one brahminy kite, three crested goshawks, four changeable hawk-eagles, and three white-bellied sea eagles. Each raptor was fitted with a Lotek solar GPS transmitter to monitor its movements. We used continuous-time movement models and autocorrelated kernel density estimators to determine their home ranges, and used down-weighted Poisson regression to analyse their resource selection. Our findings revealed that the raptors initially exhibited large exploratory ranges before establishing smaller, more defined home territories. Tree cover and proximity to water sources emerged as significant predictors for most raptor occurrences, with the birds generally favouring areas of higher tree cover and locations near water bodies. Collectively, our results suggest that Singapore's urban landscape, with its mix of green spaces and water bodies, can support a healthy population of resident raptors, provided such suitable habitats are maintained.

Keywords: habitat selection, movement ecology, satellite tracking, urban ecology

O16

A Study on the Perception and Tolerance of Malaysians Towards Barn Owls (*Tyto javanica javanica*)

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This study was conducted to investigate the perception and tolerance of Malaysians towards a Southeast Asian Barn Owl subspecies (*Tyto javanica javanica*), in order to gain insight as to the relationship between people and this species that is species widely used a biological control agent against rat pests in agricultural areas in the country. The study was conducted using an online questionnaire form to assess knowledge, attitude and behavioural intentions of respondents in Malaysia towards barn owls, along with knowledge of any traditional practices and beliefs of barn owls. We collected a total of 726 respondents during the study period. Overall, knowledge of barn owl was low (median = 45.45%, IQR = 36.37), however attitude scores were mostly positive (median = 4.13, IQR = 1.25). Respondents reported mostly positive behavioural intentions towards barn owls (median = 4, IQR =1). A General Linear Model (GLM) analysis was used to investigate which socio-demographic factors influenced knowledge and attitude scores towards barn owls. Males and respondents who had previous encounters with barn owls had higher knowledge and attitude scores. Gender, education level and habitat surrounding residence influenced knowledge and attitude scores. Additionally, older respondents and respondents working in agricultural fields had higher knowledge scores. Only 112 respondents (15.43%) reported knowledge on traditional beliefs related to barn owls, most of which were negative beliefs. Education and awareness programs, especially those aimed at younger generations, could help improve knowledge and attitudes towards barn owls, as well as dispel negative traditional beliefs. Social media could also be used to spread knowledge of barn owls, especially to increase awareness of the threat of anticoagulant rodenticide misuse towards barn owls.

Keywords: Barn Owl, people, perception, Southeast Asia

O17

Factors Affecting the Use of Artificial Perches by Black-winged Kites

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Artificial perches are known to attract raptors to fields for rodent pest control; however, the factors influencing raptors' perch-use behavior remain unclear. This study aims to investigate these factors, focusing on perch location, raptor prey composition, rodent relative abundance, and vegetation cover. From October 2023 to September 2024, we installed artificial perches equipped with camera traps at 18 study sites in Southern Taiwan. Another camera trap with a rodent bait was set alongside each perch to estimate rodent relative abundance. Furthermore, vegetation cover at each study sites was estimated. Results showed that the Black-winged Kite (*Elanus caeruleus*) was the raptor most frequently utilizing artificial perches. Among the 18 study sites, 16 recorded instances of Black-winged Kites delivering prey to the artificial perches. The monthly average number of prey items was 7.4 (sd = 7.4, max. 29.4). A total of 1,388 preys were recorded, with rodents making up the majority of their prey composition (approximately 63%). Besides rodents, Black-winged Kites also preyed on birds, reptiles and shrews (13%, 13% and 11%, respectively). Rodent relative abundance showed a significant positive correlation with vegetation cover levels. However, no significant relationship was found between rodent relative abundance and number of prey items captured by Black-winged Kites. Instead, the distance of artificial perches from the nearest existing potential perch was significantly correlated with number of prey items captured ($p < 0.05$). Our result indicates that the more open an area is, the more frequently Black-winged Kites will utilize the artificial perch to hunt. However, this has little correlation with the relative abundance of rodents, possibly because Black-winged Kites also prey on non-rodent species. This study demonstrates that Black-winged Kites can provide ecological services for rodent pest control, but their use of perches and hunting frequency are influenced by the location of the perches and the surrounding environment.

Keywords: camera trap, biological pest control, Black-winged Kite, rodent relative abundance, vegetation cover

O18

Discussing Stakeholders' Perspectives towards Existing Payment for Ecosystem Services Schemes in Taiwan, Taking Raptor Conservation for example

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The concepts and definitions of "ecosystem services" and "payment for ecosystem services" (PES) have gradually taken shape since the 1970s. Over the past decade, PES has flourished globally, becoming a crucial tool for conservation strategies. In Taiwan, several PES policies have been implemented under this historical background, with 10 endangered species included in these policies by the end of 2023. However, many species still require urgent attention and conservation, including large endangered raptors such as mountain hawk-eagle and tawny fish owl. In addition to influencing the provision of ecosystem services as the apex predator, they also closely intertwine with the livelihoods and culture of local communities. Given this, applying PES to raptor conservation will be a novel and viable approach in the future. However, there remain unresolved issues in the development of PES, one of which is the relationship between PES schemes and their stakeholders. Therefore, this study aims to understand stakeholders' perspectives towards existing PES schemes in Taiwan and seeks to answer research questions, hoping to serve as a guideline before implementing raptor conservation programs. The study involved interviews with 38 poultry farmers affected by raptor disturbances, spanning 6 counties and cities, including 24 villages, across Taiwan, along with the collection of 11 valid questionnaires. Preliminary results indicate that 26 farms across 21 townships experienced raptor predations. Known raptor species causing predations include the mountain hawk-eagle (*Nisaetus nipalensis*), crested goshawk (*Accipiter trivirgatus*), besra (*Accipiter virgatus*), crested serpent eagle (*Spilornis cheela*), brown wood owl (*Strix leptogrammica*), and black kite (*Milvus migrans*). Raptor intrusions showed two daily peaks, with seasonal variations depending on the species and most incidents occurred at free-range poultry farms near forest. Farmers' losses ranged from hundreds to tens of thousands of New Taiwan dollars. There are wildlife damage control measures, such as fencing, firecrackers, and traps, with mixed effectiveness. Farmers generally hope the government will provide more effective compensation programs to protect both raptors and poultry. While enclosed farming can reduce raptor intrusions, it may impact farming scale and economic benefits; hence, looking for more flexible solutions is needed. Concurrently, the research team also participated in 22 traditional rituals and life ceremonies of the Paiwan and Rukai, documenting the cultural use of mountain hawk-eagle feathers. Preliminary findings indicate that these feathers hold

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cultural and symbolic significance but may also drive increased mountain hawk-eagle hunting pressure due to commercial demands. To address these challenges, the research team collected stakeholders' opinions on PES, exploring potential solutions for balancing cultural preservation and ecological sustainability. As the study is still in its early stage, future efforts will require integrating diverse perspectives to design multifaceted conservation practices that promote harmonious coexistence between human activities and natural ecosystems.

Keywords: compensation, conservation, human- raptor conflict, human-wildlife conflict, incentive, payment for ecosystem services, PES, stakeholder, raptor

O19

Population Expansion and Adaptation to Suburban Habitats of the Black Eagle in Taiwan

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Black Eagle (*Ictinaetus malaiensis*) has the longest wingspan of Taiwan's 160 species of resident birds, but it is also the latest to be discovered, indicating that it used to be extremely rare in the early years. Since the establishment of the Raptor Research Group of Taiwan in 1994 we had begun to collect sighting records of Black Eagle and created a database to maintain these records. Since 2015, we called for records from the public through an open Facebook group so that the database has been increased significantly. By the end of 2024, the database has accumulated 6,503 records over 30 years. The following are some analysis of the distribution range and habitat changes of the population. The island of Taiwan are divided into 1609 5km x 5km square grids, only 168 grids (10.4%) were covered at the end of 1999, and 651 grids (40.5%) at the end of 2024. The number of grids in 2024 is already 3.9 times higher than that in 1999. In terms of administrative divisions, there are a total of 352 townships in Taiwan. At the end of 1999, only 60 townships (17.1%) were covered, but by the end of 2024 the number increased to 180 townships (51.1%). In 25 years, the number has tripled and is now more than half of the total townships. Black Eagle is a forest raptor that hunts birds and mammals hiding in the canopy. Originally, they preferred to inhabit the densely forested mountainous areas from 500 to 1,500 meter in altitude. However, since about 2010, there have been more and more sightings at lower altitudes, in the foothills and even on plains. Many records showed that it has adapted to the surroundings of villages and towns. They were often seen to hunt in betel nut trees and coconut trees, where nesting squirrels and red doves are easy preys. In summary, the changing of the Black Eagle from an endangered species in the mountains to an increasingly common species in the suburb is attributed to the following factors: 1) the increasing conservation awareness of most citizens; 2) the reduction of the use of pesticides in the countryside, which has led to an increase of small animals; and 3) the learning to hunt in betel nut trees. Black Eagle is one of the positive examples of Taiwan's wildlife moving from endangered status to safe, and is a new symbol of the Satoyama species.

Keywords: betel nut tree, Black Eagle, *Ictinaetus malaiensis*, population expansion, suburban habitats

O20

Satellite Tracking and Habitat Use of Australasian Grass-Owl

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Australasian Grass-Owl (*Tyto longimembris*) is listed as Least Concern globally by IUCN. However, it is a rare species facing serious threats due to the overlapping of its habitat and human disturbance. We analyzed the satellite tracking data of 39 individuals from 2018 to 2024 to investigate the influence of age and paring status on the daily distance between roost sites and the size of nightly home range during the non-breeding season. For adults (n=18), the average daily movement (0.36±0.64 km) and nightly home range (2.08±1.93 km²) were significantly lower than those of juveniles (n=21), which averaged 0.75±0.80 km and 4.11±3.34 km², respectively ($p<0.01$, $p<0.05$). Among adults, paired individuals (n=10) showed a significant smaller average daily movement (0.04±0.03 km) and nightly home range (0.98±0.80 km²) compared to unpaired individuals (n=8), which averaged 0.76±0.79 km and 3.65±1.99 km², respectively ($p<0.001$, $p<0.05$). This suggests that juveniles are in an exploratory phase, leading to more extensive movement, while unpaired adults tend to change roost sites frequently. Despite significant individual variation in habitat use, most evening GPS fixes (68±17%) were in early-successional grassland, followed by agricultural land (14±12%) and in orchards (6±13%). Fishponds and saltpans were also important foraging habitats. To sum up, grassland is the most frequently used land use type in the evening by Australasian Grass-Owl, and also serves as the sole roosting habitat. Therefore, how to maintain or even create suitable habitats for Grass-Owl becomes key challenges for conservation.

Keywords: habitat use, home range, movement pattern, satellite tracking

O21

Assessing Population Trends of the Mountain Hawk-Eagle in Taiwan Using Occupancy Modeling

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The Mountain Hawk-Eagle (*Nisaetus nipalensis*) is an endangered raptor species in Taiwan, facing threats such as hunting. Systematic monitoring is urgently needed to track population dynamics and develop effective conservation strategies. This study employed the MaxEnt model to predict the species' distribution and used a stratified random sampling approach (at three levels) to select 90 survey grids (5×5 km) in Taiwan. Two nationwide surveys were conducted during 2019–2020 and 2023–2024. We applied Occupancy Modeling with conditional replicates, conducting two surveys in all grids in October, followed by three additional surveys in November for grids where the species was previously detected. Detection probability was estimated based on presence/absence records (1/0), and used to adjust occupancy rates. The 2019–2020 survey estimated an occupancy rate of 0.3763 (95% CI: 0.2653–0.502) and a detection probability of 0.3601 (95% CI: 0.2873–0.4400). Using the occupancy rate and the estimated number of Mountain Hawk-Eagles at each level, three models were applied to estimate the total population: 328 individuals (95% CI: 231–438) in the null model (no division by region or level), 332 individuals (95% CI: 201–499) in the region model (data stratified by region only), and 403 individuals (95% CI: 142–654) in the global model (data divided by both region and level).The 2023–2024 survey estimated a occupancy rate of 0.45 (95% CI: 0.3151–0.5926) and a detection probability of 0.4444 (95% CI: 0.3094–0.5882). Using the same estimation models, the total population was projected at 596 individuals (95% CI: 417–784) in the null model, 619 individuals (95% CI: 368–887) in the region model, and 590 individuals (95% CI: 406–797) in the global model. The results indicate an increase in the Mountain Hawk-Eagle population, particularly in northern Taiwan. Future research should integrate reproductive biology studies and satellite tracking to refine population estimation. These approaches will help investigate key factors influencing population dynamics and enhance the understanding of the species' ecological requirements for effective conservation.

Keywords: long-term monitoring, Mountain Hawk-Eagle, occupancy modeling, species distribution model

O22

Estimating the Population Size of Oriental Honey Buzzards (*Pernis ptilorhynchus orientalis*) Using the Photographic Mark-Resight Method in Yangmingshan, North Taiwan

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The Oriental Honey Buzzard (*Pernis ptilorhynchus orientalis*) is a widespread migratory raptor in East Asia. It was not until a series of observational records and satellite tracking studies beginning in 1995 that the existence of a resident population in Taiwan was confirmed. Monitoring forest raptors is especially challenging because of their elusive behaviour and the dense canopy cover in Taiwan's evergreen forests. However, the various plumage color morphs of Honey Buzzards, along with feather wear, enable individual identification during breeding season and provide an opportunity to use a mark- resighting modelling to estimate the size of its population. This study was conducted in Yangmingshan National Park, located in northern Taiwan. We selected two observation sites in valley habitats, which are preferred breeding habitats for the species, and one site on a foothill with a wide-open space, representing a secondary habitat type. Surveys were conducted three times a month during the breeding seasons in June and July of 2023 and 2024. Individual birds were identified based on their plumage characteristics and feather wear patterns. Each bird was assigned a unique ID number and classified by age and sex. Population estimates were derived using the Schnabel closed population model. A total of 30 adult males and 23 adult females were identified in 2023, while 29 adult males and 20 adult females were recorded in 2024. The population estimates at the two valley sites were 20.33 individuals (SD = 3.3) and 18.56 individuals (SD = 3.04) in 2023, and 24.8 individuals (SD = 6.15) and 16.9 individuals (SD = 2.42) in 2024. Population fluctuations between the two years were more pronounced at the foothill site, with estimates of 34 individuals in 2023 (SD = 10.49) and 22.47 individuals in 2024 (SD = 3.87). The results of this study indicate that the "mark-resighting" method, which employs photographic individual identification, has potential to estimate raptor populations that exhibit individual differences, are commonly found, and are densely distributed. Future research will focus on examining the movement patterns and home ranges of the Oriental Honey Buzzard during the breeding season. This allowing for more accurate population estimates for the entire Yangmingshan area.

Keywords: Oriental Honey Buzzard, photographic mark-resight method, Yangmingshan

O23

The Populations of Only Two Breeding Raptor Species of Taiwan Have Grown in Recent Decades

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Abundance indicators and population trends are essential metrics for assessing progress toward the Nature-Positive target. However, data on raptor population trajectories—despite their role as keystone species—remain scarce in Asia. To address this knowledge gap, we analyzed data from the Taiwan Breeding Bird Survey to determine the population trends of eight diurnal and six nocturnal raptor species across different regions of the Taiwan Ecological Network from 2011 to 2021. Among diurnal raptors, only the Black-winged Kite (BWK) and Oriental Honey Buzzard (OHB) exhibited significant population growth over the past decade across the Taiwan proper. Regionally, BWK populations increased significantly in both the western and southwestern areas, whereas OHB showed no significant regional changes. The remaining 12 raptor species exhibited no significant population trends during the study period. The observed increase in BWK and OHB populations may be attributed to their adaptability to human-dominated landscapes. In contrast, the lack of significant trends for most species could be influenced by survey data limitations, particularly in relation to the breeding season of raptors. Our findings underscore not only the positive trends in specific species but also the urgent need for a systematic, long-term monitoring framework for these ecologically important keystone species.

Keywords: citizen science, composite indicator, index, multi-species indicator, predator

O24

Invasive Species as Breakfast: Predation on the Giant African Snail (*Lissachatina fulica*) by the Crested Serpent-Eagle (*Spilornis cheela*)

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Many introduced species have significant impacts on ecosystem. However, after adapting to their new environment, these exotic species may establish novel interactions with native species. The Giant African Snail (*Lissachatina fulica*) is considered one of the World's Worst Invasive Alien Species. It was first introduced to Taiwan in 1932 and is now the largest snail species on the island, causing considerable economic impacts to agriculture. In a wildlife monitoring study, we observed that this invasive species has become a stable prey item for a native raptor, the Crested Serpent-Eagle (*Spilornis cheela*).

From December 2022 to November 2024, we set up 25 camera traps in a 300-hectar artificial plantation in Hualien County, eastern Taiwan. During the two-year monitoring period, we recorded 272 sightings of Crested Serpent-Eagles across 23 camera traps. Of these, we identified 133 predation events, with the Giant African Snail being the primary prey, accounting for 88.7% of the recorded prey items. Most Crested-Serpent Eagles sightings (55.5%) and its snail hunting activities (68.6%) occurred in the early morning, before 8:00 AM. Only six snail-eating events by other species were recorded, with these being consumed by three different mammal species. Currently, no information regarding the negative impacts of the African Snails on the forest, instead, we found they may be beneficial to the Crested Serpent-Eagle. Although the biomass of the Giant African Snail is small, its high abundance and the short handling time for the eagle suggests that it provides a significant food source for the Crested Serpent-Eagle, particularly in the early morning when its main prey-snakes- are not yet active and are harder to find.

Keywords: camera trap, Crested Serpent-Eagle, Giant African Snail, invasive species, predation

O25

Raptor Conservation in Northern Southeast Asia

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Northern Southeast Asia raptor conservation region consists of 14 countries or national jurisdictions in Asia and has a diverse habitat including high-altitude plateaus, deserts, savannas, grasslands, forest etc. A total of 123 raptors (including owl) inhabits this mosaic of habitat, however the populations of 66 species (over 53%) are declining and 22 species (nearly 18%) are globally threatened. Anthropogenic activities are the major causes of this decline. Immediate conservation attention is required to reverse this decline and the first step is to identify priority species. Here in this report, we analysed Birdlife International data to identify priority raptor species that need immediate conservation attention. Our analyses are based on the proportion of global range of the species within the region and EDGE (evolutionarily distinct, globally endangered) scores of the given species. Our results have shown 53 species of raptors have over 50% of their global range within this region and top ten priority species are: Forest Owlet, Red-headed Vulture, Andaman Serpent-eagle, Pallas's Fish-eagle, White-rumped Vulture, Great Nicobar Serpent-eagle, Egyptian Vulture, Bearded Vulture, Serendib Scops-owl, and Nicobar Sparrowhawk. India has the highest weighted threatened evolutionary history followed by China, Sri Lanka, Pakistan, and Nepal. India also has the top six sub-national units for the weighted threatened evolutionary history, with Maharashtra being the top-ranked sub-national unit of this region with nearly 60% of the global range of the Forest Owlet. Forest habitat has the most threatened evolutionary history, which is a prime habitat of 26 species including Forest Owlet and Red-headed Vulture; followed by rocky areas and wetlands. Agriculture, hunting, and ecosystem modification are identified as the top three threats to raptors of this region. Habitat management and protection, education and law/policy implementation are the recommended actions to conserve raptors of this region. Two Critically Endangered species, the Indian Vulture and Slender-billed Vulture, did not fall within the top-10 priority species because of their lower EDGE Score (<1) and the relatively small proportion of global range of Slender-billed Vulture in this region. Current global range of many species might be different than presented by Birdlife International as these include former or extirpated ranges as an area of current distribution, therefore we recommend to update these data. Our results help prioritize conservation attention, although several other species with small and declining population are outside the top-10 priority list merit additional consideration for conservation.

Keywords: EDGE score, evolutionary history, priority species, threats, vulture

O26

State of the World's Raptors: Indonesia

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Raptors in Indonesia face various continuously increasing threats, especially to their natural habitats that are mainly forests. There are 11 globally threatened species, including two Critically Endangered, four Endangered, and five Vulnerable species, with 22 other species classified as Near Threatened on the IUCN Red List (IUCN 2024). A recent study by McClure et al. 2023 shows that Indonesia hosts the greatest bird evolutionary history and evolutionary history of endemic birds of any country in the world, but ironically and at the same time, also has the most threatened evolutionary history and the most threatened evolutionary history of endemic birds. This study is aimed at assessing the raptors recorded in Indonesia by using Evolutionary Distinctiveness and Global Endangerment values (EDGE) weighted by the percentage of a species range within Indonesia (wEDGE) to prioritize raptor species for research and conservation and to inform species and habitat protection policies at local and national levels. One hundred nineteen raptor species occur within Indonesia, 69 of which have decreasing global populations, and 11 are threatened. According to wEDGE scores, the Siau Scops-owl (*Otus siaoensis*) is the top priority raptor species in the region which has not been recorded since the holotype specimen was collected in 1866, followed by the Papuan Eagle (*Harpyopsis novaeguineae*) and Flores Hawk-eagle (*Nisaetus floris*). The top 9 species are threatened with extinction and 9 of the top 10 have decreasing global populations. Seven of the top 10 species are endemic to Indonesia. Nusa Tenggara Timur is the top sub-national unit and has 31 raptor species, five raptor species are endemic to Nusa Tenggara Timur including the Least Boobook (*Ninox sumbaensis*) and Flores Scops-owl (*Otus alfredi*). Followed by Papua with 36 species including Biak Scops-owl (*Otus beccarii*), endemic to Papua, and 37.5% of the Papuan Eagle's range within Indonesia occurs within this unit. Forest is by far the habitat harboring the most threatened evolutionary history in the region. This habitat is listed as of major importance for 49 species in Indonesia including all of the top 10 wEDGE species and 29 regional endemics. The wEDGE assessment of Indonesian raptors provides a list of species that should be prioritized for conservation and research in the future. Moreover, these findings can inform both national and local species protection policies. Although all diurnal raptors are protected by existing regulations, records of sightings and new distributions continue to emerge, revealing species that are confirmed to be present in Indonesia but are not yet covered by protection policies.

Keywords: endemic, Indonesia, raptor, wEDGE assessment

O27

Investigating the Importance of Glass Collision Injuries in Raptors: A Retrospective Analysis of Raptor Rescue Cases from 2017 to 2024 in the Raptor Rehabilitation Station in Taiwan.

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The Raptor Rehabilitation Station, which belongs to the Raptor Research Group of Taiwan, has been conducting raptor rescue operations since 2017. Between 2017 and 2024, a total of 188 raptors suspected or confirmed to have collided with glass were admitted for treatment, with diurnal raptors accounting for 65.96% and nocturnal raptors for 34.04%. Among the diurnal raptors, the most treated species due to glass collisions was the Crested Goshawk (*Lophospiza trivirgata*), comprising over 80% of diurnal cases, primarily consisting of immature individuals. The main clinical symptom observed was posterior paralysis, and post-mortem examinations of non-surviving individuals often revealed fractures or cracks in the upper thoracic vertebrae. This suggests that spinal injuries caused by glass collisions led to neurological damage and paralysis. Among the nocturnal raptors, the Collared Scops Owl (*Otus lettia*) accounted for the most cases (45.31%), followed by the Northern Boobook (*Ninox japonica*, 29.69%), with eye injuries being the most common symptom. Raptors treated for glass collisions had an average hospitalization duration of 26 days, with a median of 11 days. After treatment, 72.34% were released back into the wild, while 26.66% either died during treatment or were euthanized. Although glass collisions accounted for less than 20% of all cases, and the release rate exceeded 70%, a comparison between rescued cases and those that were dead on arrival revealed that the latter had better body condition scores. This suggests that healthier raptors have a higher mortality rate after colliding with glass than weaker individuals. Therefore, wildlife rescue and rehabilitation organizations, if focusing only on injured and sick raptor cases, may develop the misconception that glass collisions are not a severe cause of injury. Healthier raptors that collide with glass may die on the spot and are never brought in for rescue.

Keywords: Crested Goshawk, glass collisions, posterior paralysis, raptor rescue

O28

Projected Impacts of Climate Change on Raptor Distributions: A Case Study of the Migratory Oriental Honey-Buzzards and the Endemic Javan Hawk-Eagle in Indonesia

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Global environmental changes have significantly impacted migratory birds and endemic species, highlighting the need for comprehensive conservation strategies. The Oriental Honey-Buzzards (OHB, *Pernis ptilorhynchus*), a long-distance migratory raptor reliant on wasp and bee larvae, faces a considerable redistribution of its breeding and wintering habitats due to climate change. Using species distribution models and socio-economic pathways, we predict a significant range contraction in the OHB's wintering and breeding areas by 2050 and 2100. This will likely result in increased migration distances under all scenarios. High-risk areas were identified across the OHB's habitats, with limited refugia coverage. Future conservation efforts should focus on habitat restoration and the establishment of new protected areas to mitigate the risks posed by climate anomalies and vegetation dynamics. Similarly, the Javan Hawk-Eagle (JHE, *Nisaetus bartelsi*), an endemic raptor species on Java Island, Indonesia, is highly vulnerable to climate change. Ecological niche modelling and machine learning approaches under sustainability and business-as-usual (BAU) scenarios for 2050 reveal a potential decline in the JHE's geographic distribution by 28.41% and 40.16%, respectively. Temperature emerged as the most critical factor affecting the JHE's distribution. Under the sustainability scenario, high-potential refugia were identified, covering 7,596 km² (61%), while the BAU scenario projected only 4,403 km² (35%) as refugia. To ensure the survival of these species, conservation strategies must prioritize habitat restoration, refugia preservation, and landscape connectivity. For the OHB, addressing multifaceted threats through targeted landscape management is crucial. In the case of the JHE, integrating local community participation into conservation planning is essential. Both studies emphasize the importance of adaptive management practices in response to global climate change, which poses significant threats to biodiversity and ecosystem stability. The findings

underscore the urgency of implementing proactive conservation measures to safeguard long-distance migrants and endemic species against future environmental challenges.

Keywords: climate change, Javan Hawk-Eagle, Oriental Honey-buzzards, refugia, species distribution models

O29

Slender-billed Vultures: Projected future in Asia based on climate change and distribution modelling

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Slender-billed Vulture (*Gyps tenuirostris* Gray 1884; SBV) is one of the critically endangered vultures found in Asia. After the crash, population of this species is not currently recovering despite plausible efforts. The habitat of SBV is also believed to be affected by climate change. This makes it pertinent to understand the knowledge gaps in conservation strategy of this species. Therefore, we projected the habitat spread and future changes to assess the living conditions. We also tried to estimate population and conservation gaps for this species. Maxent, a species distribution modelling tool along with a few General Circulation Models / Global Climate models (MIROC6, HadGEM3-GC31-LL, and GISS-E2-1-G) and two shared socioeconomic pathways (SSP245 and SSP585) was used for the purpose. Our results based on robust modelling (AUC 0.921 and 0.939, and CBI 0.994 and 0.997) suggested that precipitation (bio13 and bio19) had more contribution in niche characterisation than temperature (bio4 and bio2). Total suitable habitat for SBV in all the range countries was assessed to be 397340 km2. Availability of suitable habitat expanse varied in decreasing order: India >Nepal >Myanmar >Cambodia >Bangladesh >Thailand >Pakistan >Vietnam > LaoPDR >Bhutan. Total area changed in both near (2050) and distant (2090) future scenarios. It showed expansion and contraction both but net loss trend in three out of four scenarios (SSP585/2050, SSP245/2090 and SSP 585/2090; except SSP245/2050). With respect to conservation through Protected Area (PA), a huge conservation gap i.e., suitable area outside vs inside PA, was revealed (88% vs 12%). Population trend was also not very encouraging, almost unchanged till seven decades from the present. Such a situation demands quick and proactive responses should we aim to conserve this rapidly disappearing scavenger. Data generated, results divulged, and management implication suggested appeared to be very useful for the policy makers and conservationists.

Keywords: conservation gaps, habitat dynamics, habitat suitability, niche factors, population trend

O30

Assessing Vocal Activity Pattern of Crested Serpent-Eagle (*Spilornis cheela malayensis*) in a Lowland Forest in Peninsular Malaysia: A Pathway for Long-term Monitoring of Tropical Raptors

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The Crested Serpent-Eagle (*Spilornis cheela*), a common raptor species found in lowland tropical forest and many wooded habitats in parts of South and Southeast Asia. Among the three subspecies present in Malaysia (*Spilornis cheela malayensis, S. c. pallidus, and S. c. richmondi*), *S. c. malayensis* is restricted to Peninsular Malaysia, while the other two subspecies are found only in Borneo Island. This study aimed to assess the vocal activity of *S. c. malayensis* during breeding season. Acoustic surveys were conducted in December 2021 and April 2022, between 06:00 and 19:00 hrs in Bintang Hijau Forest Reserve, a lowland forest in northwestern Peninsular Malaysia. To visualise the vocal activity pattern, the calls of species were extracted and measured via spectrograms. The calls were also parameterised with eight vocal parameters. From a total of 1,120 recording hours, the call events based on five call types were determined to identify activity peaks which occurred between 9:00 hrs and 11:00 hrs and 13:00 hrs and 15:00 hrs, with highest activity recorded at 10:00 hrs. The study not only enhanced our understanding of the vocal behaviour of *S. c. malayensis* during its breeding season but also demonstrated the potential of bioacoustics in the long-term monitoring of tropical raptor species, emphasising its efficiency and reliability.

Keywords: bioacoustics, bird monitoring, breeding ecology, raptor conservation, spectrogram, tropical forest

Collared Owlet Moonlit Songs: Vocalization Patterns under Lunar Cycle Dynamics

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The dynamics of lunar phases and the moon's position in the sky can significantly influence the vocal behaviors of owls, yet studies on these effects in Taiwan are scarce. This study utilized Passive Acoustic Monitoring (PAM) to collect acoustic data from three montane forest stations along the Southern Cross-Island Highway in the southern area of Yushan National Park. Recordings were conducted in 2021 and 2023, from 4 PM to 8 AM daily, with 1-minute recordings every 3 minutes, resulting in approximately 11,320 hours of audio data. The SILIC (Sound Identification and Labeling Intelligence for Creatures) system automatically identified 76,588 vocalizations of Collared Owlet (*Taenioptynx brodiei*) and 412,934 of Mountain Scops-Owl (*Otus spilocephalus*). Analysis of the hourly Vocalization Activity Rate (VAR) revealed peaks in February–May and August–November for both species. Notably, the hourly VAR of Collared Owlet showed a strong correlation with lunar dynamics, with significant increases during full moon phases and when the moon was at its zenith. However, this pattern was not observed in Mountain Scops-Owl. Given that owl surveys rely heavily on vocalization detectability, these findings provide valuable guidance for optimizing field survey schedules while accounting for species-specific differences. Our results underscore PAM's effectiveness in uncovering complex temporal patterns in raptor vocalizations, highlighting its potential as a powerful tool for understanding nocturnal bird behavior over extended time scales.

Keywords: lunar phases, moon position, passive acoustic monitoring, SILIC, vocalization activity rate

O32

Seasonal Activity Patterns of the Australasian Grass-Owl (*Tyto longimembris*) Revealed Through Passive Acoustic Monitoring

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The Australasian Grass-Owl is classified as an endangered species in Taiwan. In earlier years, most information came from rescue cases and nest observations. However, recent efforts have expanded to include field surveys and satellite tracking. Despite these advancements, knowledge about the owl's nocturnal behavior and vocal activity remains limited. Passive acoustic monitoring (PAM) offers a long-term, cost-effective, and non-invasive method for collecting acoustic data. In this study, we utilized autonomous recording units (ARUs) and automated signal recognition software to monitor spontaneous vocal activity. Eight monitoring stations were set up on high riverbanks along the Zengwen and Yenshui Rivers in southern Taiwan, with continuous nocturnal monitoring conducted over an entire year from 2023-2024. The species is known to vocalize during nocturnal activities, exhibiting two vocalization peaks: within two hours after sunset and two hours before sunrise. Although the owls call throughout the year, peak vocal activity occurs from May to September. The late breeding season ends in April, marking the juvenile dispersal period, during which increased vocal activity is observed. From July to September, the owls enter the pre-breeding phase, where pair formation begins. For future monitoring efforts of this species, especially when considering budget and manpower constraints, it is recommended to conduct surveys from May to September, focusing on the two-hour periods after sunset and before sunrise when vocal activity is at its highest.

Keywords: Australasian Grass-Owl, passive acoustic monitoring, vocal activity

O33

DNA-based Dietary Analysis and Evaluation of Sampling Methods for the Japanese Mountain Hawk-Eagle during the Nestling Period

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The Mountain Hawk-eagle is a top-predator of the forest ecosystem, and thus, understanding its food habit is necessary for understanding the ecological pyramid of the region. The diet of Mountain Hawk-eagles during the nesting period have been studied through methods such as image analysis using camera traps and visual identification of bones, fur, feathers, and other remains left uneaten. However, as prey brought to the nest is often partially dismembered or eaten, and some of them are juveniles or chicks, it is often difficult to confirm their external characteristics and identify the species.

Therefore, this study explored an alternative method to comprehensively and efficiently detect the prey of Mountain Hawk-eagles using DNA metabarcoding. The study area is the Suzuka Mountains, which spans Shiga and Mie Prefectures in Japan. We collected pellets, feces, nest materials, substances adhering to the nest materials, as well as swabs from feet and cloaca of Mountain Hawk-eagle chicks to detect prey DNA.

As a result of the analysis, 29 prey species of the Mountain Hawk-eagle were identified. We detected the greatest number of prey species from nest material sample. We propose a new sampling method for understanding the food habits of the Mountain Hawk-eagle and other raptors, which could also be utilized in environmental impact assessments.

Keywords: DNA metabarcoding, environmental impact assessment, Mountain Hawk-eagle, nest material, sampling method

O34

Conservation Genetic/Genomic Analyses of the Mountain Hawk-Eagle

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Assessing population structure and genetic diversity is crucial for devising conservation management strategies in endangered species. In small and/or fragmented populations, the likelihood of inbreeding and genetic drift (chance events that lead to fixation of alleles) increases, which then can lead to decreased genetic diversity and accumulation of deleterious alleles. Reduction in fitness, such as poor reproductive success, high mortality rate, low survival rate, and consequently, increased extinction risk, are possible outcomes of inbreeding and genetic drift. Hence, in endangered species, it is important to understand how distinct and diverse their populations are. This type of information can be used to predict population viability and extinction risk, and also design precise management approaches, including designation of conservation units and planning translocations (e.g. for encouraging gene flow). The Mountain hawk-eagle (*Niseatus nipalensis*) is a large Asian raptor, positioned at the top of the forest ecosystem. In various parts of its distribution, the species is threatened by extinction, but population- and conservation genetic are poorly studied in Mountain hawk-eagles. The current lack of genetic information about this species underscores the urgent need for dedicated research in this field. Here, I present an overview of past and ongoing genetic/genomic research conducted in the Mountain hawk-eagle, specifically in Japan. Initial and follow-up studies using mitochondrial DNA (mtDNA) showed a surprisingly high number of haplotypes compared to other endangered raptors. However, recent genomic analyses suggest that genome-wide heterozygosity levels are, in fact, comparable to endangered species. Phylogeographic analysis using mtDNA implied the possibility of limited gene flow between regions within Japan. Whole-genome analyses also indicated the potential presence of multiple subpopulations. Future comparisons with populations outside of Japan will provide a species-wide resolution of Mountain hawk-eagle genetics, allowing for more comprehensive conservation actions. In addition to the recent results of analyses, this presentation outlines the strengths and limitations of the currently available genetic tools in the context of conservation.

Keywords: genetic diversity, genetic population structure, mtDNA, next generation sequencing

O35

The Reflection of 25th Years of Conservation Efforts of Javan Hawk-Eagle (*Nisaetus bartelsi*) in Indonesia

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The Javan Hawk-Eagle (JHE- *Nisaetus bartelsi*) is an endangered bird of prey endemic to Java, Indonesia. Recognized as a symbol of the Republic of Indonesia due to its association with the mythical Garuda, this species has been the focus of intensive conservation efforts. In the late 80s, the JHE was identified as one of the least known and most threatened raptors in the world. Following the first international research and the publication of its status in the early 90s, the species gained global attention. Subsequent bio-ecological research and initial conservation efforts were then initiated. Furthermore, the establishment of the Javan Hawk-Eagle Conservation Working Group (*Kelompok Kerja Pelestarian Elang Jawa*-KKPEJ) in 1997 marked a significant milestone, laying the groundwork for more comprehensive research and conservation initiatives for JHE. This included the creation of a network called Raptor Indonesia in 2001. The population dynamics of the Javan Hawk-Eagle have been closely monitored, particularly following the implementation of the Javan Hawk-Eagle Conservation Strategy and Action Plan (SRAK) for 2013–2022. This plan outlines critical measures such as habitat protection and restoration, intensive population monitoring, regulation of trade and ownership, and rehabilitation and reintroduction programs. From extensive field studies and data compilation since 1997, the estimated population of the Javan Hawk-Eagle stands at approximately 583 pairs, distributed across Java and Bali (294 pairs in Western Java, 64 pairs in Central Java, 219 pairs in Eastern Java, and 6 pairs in Bali). These findings underscore the importance of continued efforts to safeguard this iconic species and its habitats amidst ongoing environmental challenges. The strategy and conservation action for JHE have served as a model in the development of the Flores Hawk Eagle conservation strategy and action plan.

Keywords: conservation strategy and action plan (SRAK), distribution, Javan Hawk Eagle Conservation Working Group, KKPEJ, population dynamic

O36

Neotropical Raptor Network: A Model for Raptor Conservation in the Americas

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The Neotropics is a zoogeographical region encompassing parts of North, Central, and South America from southern Mexico to northern Argentina. It also includes the Caribbean Region, and parts of southern Florida and east Texas. Within the Neotropics, there are over 30 countries and 300 extant languages. It has a high level of biodiversity, and is home to a variety of ecosystems, including important habitat for migratory raptors and endemic species. The region is particularly raptor-rich, with over 180 species documented. It is also home to several endemic bird families, including seriemas, which recently have been categorized as raptors.

Raptors throughout the region face a multitude of anthropogenic threats including poisoning, loss of habitat, and poaching. Many of these threats are a direct result of human-raptor conflicts, particularly when raptors prey on domestic animals. Challenges for raptor conservation in the region include difficult access to study sites, lack of trained biologists/researchers, and sparse funding opportunities.

Raptor conservation and research in the Neotropics can benefit significantly from better communication and collaboration among those working for raptor conservation in the region. The Neotropical Raptor Network promotes information exchange through its website, social media, and communication applications. This information exchange is increasing conservation and research capacity through the sharing of information, training sessions, planning and advertising events, publishing news on raptor research and conservation developments, publishing sightings or requesting information on poorly known and endangered raptors, advertising newly published information, and sharing job listings and funding opportunities. The network quickly and effectively allows its members to get in immediate contact with those on the leading edge of Neotropical raptor conservation. This, together with a biannual bulletin that highlights work being done by raptor conservationists throughout the region, and a major international scientific conference held every 3-4 years, has created a flourishing network of individuals interested in raptor conservation in the Neotropics. The Neotropical Raptor Network model can be used to develop similar social networks around raptor research and conservation around the globe.

Keywords: capacity building, conservation, information exchange, neotropics, raptors

O37

Ecology and Conservation of Endangered Flores Hawk-eagle *Nisaetus floris* in Nusa Tenggara Island, Indonesia

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The Flores Hawk-eagle *Nisaetus floris* is an endangered species which exclusively occupies the last remnant forests of the Nusa Tenggara islands, Indonesia. Studies to explore its distribution throughout the islands and to uncover its eco-biology have been ongoing since 2010-2024. Recent field surveys recorded new Flores Hawk-eagle nests at Mount Maria Donggomasa, Mbeliling Landscape, Nggorang Bowosie Protected Forest, Mount Kelimutu National Park, Mount Tambora National Park, Mount Rinjani National Park, and other protected areas. Ecological research, including GPS tracking, has provided information on diet, breeding biology, the estimated home range size, and population size. Prey species include, monitors lizards (*Veranus salvator bivittatus*), macaques (*Macaca fascicularis*), gekkos (*Gekkos smithii*), bats (*Cynopterus n. nusatenggara*), domestic chickens, as well as other small birds, small mammals and snakes. Flores Hawk-eagle can breed the year, but peak breeding occurs between January and September. Adults sexually mature at the age of three to four years and can breed every year, laying only one egg. Incubation lasts for 37-40 days and the chick is fully fledged at 70 days old. Both parents take part in chick rearing. The home range (95% Autocorrelated kernel density) of the breeding adult female eagle monitored by GPS at Maria Donggomassa Protected Forest, West Nusa Tenggara has an estimated of 22km^2. This included some of the late chick rearing and post-natal dependency phase, thus the non-breeding area used may be larger. From long-term monitoring, we estimate the mature population of this species to be 166-456 individuals. Thus, although our understanding about the enigmatic bird of prey is improving, it should still be classed as Critically Endangered (possibility with <250 individuals). Conservation activities on the Flores Hawk-eagle have been conducted through organizing local training for awareness and community participation, nest protection programme and regular monitoring. Several local training sessions have been carried out in East Nusa Tenggara. Nest search and protection programmes with the involvement of local community haves been carried out at Mbeliling Landscape Protected Forest, and in certain area of Nggorang Bowosie Protected Forest.

Keywords: conservation activities, ecological research, Flores Hawk-eagle, GPS tracking, *Nisaetus floris*

Impact of Urbanization on the Nesting Materials of Black Kite Breeding in Pokhara Valley, Central-west Nepal

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Urbanization is a significant human activity that results in the transformation of natural ecosystems into human-dominated ecosystems. Numerous studies have identified several adverse consequences of urbanisation on various species, while some have demonstrated resilience in adapting to the evolving environment. The Black Kite *Milvus migrans* falls on the later species. Urbanization frequently alters the types of resources that avian species require, including the types and availability of nesting sites and materials. The quality and availability of nesting materials is a key factor in the reproductive success and growth of chicks. Scientific information on the nesting materials utilized by the diurnal raptors is either predicated on anecdotal visual examination or data that is explicated qualitatively. This study aims to address this knowledge gap by collecting quantitative data on the impact of urbanisation on the nesting materials of Black Kites in Pokhara valley Nepal.

During the breeding seasons of Black Kites (March – July) in 2022, we used Jumar technique to reach the nests and estimated the ratio of plant materials, clay, and human-used materials used to build nests. Out of 61 active nests discovered, we sampled 28 nests randomly. The nests of Black Kites were 3 types; round, oval, and irregular with 83.2% ± 8.3% of natural materials and 16.8% ± 8.3% of artificial. We collected 425 different kinds of artificial items from the nests, mainly pieces of clothes (38.3%) followed by plastic bags (33.4%), masks (14.6%), industrial plastic (9.6%) and papers (4%). White colour materials were mostly found in the nests (27.3%) followed by black (20.5%), red (18.6%), blue (17.2%), and the rest for other colors. The ratio of plant materials, clay, and human-used materials present in the nest vary significantly (Kruskal-Wallis tests: H = 68.563 df = 2, P = 1.29e15). Similarly, nest shape did not significantly vary the nest diameter (Kruskal Wallis test: H = 0.002, df = 2, P = 0.998). Reduced access to natural nest building materials and greater availability of anthropogenic trash may be the causes of the higher integration of anthropogenic elements. The amount and variety of human-used materials found in urban Black Kite nests suggests that urban forests are necessary for nesting materials in order to lessen potential shortages.

Keywords: active nests, Black Kite, impact, nesting materials, urbanization

O39

Twenty Years of Black Kite Conservation in Taiwan: From Scientific Monitoring to Conservation Actions

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The Black Kite (*Milvus migrans*) in Taiwan once had a scarce population due to habitat destruction and secondary poisoning, with fewer than 200 individuals recorded in 1995. In 2004, the Keelung Wild Bird Society established a conservation action plan, initiating systematic conservation efforts. The Raptor Research Group of Taiwan (RRGT) and the National Pingtung University of Science and Technology (NPUST) formed a research team to promote habitat conservation, eco-friendly agriculture, and toxicology studies, identifying poisoning as the greatest threat to Black Kites. Since 2013, nationwide joint surveys have been conducted annually to monitor population trends through evening roosting counts. In 2015, the documentary Fly, Kite Fly and the "Eagle-Friendly Red Beans" initiative increased public awareness and promoted eco-friendly agriculture, cancelling the nationwide anti-rodent campaign. In 2016, the research team launched a satellite tracking program to analyse Black Kite movement patterns and roost site changes, while also enhancing the accuracy of population monitoring through complementary field surveys. In 2017, high concentrations of carbofuran products were banned. The 2024 joint survey recorded 873 resident individuals in September, increasing to 945 in December with the inclusion of migratory populations, a significant rise from 272 individuals in 2013, demonstrating the effectiveness of conservation strategies. As the population stabilizes, the Black Kite Nest Cam LIVE project started in 2020, and a crowdfunding initiative will launch in 2025 to further engage the public. Over the past two decades, efforts in wildlife rescue, toxicology research, habitat protection, satellite tracking, and cross-agency conservation policies, combined with long-term monitoring, have contributed to stable population growth. However, Black Kites still face threats like secondary poisoning from pesticide and rodenticides, and habitat destruction. Continued policy advocacy and stronger social participation are essential to ensuring the long-term sustainability of the Black Kite population.

Keywords: eco-friendly agriculture, population monitoring, public participation

O40

The Impact of Typhoon GAEMI on Australasian Grass-Owl along Zengwen River

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Australasian Grass-Owl (*Tyto longimembris*) is listed as a Least Concern species globally by IUCN, but it is considered a rare and endangered resident bird in Taiwan. Previous studies through synchronized surveys and satellite tracking have revealed that river floodplains along Zengwen River as key habitats for this species. However, their response to disturbance like flooding remains unclear. On July 25, 2024, Typhoon GAEMI made landfall in Taiwan, bringing heavy rainfall to central and southern Taiwan. The resulting surge in river severely damaged grasslands and farmlands within the floodplain. Satellite tracking revealed that Australasian Grass-Owls residing in the floodplain abandoned the flooded roosts after the typhoon, and returned after water receded. Additionally, individuals that originally foraged in floodplain farmlands temporarily avoided foraging there. According to synchronized surveys before and after the typhoon, 12 Australasian Grass-Owls were recorded in the middle and lower reaches of the river in mid-July, with their locations evenly distributed. One month after the typhoon, only 5 individuals were recorded, concentrated near the river mouth. Flooding deposited large amounts of sediment, burying many grassy areas and transforming vegetated habitats into bare land. A drastic change in grassland coverage (-73.4%) and a notable reduction in farmland (-19.8%) were observed immediately after the typhoon. These findings suggest that major flooding events can significantly reduce grassland availability and cause temporary habitat loss, leading to shifts in habitat use by Australasian Grass-Owls.

Keywords: flooding, land use, satellite tracking, synchronized surveys, typhoon

I Know Places: Identifying Threats and Mapping Occurrences of the Globally Endangered South Philippine Hawk-eagle (*Nisaetus pinskeri*) Through Citizen Science Approaches

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Understanding the causes of population decline is crucial for managing and conserving species on the brink of extinction. This study analyzes citizen science reports of rescues and wild sightings of the globally endangered South Philippine Hawk-eagle (*Nisaetus pinskeri*), complemented by firsthand occurrence data from fieldwork across the species' range. We aimed to address three key questions: (1) What caused the capture of South Philippine Hawk-eagles? (2) Which age groups are most vulnerable? and (3) Where are the geographic hotspots for rescues and sightings? For the first time, we provide preliminary insights into the extent and severity of the threats facing this species. A total of 86 occurrence records were collated, comprising 73.25% (n=63) wild observations and 26.74% (n = 23) rescue cases, spanning from 2018 to 2024. The leading cause of captures was weakened individuals, often due to injuries from chicken nets or retaliatory attacks by chickens they preyed on, accounting for nearly 40% of cases (n=9). Poaching was the second most common cause, representing 21.74% of cases (n=5), with three incidents involving poachers climbing nests to take nestlings. Shooting and trapping each contributed 13.04% (n=3), underscoring the ongoing threat of direct human persecution. On average, 3.14 rescues were reported annually over the past seven years, with 2024 recording the highest activity at 10 rescues, nearly one per month. Age-specific analysis revealed that sub-adults and fledglings are the most vulnerable stages, collectively making up 65.21% (n=15) of cases, likely due to their transitional nature as they learn survival skills or establish territories. Geographically, 69.76% (n = 60) of all cases were recorded on Mindanao Island, with Region 11 contributing 29.06% (n = 25), primarily within the Mt. Apo mountain range. This study underscores the importance of community participation in monitoring and conservation efforts while highlighting significant challenges to the survival of this raptor. Targeted conservation strategies addressing the primary threats and enhanced field surveys in high-priority areas are urgently needed to secure the

future of the South Philippine Hawk-eagle.

Keywords: conservation, endangered species, hotspots, *Nisaetus pinskeri*, rescues

O42

Raptors and Airports in Indonesia: State, Risk, and Opportunity

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Like other avian groups, diurnal raptors at airports pose a potential risk for bird strikes and their associated impacts. Raptors have been identified as one of the bird groups with a high strike rate. Collisions with raptors present a significant threat to aviation safety. The impact and risk are heightened because this group of species generally has a large body size and wingspan and exhibits flight behaviors that increase the risk of collisions with aircraft, including soaring, flocking, and rapid gliding. We recorded the occurrence of diurnal raptors at Hang Nadim International Airports (Batam, BTH), and Labuanbajo (Nusatenggara, LBJ); and we have recorded their presence in few major airports in Indonesia: Kualanamu International Airport (Medan, KNO), Hang Nadim International Airport (Batam, BTH), Soekarno-Hatta International Airport (Jakarta, CGK), Yogyakarta International Airport (Yogyakarta, YIA), and I Gusti Ngurah Rai International Airport (Denpasar, DPS). The survey was conducted twice over the course of one year, with one survey during the autumn migration season of raptors (September-February) and another during the non- migration season (March-August) in 2020-2021. We recorded data on the presence of raptors, including species, population size, location within the airport, proximity to flight paths, and associated activities and behaviors. Additionally, we collected information on bird strike incidents involving raptors from airport authorities. We assessed the risk and hazard level of bird strikes based on factors such as the bird's size, wingspan, social behavior, flight behavior, and position within the airport. The number of diurnal raptors at each airports is as follows: seven species at KNO (*Elanus caeruleus* - Black-winged Kite, *Spilornis cheela* - Crested Serpent-eagle, *Circus spilonotus* - Eastern Marsh Harrier, *Accipiter badius* - Shikra, *Accipiter soloensis* - Chinese Sparrowhawk, *Haliaeetus leucogaster* - White-bellied Sea-Eagle, and *Haliastur indus* - Brahminy Kite), four speceies at BTH (*Nisaetus cirrhatus* - Changeable Hawk Eagle, White-bellied Sea-eagle, Brahminy Kite, and *Falco peregrinus* - Peregrine Falcon), two species at YIA (Brahminy Kite and *Falco moluccensis* - Kestrel), and two species at DPS (White-bellied Sea Eagle and Peregrine Falcon). No diurnal raptors species were recorded at CGK. Based on the risk level assessment, at KNO, one species is classified as high risk, namely the Black-winged Kite. At BTH, two species are categorized as high risk: the White-bellied Sea-Eagle and the Brahminy Kite. At YIA, one species is categorized as high risk, the Brahminy Kite. At DPS,

the Peregrine Falcon is categorized as high risk. The remaining species at each airport fall under lower to medium risk categories. During the study period, two bird strike events involving Brahminy Kite occurred, both at BTH. In addition to the hazards and risks associated with the presence of raptors at airports, their presence also has the potential to reduce the risk of bird strikes from other avian species. Several airports have implemented the use of trained raptors to deter other bird species that pose a strike risk, though this practice has not yet been adopted in Indonesia. However, such an approach requires thorough and comprehensive study and planning prior to implementation.

Keywords: airplane, bird of prey, bird strike, falconry, hazard and risk level

O43

Preliminary Study on Secondary Poisoning of Raptors by Rodenticides in Northern Taiwan

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The Raptor Research Group of Taiwan has been conducting raptor rescue operations in northern Taiwan since 2017. In 2021, we began testing for pesticides and rodenticides in injured raptors. Over the past four years, we have collected 115 raptors and 118 samples (liver or stomach contents) for rodenticide testing. Excluding 9 individuals that had been treated with Vitamin K for more than two weeks, the rodenticide-positive rate among the remaining 106 raptors was 60.38%. When looking at species-specific data, the highest positive rate was found in the Black Kite (*Milvus migrans*) at 100% (n=6), followed by the Crested Goshawk (*Lophospiza trivirgata*) at 79.07% (n=43), the Peregrine Falcon (*Falco peregrinus*) at 75% (n=4), the Besra (*Tachyspiza virgata*) at 66.67% (n=3), the Tawny Fish Owl (*Ketupa flavipes*) at 50% (n=2), the Collared Scops Owl (*Otus lettia*) at 48% (n=25), the Serpent Eagle (*Spilornis cheela*) at 41.67% (n=12), and the Oriental Honey Buzzard (*Pernis ptilorhynchus*) at 25% (n=4). No rodenticide residues were detected in the samples from the Mountain Scops Owl (*Otus spilocephalus*) (n=6) and the Osprey (*Pandion haliaetus*) (n=1). Among the 9 individuals treated with Vitamin K for more than two weeks, only one Collared Scops Owl was found to have a trace amount of Coumatetralyl (0.006ppm), while the other 8 raptor samples showed no rodenticide residues. Therefore, we recommend that during the rescue of raptor species at high risk of rodenticide exposure, even in the absence of obvious rodenticide poisoning or anemia symptoms, a course of Vitamin K for more than two weeks be administered as prophylaxis to avoid clotting disorders.

Keywords: raptor rescue, rodenticide, vitamin K

O44

Risks of avian collision at the Pokhara Regional International Airport, Nepal

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The recently inaugurated Pokhara Regional International Airport (PRIA) in western Nepal has raised concerns among conservationists regarding its environmental impact. To understand such concerns, this study reviews the Environmental Impact Assessment (EIA) report for PRIA using long-term bird monitoring data and evaluate the risk of bird strikes and propose mitigation strategies. Our analysis reveals that the EIA overlooks the presence of large, high-risk bird species, such as vultures, in the vicinity of the airport. We identified significant collision risks involving several threatened species, including the Egyptian Vulture (*Neophron percnopterus*, Risk Rating [RR] = 17), Slender-billed Vulture (*Gyps tenuirostris*, RR = 15), Himalayan Vulture (*Gyps himalayensis*, RR = 15), White-rumped Vulture (*Gyps bengalensis*, RR = 15), Griffon Vulture (*Gyps fulvus*, RR = 14), and Red-headed Vulture (*Sarcogyps calvus*, RR = 14). Current management interventions may be inadequate to safeguard both birds and air traffic. We recommend systematic surveys of birds in airport vicinity, their movement pattern and urge authorities to adopt measures that enhance the safety of PRIA for both aviation and the surrounding environment.

Keywords: collision risks, Nepal, Pokhara Regional International Airport, vulture

P1

Haematology and Blood Chemistry of the Japanese Mountain Hawk-eagle (*Nisaetus nipalensis orientalis*)

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We determined the values of haematology and blood chemistry of the Japanese Mountain Hawk-eagle in the Suzuka Mountains, Japan. Blood samples were obtained from 36 adults, 10 young birds, 5 juveniles and 56 nestlings from 1991 to 2024. PCV (%):38.4±3.55 for adults, 39.8±3.16 for young birds, 40.0±2.35 for juveniles and 32.1±3.26 for nestlings. RBC (×10^{10}/l):213.3±24.84 for adults, 220.3±20.55 for young birds, 220.2±14.36 for juveniles, 222.0±50.26 for nestlings. HGB (g/dl):19.0±2.30 for adults, 19.6±2.25 for young birds and 14.3±2.97 for nestlings. AST (U/l):213.9±70.17 for adults, 243.3±56.79 for young birds, 171.4±45.60 for juveniles and 108.7±16.95 for nestlings. ALT (U/l):22.0±10.48 for adults, 23.5±16.20 for young birds, 15.6±4.39 for juveniles and 11.5±5.06 for nestlings. TP (g/dl):3.2±0.52 for adults, 3.0±0.34 for young birds, 2.8±0.50 for juveniles and 3.3±0.35 for nestlings. BUN(mg/dl):1.0±1.73 for adults, 0.1 for young birds, 0.6±0.95 for juveniles and 4.6±3.22 for nestlings. ALP (U/l):274.1±215.30 for adults, 117.7±37.38 for young birds, 144.7±71.44 for juveniles and 1101.4±392.38 for nestlings. ALB (g/dl):0.9±0.37 for adults, 0.8±0.21 for young birds, 1.0±0.36 for juveniles and 1.2±0.17 for nestlings. Ca (mg/dl) :7.5±1.55 for adults, 9.4 ±0.21 for juveniles and 10.2±0.21 for nestlings. TG (mg/dl):127.4±77.02 for adults, 104.0±25.12 for young birds , 106.3±96.07 for juveniles and 90.2±65.8 for nestlings. TCHO (mg/dl):155.3±56.76 for adults, 189.2±32.88 for young birds, 151.5±24.91 for juveniles and 170.8±48.98 for nestlings. AMYL (U/l):169.3±62.36 for adults, 163.5±44.18 for young birds, 166.4±55.57 for juveniles and 181.4±53.35 for nestlings. Although the value of PCV, AST and ALT for adults were higher than nestlings, the value of BUN, ALP and Ca for nestlings were higher than adults at the 0.01 significant difference. Haematological and blood chemistry parameters varied in individuals. Even from one sample to the next in the same individual and in short interval periods parameters varied. Although the establishment of normal ranges of haematology and blood chemistry is very important, it is difficult to estimate the physical condition of health from only one blood examination. On the other hand, if the results of each blood examination are found to be obviously abnormal, they indicate that the bird is critically ill and therefore we should not release rescued birds into the wild.

Keywords: blood chemistry, haematology, Mountain Hawk-eagle

Conservation Genetics of Small Island Populations of the Crested Serpent-eagle in Japan

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The Crested serpent-eagle (*Spilornis cheela perplexus*) is an apex predator on Iriomote and Ishigaki Islands, Japan. The Japanese Ministry of the Environment classifies this eagle as critically endangered (CR) with approximately 100 individuals on each island. However, conservation genetic studies essential for conservation management are lacking. This study aims to clarify the genetic population structure, diversity, inbreeding levels, and demographic history of each population to inform the current genetic status of this species to suggest conservation strategies.

We performed whole-genome resequencing on four individuals from Iriomote Island and three from Ishigaki Island. Additionally, genomic data of a subspecies on Simeulue Island, Indonesia were obtained from NCBI GenBank. Population structure of three localities was assessed using PCA, ADMIXTURE, and phylogenetic analysis. Genetic diversities were assessed with the genome-wide heterozygosity and nucleotide diversity (π) estimated with ANGSD, and inbreeding levels were evaluated using runs of homozygosity (ROH) with PLINK. Effective population size (*Ne*) demography was inferred via PSMC and SMC++.

Results of the PCA, ADMIXTURE and phylogenetic analysis revealed distinct genetic differentiation among the three island localities. Genetic diversity was lower in the Japanese populations (heterozygosity: 1.7×10^{-3} in Iriomote, 1.5×10^{-3} in Ishigaki; π: 1.9×10^{-3} and 1.7×10^{-3}, respectively) than in the Simeulue (heterozygosity: 2.3×10^{-3}). Although Iriomote population showed higher heterozygosity than the Ishigaki population, the difference was not significant (brunner munzel test, p=0.17). Inbreeding levels were highest in Ishigaki, followed by Iriomote and lowest in Simeulue (F_{ROH}: 2.9×10^{-2}, 2.1×10^{-2} and 0.00 respectively). Demographic analysis suggested that the ancestors of island populations in Japan experienced bottleneck event in relatively recent time (around a thousand to a million years ago). This event is likely related to geographical isolation and the limited carrying capacity of small islands. Additionaly, this population decline might contribute to lower genetic diversity and higher inbreeding in Japanese populations compared to Simeulue Island population. We will analyze the estimated extinction risk under further demographic decline based on these results.

Keywords: conservation genetics, Crested Serpent-eagle, island ecology, island raptor, small population

Catching the Winds of the World to Study and Conserve Raptors Globally

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Few elements of biodiversity are as effective in leveraging conservation goals as birds and particularly raptors. I intend to use this to get more and more people to share the interest and passion that raptor specialists and raptor-focused organizations around the world have in conserving raptors and their habitats in their fields of action. On the one hand, there are young organizations (e.g. those in my home country, Bolivia), which are strengthening its foundations to become a benchmark for raptor research and conservation. On the other, there are many and diverse long-standing organizations with similar visions around the world, from which we should learn and collaborate with globally. Thus, the objectives of this initiative are: 1) Promote raptor monitoring and the exchange of related experiences among raptor researchers from different countries. 2) Increase the reach and influence of our organizations through a local action-global impact approach to raptor monitoring. 3) Promote our organizations in our communities by offering an alternative to connect with raptor specialists and enthusiasts internationally. 4) Contribute to the growth of raptor monitoring and its conservation through a new perspective of international action. The procedures to develop this project will include: 1) Create a database of the people who are interested in participating. 2) Carry out a random draw to form collaborating teams. 3) Introduce each other to the people who will make up a team. 4) Share their experiences of raptor monitoring in their countries, through the social networks and communication media of participating organizations (at least one shared monthly post including all the material that the members of each team deem appropriate). The expected results are: 1) The raptor research communities associated with participating organizations are informed and know more about what it is like to monitor raptors in another part of the world. 2) The people who make up the raptor monitoring teams contribute to achieving the institutional goals of participating organizations at a local and international level. 3) Participating organizations increase the visibility of the work they do and the likelihood of attracting more people to raptor monitoring and conservation.

Keywords: collaborative monitoring, community science, global conservation, hawkwatch sites, migration

The Role of Raptors in Zoonotic Pathogen Transmission Cycles in Northern Taiwan

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Recently, various species of raptors have become more common in areas of human activity due to habitat overlap, resulting in more frequent interactions between raptors and human communities over time. As opportunities to admire these astonishing creatures increase, conflicts such as glass collisions, car accidents, and environmental damage threatening raptors' lives become more prominent. Meanwhile, the transmission of pathogens has quietly begun. However, the role of raptors, as top predators in the food chain and hosts of ectoparasites such as important vectors like ticks, as well as potential reservoirs for vector-borne zoonotic diseases, remains unclear. Understanding the occurrence of zoonotic pathogens, monitoring their prevalence, and researching their impact on both raptors and humans are critical for the conservation of raptors and for maintaining a balanced coexistence between raptors and human communities.

In our study, a total of 192 blood samples and 18 ectoparasite samples were collected by the Raptor Research Group of Taiwan during the rescue and rehabilitation of raptors in northern Taiwan since 2020. In rescued individuals, the majority are *Lophospiza trivirgata*, with 56 samples collected. This is followed by 46 samples of *Spilornis cheela* and 24 samples of *Otus lettia*. These raptor species are the most commonly observed and frequently disturbed in urban and suburban areas of Taiwan. Ectoparasite samples were also collected, including the most frequently collected flat flies, specifically *Pseudolynchia canariensis* and *Ornithomya* sp., found on various individuals. This was followed by three species of feather lice. Mite samples, identified as *Androlaelaps* sp., were taken from two individuals of *Otus lettia*, while ticks identified as *Haemaphysalis hystricis* were collected from a *Spliloris cheela*.

The screening for zoonotic pathogens included *Rickettsia*, *Babesia*, *Anaplasma*, and *Borrelia*, all of which are significant vector-borne pathogens that can be transmitted from animals to humans. This was accomplished by purifying DNA from blood samples, followed by molecular detection. In the preliminary results of the pathogen detection, all samples tested negative for *Rickettsia*, *Ehrlichia*, *Babesia*, and *Borrelia*, yet symbiotic *Wolbachia* sp. and *Arsenophonus endosymbiont* were identified in flat fly samples. There is still a research gap about the influence of the symbiotic microbiome in flat flies, therefore, future research will continue to explore the possible effect of these endosymbionts, and to monitor the potential for transmission between raptors and humans.

Keywords: *Babesiae*, ectoparasites, rehabilitation, rescue, rickettsiae, zoonotic pathogens

Phylogeography and Population Genetic Structure Analysis of Raptors: A Case Study of the Black Kite Subspecies (*Milvus migrans formosanus*) in Taiwan

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The Black Kite in Taiwan is recognized as a distinct subspecies (*Milvus migrans formosanus*). In the past, its population was stable, but due to excessive pesticide use in the 1980s, its numbers declined drastically. In recent years, conservation efforts have led to a population recovery. However, following a bottleneck effect, genetic diversity is expected to decrease significantly. Additionally, cases of inbreeding and offspring deformities have been observed, raising concerns about the future of the population. Furthermore, there is currently no molecular evidence supporting the classification of the Black Kite in Taiwan as a distinct subspecies. The presence of migratory populations and their population size also remain unresolved questions.

This study employs mitochondrial DNA analysis for phylogeography and microsatellite markers for population genetic structure analysis. By comparing with the subspecies *M. m. lineatus* and *M. m. govinda*, the study aims to provide molecular evidence for the independent subspecies status of *M. m. formosanus* and identify potential migratory populations. Additionally, it seeks to assess the degree of gene flow between northern and southern populations in Taiwan and analyze genetic diversity within the population.

Sampling sites were divided into northern and southern Taiwan, with sample collection conducted from April 2012 to April 2024, totalling 115 samples. The sample types include blood and tissue, obtained from 81 fledglings, 16 juveniles, 14 adults, and 4 individuals of unknown age. The expected results should reveal molecular evidence supporting *M. m. formosanus* as a distinct subspecies through haplotype network analysis and phylogeographic trees. Furthermore, based on satellite tracking data of northern and southern populations in Taiwan, inter-population exchange is predicted to be low. The genetic differentiation within populations is expected to be moderate, with signs of inbreeding. Due to the presence of migratory Black Kite populations in Taiwan, genetic diversity at microsatellite loci is predicted to be moderate.

Establishing genetic research data for the Black Kite in Taiwan not only provides a more detailed molecular-level understanding of the population but also serves as an important reference for future conservation strategies. This

foundational research is crucial for the species' long-term protection.

Keywords: cytochrome *b*, genetic differentiation, genotype diversity, inbreeding, microsatellite, mitochondrial, NADH dehydrogenase 2

AI-Driven Multi-Omics Integration Identifies Genetic and Epigenetic Adaptations in Endangered Raptors Facing Urbanization and Climate Change

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Background/Aim: Urbanization and climate change threaten Southeast Asian raptors, driving habitat loss and reduced biodiversity. Understanding genetic and epigenetic mechanisms of resilience is critical for conservation. This study uses an AI-driven framework combining whole-genome sequencing (WGS), transcriptomics, and ecological data to explore adaptive capacities in the Javan Hawk-Eagle (*Nisaetus bartelsi*) and the Philippine Eagle (*Pithecophaga jefferyi*), aiming to identify markers of urban tolerance and climate adaptability. **Methods:** This study utilized data from existing repositories, including WGS from 12 raptor species (2,856 genomes, 2015–2023, NCBI), transcriptomic profiles (1,112 samples, GEO), and ecological metrics (e.g., urban density and habitat range) from the Global Raptor Impact Network (GRIN). AI models included a convolutional neural network (CNN) to identify single nucleotide polymorphisms (SNPs) linked to resilience and a transformer-based model for transcriptomic markers associated with climate adaptation. A graph neural network (GNN) integrated multi-omics data with ecological metrics, mapping adaptive pathways. Validation involved cross-species comparisons and simulations of environmental stress scenarios. **Results:** The analysis identified 56 SNPs, including genes like CYP1A2 (pollution metabolism) and CLOCK (circadian rhythm), with a predictive accuracy of 89.7% (95% CI: 87.5–91.9%). Transcriptomic analysis revealed 42 markers such as HSP70, linked to oxidative stress response. Urban populations showed a 12.6% (95% CI: 11.2–14.0%) reduction in heterozygosity compared to protected populations. Three key adaptive pathways regulating stress response, metabolic flexibility, and neuroplasticity were mapped, providing valuable understanding of survival mechanisms. **Conclusions:** This study applies AI-driven multi-omics integration to investigate raptor adaptation under urban and climate pressures. By identifying essential genomic and transcriptomic markers, it emphasizes the significance of preserving genetic diversity and provides innovative tools for conservation strategies addressing urbanization and climate change challenges.

Keywords: AI-driven multi-omics, endangered raptors, epigenetic markers, genetic adaptations, urbanization and climate change

Breeding Pair Turnover in Mountain Hawk-Eagles

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Presenters will present on behalf of The Project Team for Research and Conservation of The Japanese Mountain Hawk-eagle

Turnover is an important measure of population dynamics in wildlife. In the case of socially monogamous raptors that mate for life, monitoring turnover (i.e. replacement) of breeding individuals, especially upon vacancies resulting from death, can provide valuable information on life history and population viability, which in turn can be applied towards conservation management. Here, we provide a case-study on the Mountain Hawk-eagle, an apex predator of Asian forest ecosystems. They are listed as endangered in various regions, but their population dynamics are understudied. We used genetic information from Mountain Hawk-eagles of the Suzuka Mountains in Japan to identify individuals and their turnover in breeding pairs. Data from a 501 base-pair sequence of the mitochondrial control region in adults and chicks, originally obtained for surveying genetic diversity, was compared across survey years in five territories to detect replacement of breeding female individuals. We found that in three pairs, at least one turnover event in the female had occurred, while in the remaining two pairs, at least two turnover events had taken place. This observation based on genetic information, corroborates visual monitoring of wing-markers and radio-telemetry data. The limitation to this methodology, however, is that mitochondrial DNA is maternally inherited, meaning it cannot detect male turnover. Analyses of nuclear DNA markers are required to encompass both sexes, which can ultimately provide insights into whole-population dynamics. Yet, combined, the evidence of breeding pair turnover gathered in this study shows that a vacancy in a pair is often promptly filled by a new individual, suggesting that the Mountain Hawk-eagles of the Suzuka Mountains may have a sufficient number of individuals, who are, so to speak, waiting for a spot to open up in the breeding pool.

Keywords: individual identification, mtDNA, *Nisaetus nipalensis orientalis*, population dynamics, tagging

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Population Status of the Eastern Grass Owl in Central Taiwan: A Preliminary Study

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The Eastern Grass Owl (*Tyto longimembris*) is an endangered and protected species in Taiwan. Although sporadic records of this owl were reported across Taiwan in the 1970s, from 2000 to 2020, most sightings occurred along the elevated riverbanks of lower rivers in southwestern Taiwan, with only a few records from other locations. In this study, we collected audio data using automatic audio recorders (Song Meter Micro) at the estuary of the Zhuoshui River in central Taiwan between 18:00 and 06:00, from November 2023 to December 2024. Grass owl calls were identified within the recordings through deep learning model. The results show peak vocal activity in July (21 days), February (15 days), and March (16 days), while calls were rare in December (2 days in 2023 / 1 day in 2024). These findings suggest that grass owls may be unable to inhabit the estuary during summer flooding caused by typhoons or during strong winter winds. Similar monitoring methods were applied from July to September 2024 at various sites in central Taiwan, including the Chichi Diversion Weir to the lower Zhuoshui River (N=30), Dajia River (N=6), Wu River (N=4), Dadu Plateau (N=15), and Hushan Reservoir (N=1). Each site was continuously monitored for five days (at least 60 hours in total). Of the 56 recorder sites (3,360 hours of recordings in total), grass owls were detected at the lower Zhuoshui River (N=12) and Dadu Plateau (N=2). These results indicate that using automatic audio recorders is a feasible method to monitor grass owl activity, facilitating efficient detection during peak vocalization periods. Nevertheless, it is necessary to extend monitoring durations in areas where owls are less abundant. Finally, we recommend promoting citizen participation in Eastern Grass Owl monitoring to increase monitoring durations, expand survey coverage, and gather more comprehensive data on this elusive species.

Keywords: activity peaks, autonomous recording unit, Grass Owl, survey methods

Conservation Strategies for the Eastern Grass Owl in Pastures: Balancing Breeding Success and Forage Production

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The Eastern Grass Owl (*Tyto longimembris*) is a rare and protected species in Taiwan, primarily inhabiting early successional and elevated riverbanks with minimal human disturbance in southwestern Taiwan. The Taiwan Livestock Research Institute (TLRI) is major forage supplier for Taiwan dairy industry. To increase yield, the pastures at TLRI are regular mowed, forming a highly disturbed environment. This study aimed to explore the factors affecting the breeding success of grass owls in these pastures, and to track the movements of fledglings, providing insight for effective conservation strategies. Between 2021 to 2024, we recorded four breeding nests of grass owls at TLRI. While the individuals in breeding pairs varied annually, the nesting locations remained consistent. The results indicate that the fraction of vegetation cover is a key factor influencing the breeding success of grass owls, with regular mowing reducing habitat suitability for breeding. In years with higher rainfall, delayed mowing due to muddy ground allowed the grass to grow denser, providing adequate cover for breeding success. Based on developmental stages, the earliest egg-laying period was estimated to be in September (2021), while the latest occurred in December (2024). In 2023, we tracked the movements of three 8-week-old fledglings using backpack tags. At 10 weeks old, the fledglings roosted within a 50-meter radius of their nests, and their movement range exceeded 1,000 meters by 11 weeks old. Two 12-week-old fledglings travelled up to 2,598.6 meters from the nest, with perching and roosting sites no longer overlapping, indicating their independence. The main causes of grass owl injuries and breeding failure were accidents involving mower blades during mowing operations and reduced vegetation cover. To balance pasture production and grass owl conservation, we collected audio data using automatic audio recorders to monitor their activity levels and used a thermal imaging camera for nighttime observations at sites with higher activity during breeding season (July). If paired owls were detected, mowing operations were temporarily suspended, and ground searches were conducted to confirm the presence of grass owl nests before mowing resumed. To prevent potential threats to nestlings from other species (e.g. cattle, stray dogs) after mowing, temporary fencing (50m × 50m × 1.2m) was built around the identified nest sites. The fencing remained until the birds had fully fledged and left the area. This study demonstrates that acoustic monitoring, combined with collaborative mowing operations during the grass owl breeding season and reduced interference around nesting sites, could positively enhance the breeding success of Eastern Grass Owls while maintaining the pasture yield.

Keywords: automatic audio recorder, breeding nest, fencing, fledgling activity

Aging the Short-eared Owl by 15-years Banding Recoveries of Taiwan

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Age determination in birds is crucial for understanding vital population parameters such as age structure, survival rates, migration strategies, and breeding patterns. While long-term banding and recapture efforts are essential for accurately determining the age of most bird species, these efforts require both a large number of banded individuals and an extended banding period. In this study, we banded a total of 362 Short-eared Owls from 2010 to 2024, comprising 291 females and 71 males. Over a 15-year period, we recaptured 12 individuals (9 females and 3 males) with recapture intervals ranging from 1 to 6 years. By examining the time differences between recaptures, and utilizing the photographs and data recorded at each capture event, we deduced specific age-related plumage characteristics. For females, these included the presence and shape of a sagittal patch on the ventral wing surface, the extent of tawny coloration on the ventral wing, the number of bars on secondary feathers s1-s4, the black markings on primary feathers p6-9, and the number of bars on the outermost tail feathers. For males, age-related plumage characteristics included the number of bars on secondary feathers s1-s4, black markings on primary feathers p6-9, and the number of bars on the outermost tail feathers. By analyzing these characteristics across recaptured individuals, we identified the following optimal age determination criteria. Juvenile females (under one year old) exhibit a distinctive, broad sagittal patch on the ventral wing surface. At one to two years old, the patch becomes teardrop-shaped. By two to three years, it transitions into a striped pattern, and disappears entirely in individuals older than three years. Juvenile males (under one year old) possess four bars on secondary feathers, which decreases to three by the third year and to two by the sixth year. These bars disappear completely by the twelfth year. Based on these sex and age-related data, we inferred that the chronological order of arrival to Taiwan each year is: older adult females, younger adult females, younger adult males, older adult males, with younger adult females being the last to depart.

Keywords: aging, *Asio flammeus*, banding, Short-eared Owl, Taiwan

Territory Size of the Grey-Faced Buzzard (*Butastur indicus*) Breeding in Korea

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The Grey-faced Buzzard (*Butastur indicus*) has been commonly believed as a passage migrant passing through the Korean Peninsula in spring and autumn along the East Asian Flyway, but recent records in breeding seasons are increasing in South Korea. Due to the lack of information on the newly colonizing breeding population in Korea, research on spatial use and habitat selection is needed for habitat management and species conservation. In this study, we analyzed their breeding territory using the minimum convex polygon (MCP) and the kernel density estimation (KDE) methods, using GPS transmitters deployed on nine buzzards in early July 2024, in Yeoncheon-gun, Gyeonggi Province in South Korea. Breeding territories were established at the edge of the forest and near rice paddies. The median of the territory size based on 100% MCP was 35.2 ha (range: 29.0-96.6 ha), that of 95% KDE was 56.5 ha (range: 38.1-149.9 ha), and that of the core area estimated by 50% KDE was 13.8 ha (range: 7.9-43.7 ha). Habitat preferences based on Ivlev's electivity index indicated that they preferred only forest habitats, as they nested mainly in forest edges during the breeding season. Although the preference for rice paddies was not confirmed, however, their territories were always composed of forest and rice fields suggesting that the rice fields are also a critical factor in the breeding habitat selection as important foraging grounds. Given the rapid natural and socio-economic environmental changes in rural areas, such as the reduction of rice fields and their conversion into factory farming or greenhouses, it is necessary to continuously monitor the occurrence, habitat use, and changes in breeding populations of the buzzard in Korea.

Keywords: *Butastur indicus*, GPS telemetry, Grey-faced Buzzard, habitat preference, territory size

Migratory Route of the Grey-faced Buzzards Wintering on Amami-Oshima Island, Japan

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Grey-faced buzzards are migratory birds that breed in the Far East, including northeastern China, the Korean Peninsula, and Japan, and overwinter in Southeast Asia in the Philippines and Indonesia. In Japan, they winter on islands south of Amami-Oshima. Amami-Oshima Island is the largest wintering ground for Grey-faced buzzards in Japan, with more than 2,000 birds known to winter there. However, until now it was not known where the Grey-faced buzzards wintering on Amami-Oshima were breeding. In the case of migratory birds, conservation cannot be achieved by protecting only wintering, stopover, or breeding areas. In addition, a full understanding of the migratory routes of the Grey-faced buzzard, which moves internationally between Japan, China, Korea, Taiwan, and the Philippines, is necessary for the conservation of the species. Based on these issues, a survey was conducted from February 26 to March 1, 2024, to determine where individuals wintering on Amami-Oshima come from. Eleven wintering individuals from Amami-Oshima were captured, fitted with DRUID GPS tags using the leg loop harness method, and released. As a result, GPS data confirmed that all 11 birds had migrated to the Japanese mainland. The average travel days were 9 (7-16) and the average distance travelled was 1569 km (1358-1805). It was found that during the fall migration, they take one or two stopover sites in Japan and stay there for a certain period of time. It was evident that the fall migratory route follows the spring migratory route and returns to the same point as the capture site. For two birds, GPS data was not available during the process. The reason for this could not be clarified.

Keywords: Amami-Oshima, DRUID, GPS tag, Grey-faced Buzzard, leg loop harness method, migratory route

Migration Route of a Male Hen harrier *Circus cyaneus* in Taiwan

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The Hen harrier (*Circus cyaneus*) is distributed across Asia and Europe, breeding between 40 and 70 degrees north latitude and migrating southward to between 20 and 40 degrees in winter, including Taiwan. The wintering period of Hen harriers in Taiwan is from mid-September to May of the following year according to eBird. Wintering habitats of Hen harriers include grassland, farmland and airport. There are only a few documented observations of Hen harriers in East Asia, and biological information remains limited. We rescued a male sub-adult Hen harrier and attached a satellite tracker after medical treatment in 2022. The Hen harrier returned to the wild on December 30, 2022, and was tracked for a total of 141 days (775 locality data), including 109 days of wintering in Taiwan and 32 days of migration. This male Hen harrier inhabited the Taichung Airport throughout the winter before flying north and stopping at Hsinchu Airport in early April. This harrier departed from Hsinchu Airport (24°48'N, 120°56'E) and flew into China on April 17, with its last detected location in Obluchye District, Jewish Autonomous Oblast, Russia (49°00'N, 131°52'E), covering a total migration distance of 3,567 km. This Hen harrier flew to China and travelled north along the coast, from the Shandong Peninsula to the Liaodong Peninsula into North Korea before turning back to Northeast China and then into Russia. The Hen harrier crossed three seas - the Taiwan Strait (287 km), the Yellow Sea (159 km), and the Bohai Sea (175 km) - making 18 stopovers during land migration. The Hen harrier selected grassland, farmland, and riparian areas both during wintering and migration, indicating that the preservation of such habitats is extremely important for the species.

Keywords: *Circus cyaneus*, Hen Harrier, migration, satellite telemetry, Taiwan

Migration of the Wintering Short-eared Owl *Asio flammeus* in Taiwan

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The Short-eared Owl (*Asio flammeus*) is an uncommon winter migrant to Taiwan, typically present from November to April, with northward migration beginning in April and May. Despite their regular occurrence, the breeding grounds and migration routes of these owls remain completely unknown in East Asia. We conducted satellite tracking of 12 Short-eared Owls (10 females, 2 males) between 2018 and 2024 to investigate their spring migration patterns. The earliest departures occurred on April 2, 2024 (two females), while the latest departure was recorded on May 29, 2022 (one juvenile male). The mean tracking duration for northward migration was 32.3 ± 15.1 days. Migration distances ranged from 3,074–6,478 kilometers, with terminal locations spanning from 55°N to 68°N latitude. Notably, one female travelled to Ambarchik near the Arctic Circle, representing the longest migration distance recorded for this species in East Asia. We identified two distinct migration routes: a continental route (used by 66.7% of tracked birds) crossing the Taiwan Strait to mainland China and following northward to the Shandong Peninsula, then crossing the Yellow Sea to reach the Liaodong Peninsula before entering Russia. The alternative island-hopping route (used by 33.3%) proceeds from northeastern Taiwan across the Ryukyu Islands to Kyushu, then continues via the Korean Peninsula to mainland China before reaching Russia. The island-hopping route involved flights ranging from 43–1,154 kilometers between stopover sites. This study provides the first comprehensive documentation of migration routes for Short-eared Owl's wintering in Taiwan and provided insights into the movement patterns of island-dwelling migrants in East Asia. The Short-eared owls that chose the island-hopping route had to cross the 3,000-meter-high Central Mountain Range to the east of Taiwan before heading out to sea. It is difficult to explain this deliberate behavior as a random. The distinct route choices observed in this study raise important questions for future research regarding whether route selection is determined by random choice, genetics, or other factors.

Keywords: *Asio flammeus*, island-hopping, migration, satellite tracking, Short-eared Owl

A Technique to Attaching PinPoint GPS Tag on to Released Javan Hawk Eagle (*Nisaetus bartelsi*)

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Post-release monitoring of rehabilitated raptors using PinPoint GPS tag is very useful in determining the movement of released raptors. The tag must be monitored for the bird welfare. The research aims to reduce the effects of tag attachments that might interfere with the bird welfare by improving attachment methods. The tag used in this research was Platform Transfer Terminal (PTTs) PinPoint Solar GPS-Argos. It was attached to rehabilitated male Javan Hawk Eagle's back using a Teflon harness. The combined tag and harness weight should not exceed 3% - 5% of the raptor’s body weight (equipment mass = 21 g; raptor mass = 850 g). The tag was attached to the raptor's back and the harness straps were fastened to the attachment points. The harness straps were inserted to square cardboard template which was placed in front of the sternum to connect from the attachment point. The template and straps were sewn to secure the position of the straps to refrain from excessive friction and ensure the tag will be properly aligned on the raptor’s back. The tagged raptor was monitored for a week at the rehabilitation center's flight training cage before its release. The flight training cage was provided by PT PLN Indonesia Power, which regularly supports raptor conservation efforts. After tagging, the raptor’s behavior showed it was pecking at the harness straps. After a day, the raptor was seen to get used to the tag attached which was indicated by the raptor actively flying and hunting in the cage. After a week of monitoring the raptor was released into the wild. The raptor that was released had gone through several procedures including performing health examination, ensuring that exhibited behaviors indicate readiness towards release, and making sure that the location is appropriate for release. On-site monitoring was carried out for two weeks after release. The data from the raptor's movement that was obtained from GPS tag was collected for 7 months.

Keywords: attaching technique, Javan Hawk Eagle, PinPoint GPS Tag, post-release monitoring

Migration Routes of a Rescued Black Kite (*Milvus migrans*) along the Coast of East Asia

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The Black Kite (*Milvus migrans*) may be the most numerous birds of prey in the world, but information on its population status and migratory habits in East Asia are still severely lacking. The Black Kite population in Taiwan is generally considered to comprise the subspecies *M. migrans formosanus*, which is indigenous to Taiwan and Hainan. Through satellite tracking, this study was the first to identify a migratory individual (possibly belonging to the subspecies *M. migrans lineatus*) in Taiwan and successfully recorded its complete migration route within East Asia. This kite was rescued from secondary poisoning of both rodenticides and carbofuran in southern Taiwan. Tracked from April of 2020 to November of 2021, the kite took two spring and two autumn migration routes. In addition to Taiwan, this individual stayed in the same wintering grounds in southeastern China; however, it flew to two different sites for the two consecutive summers: the Shandong Peninsula during the first summer and the Russian Far East during the second summer. The bird exhibited exploration behaviour during the second summer, and it had a home range of 135,477 km^2 (95% kernel density estimation). The Black Kite population has been declining in many parts of East Asia, which warrants further attention. Our findings highlight the need for collaborative efforts for the conservation of Black Kites in East Asia.

Keywords: activity range, Black Kite, conservation, East Asian–Australasian Flyway, satellite tracking, secondary poisoning

Tracking the Migration of the Eurasian Kestrel Using GPS Transmitters: A Case Study from a Northern Taiwan Airport

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Avian movement patterns are a key focus in aviation safety research. The Eurasian Kestrel (*Falco tinnunculus*) is widely distributed across Eurasia and is a common wintering bird in Taiwan. It prefers open habitats such as grasslands and farmlands but can also be found on cliffs and buildings. Airports, which provide vast open spaces, are also utilized by overwintering kestrels. In April 2022, a female adult kestrel was rescued at Taipei Songshan Airport after being injured by mist nets. Following rehabilitation, it was fitted with a GPS/GSM transmitter to investigate site fidelity and migration routes. The bird was released on April 13 in Beitou District, Taipei City. After briefly stopping in Dayuan and Zhongli Districts of Taoyuan City, it returned to the vicinity of Songshan Airport before departing from Tamsui District, New Taipei City, on April 23. It then landed on Pingtan Island, Fujian Province, China, and continued north along the Chinese coastline, reaching Panshidian Town, Haiyang City, Yantai, Shandong Province, on May 14, where it spent the breeding season. The southward migration began on September 14, following the Yellow Sea coast to Taizhou and Wenzhou in Zhejiang Province before departing over the East China Sea. The bird made landfall in Shimen Districts, New Taipei City, on September 18, then moved to Songshan District, Taipei City, including within the airport grounds. Unfortunately, the kestrel was killed in a collision with an aircraft on October 11. The total tracking period lasted 183 days, during which 5,571 valid location data points were collected. During its migration, the kestrel completed two long-distance overwater flights: one in spring from Taiwan across the Taiwan Strait to Fujian Province, China, and another in autumn from Jiangsu Province, China, across the Yellow Sea to Shandong Province. During its northward migration, the kestrel crossed the Taiwan Strait at an average speed of 51.8 ± 3.88 km/h and an average altitude of 241 ± 65.82 m, while crossing the Yellow Sea at an average speed of 39.3 ± 2.92 km/h and an altitude of 119.82 ± 26.93 m. During its southward migration, the bird flew across the Yellow Sea at an average speed of 42.8 ± 9.93 km/h and an altitude of 248.4 ± 45.09 m, while crossing the East China Sea at an average speed of 32.5 ± 1.88 km/h and an altitude of 166.12 ± 35.93 m. Additionally, while flying along the Chinese coastline, the bird travelled northward at an average speed of 34.97 ± 1.23 km/h and an altitude of 267.2 ± 32.55 m, taking approximately 20 days, whereas its southward journey was faster, with an average speed of 36.56 ± 2.42 km/h, an altitude of 180.94 ± 13.29 m, and a duration of only 4 days. Although the tracking was prematurely terminated due to the collision, the collected data successfully documented the complete northward and southward migration routes, demonstrating high site fidelity to its wintering area. This study provides valuable reference data on the migration ecology of Eurasian kestrels and lays the groundwork for future related research

Keywords: bird strike, Eurasian Kestrel, GPS tracking, migration ecology

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Preliminary Study on Satellite Tracking of Urban Crested Goshawks

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Since around 2000, Crested Goshawks (*Lophospiza trivirgata*) have begun establishing breeding populations in urban areas of Taiwan. However, due to limitations in manpower and equipment, our understanding of their movement patterns remains limited. With advances in technology, the weight and size of bird tracking devices have significantly decreased in recent years. Additionally, the incorporation of solar panels has extended tracking duration, allowing researchers to track smaller raptors and gain insights into their home ranges. In 2021, a male Crested Goshawk, originally banded as a nestling in 2016, was rehabilitated at Raptor Research Group of Taiwan (RRGT) Rehabilitation Station. After recovery, it was released on April 8, 2021, in Datong District, Taipei City. Before release, a GPS/GSM transmitter was fitted to the bird to investigate the movement patterns of urban Crested Goshawks. Three years of tracking data revealed that the transmitter only transmitted data between February and September each year, with 85.56% of the data recorded between April and July. This suggests that the bird was more active during the breeding season, allowing the solar-powered transmitter to receive sufficient sunlight for charging and data transmission. Based on data from 2022 and 2023, we calculated the home range of this individual. The estimated AKDE95 values were 0.8277 km² (95% CI: 0.6573–1.0174) in 2022 and 0.8126 km² (95% CI: 0.6632–0.9768) in 2022. The AKDE50 values were 0.1374 km² (95% CI: 0.1091–0.1689) in 2022 and 0.1242 km² (95% CI: 0.1014–0.1493) in 2023. When combining data from both years, the AKDE95 was 0.8591 km² (95% CI: 0.7398–0.9873), and the AKDE50 was 0.1228 km² (95% CI: 0.1058–0.1411). Analysis of the bird's roosting sites showed that it primarily roosted near roads rather than within park or green spaces. Based on current findings, while Crested Goshawks are forest-dwelling raptors, the charging efficiency of the GPS transmitter was lower than expected. However, under specific conditions, the transmitter still provided valuable insights into their movement patterns.

Keywords: Crested Goshawk, home range, satellite tracking, urban raptors

Current Status of Crested Goshawk Banding and Color Ring Resighting Records in Northern Taiwan

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Since the 2000s, the Crested Goshawk (*Lophospiza trivirgata*) has gradually adapted to urban environments in Taiwan, establishing stable breeding populations in metropolitan areas. To facilitate individual identification and better understand the breeding ecology and movement patterns of urban Crested Goshawks, the Raptor Research Group of Taiwan (RRGT) initiated nest monitoring and individual banding in northern Taiwan in 2014. After the establishment of the RRGT Raptor Rehabilitation Station in 2017, all rehabilitated and released Crested Goshawks have been fitted with plastic color rings. As of December 2024, a total of 268 individuals have been banded, with 22 confirmed deaths. Since 2017, we have encouraged the public to report sightings via an online form. As of now, we have received 109 reports involving 49 individuals, accounting for 18.28% of all banded birds, showing a slight increase compared to 2020. Among the reported individuals, 22 were observed only once (44.9%), while 27 were observed multiple times (55.1%). The most frequently reported individuals since 2020 are three males: "Red 69," "Red 28," and "Green 15," each with five recorded sightings. The last record of "Red 69" indicates that it was engaged in nest building. The longest recorded movement after 2020 was documented for a juvenile female, "Blue H1," banded at a nest site in Daan Forest Park in 2023. This individual was first observed at Minsheng Park in April of the following year and later reappeared at Tamkang University by the end of the same year, traveling approximately 20 km in a straight line from its natal site. It has since been consistently observed within the Tamkang University campus. The longest-living known banded individual is "Red 96", a male juvenile banded in 2016. GPS tracking data confirm it remains active in the Datong District of Taipei City. Although many aspects of the Crested Goshawk's urban adaptation remain unknown, individual banding and color ring reports provide valuable insights into their movement patterns and habitat use in urban environments.

Keywords: banding, color ring, Crested Goshawk, resightings, ringing, sighting reports

Unseen Threat: Citizen Science Reveals Raptor Involvement in Bird-Window Collisions in Taiwan

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Bird-window collisions (i.e. birds crashing into man-made glass structures) are a major contributor to human-induced avian mortality. While this conservation issue has gained recognition, most research has focused on temperate regions, particularly North America, leading to a disproportionate focus on songbird species. Emerging reports from rehabilitation centers suggest that raptors may be more commonly affected but less frequently reported. To address this gap, the present study developed a methodology utilizing citizen science to systematically collect both active reports and passive reports scattered in social media (Facebook) to examine the bird-window collision patterns in Taiwan, a highly urbanized tropical and subtropical Asian island. This approach allows for an assessment of raptor involvement in bird-window collisions within this context.

Over the past decade, approximately 2,600 bird-window collision cases have been posted, of which 281 involved raptors (26% resulting in fatalities). The reported raptors included 11 diurnal and 6 nocturnal species, representing nearly half of Taiwan's non-vagrant raptor species. The five most frequently reported species (with >10 individuals recorded) were the Crested Goshawk (*Accipiter trivirgatus*, N=156), Besra (*Accipiter virgatus*, N=40), Northern Boobook (*Ninox japonica*, N=20), Collared Scops-Owl (*Otus lettia*, N=13), and Collared Owlet (*Taenioptynx brodiei*, N=13) , all of which were involved in daytime collisions. The unexpectedly high number of collisions involving the Crested Goshawk places it third among all bird-window collision species recorded in Taiwan. To our knowledge, this is one of the first reports to identify a raptor as a top collider.

Overall, our study underscores glass collisions as a neglected threat to raptors in Taiwan and potentially across Asia. This risk may increase as raptors increasingly occupy urban environments. We advocate for expanded research in under-studied regions to develop targeted conservation strategies for this growing global conservation challenge.

Keywords: bird-window collisions, citizen science, raptors, social media, Taiwan

First Account of Raptor-window Collisions Reported Through Citizen Science in the Philippines

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With increasing urbanization globally, bird-window collisions (BWC) is a growing anthropogenic threat that occurs when birds cannot distinguish glass as barriers and fly straight into them, causing injuries or death – for raptors, BWCs can happen during high speed pursuits of prey. Urban landscapes attract these birds due to the availability of prey, carrion, nest sites, and perches; consequently, building collisions were the top cause of admissions of raptors in veterinary clinics and rehabilitation centers worldwide. BWC studies were mostly from temperate regions (United States, Canada), but recent research from Southeast Asia has started in Singapore, Taiwan, and now in the Philippines. Bird Window Strike Philippines (BWS PH) collects citizen science data on collisions in the country through its Facebook page. Out of 407 reports from 2013 to 2024, 16 collisions of eight raptor species were recorded, including families Accipitridae (n=4), Falconidae (n=1), Strigidae (n=10), and Tytonidae (n=1). Majority of colliders were resident species, but migratory species (Chinese Sparrowhawk, Japanese Sparrowhawk, and Northern Boobook) were recorded in April and November, likely when these birds were migrating. Endemic species reported included the Philippine Scops Owl, Luzon Boobook, and the threatened Philippine Eagle-Owl classified as Vulnerable by the IUCN Red List and Endangered by the Philippine Red List Committee. Six out of the 16 collisions eventually ended in mortality, possibly with the individuals succumbing to internal injuries. Majority of raptor-window collisions occurred at residential buildings (n=7), followed by institutional (n=4) and commercial (n=3) infrastructures. This study is the first account of raptor-building collisions in the Philippines, but further data collection is needed throughout the country since most reports received were from Luzon. Alongside studies in Taiwan and Singapore, we can better understand how raptors in this region are affected by BWCs. Due to behavioral differences like the use of various visual fields during hunting, it could be worthwhile to investigate whether the drivers of window collisions for raptors might differ from those of non-raptor species, which could in turn correspond to unique mitigation strategies.

Keywords: anthropogenic threats to wildlife, bird-window collision, citizen science, Philippine raptors, raptor-building collision, urbanization

Seasonal Trends and Age Distribution of Raptor Window Collisions in Taiwan: Insights from Citizen Science Data from 2021-2024

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Bird window collisions (BWC) have been increasingly recognized as an important conservation issue in Taiwan. Previous studies have shown that bird species prone to window collisions in Taiwan differ from those in temperate regions, especially North America. However, a systematic investigation into the peak periods of bird-window collisions and age distribution of affected birds in Taiwan, as well as comparisons with other regions, remains unexplored. According to the 2022 rescue reports from Raptor Research Group of Taiwan on Facebook, over 10% of rescued raptors were injured due to collisions with glass. This makes bird window collisions the second most common cause of injury after traffic accidents or suspected traffic accidents. This study compiled over 200 records of raptor collision events from 2021 to 2024, mostly collected through citizen science efforts from Facebook group. During this period, 14 raptor species were recorded. The raptor species with the highest number of collisions is Crested Goshawk (*Accipiter trivirgatus*, N= 123),followed by Besra (*Accipiter virgatus*, N = 22), Northern Boobook (*Ninox japonica*, N = 22), Collared Scops Owl (*Otus lettia*, N = 19). We analyzed the monthly frequency of collisions and examined the proportion of adult and non-adult individuals involved in collision events, a as well as the proportion of raptors in monthly reported cases. Our findings reveal that the peak collision months are autumn, accounting for 36% collision of the year: conversely, summer is the lowest, accounting for only 18%. Also, we compared the vulnerability of mature and immature (any age other than mature, identifying by their different appearance compare to mature) in collisions of different species. Our data show that immature individuals of the Crested Goshawk are prone to collision than mature individual, while no immature collision events of the Northern Boobook and Collared Scops Owl were reported in the Facebook group. This study provides data to support raptor conservation efforts, enhances the understanding of raptor window collision dynamics in Taiwan, and serves as a foundation for future research to develop effective mitigation measures.

Keywords: age distribution, bird window collisions, citizen science raptors, seasonal distribution, Taiwan

Can Raptor Perches Mitigate Crop Damage from Birds and Rodents?

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Bird crop damage is one of complicated human-wildlife conflicts for maintaining agriculture and conservation balance. In recent years, the raptor perch with camera trap could provide a site for resting and foraging, serving as a tool for avian surveys and behavioral observations. However, its effect concerning pest control is still poorly understood. Thus, we installed three sets of perches with camera traps in rice paddies under different farming practices in eastern Taiwan between 2022 and 2024. We have collected 19,263 photos from 25 bird species. The species with highest Standard Value (SV) was Black-winged Kite (2.54 ± 1.83), followed by the Black Drongo (2.38 ± 3.09). The Black-winged Kite (BWK) primarily preyed on rodents (n = 566) and birds (n =59), while the Black Drongo mainly fed on insects (n = 474). About one year after setting, we recorded BWK with rodent prey every month, with a peak of 58 rodents in a single month and a maximum of eight in a single day. Additionally, 86 records of breeding behavior of the BWK were observed, including mating and carrying nest materials. A total of 302 photos of juveniles were recorded. The results of the generalized additive mixed model showed a significantly increasing trend on SV of predatory birds, and non-significant change of granivorous birds. In summary, the perches could attract predatory birds to rice fields for raptor surveys, and it might present the effects of pest control. We suggest promoting further research with rodent surveys to examine the effects of pest control and make it as a tool for biodiversity-friendly agriculture.

Keywords: carnivorous, ecosystem functions, ecosystem services, foraging behavior, trail camera

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Testing Avian Preferences for the Height and Location of Raptor Perches

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Raptor perches can attract predatory birds to farmlands and provide valuable ecosystem services. However, limited research has explored the preferences of different bird species for perch height and location. From August 2023 to June 2024, we established 12 sampling sites in southern Taiwan, each equipped with a tall perch (6 m) and a short perch (3 m) positioned approximately 50 m apart. The positions of the perches were swapped every two months, and camera traps were installed on the perches to record visiting bird species. A total of 8 raptor species were recorded, among which the Black-winged Kite (*Elanus caeruleus*), Common Kestrel (*Falco tinnunculus*), Eastern Grass-Owl (*Tyto longimembris*), and Collared Scops-Owl (*Otus lettia*) frequently used the perches. Regarding perch height preferences, the Black-winged Kite and Common Kestrel showed a higher frequency of use on tall perches, while the Eastern Grass-Owl and Collared Scops-Owl utilized both tall and short perches. In terms of perch location, all four species exhibited preferences for specific positions at certain sites. Based on these findings, diurnal raptors tend to prefer tall perches, while nocturnal raptors use both tall and short perches. Preferences of perch location may be influenced by surrounding environmental factors, warranting further analysis.

Keywords: artificial perch, automatic bird monitoring, bird ecosystem service

Behavioral Composition and Perch Competition of Common Bird Species on Raptor Perches

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Artificial perches, in addition to attracting raptors as a method for rodent pest control, can be equipped with camera traps for bird automatic monitoring and behavior recording. However, birds may use perches for various purposes, and competition over perch usage may occur. From 2020 to 2024, dozens of artificial perches were established in southern Taiwan's farmlands and wilderness. The study analyzed the behavior of four raptor species: Black-winged Kite (*Elanus caeruleus*), Eastern Grass Owl (*Tyto longimembris*), Collared Scops Owl (*Otus lettia*), and Northern Boobook (*Ninox japonica*), as well as four non-raptor species: Long-tailed Shrike (*Lanius schach*), Black Drongo (*Dicrurus macrocercus*), Savanna Nightjar (*Caprimulgus affinis*), and Red Collared-Dove (*Streptopelia tranquebarica*). Data were collected over one year, totaling 18,729 clips of 15-second videos. Additionally, perch competition was analyzed through interactions among bird species, with 598 events recorded.The behavior analysis revealed that Black-winged Kite, Collared Scops Owl, Northern Boobook, Black Drongo, and Long-tailed Shrike primarily use perches for hunting, often bringing prey to the perches. In contrast, Eastern Grass Owl, Savanna Nightjar, and Red Collared-Dove rarely brought prey and instead frequently use the perches for calling and social interactions. The competition analysis showed that the Black-winged Kite often drove away the Long-tailed Shrike and the Black Drongo, while the Long-tailed Shrike was more likely to drive away the Black Drongo and the Red Collared-Dove. The Black Drongo often drove away the Brown Shrike (*Lanius cristatus*) and the Red Collared-Dove. The results revealed that different bird species use perches for different purposes, and some species tend to be more dominant, potentially excluding others from using the perches. This study aims to enhance the understanding and application of perch monitoring for bird species based on these findings.

Keywords: automatic monitoring, bird behaviour, camera-trap, inter-species competition, raptor perch

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Challenge of Cultural Preservation and Ecological Conservation: Promoting Imitated Feathers of the Mountain Hawk-Eagle

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The Mountain Hawk-Eagle (*Nisaetus nipalensis*) is the largest forest-dwelling raptor in Taiwan and serves as an apex predator in its ecosystem. However, human disturbances and development, habitat degradation caused by extreme weather, and poaching are all affecting the population of this species. The Mountain Hawk-Eagle also holds significant cultural value among the Paiwan and Rukai tribes in southern Taiwan. The flight feathers of subadults feature a unique black and white triangular pattern reminiscent of the markings on the hundred-pace viper (*Deinagkistrodon acutus*). Wearing these feathers symbolizes nobility, responsibility, and bravery and is typically reserved for tribal leaders or warriors. However, as the Mountain Hawk-Eagle is currently classified as an endangered protected species, striking a balance between preserving traditional culture, ecological conservation, and sustainable use has become an urgent priority. The Imitated Mountain Hawk-Eagle feathers were developed after years of perfecting and optimization by craftsman Chung Ching-Nan and were first introduced in 2017. With support from the Pingtung Branch of the Forestry and Nature Conservation Agency and assistance from the Bird Ecology Lab at National Pingtung University of Science and Technology, this initiative has been promoted through a collaboration among industry, government, and academia. From 2018 to 2023, the craftsman personally provided 142 sets of imitation feather adornments to tribal members, and a total of 15 workshops on making imitated Mountain Hawk-Eagle feathers were held across various townships, with 324 indigenous people participating. In 2023, a month-long exhibition titled "Mountain Hawk-Eagle Imitated Feathers and Tribal Traditional Culture Exhibition" was organized in Pingtung, attracting 1,150 visitors. Under the craftsman's meticulous supervision, the acceptance of imitated feathers within the tribal communities has gradually increased (currently around 50%). Those who embrace the concept not only use them as betrothal gifts but also as substitutes for real feathers at formal occasions or traditional ceremonies. Only through ongoing, respectful, and attentive communication with the tribal communities can a balance be achieved between cultural preservation and conservation.

Keywords: conservation strategies, ethno-ornithology, headdress, Mountain Hawk-Eagle

The Role of ESG in Grass-Owl Conservation: Industry-Academia Collaboration for Biodiversity Protection

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Corporate ESG (Environmental, Social, and Governance) engagement is becoming a vital force in wildlife conservation. The Australasian Grass-Owl (*Tyto longimembris*), a critically endangered species in Taiwan, lacks sufficient ecological data, particularly in the Bazhang River Basin. Through ESG-driven industry-academia collaboration, this study successfully established a systematic monitoring program, filling knowledge gaps in its distribution and behavior. From January to December 2024, five raptor perches with infrared cameras were installed along the river. Over 349 days, Grass-Owls were recorded at three sites, primarily in mid-to-lower reaches with suitable grassland and agricultural habitats. Grass-Owls were first detected 49-59 days after installation, suggesting a period of adaptation. Activity was recorded in all months except February, with peaks occurring from April to June and in September, coinciding with the non-breeding season and potential dispersal period for juveniles. Camera data also revealed that Grass-Owl activity spans the entire night, with peaks around 7 PM and 4 AM. Additionally, various diurnal raptors, including Black-winged Kite (*Elanus caeruleus*) and Crested Serpent-Eagle (*Spilornis cheela*), were also recorded, indicating broader ecological value for the monitoring perches. The HCG Foundation played a key role by providing funding and donating a wildlife conservation vehicle, enhancing research efficiency and safety. Additionally, social media outreach via Facebook reached over 190,000 people, raising public awareness. This study highlights how ESG-driven corporate participation can accelerate ecological research, strengthen conservation efforts, and engage the public.

Keywords: conservation, ESG, Grass-Owl, *Tyto longimembris*

Sexual Differences in Parental Behaviour of Mountain Hawk-Eagle (*Nisaetus nipalensis nipalensis*)

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Mountain Hawk-Eagle *(Nisaetus nipalensis nipalensis*) is little study about parental care due to its limited population in Taiwan. Previous studies only use satellite tracking or direct observation to monitor the eagles during the breeding season. The aims of this study are use automatic camera trap to monitor mountain hawk-eagle parental care, and to describe the sexual differences in parental behaviour of this species.

During the 2023 breeding season, we find three nests by using drone, and installed automatic camera traps at the early stages of nesting in January. After the breeding season, we collected image to analysis. Our results indicate that during the nesting phase, both parents participated in bringing nesting materials to the nest. However, neither during incubation, and only the female during chick rearing. females spent much more time on Incubation. During the chick rearing phase, parents delivering prey items to the nest showed a peak at midday, small to medium-sized mammals have greatest percentage.

This research fills a gap in the knowledge of mountain hawk-eagle's breeding behaviour in Taiwan, and provides data that can be used for future conservation efforts and environmental education initiatives.

Keywords: automatic camera trap, incubation, Mountain Hawk-Eagle, nesting materials, parental care

Analysis of Autumn Migratory Raptors Survey in the Tataka Area of Yushan National Park from 2020 to 2024

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Taiwan is located along the East Asian-Australasian Flyway, and the Tataka area in Yushan National Park serves as a key stopover for migratory birds, including two migratory raptors—the Chinese Sparrowhawk (*Accipiter soloensis*) and the Grey-faced Buzzard (*Butastur indicus*). Since 2019, autumn surveys of migratory raptors have been conducted in Yushan National Park, with volunteers and park staff participating in the monitoring efforts. The 2024 survey was carried out in September and October at Zhizhong and Linchi Mountain, recording a total of 60,776 individuals belonging to 15 raptor species, including 30,020 individuals of Chinese Sparrowhawk and 30,459 individuals of Grey-faced Buzzard.

In 2024, the peak migration period for the Chinese Sparrowhawk was observed on September 20 and September 23–24, while the Grey-faced Buzzard peaked on October 11, with a single-day count of 11,141 individuals at Zhizhong. Data from 2019 to 2024 indicate that the number of Grey-faced Buzzard recorded in the survey has remained stable, accounting for approximately one-third of the numbers recorded in Kenting National Park. In contrast, the number of Chinese Sparrowhawk recorded in 2024 significantly increased to 30,020—three times higher than in previous years. This rise may be influenced by survey methods, population dynamics, or changes in migration routes, necessitating further monitoring.

The findings confirm that Tataka is not only a crucial stopover site for migratory raptors but also a habitat rich in resident raptor species. This highlights its potential for birdwatching tourism and ecological education, enhancing the national park's biodiversity and recreational value.

Keywords: Chinese Sparrowhawk, Grey-faced Buzzard, migratory raptors, Tataka area

Shoushan National Nature Park's Migratory Raptors Survey in Banpingshan

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Taiwan is located along the East Asian-Australasian Flyway, and the Tataka area in Yushan National Park serves as a key stopover for migratory birds, including two migratory raptors—the Chinese Sparrowhawk (*Accipiter soloensis*) and the Grey-faced Buzzard (*Butastur indicus*). Since 2019, autumn surveys of migratory raptors have been conducted in Yushan National Park, with volunteers and park staff participating in the monitoring efforts. The 2024 survey was carried out in September and October at Zhizhong and Linchi Mountain, recording a total of 60,776 individuals belonging to 15 raptor species, including 30,020 individuals of Chinese Sparrowhawk and 30,459 individuals of Grey-faced Buzzard.

In 2024, the peak migration period for the Chinese Sparrowhawk was observed on September 20 and September 23–24, while the Grey-faced Buzzard peaked on October 11, with a single-day count of 11,141 individuals at Zhizhong. Data from 2019 to 2024 indicate that the number of Grey-faced Buzzard recorded in the survey has remained stable, accounting for approximately one-third of the numbers recorded in Kenting National Park. In contrast, the number of Chinese Sparrowhawk recorded in 2024 significantly increased to 30,020—three times higher than in previous years. This rise may be influenced by survey methods, population dynamics, or changes in migration routes, necessitating further monitoring.

The findings confirm that Tataka is not only a crucial stopover site for migratory raptors but also a habitat rich in resident raptor species. This highlights its potential for birdwatching tourism and ecological education, enhancing the national park's biodiversity and recreational value.

Keywords: Chinese Sparrowhawk, Grey-faced Buzzard, migratory raptors, Tataka area

Machine Learning-Driven Modeling of Prey Switching in Raptors: A Framework for Predicting Population Resilience Under Environmental Change

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Introductions: Raptors, as keystone predators, rely on prey switching to survive fluctuations in prey populations. Despite its importance, the mechanisms and impacts of prey switching are poorly understood due to complex multi-trophic interactions. This study uses an AI-driven framework to analyze prey switching and raptor resilience over a 10-year period, integrating ecological, climatic, and trophic network data to identify adaptive thresholds and guide conservation strategies for vulnerable species.

Methods: We developed a hybrid AI model combining temporal convolutional networks (TCNs) and ecological graph neural networks (EGNNs) to analyze prey switching patterns and population impacts. Data integration included 10 years (2013–2023) of eBird and GBIF occurrence records for 12 raptor species, prey availability metrics from peer-reviewed global studies encompassing 250 prey species, and MODIS and Landsat satellite imagery for habitat quality and fragmentation metrics. Climate data were obtained from WorldClim to model seasonal variability and extreme climatic events. Feature engineering generated adaptive flexibility scores, prey diversity indices, and predator-prey overlap metrics. The model processed over 10 million data points to estimate prey switching thresholds, population resilience indices, and extinction probabilities. Validation was achieved using 10-fold cross-validation.

Results: Prey switching occurred when prey abundance fell below 28.6% (95% CI: 25.1–32.1%) of the long-term average, identifying a critical adaptive threshold. Highly adaptable raptors experienced population declines limited to 12.8% (95% CI: 9.7–15.9%) during prey shortages, compared to 39.5% (95% CI: 35.4–43.6%) for less adaptable species. Habitat fragmentation reduced prey switching efficiency by 31.7% ($p < 0.001$), amplifying extinction risks in urbanized areas. Two species showed >80% extinction probabilities within 50 years under projected climate scenarios, emphasizing the dual threats of habitat loss and prey scarcity.

Conclusions: This study presents an AI-driven framework that uncovers critical prey switching thresholds, reveals raptor resilience under prey scarcity, and emphasizes the adverse effects of habitat fragmentation, providing practical guidance for conservation efforts targeting vulnerable raptor species.

Keywords: AI-driven modeling, conservation strategies, ecological adaptation, prey switching, raptor resilience

Modeling Cognitive Disruption in Raptors Due to Urban Light Pollution: A Neural Network Approach to Conservation

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Purpose: Urban light pollution disrupts cognitive functions, hunting efficiency, and navigation in nocturnal and diurnal raptors, threatening their ecological roles. Despite its importance, no quantitative models exist to analyze these disruptions. This study develops a spatio-temporal neural network framework to assess raptor cognitive impairments, predict behavioral adaptations, and identify high-risk zones, offering practical conservation strategies. **Methods:** The study used datasets to construct a multi-layered neural network model. Light pollution data, including intensity and spectral composition, were sourced from the Visible Infrared Imaging Radiometer Suite (VIIRS) and Earth Observation Satellites. Behavioral data for 12 raptor species, with over 15,000 records of flight paths, hunting success, and activity patterns, were obtained from eBird and the Global Raptors Information Network (GRIN). Habitat and urban structure data were integrated from OpenStreetMap (OSM) and the Global Land Cover Facility (GLCF). The model incorporated a Cognitive Disruption Index (CDI) based on light exposure and behavioral metrics, a recurrent neural network (RNN) to simulate hunting and roosting adaptations, and a risk mapping framework using gradient-boosted regression trees (GBRT) to identify critical zones. Model validation used historical data from eBird and GRIN for temporal and spatial accuracy. **Results:** Raptors exposed to light pollution above 35 lux experienced a 65% (95% CI: 61–70%) increase in CDI, causing a 37% (95% CI: 33–41%) reduction in nocturnal hunting success. Behavioral changes included a 46% (95% CI: 42–50%) shift toward diurnal activity and 52% (95% CI: 48–57%) altered flight paths to avoid urban centers. High-risk zones, concentrated above 55 lux, affected 60% of hunting territories (95% CI: 56–64%). Mitigation through adaptive lighting reduced cognitive disruption by 35% (95% CI: 30–40%). **Conclusions:** This study establishes a framework for quantitatively modeling urban light pollution's impact on raptors, combining neural networks with ecological data. Findings emphasize critical zones and practical solutions like adaptive lighting and habitat conservation, offering tools to mitigate ecological threats and guide urban planning.

Keywords: cognitive disruption, conservation strategies, raptors, spatio-temporal neural networks, urban light pollution

Workshop:

How to Effectively Promote the Concept of Preventing Bird Window Collisions

- Time: April 28th, 13:30 - 16:30
- Location: Jingshan Nature Center, Yangmingshan National Park
- Eligibility: Open to all those who have registered for ARRCN
- Capacity: 30 participants

- Priority Admission:
  - Attendees with experience in bird window collision research or educational outreach
  - Teachers or environmental educators

- Workshop Content:
  - Introduction to bird window collisions and the situation in Taiwan (20 min)
  - Bird-friendly building and glass initiatives in Taiwan (20 min)
  - Sharing and discussion of the situation in different countries or regions (50 min)
  - Low-cost methods for preventing bird window collisions, including hands-on practice (90 min)

Exhibitor List

Equipment

台灣德魯伊
施華洛世奇光學
野聲環境生態
歐帝生光電
博威鳥控

Merchandise

Aves Rapaces en Bolivia – Programa de Investigación
Birdink
Hey 鳥朋友
Himalayan Raptors
Mr.BradeHu
The Peregrine Fund
Universiti Putra Malaysia
小民日子
昕昌 x 八色鳥 x 鰲鼓
Wei 故事繪
啾阿雜羊毛氈手作
森森喚
鷹仔鋪

Exhibit

小 i 的早鳥樂園

Beverage

好啤氣

THE 13th ARRCN & 7th TAIWAN RAPTOR SYMPOSIUM

ABSTRACT BOOK 摘要集

Raptor Research Group of Taiwan

台灣猛禽保育現況報告

January, 2026

指導單位：林業及自然保育署
出版：台灣猛禽研究會
撰寫：廖珮岑

-草稿-

-草稿-

本報告共分為三章：

第一章：總論，整合 2025 年舉辦的「第 13 屆亞洲猛禽研究保育聯盟暨第 7 屆台灣猛禽研討會」及臺灣五十種猛禽近十年的發表文獻，綜合論述猛禽研究方法學進程，以及保育議題的跨領域整合概況。並就留鳥猛禽及遷徙猛禽個別物種的保育等級，分別論述物種 2025 年為止的研究概況，以此為基礎提供未來的研究與保育方向建議。

第二章：第 13 屆亞洲猛禽研究保育聯盟暨第 7 屆台灣猛禽研討會彙整，將發表內容依照物種整併，附上研討會報告摘要編號，方便進行對照。

第三章：台灣五十種猛禽個論與近十年發表文獻，整合各物種近十年在社群平台、雜誌及文獻上發表過的內容，並列出臺灣及國際發表之文獻。

第一章 總論

研究方法學進程與保育跨領域整合概況

「第 13 屆亞洲猛禽研究保育聯盟暨第 7 屆台灣猛禽研討會」於 2025 年 4 月 26-27 日舉行，與會者共計 323 位，包含來自香港、印度、印尼、日本、馬來西亞、尼泊爾、菲律賓、韓國、新加坡、泰國、澳洲、玻利維亞、加拿大、美國與德國總計有 16 個國家參與。

會議總共有 53 篇口頭發表和 32 篇海報發表。臺灣的口頭發表 21 篇和海報 21 篇含括 21 種物種：分別為魚鷹、黑翅鳶、東方蜂鷹、大冠鷲、熊鷹、林鵰、灰面鵟鷹、東方澤鵟、灰澤鵟、鳳頭蒼鷹、赤腹鷹、黑鳶、草鴞、領角鴞、黃嘴角鴞、鵂鶹、短耳鴞、褐鷹鴞、紅隼、燕隼和遊隼。

總合此次研討會與近十年臺灣猛禽發表文獻，有 15 種留棲性猛禽的**族群趨勢**被發表，其中 14 種猛禽是依據 2011-2021 年的繁殖鳥類調查（O23）；黑鳶則是依據 2013 年啟動全台黑鳶黃昏聚集同步調查，以夜棲地計數監測黑鳶族群趨勢，至今已累積十二年資料（O39）。

而遷徙猛禽族群趨勢部分，墾丁秋季遷徙猛禽調查自 1989 年起，已累積三十年監測資料，詳實記錄灰面鵟鷹、赤腹鷹、魚鷹、遊隼及其他遷徙猛禽每年過境數量且探討數量波動（O4）。**遷徙地點的記數調查**除了已累積三十年的墾丁資料外，也有新開設的調查地點，例如高雄壽山、玉山塔塔加等地，逐步累積台灣各地遷徙猛禽之監測資料（P29、P30）。

除了傳統計數調查外，針對無法直接計數的物種，近年也有發展新的應用科技或研究方法，嘗試探討物種族群動態。例如利用攝影照片進行**標誌重捕法**，應用於東方蜂鷹的族群數量估算（O22）；針對稀有、隱密、較不易調查的物種，**佔據模型**成為一套新的族群數量監測方法，例如熊鷹（O21）與草鴞（個論）；**人工棲架結合紅外線自動相機**（O13、O17）不僅成為觀察農田或夜行性猛禽（例如黑翅鳶、褐鷹鴞、草鴞、黃魚鴞等）食性與行為模式的高效技術物，更成為推廣生態農業的媒介；**被動聲學監測**則為夜行性猛禽的活動模式開闢新研究途徑，被用來監測黃嘴角鴞（O31）、鵂鶹（O31）、草鴞（O32）等物種，甚至可以透過分析聲景，評估人與猛禽的互動，作為未來保育管理方法之參考，例如蘭嶼角鴞（個論）。

透過社群平台徵集民眾觀察紀錄的**公民科學**方法，也成為近年來研究焦點，特別是那些已逐漸適應或靠近城市的物種，因物種辨識度高、目擊頻率提升，增加資料徵集的頻度及廣度。例如林鵰即是透過此方法累積三十年的資料，已可初步分析林鵰的分布範圍及棲地利用變化（O19），運用像是沒有尾巴的特徵明顯個體的無尾林鵰目擊照片，分析林鵰活動模式，成為國際上第一篇正式發表的林鵰活動模式研究（個論）。

公民科學方法也廣泛應用於都市鳳頭蒼鷹研究，透過民眾回報鳳頭蒼鷹繫放個體與色環，分析部分鳳頭蒼鷹個體在北台灣的活動模式及存活年齡（P19），並透過救傷機制蒐集分析其死亡原因，包含窗殺（O27、P20）、滅鼠藥二次中毒等（O43），作為未來鳳頭蒼鷹保育政策規畫依據。

衛星追蹤技術亦廣泛應用於猛禽研究之中，已可揭開無論是鳳頭蒼鷹在都市的活動模式（P18），黑翅鳶（個論）或草鴞（O20）於平原地區的活動模式與棲地利用，熊鷹（K3）於森林中之播遷。亦可藉由跨國合作揭開猛禽的長距離遷徙路線，例如灰面鵟鷹（O2、個論）。其中赤腹鷹更是結合中國、泰國、韓國與台灣的遷徙研究資料，已可拼湊出赤腹鷹在亞洲地區的不同遷徙路徑與模式（O3）。近期猛禽救傷系統中也盡可能加入癒後追蹤，除了解救傷效益外，也藉此加深了解稀有物種的基礎生物學：諸如魚鷹（個論）、大冠鷲（個論）、灰澤鵟（P13）、短耳鴞（個論）、紅隼（P17）、燕隼（個論），以此揭開這些物種的遷徙與活動模式之謎。

衛星追蹤的發現，結合分子親緣或同位素的研究，則證實臺灣的東方蜂鷹（個論）與黑鳶（P5、P16）同時存在遷徙與留鳥族群，未來可進一步推論兩物種在東北亞族群擴散，探討猛禽如何從遷徙性轉為留棲性的演化過程。

日本國內的熊鷹分子親緣研究，則揭示東北亞熊鷹族群的遺傳結構差異：日本本州與北海道族群具相似特徵，九州較特殊；台灣的熊鷹則展現出較高遺傳雜合性，特別是台東與其他區域差異明顯，顯示可能存在外來遺傳基因交流（O34）。未來或許需要更進一步的研究來揭開分子親緣之謎，提供更細緻的熊鷹保育規劃。

影像紀錄為過往常見的調查方法，持續累積影像也為動物行為研究帶來新的視角並擴大教育推廣的效力。例如在地面上架設紅外線自動相機，發現大冠鷲經常於清晨時段，在地面捕食非洲大蝸牛（O24）；猛禽巢位直播，不但可以藉此研究猛禽的育雛行為、食性、生活史，亦可帶動大眾自然觀察習慣，並成為推動環境教育之教材。現有巢位直播的猛禽如東方蜂鷹（個論）、鳳頭蒼鷹（個論）、黑鳶（O39）、褐林鴞（個論）和大冠鷲（個論）。

此外，近幾年的研究成果顯示，猛禽研究不再單純局限生態學，而是積極與其他學科進行合作與整合，以應對複雜的保育挑戰。**民族鳥類學**的研究深入探討熊鷹與排灣族、魯凱族的文化連結，並將傳統知識與保育策略（如仿真羽毛推廣、熊鷹羽毛保存庫等）結合，與部落展開對話（K3、O14、P26）。**農業生態學**的研究則聚焦於黑翅鳶（O13、O17、個論）與草鴞（O11、O13、P27）等猛禽在農田生態系中扮演的生物防治角色（P23、P24、P25），並將其與生態友善農業政策連結，以減少鼠藥及農藥的使用量，藉此推動環境教育。**都市生態學**則以鳳頭蒼鷹為核心，探討其在高度人為干擾環境下的適應、威脅與生存策略，特別在窗殺議題上做了許多研究與保育行動（O27、O43、P18、P19、P20、P22）。這顯示猛禽保育是個複雜的社會生態議題，單純的生物學或生態學方法已不足以應對，必須整合文化、農業與都市規劃等多元視角。

各物種未來研究與保育建議方向

依據留遷狀態，台灣五十種猛禽中留鳥（Resident）有 16 種，遷徙鳥（Migrant）有 20 種，拓殖者（Coloniser）有 2 種，迷鳥（Vagrant）有 12 種。根據 2024 年臺灣鳥類紅皮書名錄中猛禽的部分，留鳥中屬於瀕危等級者（NEN）僅有 1 種，為草鴞；易危（NVU）有 3 種，分別為熊鷹、黑鳶、黃魚鴞；接近受脅（NNT）有 5 種，分別為林鵰、蘭嶼角鴞、鵂鶹、褐林鴞、東方灰林鴞。遷徙鳥中，易危的有 1 種，為紅隼；接近受脅有 1 種，為東方角鴞。拓殖者中有 1 種為接近受脅，為遊隼（詳見表 1）。以下將依類別依序論述未來研究及保育建議方向。

表 1 台灣五十種猛禽之留遷狀態與保育等級，表中留遷狀態分為留鳥（Resident）、拓殖（Coloniser）、遷徙鳥（Migrant）、迷鳥（Vagrant）。（資料來源：2024 臺灣鳥類紅皮書名錄附錄一）

編號	中文	學名	留遷狀態	IUCN 紅皮書	台灣 紅皮書	台灣 保育等級	特有 亞種
1	魚鷹	*Pandion haliaetus*	Migrant	LC	NLC	II	
2	黑翅鳶	*Elanus caeruleus*	Coloniser	LC	NLC	II	
3	東方蜂鷹	*Pernis ptilorhynchus*	Resident	LC	NLC	II	
4	黑冠鵑隼	*Aviceda leuphotes*	Migrant	LC	NNA	II	
5	禿鷲	*Aegypius monachus*	Vagrant	NT	NNA	II	
6	大冠鷲	*Spilornis cheela*	Resident	LC	NLC	II	V
7	熊鷹	*Nisaetus nipalensis*	Resident	NT	NVU	I	
8	林鵰	*Ictinaetus malaiensis*	Resident	LC	NNT	II	
9	花鵰	*Clanga clanga*	Vagrant	VU	NNA	II	
10	靴隼鵰	*Hieraaetus pennatus*	Vagrant	LC	NNA	II	
11	白肩鵰	*Aquila heliaca*	Vagrant	VU	NNA	I	
12	金鵰	*Aquila chrysaetos*	Vagrant	LC	NNA		
13	白腹鵰	*Aquila fasciata*	Vagrant	LC	NNA	II	
14	灰面鵟鷹	*Butastur indicus*	Migrant	LC	NLC	II	
15	西方澤鵟	*Circus aeruginosus*	Vagrant	LC	NNA	II	
16	東方澤鵟	*Circus spilonotus*	Migrant	LC	NNA	II	
17	灰澤鵟	*Circus cyaneus*	Migrant	LC	NNA	II	
18	花澤鵟	*Circus melanoleucos*	Migrant	LC	NNA	II	
19	鳳頭蒼鷹	*Accipiter trivirgatus*	Resident	LC	NLC	II	V
20	赤腹鷹	*Accipiter soloensis*	Migrant	LC	NLC	II	
21	日本松雀鷹	*Accipiter gularis*	Migrant	LC	NLC	II	
22	松雀鷹	*Accipiter virgatus*	Resident	LC	NLC	II	V
23	北雀鷹	*Accipiter nisus*	Migrant	LC	NNA	II	
24	蒼鷹	*Accipiter gentilis*	Migrant	LC	NNA	II	
25	黑鳶	*Milvus migrans*	Resident	LC	NVU	II	
26	栗鳶	*Haliastur indus*	Vagrant	LC	NNA	II	
27	白尾海鵰	*Haliaeetus albicilla*	Migrant	LC	NNA	I	
28	白腹海鵰	*Haliaeetus leucogaster*	Vagrant	LC	NNA	II	
29	毛足鵟	*Buteo lagopus*	Vagrant	LC	NNA	II	
30	歐亞鵟	*Buteo buteo*	Vagrant	LC	NNA		
31	東方鵟	*Buteo japonicus*	Migrant	LC	NLC	II	
32	大鵟	*Buteo hemilasius*	Migrant	LC	NNA	II	
33	草鴞	*Tyto longimembris*	Resident	LC	NEN	I	V
34	黃嘴角鴞	*Otus spilocephalus*	Resident	LC	NLC	II	V
35	領角鴞	*Otus lettia*	Resident	LC	NLC	II	V
36	蘭嶼角鴞	*Otus elegans*	Resident	NT	NNT	II	V
37	東方角鴞	*Otus sunia*	Migrant	LC	NNT	II	
38	黃魚鴞	*Ketupa flavipes*	Resident	LC	NVU	II	
39	鵂鶹	*Taenioptynx brodiei*	Resident	LC	NNT	II	V
40	縱紋腹小鴞	*Athene noctua*	Vagrant	LC	NNA	II	
41	褐林鴞	*Strix leptogrammica*	Resident	LC	NNT	II	
42	東方灰林鴞	*Strix nivicolum*	Resident	LC	NNT	II	V
43	長耳鴞	*Asio otus*	Migrant	LC	NNA	II	
44	短耳鴞	*Asio flammeus*	Migrant	LC	NNA	II	
45	褐鷹鴞	*Ninox japonica*	Resident	LC	NLC	II	
46	紅隼	*Falco tinnunculus*	Migrant	LC	NVU	II	
47	紅腳隼	*Falco amurensis*	Migrant	LC	NNA	II	
48	灰背隼	*Falco columbarius*	Migrant	LC	NNA	II	

49	燕隼	*Falco subbuteo*	Migrant	LC	NNA	II	
50	遊隼	*Falco peregrinus*	Coloniser	LC	NNT	II	

瀕危（NEN）留鳥

草鴞

透過有條件式占據模型估算台灣南部地區草鴞族群，並持續增進調查方式以其未來發展合適的草鴞族群監測法。調查上已逐步得知草鴞分布熱點、活動區域。並透過衛星追蹤資料判定，其主要夜間棲地為草生地，而農田、魚塭等開闊地亦是草鴞重要的覓食區域。透過被動聲學研究，已可初步推估其活動高峰為每年 5 月至 9 月，時間集中在日落後與日出前的兩小時。食繭分析則顯示草鴞主食為小型哺乳動類，不過獵物選擇會隨棲地環境變化。

草鴞面臨的威脅主要為棲地喪失、鼠藥毒害、機場鳥擊防治之誤捕、遊蕩犬攻擊等，此外，極端氣候事件如短暫強降雨，使河灘草生地迅速流失，也是潛在威脅。

綜合目前研究成果，未來著重於關鍵棲地草生地維護與營造，結合生態農業推廣，降低滅鼠藥與農藥之使用，並擴大利用被動聲學、人工棲架等新研究方法，進行草鴞潛在棲地的偵測，如雲林沿海、蘭陽平原及花東縱谷等地。並持續進行各種佔據模型調查法研究，發展合適的監測架構。

易危（NVU）留鳥

熊鷹

已建立熊鷹之基礎生態資料，包括繁殖與生活史、食性、衛星追蹤活動模式、聲學等。根據 2023-2024 佔據模型估算的數據，目前全臺熊鷹族群推估約有 590-619 隻，比對過去三十年間熊鷹的監測資料顯示，北部熊鷹族群有增加並外擴的現象，南部則無明顯變化。

熊鷹面臨的主要威脅為非法狩獵。由於熊鷹羽毛在排灣族與魯凱族文化中象徵崇高地位，傳統上只有部落領袖或特殊貢獻者才能配戴，然而隨著傳統社會規範鬆動，羽毛的需求增加，導致非法獵捕增加。目前熊鷹的保育工作力求找到文化與生態保育之平衡之道，正在進行的保育項目包含熊鷹羽毛保存庫之建立、開發仿真羽毛、舉辦部落領袖論壇與工作坊等，持續進行溝通，促進各方的互相理解與共識，目前仿真羽毛的接受度逐漸提升（約 50%）。

此外，熊鷹因侵擾養雞戶而被捕獲也是當前熊鷹的威脅之一，未來除持續進行熊鷹族群之監測，也應探查熊鷹侵擾養雞戶的案例，研擬生態服務給付之方案，並秉持尊重與互相理解的態度，持續與部落溝通，共創保育方案。

黑鳶

黑鳶主要的威脅來自滅鼠藥與農藥的二次毒害，全台族群量曾經不到 200 隻。根據二十年來的全台黑鳶黃昏聚集同步調查顯示，黑鳶族群已逐漸復甦，數量已從 2013 年的 272 隻，至 2025 年的 1033 隻，明確顯示過去二十年來的保育行動帶來的成效。

於 2019 年提出第二版黑鳶保育行動綱領，從政策與法規、族群與棲地、基礎研究和公眾認知等四個面向提出保育規劃與建議。包含農藥與滅鼠藥對於猛禽危害的持續調查、推動友善農業減少用藥、持續執行全台黑鳶同步調查監測族群變化、黑鳶基礎生物學研究和增加民眾對黑鳶保育的認同等。

目前已建立黑鳶生態調查基礎資料，包含族群趨勢、繁殖與生活史、食性，衛星追蹤研究更是發現臺灣除了留鳥族群外，亦有遷徙族群（東北亞亞種 *M. m. lineatus*）；分子親緣研

究支持將臺灣黑鳶（*M. m. formosanus*）視為獨立亞種，同時，臺灣南北兩大黑鳶族群的基因交流程度低，反映出黑鳶在經歷二次毒害之後複雜的族群血緣歷史——台灣本身族群的減少，與東北亞族群擴散至台灣並逐步融合的證據。

雖然黑鳶族群數量有持續攀升的趨勢，但其主要威脅依然沒有顯著降低，應持續進行族群監測，推動滅鼠藥及農藥之減量發展合適的生物防治等替代方案。

黃魚鴞

黃魚鴞過去累積長達二十年之研究資料，初步建立黃魚鴞生態基礎資料，包含分布、繁殖與生活史、食性、活動模式等。但距離發表之系統研究已是約十年前（2015 年），由於黃魚鴞調查不易，關於全台黃魚鴞之確切族群量和趨勢，至今無法評估。

近期（2024 年），屏科大鳥類生態研究室第一次嘗試在七家灣溪沿岸架設人工棲架，成功紀錄到黃魚鴞的影像。未來可以人工棲架作為新監測方法，搭配被動聲學與影像分析，持續進行黃魚鴞監測與生態研究。

接近受脅（NNT）留鳥

林鵰

透過公民科學方式蒐集近三十年之林鵰點位資料，顯示林鵰不僅活動範圍擴大與族群量有增加的趨勢，從 2010 年開始，林鵰在低海拔被目擊之記錄逐漸增加，甚至出現在山腳與平原地區，顯示林鵰已逐漸適應村落與城鎮環境，成為郊區常見物種。另也進行林鵰衛星追蹤資料蒐集。

目前已初步建立林鵰繁殖與生活史、食性、活動模式等生態基礎資料。未來應持續追蹤林鵰族群趨勢與分布，並確定林鵰適應郊區之狀況與原因。

蘭嶼角鴞

蘭嶼角鴞為優雅角鴞其中一亞種，僅分布在蘭嶼，不僅為臺灣鳥類紅皮書接近受脅物種，在 IUCN 紅皮書的保育等級也是接近受脅。目前已建立完整繁殖與生活史、食性、活動模式、分子親緣研究。不過根據三十年前之研究資料（1988 年），蘭嶼角鴞之族群數量約為 1000 隻，族群數量逐漸下降之原因主要為人為開發，使得蘭嶼角鴞棲息之森林面積縮小，但目前並無族群趨勢變化的資料。

近年來，透過被動聲學研究方法，研究認為除了上述威脅外，蘭嶼角鴞也面臨夜間觀察等生態旅遊產業帶來的干擾，應就族群趨勢之監測進一步研擬詳細的管理規範。

鵂鶹

缺乏明確的族群估算與趨勢研究。目前已累積有形質、繁殖與生活史、食性、滋擾反應等相關研究。近年則透過被動聲學初步分析鵂鶹之活動時間、鳴叫行為及與共域物種互動之研究。

褐林鴞

目前多為繁殖觀察記錄，極少其他研究資料。上一次正式發表之文獻已是十四年前（2011 年），為觀察紀錄。近期非正式發表研究為 2021 年，偶然發現褐林鴞巢位，運用紅外線自動相機紀錄褐林鴞育雛全過程，留下一筆難得的繁殖記錄資料。

東方灰林鴞

已有食性、棲地偏好的相關研究，但仍缺乏繁殖、族群等資料。最近一次的正式發表為 2018 年玉山國家公園管理處出版的東方灰林鴞觀察日記，再之前的發表文獻為 2011 年之食性研究。

易危（NVU）遷徙鳥

紅隼

疑受到臺灣黑翅鳶近幾年族群擴散影響，壓縮度冬紅隼的棲息空間，導致紅隼數量遞減。目前有關紅隼之研究，曾有一筆 2022 年因機場鳥擊防治而中鳥網的紅隼，救傷野放後進行衛星追蹤，留下一筆難得的遷徙路線資料。除此之外，紅隼研究仍偏少。

東方角鴞

除了少數幾筆觀察紀錄外，東方角鴞並無任何研究發表，國際上的研究也相當稀少。

接近受脅（NNT）拓殖者

遊隼

從累積三十年的墾丁秋季遷徙猛禽調查資料顯示，遊隼數量有增加之趨勢，遊隼自 1994 年來在臺灣北海岸及離島陸續有繁殖成功紀錄，留棲及遷徙族群在台灣的活動與增加狀況目前還沒能掌握。

暫無危機（NLC）留鳥

東方蜂鷹

根據臺灣繁殖鳥類調查的分析數據顯示，東方蜂鷹族群量有顯著上升之趨勢。且根據同位素及分子親緣研究證實，臺灣的東方蜂鷹不但有島內留鳥族群，亦有遷徙族群，分子資料推測臺灣留棲東方蜂鷹與遷徙族群分離時間在三萬年左右，留棲與遷徙蜂鷹遺傳上截然不同。

最近的衛星追蹤研究為 2008 年執行，東方蜂鷹有島內遷徙的行為模式，目前缺少台灣遷徙性東方蜂鷹的路徑資料。

鳳頭蒼鷹

已建立鳳頭蒼鷹之基礎生態資料，包含族群趨勢與分布、繁殖與生活史、食性、活動模式、基礎繫放形質資料、行為學等。鳳頭蒼鷹面臨的威脅包含窗殺（尤其是經驗不足之未成鳥）、二次毒害、野鴿毛滴蟲感染、棲地破碎化等，目前的保育行動包括公民科學與直播帶動的環境教育、建立野鳥撞玻璃回報系統及窗殺博物館累積資料、設計防撞貼紙並宣導友善玻璃設計、救傷體系持續累積資料等。

鳳頭蒼鷹已適應都市，並在城市建立穩定繁殖族群，其偏好利用道路周邊環境的特性，使得窗殺成為重要議題。因此未來應持續監測，並持續整合建築玻璃友善設計及相關法規改善，維持都市綠帶。同時，也要結合毒物管理、都市野鴿餵食管理、救傷等長期監測，降低人為致死率以維持族群健康穩定。

松雀鷹

松雀鷹除了繁殖與食性研究之外，缺乏其他研究資料。

黃嘴角鴞

黃嘴角鴞的研究極少，從 2004 年關於花蓮族群量之調查後，下一個有發表文獻為 2019 年的研究。近五年，透過被動聲學研究方法，使黃嘴角鴞的研究有所突破，已可初步分析其鳴叫活動模式及與其他物種之共域關係。

領角鴞

領角鴞有逐漸適應城市之趨勢，在城市中已出現繁殖紀錄，且已建立初步的繁殖與生活史、食性、行為學、毒害等研究資料，但仍缺乏整體族群趨勢之評估。

領角鴞面臨之威脅包含窗殺、二次毒害，以及天然樹洞減少等。近年來人工棲架的架設，領角鴞亦會到農田環境覓食，且城市地區、農田、山區的領角鴞食性組成不同。未來可使用人工巢箱、棲架等方法，除了持續進行監測外，亦可藉此方法推動不同地區的環境教育。

暫無危機（NLC）遷徙鳥

灰面鵟鷹

從 1989 年起，在墾丁秋季的猛禽遷徙調查至今已累積三十年族群趨勢資料，2025 年的調查中，灰面鵟鷹過境數量創下歷年來數據新高。

衛星追蹤遷徙研究部分，不同國家皆有陸續進行研究：日本在 2018 年已發表一篇；臺灣於 2008-2009 年曾有衛星追蹤研究，近期則是與韓國合作，除了進行衛星追蹤外，亦合作進行灰面鵟鷹在繁殖地之棲地偏好、繁殖概況等研究。

分子親緣研究部分，日本已於 2019 年發表一篇，其結論：特定地點或遷徙路線之日本灰面鵟鷹沒有顯現明顯分支，表示基因流動頻繁。此外，沖繩的度冬個體表現高度多樣性，包括四個獨特的單倍型，有可能為其他歐亞大陸的灰面鵟鷹族群。

未來研究可持續與東亞、東南亞國家合作，整合灰面鵟鷹不同的遷徙路徑，結合分子親緣研究，理解灰面鵟鷹整體族群概況，並以此為基礎，維護其繁殖與度冬地。

赤腹鷹

從 1989 年起，在墾丁秋季的猛禽遷徙調查至今已累積三十年族群趨勢資料，赤腹鷹自 2016 年起過境族群數量顯著上升，遷徙期延後兩天。

台灣曾於 2016-2017 年間，進行全球第一次的赤腹鷹追蹤計畫；2019-2024 年開始與韓國合作，發現赤腹鷹之遷徙呈現迴圈式之遷徙模式，與風向及陸地熱氣流有關。結合 2021 年中國與泰國合作發表的赤腹鷹衛星追蹤研究，已可初步描繪出整個亞洲地區赤腹鷹的完整遷徙路徑，大致上可分為三條遷徙路線及策略。

此外，衛星追蹤得到的點位資料，亦能幫助分析赤腹鷹之繁殖棲地選擇及利用概況。有關分子親緣研究，目前仍缺乏。未來除了應持續監測族群變化，亦可與東南亞國家合作，針對赤腹鷹之度冬地做更細緻之研究。

暫無危機（NLC）拓殖者

黑翅鳶

黑翅鳶近十年來在臺灣本島族群數量顯著增長，目前認為黑翅鳶族群的擴張與其對農田等開闊人為環境的高度適應力有關。近年來，因黑翅鳶主食為鼠類，結合田區架設人工棲架，可達到生物防治之效果，推廣減少鼠藥與農藥之使用。透過棲架上架設的自動相機，也能同時分析累積黑翅鳶之食性、行為等基礎生態資料。

雖然黑翅鳶鼠藥抗性高，但依然面臨毒害問題，未來仍需持續推動鼠藥替代方案及生態農業，並持續監測黑翅鳶，以釐清其族群量顯著增長之原因。

其他不適用（NNA）物種

大鵟

大鵟雖然在 2024 年臺灣鳥類紅皮書名錄裡被列為不適用（NNA），但近幾年目擊大鵟的頻率越來越高，在 2023 年甚至有觀察到營巢行為，因此未來可多加留意，持續觀察記錄。

第二章 第 13 屆亞洲猛禽研究保育聯盟暨第 7 屆台灣猛禽研討會發表彙整

黑翅鳶 *Elanus caeruleu*

黑翅鳶近年成為台灣最受關注的猛禽之一。農業部生物多樣性研究所依據 2011 至 2021 年間的繁殖鳥類調查（Taiwan Breeding Bird Survey）結果，黑翅鳶族群於本島呈現顯著增長，尤以西部與西南部地區最為明顯。黑翅鳶的擴張被認為是對人為環境的高度適應力有關。

此外，自 2017 年起，屏科大鳥類生態研究室透過人工棲架與自動相機進行長期監測，揭示黑翅鳶在平原與農田環境中最常使用棲架並大量捕食囓齒類，對農田生態系發揮了生物防治的關鍵功能。2023-2024 年涵蓋台灣南部 18 個樣區的研究探討影響棲架利用的因子，結果顯示，黑翅鳶在 16 處樣區均有使用人工棲架的紀錄，共帶回 1,388 隻獵物，其中囓齒類佔約 63%，其餘包括鳥類（13%）、爬行類（13%）與鼩鼱（11%）。分析發現，囓齒類豐度與植被覆蓋呈正相關，但與黑翅鳶實際捕獵數量無顯著關聯；而人工棲架與最近自然棲架的距離與其捕獵數呈顯著正相關，顯示開闊區域更利於棲架的利用。

整體而言，黑翅鳶族群數量上升，並透過棲架展現對農業環境的生態服務功能。然而，棲架使用頻率受位置與環境條件影響，突顯持續推動系統化、長期監測的重要性，以兼顧物種保育與農田生態管理。

關鍵字： 黑翅鳶、族群趨勢、棲架監測、自動相機、生物防治、農田生態服務

原始發表：

O13 Using Artificial Perches for Raptor Monitoring and Promoting Ecological Farming 洪孝宇

O17 Factors Affecting the Use of Artificial Perches by Black-winged Kites 陳樂芸、洪孝宇

O23 The Populations of Only Two Breeding Raptor Species of Taiwan Have Grown in Recent Decades 紀博瑋、林大利

東方蜂鷹 *Pernis ptilorhynchus orientalis*

東方蜂鷹是廣泛分布東亞的遷徙猛禽，1995 年起透過觀察紀錄與衛星追蹤研究，確認台灣存在留棲族群。作為森林性猛禽，牠們的隱蔽行為與台灣常綠闊葉林的高密度冠層，使族群監測充滿挑戰。

農業部生物多樣性研究所根據 2011 至 2021 年台灣繁殖鳥類調查（Taiwan Breeding Bird Survey）發現，東方蜂鷹是台灣近十年間僅有兩種顯示族群顯著增長的日行性猛禽之一，雖然整體族群呈現上升趨勢，但在不同區域間未顯示顯著差異。這種族群穩定上升可能與其對人為主導環境的適應性有關。

利用東方蜂鷹特有的多樣色型可發展區域性族群監測，台灣猛禽研究會自 2023 年起於台灣北部陽明山國家公園，應用攝影進行「標誌重補法（mark-resight method）」方法，透過照片中個體的羽色與羽毛磨損作為辨識依據，調查樣區選擇兩處山谷棲地（該物種偏好的繁殖環境），以及一處山麓開闊地（次要棲地類型）。在 2023 與 2024 年的繁殖季（6 月與 7 月），每月調查三次。研究人員依據羽色特徵與羽毛磨損情形進行個體辨識，為每隻個體分配獨立 ID 編號，並依年齡與性別加以分類。

結果顯示，2023 年共識別出 30 隻雄鳥與 23 隻雌鳥，2024 年則為 29 隻雄鳥與 20 隻雌鳥。族群規模在山谷棲地估算為 16.9 至 24.8 隻之間，山麓棲地則呈現年度波動（2023 年 34 隻、2024 年 22.47 隻）。

綜合調查結果顯示，東方蜂鷹在台灣族群具有正向增長趨勢，且影像標誌重捕法能應用於族群數量估算。未來仍需結合長期監測與活動範圍研究，才能更精確掌握其在台灣整體的族群狀態與生態角色。

關鍵字： 東方蜂鷹、族群趨勢、標記－重現法、繁殖鳥類調查、陽明山

原始發表：

O22 Estimating the Population Size of Oriental Honey Buzzards (*Pernis ptilorhynchus orientalis*) Using the Photographic Mark-Resight Method in Yangmingshan, North Taiwan 蔡宜樺、張宏銘、蔡明汕、曾建偉

O23 The Populations of Only Two Breeding Raptor Species of Taiwan Have Grown in Recent Decades 紀博瑋、林大利

大冠鷲 *Spilornis cheela*

許多引入種（introduced species）對生態系具有重大影響。然而，當外來種（exotic species）適應新環境後，可能會與原生物種建立新的交互作用。非洲大蝸牛 （*Lissachatina fulica*）被列為全球百大惡名昭彰的外來入侵種之一，1932 年首次引入台灣，目前已成為島上體型最大的蝸牛，對農業造成顯著經濟損失。在一項野生動物監測研究中，我們觀察到這一入侵種已成為原生猛禽大冠鷲的穩定獵物。

自 2022 年 12 月至 2024 年 11 月，東華大學自然資源與環境學系在台灣東部花蓮縣一處 300 公頃的人工林中設置了 25 台自動相機。於兩年監測期間，共在 23 個樣點錄得 272 次大冠鷲紀錄，其中 133 次為捕食影像，主要獵物為非洲大蝸牛，占所有獵物紀錄的 88.7%。大冠鷲的出現（55.5%）及食蝸行為（68.6%）大多發生於清晨 8 點前。同期僅記錄到其他三種哺乳類共 6 次捕食蝸牛事件。目前尚無證據顯示非洲大蝸牛對森林環境造成負面影響，相反地，我們發現牠們可能對大冠鷲有益。雖然單隻蝸牛的生物量有限，但由於數量龐大、處理時間短，牠們成為大冠鷲的重要食物來源，尤其在清晨時段，當主要獵物——蛇類，尚未活躍且較難捕獲時。

關鍵字： 自動相機、大冠鷲、非洲大蝸牛、外來種、捕食

原始發表：

O24 Invasive Species as Breakfast: Predation on the Giant African Snail (*Lissachatina fulica*) by the Crested Serpent-Eagle (*Spilornis cheela*) 許育誠、鄭勝文

熊鷹 *nisaetus nipalensis*

熊鷹是台灣的瀕危猛禽，雄性平均體重約 2,200 克，雌性約 3,000 克，中海拔地區的個體略重。牠們主要棲息於森林環境中，繁殖海拔範圍從北部與東部約 500 公尺至中央山區約 2,300 公尺。屏科大鳥類生態研究室的研究顯示，成鳥的棲地活動範圍為 17-126 平方公里，亞成鳥活動範圍可達 933 平方公里。繁殖密度約為每 9.5 平方公里一對，全台推估約有 1,200 隻成鳥與 400 隻亞成鳥。雌雄個體極少共棲(<8%)。熊鷹日間平均約有 1 小時在空中飛行，主要於上午接近中午至下午進行狩獵，雌鳥負責大部分築巢工作，雄鳥則負責提供食物。

熊鷹通常每年 2 月初至 2 月中旬產卵，約 49 天後孵化，雛鳥於 7 月離巢後開始播遷，隔年初的播遷距離約 30 至 40 公里，甚至可達海拔 3,400 公尺的高山地區。雛鳥主要食物為大赤鼯鼠 (*Petaurista grandis*) 與小鼯鼠 (*Petaurista lena*)，占整體食物種類比率的 30%-40%。年輕熊鷹的狩獵技能隨年齡增長而提升，前兩年俯衝速度不到每小時 80 公里，第五年可達每小時 100 公里以上。

族群監測方面，台灣猛禽研究會運用 MaxEnt 模型預測熊鷹分布，並採三級分層隨機抽樣選取 90 個 5×5 公里網格，於 2019-2020 年與 2023-2024 年進行全國性調查。套用帶有條件性重複樣本的佔據模型，偵測機率根據有無紀錄估算，並用以修正佔據率。2019-2020 年佔據率為 0.3763（95% CI：0.2653-0.502），總族群數量推估為 328-403 隻；2023-2024 年佔據率為 0.45（95% CI：0.3151-0.5926），總族群數量推估為 590-619 隻。結果顯示台灣熊鷹族群數量有所增加，特別是在北部。未來研究應結合繁殖生物學與衛星追蹤，以精進族群估算，探討影響族群動態的關鍵因子，並支持有效保育策略。

除此之外，在台灣九種繁殖日行性猛禽中，熊鷹與原住民族文化連結深厚，尤其與排灣族及魯凱族有密切關係。排灣族語中稱熊鷹羽毛為 qadis 或 adis，象徵部落頭目、貴族或英雄的崇高地位，常用於頭飾。幼鳥初級飛羽上具三角形斑紋，象徵排灣族領袖身份。隨著二戰後傳統規範鬆動，南台灣出現熊鷹羽毛非法交易。為了尋求傳統文化保存、生態保育與永續利用之間的平衡方法，2017 年，屏科大鳥類生態研究室舉辦了「排灣族傳統 Qadis 文化重現——部落領袖論壇」，也與一位工藝師鍾金男合作推動設計人工熊鷹仿真羽毛，並嘗試推行熊鷹羽毛保存庫，供需要的部落族人借用。

論壇期間，與會者以家庭為單位填寫封閉式問卷，總計回收 44 份，並進行量化分析，評估受訪者對先前設計之保育策略的看法。問卷與訪談結果顯示，多數參與者認為，申請「熊鷹羽毛保存庫」資格及穿戴仿真羽毛，應符合傳統規範。對熊鷹仿真羽毛的接受度高於過往研究，但多數接受者僅在特定條件下接受。62%的受訪者反對將仿真羽毛作為婚禮贈禮。

2017 年的領袖論壇之後，政府、研究單位與部落持續進行多次溝通協調，2018 至 2023 年間，仿真羽毛設計師已提供 142 套仿真羽毛給部落族人，並於各鄉鎮辦理 15 場熊鷹仿真羽毛工作坊，共有 324 位原住民族參與。2023 年，於屏東舉辦為期一個月的「熊鷹仿製羽飾與部落傳統文化特展」，吸引 1150 名民眾前往。在持續的溝通下，目前仿真羽毛的接受度逐漸提升（目前約 50%），支持者不僅將其作為訂婚禮物，也逐漸在正式場合與傳統祭儀中，以仿製羽替代真羽。

綜上所述，除了持續進行熊鷹生態族群分析監測調查外，保持尊重並細緻、持續地與部落溝通，相互理解，才能在文化保存與生態保育之間找到真正平衡的解決之道。

關鍵字： 熊鷹、瀕危猛禽、佔據模型、族群監測、原住民文化、羽毛保育

原始發表：

K3 Mountain Hawk-Eagle, a Feathered Hundred-Pacer, in Taiwan 孫元勳

O14 A Cultural Keystone Species Undergoing Overexploitation- Ethnobiology of the Mountain Hawk-Eagle for the Paiwan People in Taiwan 黃永坤、Agathe Lemaitre、吳幸如、孫元勳

O21 Assessing Population Trends of the Mountain Hawk-Eagle in Taiwan Using Occupancy Modeling 王李廉、陳恩理、林思民、張安瑜、陳宛均、蔡若詩

P26 Challenge of Cultural Preservation and Ecological Conservation: Promoting Imitated Feathers of the Mountain Hawk-Eagle 王婉儀、林惠珊、黃筠傑、黃永坤、孫元勳、鍾金男

林鵰 *Ictinaetus malaiensis*

林鵰是台灣 160 種留棲鳥類中翼展最長的物種，但也是最晚被發現的，這顯示牠在早期曾極為罕見。自 1994 年台灣猛禽研究會林鵰研究小組成立以來，便開始建立林鵰紀錄資料庫。林鵰研究小組自 2015 年起透過 Facebook 社群徵集民眾紀錄截至 2024 年底，資料庫累積了 30 年來共 6,503 筆紀錄。以下為對林鵰分布範圍與棲地變化的部分分析。

將台灣島分成 1,609 個 5 公里 × 5 公里網格，到 1999 年底僅有 168 個網格（10.4%）有林鵰紀錄，而到 2024 年底則增加至 651 個網格（40.5%）。2024 年的網格數已比 1999 年高出 3.9 倍。以行政區劃來看，台灣共有 352 個鄉鎮，1999 年底僅 60 個鄉鎮（17.1%）有紀錄，但到 2024 年底增加至 180 個鄉鎮（51.1%）。在 25 年內，數量增加了三倍，現在已超過總鄉鎮數的一半。

林鵰為森林猛禽，主要捕食藏於林冠層的鳥類蛋、雛鳥與哺乳動物幼體。牠們原本偏好棲息於海拔 500-1,500 公尺的山區密林。然而，自約 2010 年起，低海拔的目擊紀錄逐漸增多，甚至出現在山腳及平原地區。許多紀錄顯示，林鵰已適應村落與城鎮的環境。牠們常在檳榔樹與椰子樹中狩獵，因為樹上容易捕捉到築巢的赤腹松鼠與紅鳩。

綜合而言，林鵰從山區的瀕危物種轉變為郊區日益常見的物種，可歸因於以下因素：1) 大多數民眾保育意識提升；2) 農村農藥使用減少，導致小型動物數量增加；3) 學會在檳榔樹上狩獵。林鵰是台灣野生動物從瀕危走向安全的正面範例之一，也是「里山物種」的新象徵。

關鍵字： 檳榔樹、林鵰、*Ictinaetus malaiensis*、族群擴張、郊區棲地

原始發表：

O19 Population Expansion and Adaptation to Suburban Habitats of the Black Eagle in Taiwan 林文宏

灰面鵟鷹 *Butastur indicus*

灰面鵟鷹為東亞地區代表性的遷徙猛禽，其繁殖地分布於中國、韓國與日本等溫帶地區，度冬地則位於菲律賓及東南亞。作為典型的東亞海洋遷徙路線（Oceanic Flyway）物種，其年度生活週期橫跨多樣氣候帶與地理區域，為遷徙鳥類生態棲位保守性（niche conservatism）與族群變化提供重要素材與研究契機。

韓國慶熙大學與台灣嘉大棲地生態研究室合作，在韓國透過 GPS 追蹤與生態棲位模型分析，想要驗證灰面鵟鷹於繁殖與非繁殖棲地間的棲位保守性。結果顯示，雖然菲律賓度冬地的氣候條件範圍較廣，但灰面鵟鷹傾向於使用與繁殖地相似的環境特徵，暗示其透過維持穩定的棲位選擇，降低季節性環境轉換的適應成本，以抵銷長距離遷徙的代價。此發現有助於理解遷徙猛禽如何在氣候變遷與土地利用變化下維持適應性。

同時，台灣位於灰面鵟鷹遷徙路徑的中繼點，墾丁秋季猛禽遷徙調查自 1989 年起長期監測其族群趨勢，2004 年後由台灣猛禽研究會承接調查。綜合三十年的監測結果顯示，灰面鵟鷹的遷徙族群數量在近三十年間呈現上升趨勢，反映出繁殖成功率與族群狀態整體良好。此長期監測不僅證實物種族群的恢復力，也印證灰面鵟鷹作為東亞遷徙生態指標種的重要性。

綜上所述，灰面鵟鷹展現了棲位保守性與穩定族群趨勢並存的特徵。透過從繁殖地到遷徙通道的整合研究，可深化對其遷徙生態策略的理解，並為預測未來在氣候變遷下的棲地變動與制定跨國保育策略提供關鍵依據。

關鍵字：灰面鵟鷹、棲位保守性、東亞海洋遷徙路線、族群趨勢、遷徙監測

原始發表：

O2 Testing Niche Conservatism in the Grey-faced Buzzard (*Butastur indicus*), a Migratory Raptor Species Breeding in Korea Hyeok-Jun Choi、Hankyu Kim、Jongbin Go、蔡若詩、呂佳家、蔡宜樺、Chang-Yong Choi

O4 Long-Term Monitoring of Migratory Raptors in Taiwan: Population Trends and Conservation Implications 蔡宜樺、李怡慧、林經國、曾建偉

魚鷹 *Pandion haliaetus*、東方澤鵟 *Circus spilonotus*、燕隼 *Falco subbuteo*、遊隼 *Falco peregrinus*

台灣位於東亞猛禽遷徙路線上，許多在東北亞、朝鮮半島與日本繁殖的猛禽在往返菲律賓與印尼的度冬地途中會經過台灣。由於東亞地形破碎，遷徙猛禽的生活史橫跨廣泛的緯度區域與多個國家，這使得評估族群風險與保育成效變得相當困難。猛禽遷徙數量監測提供一種具成本效益的方式來追蹤族群變化。

墾丁秋季猛禽遷徙調查於台灣最南端的恆春半島進行。該調查最初是為了保育灰面鵟鷹而設立，現已發展成為一項長期監測計畫，用以追蹤遷徙路線上的物種組成與族群趨勢。此調查在評估猛禽數量與遷徙時序變化方面扮演了關鍵角色，自 1989 年起已累積超過 30 年的資料。計數工作於社頂自然公園的凌霄亭進行，由兩位觀察員每日（惡劣天氣除外）使用 10x42 雙筒望遠鏡掃描天空，記錄所有飛行方向與高度合理的猛禽並辨識至物種層級。

結果顯示，東亞海洋遷徙路線的兩個主要物種：灰面鵟鷹（*Butastur indicus*）與赤腹鷹（*Tachyspiza soloensis*）皆呈現族群成長趨勢。除此之外，遊隼與魚鷹的數量也分別較早期增加了 18%與 51%。相對地，燕隼與東方澤鵟的數量則在年度間有顯著波動，但尚無明顯趨勢。

我們探討了這些猛禽族群變動的潛在原因，並提出東方澤鵟可能出現爆發性遷徙事件的可能性。此項調查結果反映出長期保育策略的成效，也提供了有關猛禽遷徙生態與行為的重要見解。

關鍵字：東亞海洋遷徙路線、東方澤鵟、魚鷹、遊隼、燕隼、猛禽遷徙調查

原始發表：

O4 Long-Term Monitoring of Migratory Raptors in Taiwan: Population Trends and Conservation Implications 蔡宜樺、李怡慧、林經國、曾建偉

灰澤鵟 *Circus cyaneus*

灰澤鵟分布於亞洲與歐洲，在北緯 40 至 70 度之間繁殖，並於冬季向南遷徙至北緯 20 至 40 度之間，包含台灣。根據 eBird 記錄，灰澤鵟在台灣的度冬期間為每年九月中旬至隔年五月，其度冬棲地包括草地、農地與機場。東亞關於灰澤鵟的紀錄觀察極少，生物學資訊仍相當有限。臺中市野生動物保育學會於 2022 年救傷一隻尚未成年的雄性灰澤鵟，並在醫療處置後裝設衛星追蹤器。這隻灰澤鵟於 2022 年 12 月 30 日重返野外，並被追蹤共 141 天（共取得 775 筆定位資料），其中包含 109 天在台灣度冬與 32 天遷徙。這隻雄性灰澤鵟整個冬季皆棲息於臺中國際機場，並於四月初起飛向北，在新竹機場停留。牠在 4 月 17 日自新竹機場（24°48'N, 120°56'E）起飛，飛往中國，最後偵測到的位置位於俄羅斯猶太自治州的奧布盧奇區（49°00'N, 131°52'E），總遷徙距離達 3,567 公里。牠後來飛往中國後沿海岸向北移動，從山東半島到遼東半島並進入北韓，之後折返至中國東北，再進入俄羅斯，跨越三個海域：台灣海峽（287 公里）、黃海（159 公里）與渤海（175 公里），並在陸地遷徙期間進行 18 次停棲。這隻灰澤鵟在度冬與遷徙期間皆選擇草地、農地與河岸區域，顯示維護這些棲地對此物種極度重要。

關鍵字：*Circus cyaneus*、灰澤鵟、遷徙、衛星遙測、台灣

原始發表：

P13 Migration Route of a Male Hen harrier *Circus cyaneus* in Taiwan 許竹君、許仲懷、鄧羽雯、林文隆

鳳頭蒼鷹 *Lophospiza trivirgata*

鳳頭蒼鷹 自 2000 年代起逐漸適應台灣都市環境，並在都市建立穩定的繁殖族群。然而，隨著都市化加速，其面臨的威脅也越加明顯。根據台灣猛禽研究會 2017 至 2024 年的救傷資料，共治療 188 隻疑似或確認窗殺（撞擊玻璃）的猛禽，其中日行性猛禽佔 65.96%，鳳頭蒼鷹為最常見個體。臨床症狀以後肢癱瘓最常見，病理解剖顯示胸椎前段常有骨折或裂痕，顯示高速撞擊造成的脊椎與神經損傷為主要致傷原因。救援後有 72.34%的個體成功野放，但仍有 26.66%死亡或需人道安樂死，儘管玻璃撞擊僅占救傷案例中的不到兩成，且野放超過七成，但相較於到院即死亡的個體，後者的體況通常較佳，這顯示體況較佳的個體更可能在撞擊後當場死亡而未進入救援系統，因此僅統計救援資料可能低估實際死亡率。

台灣大學生態學與演化生物學研究所謝季恆彙整公民科學的資料，亦顯示窗殺的普遍性。過去十年間超過 2,600 件鳥撞玻璃案例中，有 281 件為猛禽，其中鳳頭蒼鷹佔 156 件，為所有猛禽中通報頻率最高，在全台鳥撞玻璃紀錄中排名第三，未成鳥比成鳥更容易發生撞擊事件。

台灣猛禽研究會救傷站 2019-2024 年的毒物檢測則顯示，未接受長期維他命 K 治療的鳳頭蒼鷹中，滅鼠劑檢出率高達 79.07%，僅次於黑鳶，顯示其在都市及農村環境中面臨高風險的二次中毒威脅。此結果支持在救傷程序中，即便未出現出血或貧血症狀，也宜對高風險物種採取至少兩週的預防性維他命 K 治療。

在都市生態研究方面，2021 年對一隻救傷後野放的雄性鳳頭蒼鷹進行 GPS/GSM 衛星追蹤，追蹤三年資料顯示其每年 2 月至 9 月傳回資料，其中 85.56% 集中於繁殖季 4-7 月，顯示該個體在繁殖季期間活動較頻繁，使太陽能發報器足以獲得較充足日照進行充電與資料傳輸。分析後，鳳頭蒼鷹的棲地範圍（AKDE95）平均為 0.8591 km^2，AKDE50 平均為 0.1228 km^2，棲息地多位於道路附近，而非公園或綠地，顯示都市鳳頭蒼鷹雖為森林性猛禽，但能利用道路鄰近環境作為棲息地。

個體繫放與色環回報亦提供重要資訊。台灣猛禽研究會自 2014 年起，於北台灣進行巢位監測與繫放，截至 2024 年底共繫放 268 隻個體，其中確認死亡 22 隻。自 2017 年起鼓勵民眾回報色環紀錄，目前收到 109 筆、49 個體，佔所有繫放鳥的 18.28%。移動距離最長的紀錄為雌鳥「藍 H1」，牠從大安森林公園巢位移動至淡江大學，直線距離約 20 km，顯示都市鳳頭蒼鷹能進行中距離移動。最老的繫放個體為 2016 年的雄鳥「紅 96」，GPS 資料顯示，其仍活躍於臺北市大同區。

綜上所述，鳳頭蒼鷹在台灣都市環境中面臨多重挑戰，包括窗殺、中毒以及棲地改變。透過救傷資料、衛星追蹤、繫放色環回報，已能初步掌握其都市棲地利用、繁殖活動與移動模式。未來保育策略需整合建築友善設計、毒物管理、救傷與長期監測，以降低人為致死率並保障族群健康與穩定。

關鍵字：鳳頭蒼鷹、都市猛禽、窗殺、猛禽救傷、公民科學、滅鼠劑、維他命 K、衛星追蹤、色環、都市生態保育

原始發表：

O27 Investigating the Importance of Glass Collision Injuries in Raptors: A Retrospective Analysis of Raptor Rescue Cases from 2017 to 2024 in the Raptor Rehabilitation Station in Taiwan 王齡敏

O43 Preliminary Study on Secondary Poisoning of Raptors by Rodenticides in Northern Taiwan 王齡敏

P18 Preliminary Study on Satellite Tracking of Urban Crested Goshawks 王家凱、林思民、王李廉、楊明淵

P19 Current Status of Crested Goshawk Banding and Color Ring Resighting Records in Northern Taiwan 王李廉、王齡敏、楊明淵、林思民

P20 Unseen Threat: Citizen Science Reveals Raptor Involvement in Bird-Window Collisions in Taiwan 謝季恆

赤腹鷹 *Accipiter soloensis*

赤腹鷹是東亞最常見的日行猛禽之一，但其遷徙生態在東亞海洋路線上仍不完全清楚，大多數研究集中於大陸路線。為填補資料缺口，嘉大棲地生態研究室於 2019 至 2024 年間與韓國合作，衛星追蹤 41 隻赤腹鷹，其中 22 隻（53.7%）提供至少一條完整的南北遷徙路徑。追蹤結果顯示赤腹鷹呈現迴圈遷徙模式（loop migration pattern），並具有明顯季節性路線。

在秋季，這些個體從韓國出發的時間為 9 月中至下旬，較大陸的個體遷徙時間晚， 並進行兩次海上長距離遷徙（700-1,400 公里），這需要日間與夜間飛行的結合。 22 隻個體中，僅 5 條路徑（19.2%）途經台灣，絕大多數（20 條，76.9%）經琉球群島停留（12 隻在沖繩，8 隻在宮古島）後，南下至菲律賓與印尼。1 隻個體偏離遷徙線飛往中國，可能與颱風有關。這些結果表明，台灣墾丁國家公園的猛禽計數可能僅代表韓國繁殖族群的一小部分。春季時，來自 6 隻個體的 7 條北向路徑走大陸路線，避開主要的水域遷徙。其中 6 隻赤腹鷹穿越中國黃海，1 隻經過北韓。 這種不對稱性表明，季節性風向模式和停留棲地的可用性會影響路線的選擇。順風的東北風可能促進秋季的海上遷徙，而春季遷徙則依賴陸地熱氣流和中途停留補給站。

在繁殖地棲地生態方面，GPS 資料顯示 31 隻赤腹鷹的繁殖期活動範圍，AKDE 方法得到的中位數為：95%利用分布為 20.4 公頃（四分位距 IQR：14.0-30.6 公頃）、75%為 10.0 公頃（IQR：6.3-12.7 公頃）、50%為 4.5 公頃（IQR：2.9-6.6 公頃）。使用最小凸多邊形（MCP）方法所估得的中位活動範圍為 22.2 公頃（IQR：15.5–26.6 公頃）。這些結果與 2012 年透過直接觀察法所報告的活動範圍估值（19.0 與 26.2 公頃，n=2）相近。

不論是哪個方法估得的數據，都明顯大於 1975 年研究的 2.7 公頃，可能反映棲地劣化迫使個體擴大搜尋範圍以獲取資源。棲地組成分析指出，森林與農地（含水稻田）佔活動範圍約 90%，且所有個體展現高度一致的棲地依賴模式。繁殖巢位一貫位於緊鄰水稻田的森林邊緣，森林提供築巢環境，而水稻田為主要覓食來源，顯示赤腹鷹對低地森林谷地—水稻田複合棲地的高度依賴。

而墾丁地區為臺灣調查猛禽秋季南遷之重要地點，自民國 93 年起墾丁國家公園管理處委託台灣猛禽研究會進行過境猛禽族群量調查，編制人力進行全季的完整調查。調查在恆春半島社頂自然公園凌霄亭進行，由 2 位觀察員記錄每日過境猛禽的物種、數量與飛行特徵。結果顯示，赤腹鷹族群自調查初期以來增加約 45%，自 2016 年起呈顯著上升，遷徙期間也延後約兩天。

綜合衛星追蹤與長期監測資料，顯示：1) 海上與陸地中途停留棲地的保護對赤腹鷹遷徙至關重要；2) 台灣的過境猛禽計數僅代表東亞部分過境族群，因此跨國合作與資料整合對族群評估不可或缺；3)繁殖地的小型森林—水稻田景觀對族群維持具有核心作用；4)長期監測提供族群趨勢、遷徙時序與路線變化的重要資料依據，有助於未來東亞候鳥的保育策略制定。

關鍵字：赤腹鷹、東亞海洋遷徙路線、迴圈遷徙、猛禽遷徙調查、棲地利用、衛星追蹤

原始發表：

O1 Breeding Home Range and Habitat Use of the Chinese Sparrowhawk (*Accipiter soloensis*) in Korea JONGBIN GO、SE-YOUNG PARK、HWA-YEON KANG、EUN-JEONG KIM、 HYUN-YOUNG NAM、蔡宜樺、呂佳家、蔡若詩、HYEOK-JUN CHOI、HANKYU KIM、CHANG-YONG CHOI

O3 Loop Migration of the Chinese Sparrowhawk (*Accipiter soloensis*) along the East Asian Flyway
蔡若詩、呂佳家、蔡宜樺、KEITH L. BILDSTEIN、HYUN-YOUNG NAM、HANKYU KIM、JONGBIN GO、CHANG-YONG CHOI

黑鳶 *Milvus migrans*

黑鳶為兼性食腐性（facultative scavengers）猛禽，能在多樣化棲地中生存，舉凡農田、零散林地、河岸、養殖場及港口上空等。然而，繁殖期（初冬至初夏），繁殖對傾向防衛領域，變得較不群居，使觀察雛鳥食性變得困難。傳統調查有直接觀察及收集巢中殘餘食物或食繭等方法，但常被認為成本高或過於干擾。為解決此問題，屏科大鳥類生態研究室於2020-2023年的黑鳶繁殖季，在台灣南部18個巢址（16組繁殖配對）設置自動相機，共收集2,223件獵物資料。平均每巢記錄 123.5±39 件獵物，親鳥每天平均帶回 2.5±0.7 件獵物。不同棲地獵物組成差異甚大，鳥類為最常見獵物（49.9±15.7%）、魚類次之（30.2±14.9%）、哺乳類佔10.4±5.9%。靠近水域的巢址，魚類比例較高；鳩鴿科鳥類則常在林地及農田巢址被捕食。對以種子為食的鳥類的高捕食率，可能解釋 1980 年代農田廣泛使用加保扶（carbofuran）後，黑鳶族群劇烈下降的原因。不同棲地食性差異顯示本物種多功能性，小型族群可在二次毒害威脅下生存，並隨生態友善農業推廣逐步回升。

黑鳶在東亞族群的現況與遷徙習性仍缺乏研究，過去，臺灣的黑鳶族群被認為是特有亞種 *M. migrans formosanus*。不過2020-2021年的衛星追蹤結果，首次證實台灣出現具遷徙行為之黑鳶個體（可能屬亞種 *M. m. lineatus*）。該個體在南臺灣因受滅鼠藥及加保扶毒害，在救傷後進行兩次春季與兩次秋季遷徙，在中國東南方度冬，兩個夏季則分別遷徙至山東半島與俄羅斯遠東地區繁殖。第二個夏季期間，其活動範圍達 135,477 km²，顯示其具高度移動能力。此發現反映東亞黑鳶族群的高度流動性，並凸顯跨國合作保育的重要性。

在遺傳研究面向，為釐清臺灣黑鳶南北族群之間的基因交流程度，並確定是否有台灣獨立亞種，屏科大鳥類生態研究室、台灣猛禽研究會、屏科大生物資源研究所等單位，以粒線體DNA與微衛星標記分析2012-2024年共115份，來自台灣北部與南部的樣本，透過與亞種 *M. m. lineatus* 和 *M. m. govinda* 的比較，結果支持 *M. m. formosanus* 作為獨立亞種地位的分子證據。且根據台灣北部與南部族群的衛星追蹤資料，預測族群間的基因交流較低，結果顯示族群內的遺傳分化預期為中度，並伴隨近親繁殖跡象。由於台灣存在遷徙黑鳶族群，微衛星基因座的遺傳多樣性預測為中度。

回顧過去二十年黑鳶研究，台灣黑鳶族群被證實因棲地破壞與二次毒害而劇烈下降，1995年紀錄不到200隻。自2004年起，基隆市野鳥學會啟動系統性保育計畫，並與台灣猛禽研究會及國立屏東科技大學組成研究團隊，推動棲地保護、生態友善農業與毒物研究，確認毒害為最大威脅。自 2013 年起，啟動全國性黑鳶同步調查，以夜棲地計數來監測族群趨勢。2015年的紀錄片《老鷹想飛》及「老鷹紅豆」計畫提升公眾意識並推廣生態農業，取消全國性滅鼠週。2016年起，啟動衛星追蹤計畫分析移動模式與棲地變化，並輔以實地調查提升族群監測精準度。2017年禁止高濃度加保扶的使用。2024年黑鳶同步調查的結果顯示，9月族群數達 873 隻，12 月包含遷徙族群增至 945 隻，較 2013 年的 272 隻顯著增加，顯示目前的保育策略有效。

隨著族群漸趨穩定，2020 年啟動黑鳶巢位直播專案，2025 年進行群眾募資以提升公眾參與。過去二十年的野生動物救傷、毒理研究、棲地保護、遺傳研究、衛星追蹤及跨機構保育政策，加上長期監測，已促使族群穩定成長。然而，黑鳶仍面臨農藥、滅鼠劑二次毒害及棲地破壞等威脅，持續政策倡議與社會參與對族群永續至關重要。

關鍵字： 繁殖生態、覓食習性、獵物組成、衛星追蹤、遺傳多樣性、生態友善農業、族群監測、社會參與

原始發表：

O10 Nestling Diet of Black Kites (*Milvus migrans*) across Different Nesting Habitats in Southern Taiwan 黃筠傑、林惠珊、洪孝宇、謝季恩、王婉儀、蔡穎詩、鍾明璋、孫元勳

O39 Twenty Years of Black Kite Conservation in Taiwan: From Scientific Monitoring to Conservation Actions 林惠珊、洪孝宇、黃筠傑、蔡宜樺、謝季恩、王婉儀、曾建偉、孫元勳

P5 Phylogeography and Population Genetic Structure Analysis of Raptors: A Case Study of the Black Kite Subspecies (*Milvus migrans formosanus*) in Taiwan 蔡語禾、黃筠傑、洪孝宇、林惠珊、洪國翔

P16 Migration Routes of a Rescued Black Kite (*Milvus migrans*) along the Coast of East Asia 林惠珊、黃筠傑、洪孝宇、孫元勳

草鴞 *Tyto longimembris*

草鴞在全球被 IUCN 列為無危物種（Least Concern），但在台灣為瀕危的留鳥物種。由於族群數量稀少且行為隱密，其生態資料長期缺乏。近年來，研究方法從救傷個案、巢穴觀察與食繭分析，擴展至衛星追蹤、被動聲學監測（Passive Acoustic Monitoring, PAM ）、人工棲架監測等新研究方法，開始對草鴞的覓食行為、夜間活動模式、棲地使用及環境因子反應有了更完整的理解。

嘉大棲地生態研究室與臺南市野生動物保育學會合作的草鴞衛星追蹤結果顯示，幼鳥活動範圍較廣，平均每日移動距離與夜間活動範圍均顯著高於成鳥；而成鳥中有配偶的個體活動範圍最小，顯示幼鳥處於探索階段，無配偶成鳥則傾向頻繁更換棲息地。儘管個體間的棲地使用存在顯著差異，大部分夜間 GPS 定位（68±17%）位於早期演替草地，其次為農田（14±12%）、果園（6±13%），魚塭與鹽田也是其重要的覓食棲地，整體而言，顯示草地為夜間最主要且唯一的棲息棲地。

嘉大棲地生態研究室的被動聲學監測則顯示草鴞全年皆有鳴叫，但鳴叫高峰出現在日落後兩小時與日出前兩小時，且 5 月至 9 月鳴叫活動最頻繁，對應繁殖季晚期雛鳥離巢及繁殖前期配對行為。根據此研究，未來草鴞監測工作，在預算與人力有限的情況下，建議可將調查集中在 5-9 月，並可集中監測在日落後集日出前兩小時的鳴叫高峰期時。

而草鴞食繭的分析顯示，草鴞的食性以小型哺乳類為主（占總獵物的 98.4%），草鴞獵物包含囓齒類、鼩鼱類，以及少量無法辨識的蛙類、昆蟲與鳥類。不同景觀區域的獵物組成存在顯著差異（$\chi^2 = 176.98, p < 0.05$），冗餘分析（RDA）顯示姬鼠屬（*Apodemus* ）偏好森林，小鼠屬（*Mus* ）偏好農田，麝鼩屬（*Crocidura* ）偏好灌木及裸露地，研究結果支持草鴞為機會性掠食者的假說，會依據景觀條件調整獵物選擇。

極端氣候事件亦對草鴞棲地使用有顯著影響。以 2024 年 7 月登陸台灣的凱米颱風為例，曾文溪沿線氾濫平原草地與農田遭洪水嚴重破壞，颱風後草鴞暫時放棄淹水棲地，覓食行為亦暫時迴避淹水區域。根據颱風前後的同步調查，7 月中曾文溪下游共紀錄 12 隻草鴞，颱風過後一個月，僅記錄到 5 隻個體，皆集中在河口附近。洪水沉積大量泥沙，造成草地覆蓋率下降 73.4%、農田減少 19.8%，顯示重大洪水事件會導致暫時性棲地喪失，且會改變草鴞的棲地使用模式。

屏科大鳥類生態研究室透過人工棲架結合自動相機，發現設置棲架可大幅提升觀察草鴞的機會，並藉由腳環進行個體辨識，同時，也可與生態農業推廣結合，提供農田鼠害防治的作用支持保育。至 2024 年為止，南臺灣已設置超過 100 組棲架，其中 75%的棲架在三個月內即觀察到猛禽活動，其中包含草鴞，顯示人工棲架在自動化監測與生態農業推廣上具有高應用潛力。

綜合以上研究結果，草鴞為機會性捕食者，其覓食行為與棲地使用受棲地結構、季節行為、族群年齡與氣候事件影響。保育策略應著重於維持或創造草地棲地、促進農田友善管理、降低二次毒害風險，並因應極端氣候事件對棲地可用性的影響，以確保草鴞族群的長期穩定。人工棲架結合影像、聲學自動監測系統，提供長期、非侵入性的研究途徑，對族群監測及生態農業推廣具有高度應用價值。

關鍵字：草鴞、覓食生態、食性組成、棲地使用、衛星追蹤、被動聲學監測、人工棲架、極端氣候、生態農業

原始發表：

O11 Landscape Influence on Diet Composition of Australasian Grass-Owl (*Tyto longimembris*) in Southern Taiwan: Insight from Pellet Analysis 呂芷儀、張郁柔、呂佳家、洪孝宇、蔡若詩

O13 Using Artificial Perches for Raptor Monitoring and Promoting Ecological Farming 洪孝宇

O20 Satellite Tracking and Habitat Use of Australasian Grass-Owl 蔡若詩、呂佳家、張家豪、曾翌碩

O32 Seasonal Activity Patterns of the Australasian Grass-Owl (*Tyto longimembris*) Revealed Through Passive Acoustic Monitoring 張家豪、蔡若詩

O40 The Impact of Typhoon GAEMI on Australasian Grass-Owl along Zengwen River 呂佳家、張家豪、蔡若詩

領角鴞 *Otus lettia*

台灣猛禽研究會自 2017 年起持續進行猛禽救傷工作，期間對領角鴞 (*Otus lettia*) 也有系統性觀察與監測。2017-2024 年間，領角鴞在遭玻璃撞擊的夜行性猛禽中占比最高（45.31%），主要臨床症狀為眼部損傷。整體遭玻璃撞擊的猛禽住院平均為 26 天，中位數 11 天，經治療後有七成以上個體成功野放。值得注意的是，體況較佳的猛禽在撞擊玻璃後反而更易當場死亡，未能進入救援系統，因此僅統計救援個體可能低估玻璃撞擊對領角鴞的實際影響。

在農藥與滅鼠劑風險方面，台灣猛禽研究會於 2021-2024 年間，共收集 115 隻猛禽樣本進行殘留檢測。領角鴞檢出率達 48%（n=25），顯示其在野外的二次中毒風險相當高。對於高風險物種，即使未出現明顯中毒或貧血症狀，建議也應在救傷過程中預防性施用兩週以上的維他命 K，以避免凝血障礙。

此外，近年來屏科大鳥類生態研究室的人工棲架的設置與自動相機監測發現，領角鴞在平原及農田中也有廣泛利用棲架的行為，主要使用棲架獵食，以囓齒類為食，常將獵物帶到棲架上。棲架監測不僅可以提供族群動態資料，也顯示領角鴞對農田生態服務的重要性，例如控制囓齒動物，有助於生態農業的推廣。自 2022 年政府推行生態給付政策以來，農民可免費設置棲架並獲補助，促進猛禽活動與農田生態保育的結合。

綜合而言，領角鴞在台灣面臨人為威脅（窗殺、農藥二次毒害），但亦能適應農田與棲架環境，提供生態服務。未來保育策略需同時兼顧救傷、農藥管理與棲架監測，以維持其族群健康與生態功能。

關鍵字： 領角鴞、猛禽救傷、窗殺、滅鼠劑、人工棲架、生態農業

原始發表：

O13 Using Artificial Perches for Raptor Monitoring and Promoting Ecological Farming 洪孝宇

O27 Investigating the Importance of Glass Collision Injuries in Raptors: A Retrospective Analysis of Raptor Rescue Cases from 2017 to 2024 in the Raptor Rehabilitation Station in Taiwan 王齡敏

O43 Preliminary Study on Secondary Poisoning of Raptors by Rodenticides in Northern Taiwan 王齡敏

黃嘴角鴞 *Otus spilocephalus*、鵂鶹 *Taenioptynx brodiei*

月相及月亮在天空的位置會顯著影響貓頭鷹的鳴叫行為，但在台灣的相關研究仍相當稀少。農業部生物多樣性研究所利用被動聲學監測（Passive Acoustic Monitoring, PAM），在玉山國家公園南段南橫公路沿線三個山區林地監測站收集聲學資料。錄音期間為 2021 及 2023 年，每日從下午 4 點至隔日上午 8 點，每 3 分鐘錄 1 分鐘，累計約 11,320 小時音訊資料。

透過 SILIC（Sound Identification and Labeling Intelligence for Creatures）系統，自動辨識出鵂鶹（*Taenioptynx brodiei*）76,588 次鳴叫，以及黃嘴角鴞（*Otus spilocephalus*）412,934 次鳴叫。每小時鳴叫活動率（Vocalization Activity Rate, VAR）分析顯示，兩個物種的鳴叫高峰分別出現在 2 月至 5 月及 8 月至 11 月。值得注意的是，鵂鶹的每小時鳴叫活動率與月相變化呈現高度相關，在滿月期間及月亮位於天頂時顯著增加；而黃嘴角鴞則未呈現此模式。

由於貓頭鷹調查高度依賴鳴叫的可偵測性，這些結果提供了物種特異性的田野調查時間優化建議。本研究強調被動聲學監測在揭示猛禽複雜時間模式上的有效性，並突顯其作為長期理解夜行性鳥類行為的重要工具。

關鍵字： 月相、月亮位置、被動聲學監測、SILIC、鳴叫活動率

原始發表：

O31 Collared Owlet Moonlit Songs: Vocalization Patterns under Lunar Cycle Dynamics 吳世鴻、柯智仁、蔡文玲

短耳鴞 *Asio flammeus*

短耳鴞是臺灣冬候鳥，通常於 11 月至翌年 4 月間出現，而其北返遷徙始於 4 月至 5 月。了解短耳鴞的年齡結構與遷徙模式對族群保育與生態研究至關重要。臺中市野生動物保育學會整合長期繫放與衛星追蹤資料，探討臺灣短耳鴞的年齡判定方法及遷徙行為。

2010 年至 2024 年間，總共繫放 362 隻短耳鴞（291 隻雌鳥、71 隻雄鳥），其中共再捕抓 12 隻個體（9 隻雌鳥、3 隻雄鳥），再捕捉的時間間隔為 1 至 6 年不等。透過比較再捕捉個體羽色特徵的變化，可以推導出與年齡及性別相關的羽色特徵。幼雌鳥（<1 歲）腹側翅面具明顯寬廣矢狀斑，一至二歲時，斑紋會轉變成水滴狀，二至三歲時，演變成條紋狀，三歲以上斑紋則完全消失；幼雄鳥次級飛羽橫斑數量隨年齡逐步減少，未滿一歲時，有四條，第三年減為三條，第六年為兩條，第十二年完全消失。依此推論，每年短耳鴞抵達臺灣的順序為年長成雌鳥、較年輕的成雌鳥、較年輕成雄鳥、年長成雄鳥，而較年輕的成雌鳥則是最後離開臺灣的族群。

此外，關於衛星追蹤則是從 2018 至 2024 年間，對 12 隻短耳鴞（10 隻雌鳥、2 隻雄鳥）進行衛星追蹤，以研究其春季遷徙模式。北返遷徙的平均遷徙天數為 32.3±15.1 天，遷徙距離介於 3,074 至 6,478 公里，最終到達緯度北緯 55°至 68°。其中一隻雌鳥抵達北極圈附近的安巴爾奇克（Ambarchik），創下東亞地區短耳鴞的最長遷徙距離紀錄。遷徙路線分為兩條：大陸路線（66.7%的個體），從臺灣經中國東部，經過山東半島及黃海，最後抵達俄羅斯；島嶼跳躍路線（33.3%的個體），經琉球群島、九州及韓國半島進入中國，再抵達俄羅斯。選擇島嶼跳躍路線的短耳鴞，飛行必需先跨越臺灣中央山脈，隨後才出海遷徙，這種刻意行為很難解是為隨機的遷徙結果。

本研究首次完整記錄臺灣度冬短耳鴞的年齡相關羽色特徵及遷徙路線，為理解東亞島嶼型遷徙鳥類的移動策略提供重要資料，未來可進一步研究：遷徙路徑的選擇是否會受遺傳或其他因素影響，或是隨機選擇？

關鍵字：短耳鴞、*Asio flammeus*、年齡判定、繫放、遷徙、衛星追蹤、島嶼跳躍

原始發表：

P10 Aging the Short-eared Owl by 15-years Banding Recoveries of Taiwan 莊翰、陳冠豪、吳雪如、林文隆

P14 Migration of the Wintering Short-eared Owl *Asio flammeus* in Taiwan 許竹君、陳冠豪、吳雪如、林文隆

褐鷹鴞 *Ninox scutulata*

在開放環境中設置人工棲架可以吸引猛禽。近年來，將棲架與自動相機結合的方式，使研究人員能記錄猛禽種類及其獵物，廣泛應用於猛禽研究。臺灣自 2017 年開始發展棲架監測方法，目前已記錄超過 20 種猛禽及 70 多種非猛禽鳥類。在平原與農田中，最常利用棲架的猛禽為黑翅鳶（*Elanus caeruleus*）、領角鴞（*Otus lettia*）與**褐鷹鴞（*Ninox scutulata*）**，並累積了數千筆獵物紀錄。黑翅鳶與領角鴞主要以囓齒類為食，而**褐鷹鴞則主要捕食昆蟲**，在農田中提供了病蟲害防治的生態服務。

臺灣過去在農田中大量使用滅鼠藥防治囓齒動物，但研究已經證實這會對多種猛禽造成二次毒害。為推動生態農業，臺灣政府於 2022 年實施生態給付政策，至 2024 年，南臺灣已有超過 100 組棲架完成安裝。雖然初期許多農民對猛禽是否會出現在農田中感到懷疑，但有 75% 的棲架在三個月內即記錄到猛禽活動。人工棲架展現出自動化猛禽監測的高度潛力，也成為推廣生態農業的極佳工具。

關鍵字： 自動化猛禽監測、鳥類生態服務、生態農業、猛禽棲架

原始發表：

O13 Using Artificial Perches for Raptor Monitoring and Promoting Ecological Farming 洪孝宇

紅隼 *Falco tinnunculus*

鳥類的移動模式是航空安全研究的重要焦點。紅隼廣泛分布於歐亞大陸，是台灣常見的冬候鳥。牠偏好草地及農地等開闊棲地，但也能出現在懸崖與建築物上。機場因具備大片開闊空間，也會被度冬中的紅隼利用。

2022 年 4 月，一隻雌紅隼成鳥因撞上誘捕網而在台北松山機場被救傷。復原後，研究團隊為其配戴 GPS/GSM 發報器，以調查其地點忠誠度與遷移路徑。該鳥於 4 月 13 日在台北市北投區野放，短暫停留於桃園市大園區與中壢區後，又回到松山機場附近，並於 4 月 23 日自新北市淡水區起飛，之後降落於中國福建省平潭島，並沿著中國海岸線往北飛行，於 5 月 14 日抵達山東省煙臺海陽市磐石店鎮，在當地度過繁殖季。

南返遷移自 9 月 14 日開始，沿黃海岸抵達浙江省台州及溫州後，越過東海。9 月 18 日牠在新北市石門區登陸，接著移動至台北市松山區，包括松山機場範圍內。不幸的是，這隻紅隼於 10 月 11 日因與飛機相撞而死亡。

本次追蹤共持續 183 天，取得 5,571 筆有效定位資料。在遷移期間，這隻紅隼完成兩段長距離跨海飛行：一段是春季自台灣跨越台灣海峽至中國福建，另一段是秋季自中國江蘇跨越黃海至山東。

北返期間，牠跨越台灣海峽時平均速度為 51.8 ± 3.88 km/h，平均飛行高度為 241 ± 65.82 m；跨越黃海時平均速度為 39.3 ± 2.92 km/h，高度為 119.82 ± 26.93 m。南返期間，牠跨越黃海時平均速度為 42.8 ± 9.93 km/h，高度為 248.4 ± 45.09 m；跨越東海時平均速度為 32.5 ± 1.88 km/h，高度為 166.12 ± 35.93 m。

此外，沿中國海岸飛行期間，牠北向移動的平均速度為 34.97 ± 1.23 km/h，高度 267.2 ± 32.55 m，約耗時 20 天；南向遷移則較快，平均速度 36.56 ± 2.42 km/h，高度 180.94 ± 13.29 m，僅耗時 4 天。

雖然追蹤因碰撞事件提前終止，但所收集的資料完整記錄了牠的北返與南返遷移路線，並顯示其對越冬地具有高度地點忠誠性。本研究為紅隼遷徙生態提供了重要的參考資料，也為未來相關研究奠定基礎。

關鍵字：鳥擊、紅隼、GPS 追蹤、遷移生態

原始發表：

P17 Tracking the Migration of the Eurasian Kestrel Using GPS Transmitters: A Case Study from a Northern Taiwan Airport 王李廉、蔡岱樺、林思民、杜昆盈、林靖淇

第三章 台灣五十種猛禽個論與近十年發表文獻

1. 魚鷹

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NLC

台灣發表

族群趨勢

從 1989 年開始累積超過 30 年的墾丁秋季猛禽遷徙調查資料顯示，自 2014 年開始，魚鷹的數量上升 51%，北美、歐洲和日本的調查資料也都顯示魚鷹的數量正在增加，推測或許魚鷹正在從 20 世紀受 DDT 毒害影響中逐漸恢復，且逐漸開始適應都市棲地（Tsai et. al., 2025）。

衛星追蹤

2021 年 12 月，一隻魚鷹因為不明原因停留在桃園國際機場的跑道上，機場人員將其送至桃園市野鳥學會後，再轉送到台灣猛禽研究會救傷檢查。獸醫師診斷這隻魚鷹雙翅腕部擦傷，另外也有血液汞含量超標的情形。經過四週的治療與復健，取名叫魚排，並在上衛星發報器後，野放追蹤，成為台灣第一筆魚鷹衛星追蹤個體。

2022 年，待在北台灣一年後，2023 年 4 月先前往基隆嶼，接著便飛向蓮花嶼過夜，隔天開始向北飛，當天便馬上折返，抵達中國福州沿岸。接著，花三週時間，沿著中國東海岸北上，在江蘇省濱海停留一週，接著飛越黃海，抵達韓國西南全羅南道的新安郡，沿著南方海岸跳島持續向東飛，最後停留在慶尚北道與蔚山交界處的聚落 Suryeom-ri （수렴리）（台灣猛禽研究會，2023）。

台灣第一筆魚鷹衛星追蹤遷徙路線圖（台灣猛禽研究會，2023）。

研究單位

台灣猛禽研究會

2025 年 13th ARRCN 研討會發表

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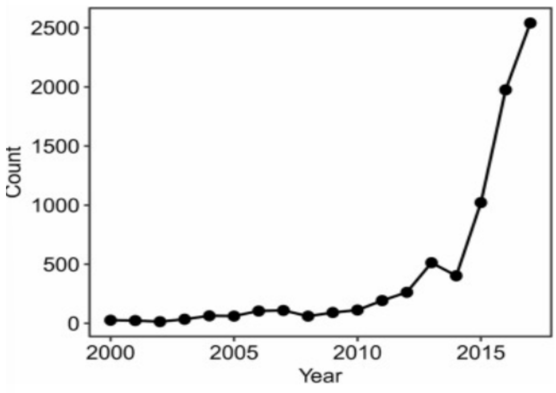
2. 黑翅鳶

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NLC

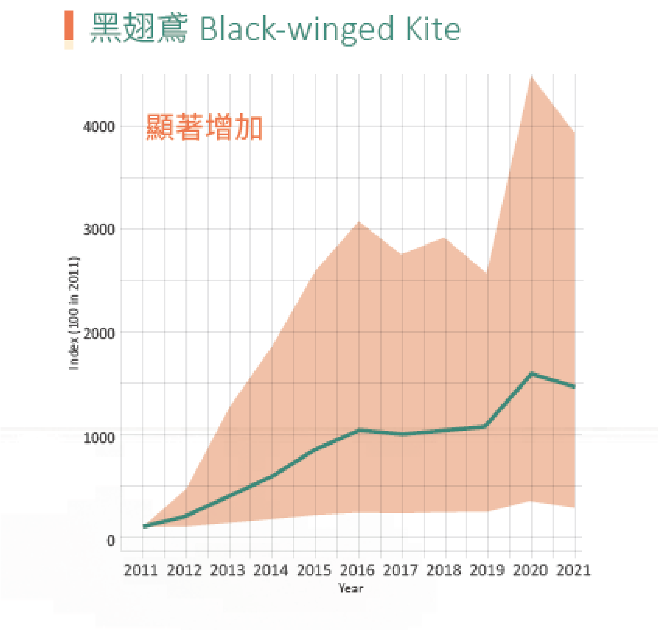
台灣發表

族群趨勢與分布

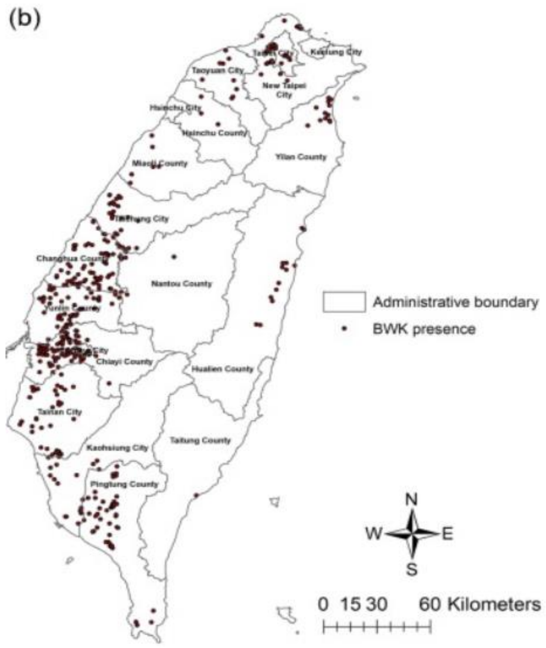
早期，臺灣本島沒有黑翅鳶分布，離本島最近的分布地為金門。1998 年，臺灣島首次記錄到黑翅鳶的地點在新北市貢寮區。2001 年，有兩筆黑翅鳶於臺灣島的繁殖行為紀錄，分別在雲林與嘉義，黑翅鳶開始在臺灣擴張。到了 2010 年，黑翅鳶族群數量急速上升，自此，全臺平原地區皆有黑翅鳶的目擊紀錄（Chi & Lin, 2025; Chen, 2022）。



2000-2017 年臺灣黑翅鳶數量統計圖，分析資料來源 eBird Taiwan（Lin et. al., 2022）。



《2024 臺灣國家鳥類報告》中 2011-2021 年黑翅鳶族群趨勢圖，綠線為中位數、 橘色範圍分別為 2.5 百分位及 97.5 百分位。分析資料來源：臺灣繁殖鳥類大調查（林大利、邱承慶、潘森識，2025）。



2014-2017 年黑翅鳶目擊記錄空間分布圖，資料來源 eBird Taiwan

（Wu et. al., 2023）。

繁殖/生活史

黑翅鳶孵化一年後即可開始繁殖，每年可繁殖 1-2 次，每對黑翅鳶一次可生育 3-4 隻雛鳥（Lin et. al., 2022）。不過根據鄭宇妘（2025）的衛星追蹤分析數據，發現其中一隻黑翅鳶母鳥在一年半內曾經嘗試過 5 次繁殖的紀錄。

曾建偉等人於 2018 年 1 月 8 日至 3 月 1 日，在南澳觀察一對黑翅鳶的繁殖行為，並將整個繁殖期分成孵蛋期、育雛期及後育雛期，觀察顯示公鳥在各階段花費最多時間在守衛，其次才是狩獵。公鳥在後育雛期雖然仍會攜帶獵物回巢哺育幼鳥，但同時間，也在其他地方另築新巢。相較之下，母鳥花費最多時間在坐巢，且隨著不同時期，坐巢時間遞減，守衛時間則相反。總和觀察，公鳥主要負責覓食及趨敵，母鳥則是坐巢及哺育幼雛為主。這次觀察期中，共記錄到 11 次親鳥攜帶獵物回巢，獵物皆為鼠類。

關於驅敵行為，相對附近曾記錄到的猛禽：大冠鷲、林鵰、東方蜂鷹、魚鷹、東方鵟、遊隼及紅隼，黑翅鳶對鳳頭蒼鷹的驅趕行為強度高，且持續時間長。行為上，公鳥面對鳳頭蒼鷹會發出不間斷的短促單鳴音，對鳳頭蒼鷹所在位置進行 V 字型來回俯衝。

2018 年 3 月 15 日已記錄到幼鳥在巢區附近活動，偶爾飛至更遠的地方巡弋，幼鳥離巢到獨立大約需要 30 天時間。

黑翅鳶公母鳥各繁殖階段之行為花費時間比例表

繁殖階段 / 行為	公鳥			母鳥		
	孵蛋期	育雛期	後育雛期	孵蛋期	育雛期	後育雛期
坐巢	-	-	-	89.4% (413)	45.0% (320)	-
打獵	18.0% (63)	33.5% (140)	27.2% (115)	-	-	-
進食	10.3% (36)	1.4% (6)	-	8.4% (39)	-	5.9% (21)
餵食	-	-	-	-	14.8% (105)	-
叼巢材 / 築巢	-	-	16.5% (70)	0.6% (3)	0.3% (2)	-
驅敵	16.9% (59)	3.8% (16)	0.7% (3)	-	0.1% (1)	-
守衛	54.9% (192)	61.2% (256)	55.6% (235)	1.5% (7)	39.8% (283)	94.1% (336)

1.「-」表示未觀察到該種行為；「( )」表示所觀察到的時間總和，單位為分鐘。

2. 行為定義

(1) 坐巢：親鳥於巢內孵卵或孵雛。(2) 打獵：可見親鳥有定點振翅等覓食行為。(3) 進食：親鳥進食。(4) 餵食：親鳥餵食雛鳥。(5) 叼巢材 / 築巢：親鳥叼巢材進巢或是築巢。(6) 驅敵：明顯針對目標進行驅趕。(7) 守衛：停棲於巢位附近。

3. 繁殖階段定義

(1) 孵蛋期：雛鳥尚未破殼時期。(2) 育雛期：雛鳥破殼後、尚未離開巢位時期。

(3) 後育雛期：雛鳥離開巢位後、仍需依賴親鳥提供食物的時期。

黑翅鳶公母鳥各繁殖階段之行為花費時間比例表（曾建偉等，2018）

食性

自 2017 年起，屏科大鳥類生態研究室透過人工棲架與自動相機進行長期監測，揭示黑翅鳶不僅在平原與農田環境中最常使用棲架，也大量捕食囓齒類，捕食高峰期為晨昏時刻，在 2019-2021 年高屏地區農田、河岸高灘地及台東水稻田區的分析中，黑翅鳶月均捕食數量最高紀錄為 49 隻鼠類，在農田生態系中發揮生物防治的關鍵功能（Hong et. al., 2022; 蔡穎詩，2022）。2023-2024 年涵蓋台灣南部 18 個樣區的研究更釐清了影響棲架利用的因子，結果顯示，黑翅鳶在 16 處樣區均有使用人工棲架的紀錄，共帶回 1,388 隻獵物，其中囓齒類佔約 63%，其餘包括鳥類（13%）、爬行類（13%）與鼩鼱（11%）。分析發現，囓齒類豐度與植被覆蓋呈正相關，但與黑翅鳶實際捕獵數量無顯著關聯；相對地，人工棲架與最近自然棲架的距離與其捕獵數呈顯著正相關，顯示開闊區域更利於棲架的利用（Hong, 2025; Chen & Hong, 2025）。

棲地利用與衛星追蹤活動模式

於台中霧峰地區衛星追蹤的一隻黑翅鳶顯示，這隻黑翅鳶對夜棲地的忠誠度很高，均在大里溪底的樹叢間夜棲；日棲地則包含霧峰地區架設的人工棲架、田區旁的檳榔、墓區、特定電線桿等，涵蓋大部分的友善田區範圍。綜合結果，黑翅鳶的活動範圍僅 1.6 平方公里，除了日間覓食活動的田區位置外，無人干擾的地區也是相當重要的（孫元勳，2020）。

另在 2022-2024 年間，於高屏地區的 7 隻黑翅鳶衛星追蹤研究則顯示，黑翅鳶有固定的活動範圍，最小活動範圍（MCP）平均面積為 189.8 km^2，核密度分析（KDE）95%平均面積則是 1.2km^2。黑翅鳶在非繁殖季時會有部分個體進行長距離探索移動，其中一隻母鳥的活動範圍就涵蓋整個台灣西部，從屏東到台北，單日移動距離最高為 219.4km^2（鄭宇妘，2025）。

競爭/生態棲位

根據 2002-2017 年全臺八個不同機場的觀測資料及 2000-2019 年來自 21 個 eBird 熱點網格資料顯示，隨著黑翅鳶數量越來越多，度冬紅隼的數量則遞減，出現族群更替的現象，由於這兩種猛禽皆以鼠類為主食，兩種猛禽有較高的生態棲位重疊度，且根據實驗證實，黑翅鳶確實對紅隼的存在表現出高度攻擊性。總結來說，臺灣黑翅鳶的擴散正顯著壓縮紅隼冬季遷徙來臺的棲地利用空間（Chen et. al., 2022）。

毒害

研究團隊於 2010-2018 年收集臺灣 21 種猛禽總共 221 個肝臟樣本，其中主食為鼠類的黑翅鳶滅鼠藥殘留濃度最高，平均濃度 0.211 ± 0.219 mg/kg，這個數據也是目前所有做過滅鼠藥殘留濃度研究的猛禽中最高的數據，比大多數猛禽高出三倍（Hong et. al., 2019；Lin et. al., 2022）。過往關於猛禽抗鼠藥的研究樣本，通常來自野生動物救傷站中已死亡或受傷的個體，送至救傷的猛禽可能已受毒性影響，出現行為異常或虛弱的狀況。不過，Lin et. al. (2022) 的研究樣本大部分來自機場飛安考量下移除的健康黑翅鳶個體，這些黑翅鳶即使體內累積之滅鼠藥濃度很高，行為仍然正常。臺灣從 1977-2014 年推行全國滅鼠週，黑翅鳶則是從 2000 年之後才開始出現在臺灣的物種，並且從 2010 年後，族群顯著增長。也就是說，雖然黑翅鳶體內的鼠藥累積快速，且濃度高，明顯高於其他猛禽，但相較於其他猛禽物種，即使在高毒素累積情況下，黑翅鳶依然能存活。

教育推廣現狀：人工棲架/生態農業

利用猛禽喜歡在高處覓食停棲的習性，在農田架上人工棲架，請猛禽成為捕鼠幫手，已經成為台灣農田生物防治的一種方式之一。由於黑翅鳶的主食為老鼠、繁殖穩定、抗鼠藥、族群數量有增加趨勢，且常用棲地環境為平原地區，這些原因都使得黑翅鳶成為農田區域人工棲架上的常客；而棲架及其上的紅外線自動相機，都讓農民更容易觀察並記錄到猛禽與鳥類，使農田生態食物網系統具象化，進而培養農民產生實際的保育行動。因而，黑翅鳶、其他猛禽與鳥類及猛禽棲架，已成為臺灣生態農法、環境教育及生物防治的教育大使（廖珮岑，2024）。

研究單位

屏科大鳥類生態研究室、臺中市野生動物保育學會、東華大學自然資源與環境學系許育誠副教授研究室、中興大學園藝學系吳振發教授

2025 年 13th ARRCN 研討會發表

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食性

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衛星追蹤/播遷

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環境棲地

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3. 東方蜂鷹

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NLC

台灣發表

族群趨勢

農業部生物多樣性研究所根據 2011 至 2021 年台灣繁殖鳥類調查（Taiwan Breeding Bird Survey），東方蜂鷹是台灣近十年間僅有兩種顯示族群顯著增長的日行性猛禽之一，雖然整體族群呈現上升趨勢，但在不同區域未顯示顯著差異（Chi & Lin, 2025）。

食性/嗅覺研究

東方蜂鷹以蜜蜂和胡蜂為主食，主要以幼蟲或蛹為食，也會食用虎頭蜂。不過近年來發現臺灣的東方蜂鷹有跟養蜂場共生的現象，東方蜂鷹經常被發現在臺灣的養蜂場覓食，牠們會在蜂場附近的樹冠層上方棲息，以蜂農丟棄的蜂巢或幼蟲為食，此外，牠們還會食用一種混合花粉、大豆和糖的黃色花粉團，通常是養蜂人提供給蜜蜂的補充食品。研究人員利用這種花粉團，進行操作性實驗，最後證實東方蜂鷹在做出覓食決策時，會綜合嗅覺與視覺，他們能夠辨識花粉的氣味，而通常嗅覺優先於視覺（花粉團的顏色）。此外，比對東方蜂鷹和其他三種猛禽的嗅覺受體基因組，發現東方蜂鷹的嗅覺受體基因組比其他猛禽大近五倍，顯示嗅覺對東方蜂鷹在覓食的重要性可能遠高於其他猛禽。這也是目前少見證實猛禽會使用嗅覺來尋找食物的研究（Yang et. al., 2015）。

衛星追蹤/同位素

過往認為在臺灣的東方蜂鷹是從日本過來的遷徙種群，直到 2008 年啟動臺灣東方蜂鷹衛星追蹤計畫後，發現追蹤的東方蜂鷹個體皆在島內移動，且有多種的移動模式，大致分為三種：南北遷徙、不規律移動、地區型（劉小如，2010）。

根據屏東科技大學翁國精老師團隊進行的同位素研究來看，臺灣的東方蜂鷹應該有兩個不同族群：遷徙族群及留鳥族群，團隊推測臺灣留棲的東方蜂鷹可能是近年才由遷徙轉變為留鳥（Weng et al., 2009）。

研究方法

目前最新的研究（發表於 2025 年亞洲猛禽研討會）為台灣猛禽研究會自 2023 年起於台灣北部陽明山國家公園，應用攝影照片進行個體識別的「標記－重現（mark-resight method）」方法，試圖透過羽色型態與羽毛磨損進行個體辨識（Tsai et. al., 2025）。

研究單位

台灣猛禽研究會、臺灣師範大學生命科學系李壽先教授

2025 年 13th ARRCN 研討會發表

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遷徙

Nourani, E. (2021). Crested honey buzzard *Pernis ptilorhynchus*. In *Migration Strategies of Birds of Prey in Western Palearctic* (pp. 49-54). CRC Press.

4. 黑冠鵑隼

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

期刊

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5. 禿鷲

IUCN 紅皮書：NT
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

期刊

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繁殖/生活史

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食性/捕食行為

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García-Macía, J., Gálvez, M., Plana, G., Vallverdú, N., Álvarez, E., Galán, M., ... & Urios, V. (2023). Analysis of the trans-Saharan migration and wintering areas of GPS-tagged Cinereous Vultures *Aegypius monachus*. *Bird Study*, *70*(4), 289-294.

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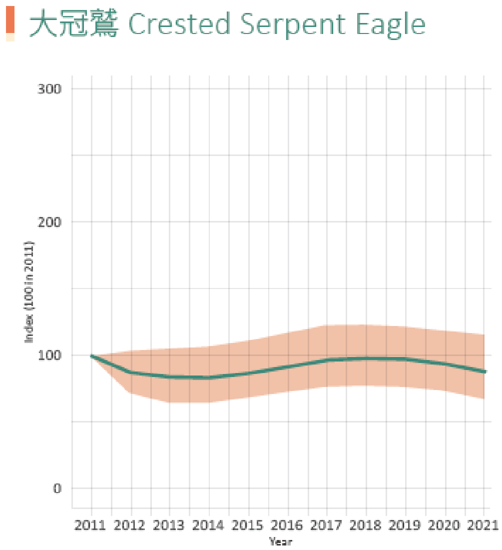
6. 大冠鷲

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NLC

台灣發表

族群趨勢

根據臺灣繁殖鳥類大調查的數據分析，2011-2021 年，大冠鷲族群呈波動變化（林大利、邱承慶、潘森識，2025）。



《2024 臺灣國家鳥類報告》中 2011 年至 2021 年間的族群變化。綠線為中位數、橘色範圍分別為 2.5 百分位及 97.5 百分位。分析資料來源：臺灣繁殖鳥類大調查（林大利、邱承慶、潘森識，2025）。

繁殖/生活史/食性

林文宏於 1992-2005 年間，調查台北地區 8 巢大冠鷲繁殖生態，顯示大冠鷲通常生 1 卵。巢位幾乎靠近人類活動環境的次生林裡，巢通常築在平均高度 10.3m 的樹上，通常都築巢在附生植物之上，形成良好的天然掩蔽體。產卵期為 3-4 月，孵化期約在 4 月中至 5 月底，幼鳥離巢大約在日齡 70-80 天時，大約在 7 月中至 8 月初離巢。紀錄的 90 筆食性資料中，蛇類佔 72.2%，為大冠鷲的主食，其中青蛇為最重要的食物，蜥蜴次之，佔 15.5%（林文宏，2005）。

除了主食為蛇類，根據 2025 年亞洲猛禽研討會許育誠的發表，近年來，透過地面紅外線自動照相機的監測資料顯示，大冠鷲也經常森林底層的地面上覓食，主要獵物為非洲大蝸牛，占所有獵物紀錄的 88.7%。大冠鷲的出現（55.5%）及捕蝸行為（68.6%）大多發生於清晨 8 點前。雖然單隻蝸牛的生物量有限，但由於數量龐大、處理時間短，牠們成為大冠鷲的重要食物來源，尤其在清晨時段，當主要獵物——蛇類尚未活躍且較難捕獲時（Hsu & Jheng, 2025）。

播遷/活動模式

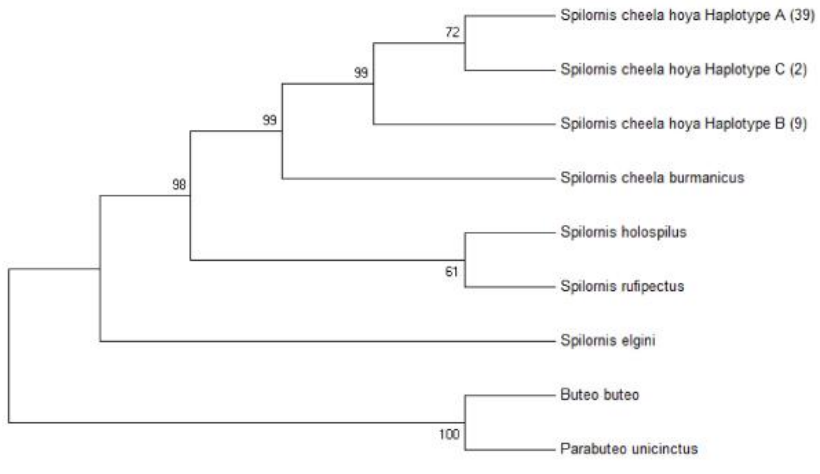
臺灣大學李培芬團隊於 1995-1997 年和 1998-2007 年用無線電追蹤臺灣南部墾丁國家公園中的大冠鷲族群。最小凸多邊形（Minimum Convex Polygon, MCP）計算之平均活動範圍為 12.34 km^2；95%固定核密度法（95% Fixed Kernel）計算出之平均活動範圍為 2.86 km^2，最低族群密度為每平方公里 2.69 隻個體，大冠鷲的活動範圍呈高度重疊，甚至能和其他個體分享核心活動區域。大部分追蹤之大冠鷲都棲息於（>90%）略微退化的半開放混合林，其次才是利用台灣相思林（*Acacia confusa*）與草地，但比例遠低於混合林（Walther et. al., 2014; Chou et. al., 2012）。

衛星追蹤

2021 年 5 月， 一隻經由壽山動物園治療後轉送至收容中心做野放訓練的大冠鷲（後統稱「壽山鷲」），經過了三週的飛行訓練後，屏科大保育類野生動物收容中心與屏科大鳥類生態研究室合作，為牠上衛星發報器做野放追蹤，在起初拾獲的地點附近做了野放，後因下起連日的大雨，衛星定位幾天沒有動靜，於是在雨中找到壽山鷲的身影，將其帶回後檢查狀態，發現無大礙，也許連日的大雨讓其翅膀濕透了，才造成牠無法飛行停留原地數日的狀況。調養一週後，為避免發生第一次野放時的情況，這次選擇異地野放，卻發現壽山鷲竟又飛回原本拾獲的地點附近，異地野放點與最初拾獲地點相差近 70 公里。這也是第一次記錄到大冠鷲異地野放後再飛回原棲地的資料。後續的追蹤也顯示，這隻大冠鷲一天的移動距離大約不超過 1 km^2，且活動範圍也不超過 1 km^2（屏東科技大學保育野生動物收容中心，2022；屏科大鳥類生態研究室，2022）。

分子親緣

根據 62 隻從臺灣北、中、南、東區域蒐集來的大冠鷲試驗樣本的粒線體 DNA 基因完成的定序分析顯示，臺灣各區域間的大冠鷲之間仍有基因交流現象，無明顯遺傳分化出現，不過北部的大冠鷲族群具有較高的遺傳變異。比對南亞地區同屬的三種猛禽，以及比對印泰大冠鷲亞種的同一個基因序列，顯示不同亞種之間已出現明顯分支，同屬間的不同物種也被獨立分支（許芯芯等人，2022）。



臺灣大冠鷲與其他物種以細胞色素 b 基因序列比較分析後所得之親緣關係樹。圖中臺灣大冠鷲（Crested Serpent Eagle, *Spilornis cheela hoya*）依其細胞色素 b 序列單套型分為 Haplotype

A、B 和 C。括弧內數字表該型所含有的隻數。*Spilornis cheela bumanicus* 為中印交界地區的大冠鷲亞種。*Spilornis holospilus* 為菲律賓蛇鵰（Philippine Serpent Eagle）。*Spilornis rufipectus* 為蘇拉威西島蛇鵰（Sulawesi Serpent Eagle）。*Spilornis elgini* 為安達曼群島蛇鵰（Andaman Serpent Eagle）。*Buteo buteo* 為普通鵟（Common Buzzard）。*Parabuteo unicinctus* 為栗翅鷹（Bay Winged Hawk）。圖中節點上的數字，表示從 1,000 次重採樣所獲得相同結果的百分比（許芯芯等人，2022）。

毒害

大冠鷲主要以蛇類為食，但研究顯示其體內常檢出滅鼠藥殘留，檢出平均濃度為台灣五種常見猛禽中的第二高，顯示主食蛇類的習性使其成為滅鼠藥中毒的高危險群之一，同時也間接證明，滅鼠藥已進入臺灣食物鏈之中。此外，2020 年 10 月至 2021 年 3 月間，共有三起大冠鷲農藥加保扶中毒案例。第一例在南投果園出現中毒症狀，嗉囊灌洗液中驗出加保扶；第二例於台北陽明山，因草皮施用加保扶粒劑防鼠，隨後發現大冠鷲屍體，胃內含蚯蚓與雞母蟲，並驗出加保扶殘留；第三例則在雲林果園，屍體胃內含非洲大蝸牛與澤蟹，肝臟與胃內容物皆驗出加保扶，且檢出高濃度的滅鼠劑可滅鼠，屬於雙重中毒。這些結果顯示，大冠鷲除了可能透過捕食蛇類間接受到鼠藥影響，也會因攝食地表活動的無脊椎動物而遭受農藥急性中毒（洪孝宇等，2022；Hong et. al., 2019）。

研究單位

台灣猛禽研究會、屏科大鳥類生態研究室、臺中市野生動物保育學會、東華大學自然資源與環境學系許育誠副教授研究室

2025 年 13th ARRCN 研討會發表

Hsu, T. C. & Jheng, S. W. (2025). Invasive Species as Breakfast: Predation on the Giant African Snail (*Lissachatina fulica*) by the Crested Serpent-Eagle (*Spilornis cheela*). The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

期刊

繁殖/生活史/食性

林文宏，2005。台北地區大冠鷲的繁殖生態綜論。*台灣猛禽研究*, (5):33-46。

播遷/活動模式

Walther, B. A., Chou, T. C., & Lee, P. F. (2014). Population density, home range, and habitat use of Crested Serpent-Eagles (*Spilornis cheela* hoya) in southern Taiwan: Using distance-based analysis and compositional analysis at different spatial scales. *Journal of Raptor Research*, *48*(3), 195-209.

Chou, T. C., Walther, B. A., & Lee, P. F. (2012). Spacing pattern of the Crested Serpent-eagle (*Spilornis cheela* hoya) in Southern Taiwan. *Taiwania*, *57*(1), 1-13.

分子親緣

許芯芯、丁詩同、曹先紹、詹芳澤、袁孝維、王佩華，2022。臺灣大冠鷲粒線體 DNA 基因選殖定序及以基因分型進行族群遺傳變異分析。*中國畜牧學會會誌* 51(1): 19-42。

毒害

洪孝宇、林惠珊、許雅玟、林德恩、林桂賢、詹芳澤，2022。大冠鷲的農藥加保扶中毒案例。*台灣生物多樣性研究*, *24*(2), 1-16。

Hong, S. Y., Morrissey, C., Lin, H. S., Lin, K. S., Lin, W. L., Yao, C. T., Lin, T. E., Chan, F. T. & Sun, Y. H. (2019). Frequent detection of anticoagulant rodenticides in raptors sampled in Taiwan reflects government rodent control policy. *Science of the Total Environment*, 691:1051-1058.

政府報告

族群趨勢

林大利、邱承慶、潘森識，2025。2024 臺灣國家鳥類報告。社團法人中華民國野鳥學會、農業部生物多樣性研究所。臺灣。

科普文章

曾建偉，2013 年 10 月 22 日。傲視天際的獵人——大冠鷲。環境資訊中心。https://e-info.org.tw/node/94396

社群媒體

衛星追蹤

屏東科技大學保育野生動物收容中心，2022 年 5 月 27 日。大冠鷲野放後去向。Facebook。https://www.facebook.com/ptrc.npust/posts/pfbid036YqPfh37uRDEPfndiph62PuzLzZE8Cgre4h5BchSPhaJ5UfdCz4R3MuazACtjii4l

屏科大鳥類生態研究室，2022 年 6 月 22 日。淺山環境的代表性猛禽--大冠鷲。Facebook。https://www.facebook.com/iwcraptor/posts/pfbid0wpeVqYjtLr1Wwr2RvrH2sSf6Pg4H6HeL37uxdNf6577LfMkuiU1jjUye2BfLC1Bfl

國際發表

期刊

族群趨勢

Manchi, S. S., Kawalkar, D., Patel, S., & Sawant, S. (2021). Occupancy and Population Abundance of Two Serpent-Eagles (*Spilornis elgini* and *S. cheela*) in the Andaman Islands, India. *Journal of Raptor Research*, *55*(4), 594-604.

繁殖/生活史

Gokula, V. (2012). Breeding ecology of the crested serpent eagle *Spilornis cheela* (Latham, 1790)(Aves: Accipitriformes: Accipitridae) in Kolli hills, Tamil Nadu, India. *TAPROBANICA: The Journal of Asian Biodiversity*, *4*(2).

食性/捕食行為

Shepherd, C. R. (2018). Observation of a Crested Serpent Eagle *Spilornis cheela* catching and eating worms on the ground in Peninsular Malaysia. *BirdingASIA*, *29*, 90-91.

分子親緣

Artuti, A. K., Sari, M., Retnaningtyas, R. W., & Listyorini, D. (2020). A phylogenetic analysis of Crested Serpent Eagle *(Spilornis cheela)* based on cytochrome-c oxydase subunit I (COI): a stepping stone towards genetic conservation of raptors in Indonesia. In IOP Conference Series: Earth and Environmental Science (Vol. 590, No. 1, p. 012008). IOP Publishing.

分類

Iqbal, M., Effendi, Z., Kurniawan, C. M. C., Isnandi, I., & Setiawan, D. (2017).Which subspecies of Crested Serpent Eagle *Spilornis cheela* occurs on Bangka island, Sumatra, Indonesia? *BirdingASIA* 27: 102–106.

行為研究

Supratman, L., Istiana, R., Dhania, R., & Zufitrianto, H. (2023). Behavioral Study of Crested Serpent-eagle (*Spilornis cheela*) as Conservation Education in Pusat Suaka Satwa Elang Jawa. *Journal of Tropical Ethnobiology*, *6*(1), 21-30.

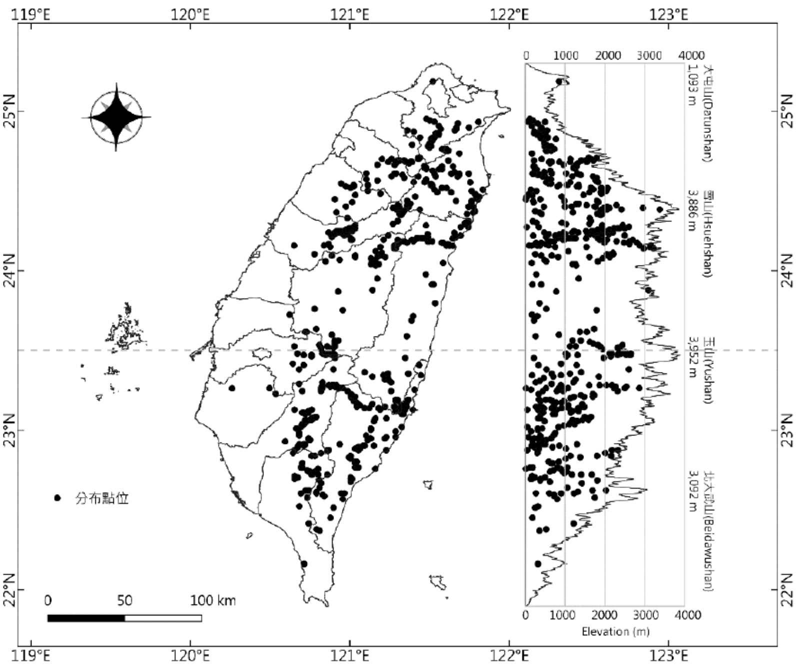
7. 熊鷹

IUCN 紅皮書：NT
臺灣鳥類紅皮書：NVU 易危

台灣發表

族群趨勢、分布與棲息環境

熊鷹主要棲息於海拔 500-3000 公尺之原始林。根據最新發表於 2025 年亞洲猛禽研討會上的分析顯示，台灣猛禽研究會運用 MaxEnt 模型預測熊鷹分布，並採三級分層隨機抽樣選取 90 個 5×5 公里網格，於 2019-2020 年與 2023-2024 年進行全國性調查。套用帶有條件性重複樣本的佔據模型，偵測機率根據有無紀錄估算，並用以修正佔據率。2019-2020 年佔據率為 0.3763（95% CI：0.2653-0.502），總族群數量推估為 328-403 隻；2023-2024 年佔據率為 0.45（95% CI：0.3151-0.5926），總族群數量推估為 590-619 隻。以上研究成果，綜合比對過去 30 年 eBird 熊鷹點位分布資料，發現臺灣熊鷹族群數量有所增加，但南北有差異。南部地區的熊鷹族群沒有明顯的外溢現象，推測與依然面臨狩獵壓力有關；而北部的熊鷹有外擴現象，形成南北兩樣情的現象（Wang et al., 2025; 農業部林業及自然保育署、農業部生物多樣性研究所，2025）。



2012-2021 年間熊鷹在台灣的分布圖（農業部林業及自然保育署、農業部生物多樣性研究所，2025）

繁殖/生活史

熊鷹為臺灣猛禽中較早開始繁殖的猛禽，通常在 2 月產卵，在前一年繁殖季末期的 8 月份，熊鷹就會開始探巢，接著頻繁攜帶巢材築巢，築巢材料種類繁多，例如五葉松、森氏紅淡比、臺灣櫸、紅楠、臺灣土肉桂等都是常見材料，雖然公母鳥皆會攜帶巢材，但主要是母鳥築巢，公鳥提供食物。熊鷹通常一窩產一個卵，3-4 月為雛鳥孵化期，照顧幼雛主要仍是

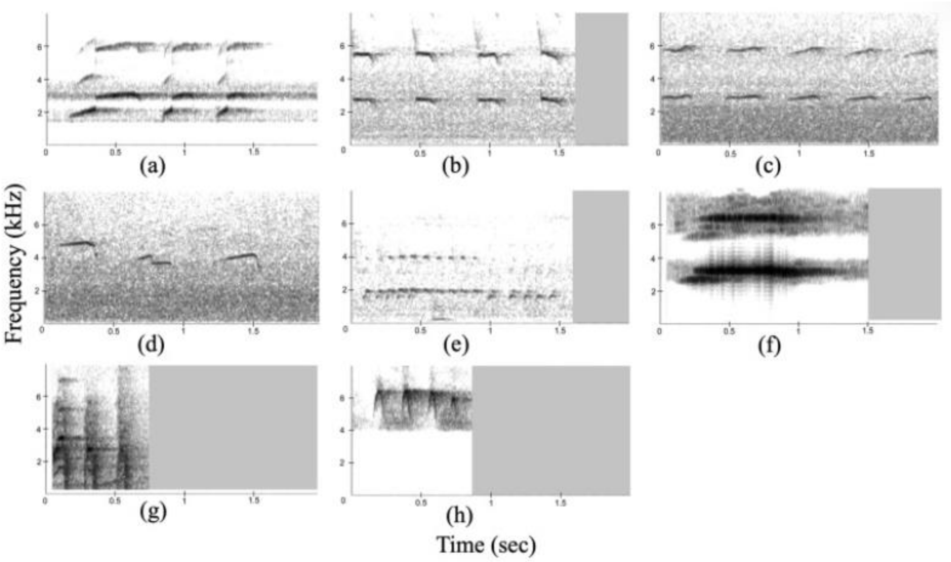
母鳥，公鳥負責供應食物。幼鳥離巢期大約落在 6 月左右，也就是幼鳥孵化後 70 天左右的時間，不過不會離巢太遠，依然由公母鳥輪流提供食物照顧。9-10 月開始，幼鳥會漸漸向外探索，逐漸離開親鳥的活動領域範圍（孫元勳等，2025）。

食性

根據巢位自動相機觀測資料顯示，熊鷹主要以哺乳動物為主食，常見獵物為小山羌、飛鼠、獼猴、松鼠等，鳥類獵物中則以藍腹鷴、野鴿為最主要獵物，不過熊鷹也會捕食蛇類等爬行動物為食。除了自動相機的紀錄外，也有許多原住民獵人曾經目擊熊鷹伸爪進飛鼠洞中，獵捕飛鼠的畫面，白面鼯鼠、大赤鼯鼠及小鼯鼠都是有過的紀錄；也有布農族獵人分享自己曾在打獵時利用樹葉吹出模仿山羌的聲音，引來一隻熊鷹（孫元勳等，2025；黃永坤、孫元勳，2012）。

聲音

研究團隊從 2006 年至 2008 年，沿著台東縣的兩條林道進行穿越線調查，並記錄 2007 與 2010 年兩個繁殖巢位的所有熊鷹鳴叫行為與環境，發現熊鷹至少有七種類型的鳴叫聲，包含飛行叫聲（flying call）、雌鳥乞食聲（female begging call）、幼鳥乞食聲（female begging call）、曾在雄鳥求偶以及正在狩獵台灣獼猴過程等情境下發出的顫音（trill）、親子聯繫叫聲（parent-offspring contact call）、警戒聲（alarm call）、僅在圈養個體記錄過的高音鳴叫（high-pitched call），其中幼鳥乞食聲有記錄到兩型（Huang et. al., 2021）。



臺灣熊鷹各種名叫類型的聲紋圖：(a)飛行叫聲，(b) 雌鳥乞食聲，(c) 幼鳥乞食聲第一型，(d) 幼鳥乞食聲第二型，(e) 顫音，(f) 親子聯繫叫聲，(g) 警戒聲，(h) 高音鳴叫（Huang et. al., 2021b）。

活動模式/衛星追蹤

根據衛星追蹤資料顯示，宜蘭地區的成年熊鷹的活動範圍介於 24.2 ± 4.3 平方公里（n=3，18-27.7 km^2）；南橫地區則介於 23.0 ± 4.3 平方公里（n=4，18-26 km^2）；藤枝森林遊樂區一隻公熊鷹的活動範圍高達 125.9 km^2，該個體偶而會離開平時活動的區域往外探索

（孫元勳等，2025；農業部林業及自然保育署、農業部生物多樣性研究所，2025；黃琮傑，2022）。

分子親緣

日本國內的熊鷹分子親緣研究，揭示東北亞熊鷹族群的遺傳結構差異：日本本州與北海道族群具相似特徵，九州則較特殊；台灣的熊鷹則展現出較高遺傳雜合性，特別是台東與其他區域差異明顯，顯示可能存在外來遺傳基因交流（Naito-Liederbach, 2025）。臺灣的熊鷹系統分類計畫正在進行中，不久的將來，棲居臺灣島上的熊鷹的分類地位或許將有新的發現（農業部林業及自然保育署、農業部生物多樣性研究所，2025）。

民族鳥類學

熊鷹在台灣的原住民文化中佔有重要的地位，尤其在排灣族和魯凱族的文化中。以排灣族來說，熊鷹在排灣語中叫 qadis，不過當熊鷹攻擊人時，牠也可以被叫做 vangalan（兇猛的敵人），看到熊鷹在山崖上空盤旋時，以 drulitian（在山脊上方盤旋）稱呼熊鷹。從語言上就能看出正是因為熊鷹的生態習性，牠既是強大具有威脅的敵人，也象徵部落首領的威嚴與責任，因此，配戴熊鷹羽毛也象徵著部落頭目受人尊敬的地位。

傳統上，不是所有人都能配戴熊鷹羽毛，只有頭目和為部落做出貢獻的人才能配戴，且每個階級能配戴的羽毛部位不同，例如頭目可以配戴最長的初級飛羽。而羽毛在頭目和貴族的婚禮中尤其重要，會特別配戴類似百步蛇紋路，白底之上有許多黑色三角形紋樣的羽毛。也因為配戴的嚴格規範，熊鷹在傳統上都不是能隨意捕抓獵殺的對象。

不過隨著台灣整體社會經濟環境的巨變，原住民傳統文化也隨之流失，如今的熊鷹羽毛可以透過金錢買賣，從獵人、中盤商或是在藝品店購得羽毛，而且價格隨著熊鷹族群數量的下降，越來越昂貴。如今，配戴羽毛象徵的是社會地位和財富，而非傳統的部落階級（Huang et. al., 2021a；Taiban et. al., 2019）。

教育推廣現狀：熊鷹保育論壇與溝通/仿真羽毛/熊鷹羽毛庫

除了棲地減少以外，盜獵壓力為熊鷹族群主要減少的原因。為了在傳統文化和保育之間取得平衡，除了持續進行熊鷹生態與人文研究，包含熊鷹生活史、棲地需求、族群監測，以及持續監測獵捕壓力外，研究人員從 2007 年開始，開始與部落溝通並合作展開「熊鷹羽毛庫」，收集圈養或救傷個體自然脫落的羽毛，供需要的人借用，以滿足傳統禮俗之需求。與此同時，屏科大研究團隊也在農業部林業及自然保育署屏東分署的支持下，與藝術家合作，在鵝毛上彩繪熊鷹羽毛的花色，製作「熊鷹仿真羽毛」，並舉辦熊鷹保育論壇與仿真羽毛工作坊，持續與部落溝通合作（孫元勳等，2025；孫元勳，2021）。

研究單位

屏科大鳥類生態研究室、屏東科技大學森林系吳幸如助理教授研究室、台灣猛禽研究會、嘉大棲地生態研究室

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孫元勳，2023。熊鷹族群生態與保育（二）。112 年度農業部林業及自然保育署林業發展計畫執行成果報告書。

孫元勳，2022。熊鷹族群生態與保育（一）。行政院農業委員會林務局 111 年度林業發展計畫執行成果報告。

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孫元勳，2020。108-109 年度玉山國家公園熊鷹族群生態與周邊布農部落之關聯 2/2。109 年度玉山國家公園管理處計畫執行報告。

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食性/捕食行為

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播遷/活動模式

Nishibayashi, N., Kitamura, W., & Yoshizaki, S. (2022). Comparison of the home ranges of Mountain Hawk-Eagles during different phases of wind farm construction. *Ornithological Science*, *21*(1), 63-70.

棲地環境

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8. 林鵰

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NNT 接近受脅

台灣發表

族群趨勢

林鵰是台灣在文字記錄上最晚被記錄的留鳥。台灣猛禽研究會從 1994 年成立，便開始林鵰的觀察紀錄，截至 2024 年底，已累積 30 年共 6503 筆紀錄資料。若對林鵰的分布範圍進行分析，將台灣島分成 1,609 個 5 公里 × 5 公里網格，1999 年底僅有 168 個網格（10.4%）有紀錄，但到了 2024 年底，則增加至 651 個網格（40.5%）。2024 年的網格數已比 1999 年高出 3.9 倍。而若以行政區劃來看，台灣共有 352 個鄉鎮，1999 年底僅 60 個鄉鎮（17.1%）有紀錄，但到 2024 年底增加至 180 個鄉鎮（51.1%）。在 25 年內，數量增加了三倍，現在已超過總鄉鎮數的一半。

若單從目擊記錄數量來看，從 2010 年開始，林鵰在低海拔的目擊記錄逐漸增加，甚至出現在山腳與平原地區，顯示林鵰已適應村落、城鎮的環境，林鵰已逐漸從瀕危物種轉變為郊區常見物種（Lin, 2025）。

繁殖/棲地/食性

根據早期的紀錄，林鵰常在 500-1500 公尺的深山至淺山過度棲地活動，偏好築巢在原生闊葉樹上的巢狀蕨類，捕食森林上層其他動物，例如飛鼠、松鼠等（林文宏、何華仁，2010）。不過自從 2010 年開始，低海拔的目擊記錄增加，林鵰不僅逐漸適應村落環境，也開始有目擊記錄觀測到林鵰在檳榔樹及椰子樹林中覓食，捕食樹上築巢的赤腹松鼠及紅鳩（Lin, 2025）。

活動模式/研究方法

林鵰因為隱密的生活習性，使得研究具挑戰性，不過，一隻無尾的林鵰意外成為研究方法上的突破口。透過在臉書社群上蒐集 2013-2016 年間這隻無尾林鵰的目擊照片，彙整這隻林鵰的活動模式，發現其有季節性移動行為，春季在大屯與觀音山區活動，秋季則向南飛至烏來棲息。依季節計算其活動範圍，春季為 54.1km^2，秋季則為 47.1 km^2。這筆公民科學成果不但是台灣第一次的林鵰活動模式研究，也是國際上第一篇正式發表的林鵰活動模式研究（Lin et. al., 2021）。

屏科大鳥類生態研究室於 2020-2022 年，在玉山國家公園地區繫放並追蹤一隻林鵰幼鳥，其擴散的活動範圍（MCP）達 7348 km^2，橫跨南投、雲林、嘉義、台南、高雄、屏東及台東多地。此林鵰幼鳥大部分的活動時間從早上 9 點開始，在 10 點時達到活動高峰，此段區間通常有 70%的時間在飛行，14 點之後開始遞減（孫元勳，2023）。

研究單位

台灣猛禽研究會、屏科大鳥類生態研究室

2025 年 13th ARRCN 研討會發表

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9. 花鵰

IUCN 紅皮書：VU 易危
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

期刊

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棲地環境

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10. 靴隼鵰

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

期刊

族群趨勢

Surdo, S., Galasso, P., Cusimano, C., Reale, M., & Zafarana, M. A. (2022). Citizen science project to monitor wildlife: a first census of wintering Booted Eagle *Hieraaetus pennatus* in Sicily. *Rivista Italiana di Ornitologia*, *92*(2), 33-38.

繁殖/生活史

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遷徙

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環境棲地

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Lerner, H. R., Christidis, L., Gamauf, A., Griffiths, C., Haring, E., Huddleston, C. J., ... & Gjershaug, J. O. (2017). Phylogeny and new taxonomy of the Booted Eagles (Accipitriformes: Aquilinae). *Zootaxa*, 4216(4):301-320.

形質測量

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Bosch, J., Mestre, J., Baiges, C., Martínez, J. E., Calvo, J. F., & Jiménez-Franco, M. V. (2019). Colour plumage polymorphism in the Booted Eagle: inheritance pattern and temporal stability of the morph frequencies. *Journal of Zoology*, *308*(3), 212-220.

11. 白肩鵰

IUCN 紅皮書：VU 易危
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

期刊

繁殖/生活史

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食性/捕食行為

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播遷/活動模式

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遷徙

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棲地環境

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威脅

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Kovács, E., Fabók, V., Kalóczkai, Á., & Hansen, H. P. (2016). Towards understanding and resolving the conflict related to the Eastern Imperial Eagle (*Aquila heliaca*) conservation with participatory management planning. *Land Use Policy*, *54*, 158-168.

12.金鵰

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

根據 2025 年亞洲猛禽研討會日本的國家報告，金鵰目前是日本最瀕危的猛禽物種，全日本僅剩下 500 隻個體、200 對繁殖對。繁殖成功率也逐漸下降，從 1981-1990 年的 44%，1999-2000 年的 25%，2001-2010 年的 26%，到 2011-2020 年，僅剩 17%。有預測模型指出，金鵰極有可能於 2050 年在日本滅絕。造成金鵰數量下降的原因推測為因農損而驅除大型哺乳動物的狩獵用鉛彈中毒、開發及綠能設置導致的棲地喪失等原因。目前日本政府計畫在 2030 年前將鉛彈導致的鳥類鉛中毒事件降至零，且正在執行金鵰動物園圈養繁殖野放計畫，期望透過修改法規及人工繁殖的方式，讓金鵰的族群恢復（Azuma, 2025）。

2025 年 13th ARRCN 研討會發表

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繁殖/生活史

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食性/捕食行為

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播遷/活動模式

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Whitfield, D. P., Fielding, A. H., Anderson, D., Benn, S., Reid, R., Tingay, R., & Weston, E. (2024). Sex difference in natal dispersal distances of Golden Eagles *Aquila chrysaetos* in Scotland. *Ibis*, *166*(1), 146-155.

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遷徙

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棲地環境

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威脅

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風機議題

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考古人類學

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Gjershaug, J. O., Halley, D., & Stokke, B. G. (2019). Predefinitive plumage in the golden eagle (*Aquila chrysaetos*): a signal of aggression or submission?. *Journal of Raptor Research*, *53*(4), 431-435.

13. 白腹鵰

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

期刊

族群趨勢

Redondo-Gomez, D., Bautista, J., Gil-Sánchez, J. M., Parés, F., Hernandez-Matias, A., Resano-Mayor, J., ... & Moleon, M. (2022). Towards accurate and simple morphometric sex differentiation in Bonelli's Eagle *Aquila fasciata* nestlings: Interpopulation variations and influence of growth conditions. *Avian Biology Research*, *15*(1), 3-12.

繁殖/生活史

Viollat, L., Millon, A., Ponchon, C., Ravayrol, A., Couturier, T., & Besnard, A. (2024). Both movements and breeding performance are affected by individual experience in the Bonelli's eagle *Aquila fasciata*. *Ecology and Evolution*, *14*(7), e70081.

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食性/捕食行為

Di Vittorio, M., Valvo, M. L., Di Trapani, E., Sanguinetti, A., Ciaccio, A., Grenci, S., ... & López-López, P. (2019). Long-term changes in the breeding period diet of Bonelli's eagle (*Aquila fasciata*) in Sicily, Italy. *Wildlife Research*, *46*(5), 409-414.

播遷/活動模式

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棲地環境

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威脅

Vicedo, T., Navas, I., María-Mojica, P., & García-Fernández, A. J. (2024). Widespread use of anticoagulant rodenticides in agricultural and urban environments. A menace to the viability of the endangered Bonelli's eagle (*Aquila fasciata*) populations. *Environmental Pollution*, *358*, 124530.

López-Peinado, A., Urios, V., & López-López, P. (2024). A comprehensive analysis of spatial and temporal patterns of anthropogenic adult mortality of Bonelli's eagles in eastern Spain. *The Journal of Wildlife Management*, *88*(8), e22643.

Gil-Sánchez, J. M., Molleda, S., Sánchez-Zapata, J. A., Bautista, J., Navas, I., Godinho, R., ... & Moleón, M. (2018). From sport hunting to breeding success: Patterns of lead ammunition ingestion and its effects on an endangered raptor. *Science of the Total Environment*, *613*, 483-491.

Hernández-Matías, A., Real, J., Parés, F., & Pradel, R. (2015). Electrocution threatens the viability of populations of the endangered Bonelli's eagle (*Aquila fasciata*) in Southern Europe. *Biological Conservation*, *191*, 110-116.

考古人類學

Moleón, M., Graciá, E., García, N., Gil-Sánchez, J. M., Godinho, R., Beja, P., ... & Sánchez-Zapata, J. A. (2024). Wildlife following people: A multidisciplinary assessment of the ancient colonization of the Mediterranean Basin by a long-lived raptor. *People and Nature* 6(3):1303-1319.

14. 灰面鵟鷹

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NLC

台灣發表

族群趨勢

灰面鵟鷹為每年春秋兩季過境台灣的遷徙猛禽。墾丁社頂自然公園凌霄亭為秋季灰面鵟鷹過境期重要的計數調查地點，從 1989 年起，已累積超過 30 年的計數資料，而台灣猛禽研究會則從 2004 年起開始承接每年的過境猛禽調查，根據歷年的調查結果，每年十月平均約有 50,000 隻灰面鵟鷹過境恆春半島，且族群呈現成長趨勢；在 2025 年的調查總計 104,721 隻通過恆春半島，創 30 年來數據的新高（Tsai et. al., 2025 ）。

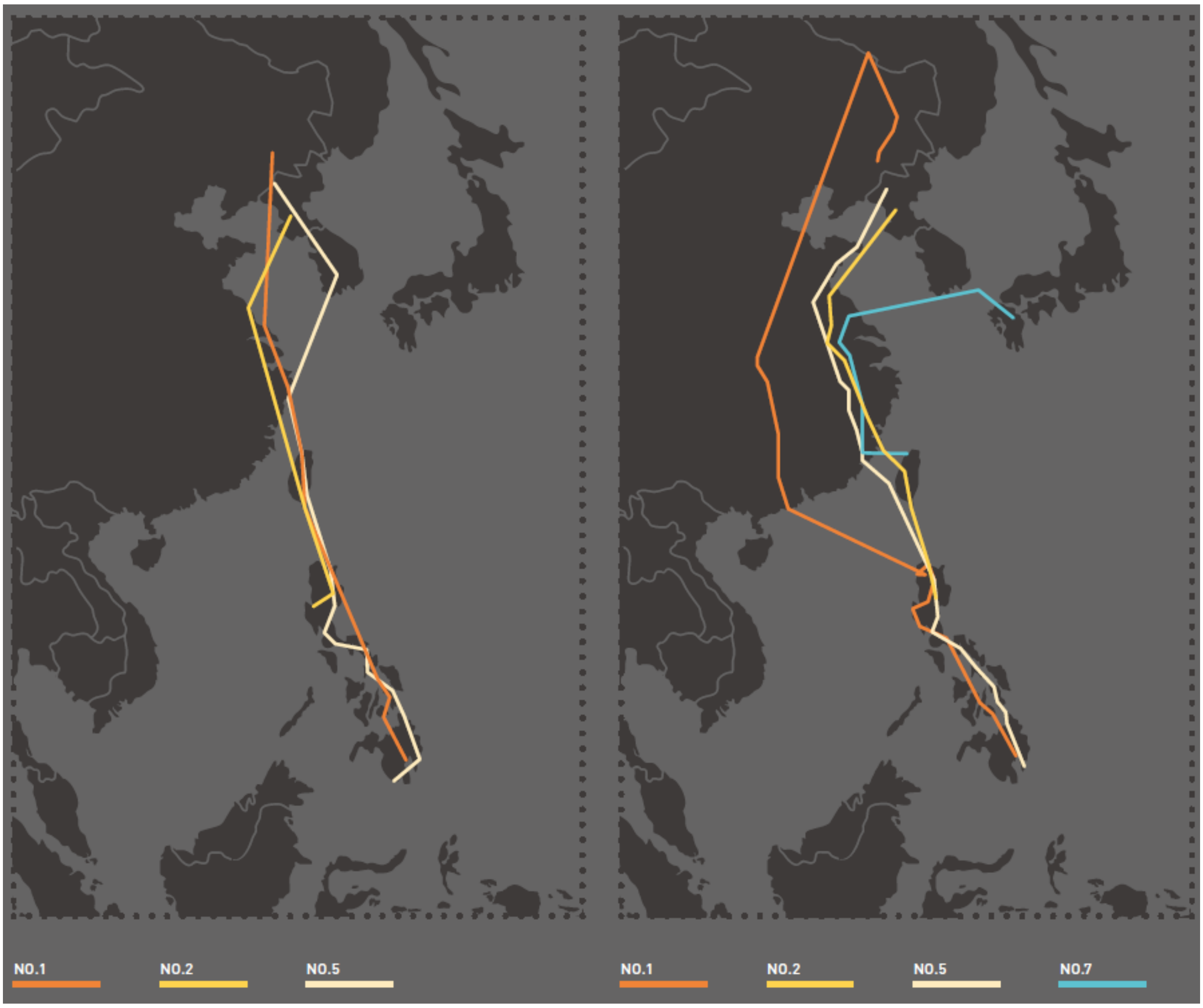
2004-2025 年灰面鵟鷹過境數量及主要過境期（台灣猛禽研究會，2025）。

遷徙模式

2008-2009 年的灰面鵟鷹衛星追蹤計畫，揭開過境台灣的灰面鵟鷹遷徙之謎。灰面鵟鷹夏季在中國東北、韓半島及日本等地繁殖，在中國東北、韓國繁殖的灰面鵟鷹通常會沿著中

國沿岸遷徙，過境台灣後，遷徙至菲律賓度冬（劉小如，2008）；而在日本繁殖的灰面鵟鷹多會沿著琉球群島，經過台灣後，再飛向菲律賓度冬，灰面鵟鷹選擇的遷徙路徑除了受到陸地遠近的遠近影響外，也容易受到遷徙時的風向影響。（Nourani et. al., 2018）。

除了自行遷徙外，2023 年 3 月在一艘航行於巴士海峽的船隻上，記錄到約 40 隻灰面鵟鷹，在黃昏時降落至船上夜棲休息，「搭便船」北返，並於隔天清晨五點離開。由於這些灰面鵟鷹並未在天氣差時降落，從外觀觀察，也並未呈現虛弱的身體狀況，因此判斷這群灰面鵟鷹是有意識地選擇乘船遷徙，顯示出灰面鵟鷹或許已經發展出新的長距離遷徙方法（Wu et. al., 2024）。



《2020 臺灣國家鳥類報告》中灰面鵟鷹編號 1、2、5 號個體之秋季（左）及春季（右）遷移路徑（台灣猛禽研究會，2020；取自林大利等，2020）。

繁殖地、度冬地生態棲位模式

由嘉大棲地生態研究室、台灣猛禽研究會及韓國慶熙大學合作的衛星追蹤研究，除了持續研究灰面鵟鷹遷徙模式外，也藉此分析灰面鵟鷹於度冬地及繁殖地的生態棲位模型分析。

若遷徙物種具有生態棲位保守性（niche conservatism），也就是在繁殖地與度冬地使用環境條件相似的棲地，可降低因適應不同環境而需進行季節性棲位轉換所帶來的成本，以抵

銷長距離遷徙付出的代價。因此，判斷一物種是否展現棲位保守性，可以理解其如何因應氣候變遷與土地利用變化。研究結果由研究者共同發表於 2025 年亞洲猛禽研討會。

研究結果顯示，灰面鵟鷹傾向於使用與繁殖地相似的環境特徵，暗示其透過維持穩定的棲位選擇，降低季節性環境轉換的適應成本，此項發現將有助於制定亞洲遷徙猛禽的保育與管理策略，並促進國際合作的推動方向（Choi et. al., 2025）。

教育推廣現狀：過境賞鷹/環境教育

早期因為生活條件較差，每年過境台灣的灰面鵟鷹成為居民難得的肉類來源，隨著經濟逐漸好轉，鷹肉逐漸不被視為蛋白質補充品。不過隨著日本國內於 1970 年代禁止獵捕灰面鵟鷹，日本國內依然流行猛禽標本，因此日本商人轉而從台灣進口猛禽標本，此時在台灣獵捕灰面鵟鷹的用途轉而出口標本用。

台灣於 1994 年成為美國培利修正案第一個制裁對象後，保育能量大增，除了修改《野生動物保育法》、加大執法力度外，也包含民間單位大力推行的生態教育。配合墾丁國家公園帶動的觀光資源與生態旅遊政策，墾丁國家公園管理處、林務局及中央政府等單位投入大量資金進入當地社區，生態保育人士執行灰面鵟鷹的計數調查工作於 1989 年起持續進行至今，在地學校則開始推行灰面鵟鷹生態教育，逐漸建立新的保育價值觀給下一代，並培養在地居民擔任生態教育解說員。

此外，也集結曾經是灰面鵟鷹獵人的在地人組成護鷹巡守隊，取締非法狩獵，創造另類經濟價值。以上述綜合方法，逐漸改變全鄉的組織、利益分配與觀念，這才逐漸扭轉過往狩獵灰面鵟鷹的習慣，建立現今的保育生態政治（湯京平、張元嘉，2013）。

研究單位

台灣猛禽研究會、嘉大棲地生態研究室、高雄醫學大學生物醫學暨環境生物學系陳炤杰副教授研究室

2025 年 13th ARRCN 研討會發表

Tsai, Y.H., Lee, I. H., Lin, C. K., Tseng, C. W. (2025). Long-Term Monitoring of Migratory Raptors in Taiwan: Population Trends and Conservation Implications. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

Choi, H. J., Kim, H., Go, J., Choi, C. Y., Tsai, J. Z., Lyu, J. J., Tsai, Y. H., Choi, C. Y. (2025). Testing Niche Conservatism in the Grey-faced Buzzard (*Butastur indicus*), a Migratory Raptor Species Breeding in Korea. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

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族群趨勢

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棲地環境

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保育政治

Ouano, N. B., Baddu, V. D., & Tabian, J. L. T. (2022). Historical–Biographical Study on Grey-Faced Buzzard (*Butastur indicus*) from the Perspectives of the Old Folks in Sanchez Mira, Cagayan, Philippines. *Indian Journal of Science and Technology*, *15*(6), 259-265.

形質測量

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方法學

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15. 西方澤鵟

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

期刊

族群趨勢

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遷徙

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Agostini, N., Chiatante, G., Dell'Omo, G., & Panuccio, M. (2021). Differential autumn migration between sex and age groups in the Western marsh harrier: a longitudinal pattern analysis. *Ethology Ecology & Evolution*, *33*(1), 73-82.

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棲地環境

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救傷/獸醫學

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16. 東方澤鵟

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表

族群趨勢

墾丁社頂自然公園凌霄亭為秋季猛禽過境期重要的計數調查地點，從 1989 年起累積超過 30 年的計數資料，而台灣猛禽研究會則從 2004 年起開始承接每年的過境猛禽調查，根據歷年的調查結果，東方澤鵟的數量有顯著波動，相較起前十年的調查數量，近十年東方澤鵟數量有明顯上升趨勢，值得未來持續觀測及研究（Tsai et. al., 2025 ）。

2025 年 13th ARRCN 研討會發表

Tsai, Y. H., Lee, I H., Lin, C. K., Tseng, C. W. (2025). Long-Term Monitoring of Migratory Raptors in Taiwan: Population Trends and Conservation Implications. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

國際發表

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繁殖/生活史

Senzaki, M., Yamaura, Y., & Nakamura, F. (2017). Predicting off-site impacts on breeding success of the marsh harrier. *The Journal of Wildlife Management*, *81*(6), 973-981.

Senzaki, M., Yamaura, Y., & Nakamura, F. (2015). The usefulness of top predators as biodiversity surrogates indicated by the relationship between the reproductive outputs of raptors and other bird species. *Biological Conservation*, *191*, 460-468.

棲地環境

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分子親緣

Nagai, K., Takahashi, Y., Yamazaki, S., & Azuma, A. (2018). Analysis of the genetic diversity and structure of the Eastern Marsh Harrier in Japan using mitochondrial DNA. *Journal of ornithology*, *159*, 73-78.

Oatley, G., Simmons, R. E., & Fuchs, J. (2015). A molecular phylogeny of the harriers (*Circus, Accipitridae*) indicate the role of long distance dispersal and migration in diversification. *Molecular phylogenetics and evolution*, *85*, 150-160.

17. 灰澤鵟

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表

遷徙/衛星追蹤

灰澤鵟在亞洲的研究極少。臺中市野生動物保育學會於 2022 和 2023 年，在救傷野放的一公一母共兩隻灰澤鵟身上放上衛星發報器追蹤，後來紀錄雄鳥的完整遷徙路徑，初步追蹤研究成果則於 2025 年以海報形式發表於第十三屆亞洲猛禽研討會上。衛星追蹤資料顯示，灰澤鵟在四月從桃園新竹一帶出海到中國，接著沿著海岸省份轉向朝鮮半島，再進入俄羅斯繁殖，總計花費一個月的時間抵達俄羅斯東部；九月則幾乎沿著原路線南遷，抵達台灣。灰澤鵟單趟飛行距離約為 3,500 公里，一年的遷移距離約 7,000 公里（Hsu et. al., 2025；臺中市野生動物保育學會，2024）。

臺中市野生動物保育學會於 2022 及 2023 年追蹤救傷後野放之灰澤鵟的遷徙路徑圖（臺中市野生動物保育學會，2024）。

研究單位

臺中市野生動物保育學會

2025 年 13th ARRCN 研討會發表

Hsu C. C., Hsu, C. H., Deng, Y. W., Lin, W. L. (2025). Migration Route of a Male Hen harrier *Circus cyaneus* in Taiwan. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

社群媒體

臺中市野生動物保育學會，2024 年 5 月 11 日。5/11 國際候鳥日-灰澤鵟的遷徙路徑。Facebook。
https://www.facebook.com/photo.php?fbid=822360469916564&id=100064278565542&set=a.458376809648267

國際發表

期刊

食性

Ludwig, S. C., McCluskie, A., Keane, P., Barlow, C., Francksen, R. M., Bubb, D., ... & Baines, D. (2018). Diversionary feeding and nestling diet of Hen Harriers *Circus cyaneus*. *Bird Study*, *65*(4), 431-443.

繁殖/生活史

Caravaggi, A., Irwin, S., Lusby, J., Ruddock, M., O'Toole, L., Mee, A., ... & O'Halloran, J. (2019). Factors influencing Hen Harrier *Circus cyaneus* territory site selection and breeding success. *Bird Study*, *66*(3), 366-377.

Redpath, S., Thompson, A., & Amar, A. (2017). Female begging calls reflect nutritional need of nestlings in the hen harrier *Circus cyaneus*. *BMC Evolutionary Biology*, *17*, 1-8.

遷徙

Morollón, S., García-Macía, J., Onrubia, A., Lee, S., & Urios, V. (2024). Migration patterns of breeding Hen Harriers *Circus cyaneus* in Spain. *Bird Study*, *71*(1), 40-47.

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棲地環境

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Caravaggi, A., Irwin, S., Lusby, J., McCarthy, A., Mee, A., Nagle, T., & O’Halloran, J. (2020). Forest management and Hen Harrier *Circus cyaneus* conservation in Ireland. *Irish Birds*, *42*, 1-12.

O’Donoghue, B. G. (2020). Hen Harrier *Circus cyaneus* ecology and conservation during the non-breeding season in Ireland. *Bird Study*, *67*(3), 344-359.

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Geary, M., Haworth, P. F., & Fielding, A. H. (2018). Hen harrier *Circus cyaneus* nest sites on the Isle of Mull are associated with habitat mosaics and constrained by topography. *Bird Study*, *65*(1), 62-71.

分子親緣

Choi, E. H., Enkhtsetseg, G., Baek, S. Y., Hwang, J., Park, B., Jang, K. H., ... & Hwang, U. W. (2021). Complete mitochondrial genome of a hen harrier *Circus cyaneus* (Accipitriformes: Accipitridae) from South Korea. *Mitochondrial DNA Part B*, *6*(1), 185-186.

形質測量

Pecsics, T., Marx, A., & Csörgő, T. (2021). The possible occurrence of cranial asymmetry in three harrier (Accipitridae:) species. *Ornis Hungarica*, *29*(1), 139-148.

再引入議題

Marino, F., Crowley, S. L., Foley, N. A. W., McDonald, R. A., & Hodgson, D. J. (2024). The transformative potential of local stakeholder engagement in the reintroduction of a contested species. *Biological Conservation*, *296*, 110688.

保育政治

Lusby, J., Fernández-Bellon, D., & Kavanagh, L. (2024). Review of mitigation measures for the protection of Hen Harrier and Merlin from forest management disturbances and recommendations for improvements to protection procedures.

Ewing, S. R., Thomas, C. E., Butcher, N., Denman, B., Douglas, D. J., Anderson, D. I., ... & Wilson, J. D. (2023). Illegal killing associated with gamebird management accounts for up to three-quarters of annual mortality in Hen Harriers *Circus cyaneus*. *Biological Conservation*, *283*, 110072.

Marino, F., Crowley, S. L., Williams Foley, N. A., McDonald, R. A., & Hodgson, D. J. (2023). Stakeholder discourse coalitions and polarisation in the hen harrier conservation debate in news media. *People and Nature*, *5*(2), 668-683.

Fernandez-Bellon, D., Lusby, J., Bos, J., Schaub, T., Mccarthy, A., Caravaggi, A., ... & O’halloran, J. O. H. N. (2021). Expert knowledge assessment of threats and conservation strategies for breeding Hen Harrier and Short-eared Owl across Europe. *Bird Conservation International*, *31*(2), 268-285.

St John, F. A., Steadman, J., Austen, G., & Redpath, S. M. (2019). Value diversity and conservation conflict: Lessons from the management of red grouse and hen harriers in England. *People and Nature*, *1*(1), 6-17.

Wotton, S. R., Bladwell, S., Mattingley, W., Morris, N. G., Raw, D., Ruddock, M., ... & Eaton, M. A. (2018). Status of the Hen Harrier *Circus cyaneus* in the UK and Isle of Man in 2016. *Bird Study*, *65*(2), 145-160.

風機議題

Wilson, M. W., Fernández-Bellon, D., Irwin, S., & O'Halloran, J. (2017). Hen Harrier *Circus cyaneus* population trends in relation to wind farms. *Bird Study*, *64*(1), 20-29.

18. 花澤鵟

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表

社群媒體

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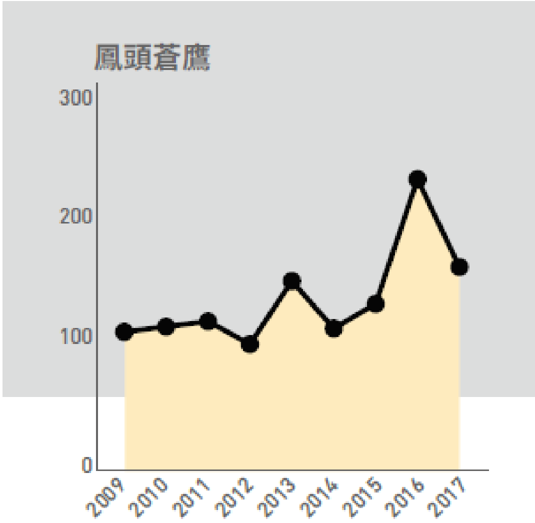
19. 鳳頭蒼鷹

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NLC

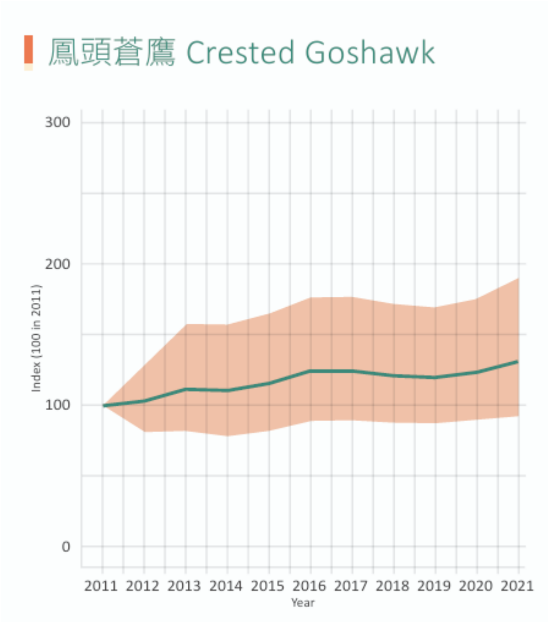
台灣發表

族群趨勢

根據臺灣繁殖鳥類大調查的資料顯示，鳳頭蒼鷹為台灣族群量明顯增加的三種猛禽之一，並且鳳頭蒼鷹自 2000 年代開始，逐漸適應台灣的都市環境，在都市建立穩定的繁殖族群（林大利等，2020）。



《2020 臺灣國家鳥類報告》中 2009-2017 年鳳頭蒼鷹族群趨勢圖，資料來源：臺灣繁殖鳥類大調查（林大利等，2020）。



《2024 臺灣國家鳥類報告》中 2011-2021 年鳳頭蒼鷹族群趨勢圖，綠線為中位數、 橘色範圍分別為 2.5 百分位及 97.5 百分位。資料來源：臺灣繁殖鳥類大調查（林大利、邱承慶、潘森識，2025）

繁殖/棲地環境/生活史

鳳頭蒼鷹為目前台灣唯一從郊區自然擴散到都市地區繁殖的日行性猛禽。林業試驗所與台灣猛禽研究會於 2020-2021 年以徒步方式尋找台北市區公園、校園及行道樹上隻鳳頭蒼鷹的巢位，測量繁殖巢樹、其所在棲地並記錄繁殖狀況。結果顯示在台北市繁殖的鳳頭蒼鷹巢位通常在都市化程度相對較低的地區（例如人造鋪面比例低、離道路和建物距離遠，且具穩定水源較近），且有較大面積樹林覆蓋的地點，樹林面積大約是半徑 150 與 300m（蕭明堂等，2022）。

-草稿-

2014-2016 年間，猛禽會紀錄北台灣鳳頭蒼鷹的 34 個繁殖巢位時，也記錄其生命史：產卵期為 3 月中至 4 月初，幼鳥自 6 月開始離巢，三 年共有 48 隻幼鳥成功離巢，平均繁殖成功率為 89%（陳恩理，2014）。

食性

2020 年 5-7 月，鳳頭蒼鷹的繁殖季期間，林業試驗所與台灣猛禽研究會在台北植物園架設自動相機監測一個鳳頭蒼鷹巢位，紀錄育雛期間的食物內容。在 1250 小時的影片中，共有 152 筆食物，並確認 9 種鳥類、3 種哺乳類及 1 種蜥蜴等物種。鳥類最常出現佔 50%，其中鳩鴿科鳥類佔一半；哺乳類生物量最大佔 58%，其中溝鼠(*Rattus norvegicus*)佔 83.2%；而 150~250g 及 50~100g 是最常見的獵物尺寸，共佔 57%。每日供食自日出開始，至日落後 1 小時內結束，供食生物量在清晨及傍晚有明顯的雙峰型態（葛兆年等，2021）。

2014-2016 年間，台灣猛禽研究會紀錄北台灣鳳頭蒼鷹的 34 個繁殖巢位時，也同樣以自動相機錄影監測，記錄到育雛期間，母鳥主要負責在巢區中育雛，公鳥則負責提供食物，並收集到 943 筆食性紀錄：動物為主，鳥類以麻雀、鳩鴿科及八哥屬最多，哺乳類以溝鼠數量最多（陳恩理，2014）。

兩份食性研究顯示，北台灣都市內的鳳頭蒼鷹主要以鳩鴿科鳥類及哺乳動物溝鼠為主要食物。

活動模式

2021 年台灣猛禽研究會為一隻救傷後野放的雄性鳳頭蒼鷹佩戴 GPS/GSM 發報器，以研究都會鳳頭蒼鷹的移動模式。三年的追蹤資料顯示，發報器每年僅於 2 月至 9 月期間傳回資料，其中 85.56% 的資料集中在 4 月至 7 月，顯示該個體在繁殖季期間活動較頻繁，使太陽能發報器能獲得較充足日照以進行充電與資料傳輸。根據 2022 與 2023 年的資料，我們計算了此個體的棲地範圍，合併兩年的資料後，AKDE95 為 0.8591 km^2（95%CI: 0.7398-0.9873），AKDE50 為 0.1228 km^2（95%CI: 0.1058-0.1411）。鳳頭蒼鷹主要棲息於道路附近，而非公園或綠地之中（Wang et. al., 2025a）。

除了衛星發報器追蹤之外，台灣猛禽研究會為了進行個體辨識，深入了解在都市繁殖的鳳頭蒼鷹生態與移動模式，於 2014 年起，在北臺灣展開巢位監測與個體繫放。此外，從 2017 年 RRGT 猛禽救傷站成立後，所有救傷後野放的鳳頭蒼鷹皆會配戴塑膠色環。到 2024 年 12 月為止，總共有 268 隻個體完成繫放，確認死亡 22 隻。

2017 年，開始鼓勵民眾透過線上表單回報色環紀錄。目前共收到 109 筆、49 個體的回報，佔所有繫放鳥的 18.28%，較 2020 年略有增加。在這些個體中，22 隻被觀察到一次（44.9%），27 隻被多次觀察（55.1%）。自 2020 年以來回報最頻繁的三隻個體皆為公鳥：紅 69、紅 28 及綠 15，各有五筆紀錄，其中紅 69 的最新紀錄顯示其正在築巢。2020 年後移動距離最長的紀錄為雌鳥藍 H1。此個體於 2023 年在大安森林公園巢位被繫放，隔年 4 月首次出現在民生公園，之後又於同年年底出現在淡江大學，直線距離約 20 km，之後持續於淡江校園內出現。紀錄最久的繫放個體是 2016 年繫放的雄鳥紅 96，GPS 資料顯示其仍活躍於臺北市大同區（Wang et. al., 2025b）。

救傷議題

根據台灣猛禽研究會於 2017-2024 年的救傷資料，共 188 隻猛禽疑似或確認窗殺（撞擊玻璃），其中日行性猛禽佔 65.96%，鳳頭蒼鷹不僅是日行性撞擊個案中最多的物種，且多為未成年個體，臨床症狀以後肢癱瘓最為常見，病理解剖顯示胸椎前段常有骨折或裂痕，顯示高速撞擊造成的脊椎與神經損傷為主要致傷原因。儘管玻璃撞擊僅占救傷案例中的不到兩成，且野放超過七成，但相較於到院即死亡的個體，後者的體況通常較佳，這顯示體況較佳的個體更可能在撞擊後當場死亡而未進入救援系統，顯示僅統計救援資料可能低估實際死亡率（Wang, 2025a）。公民科學資料也證實窗殺威脅的普遍性。過去十年間超過 2,600 件窗殺案例中，有 281 件是猛禽，鳳頭蒼鷹即佔 156 件，為所有猛禽中通報頻率最高，且在全台鳥撞玻璃紀錄中排名第三（Hsieh, 2025; Wang et. al., 2025c）。

在中毒風險方面，2019-2024 年的毒物檢測中，在未接受長期維他命 K 治療的 106 隻猛禽內，鳳頭蒼鷹的殺鼠劑檢出率高達 79.07%，僅次於黑鳶，顯示其在都市及農村環境中面臨高風險的二級中毒威脅。此結果支持在救傷程序中，即便未出現貧血或出血跡象，仍宜對高風險物種採取兩週以上的預防性維他命 K 治療（Wang, 2025b）。

滋擾/行為學

過去在鳳頭蒼鷹繁殖巢的食性研究中，領角鴞 (*Otus lettia*) 是最主要的鳥類獵物，推測鳳頭蒼鷹捕食領角鴞可能是憑藉著某種訊號：藉由小型鳴禽對領角鴞的群聚警戒叫聲來發現領角鴞躲藏的地點並捕食之。為了證明這個假說，研究人員利用領角鴞及鳳頭蒼鷹的標本，來進行小型鳴禽群聚滋擾叫聲的錄製，之後再利用錄製的滋擾聲進行回播，以測試鳳頭蒼鷹是否會依循滋擾聲來尋找領角鴞並進行捕食。回播的結果顯示，在附近播放對領角鴞的滋擾聲的標本有較高的比例遭受攻擊並被啄食，前往的掠食者包括鳳頭蒼鷹、大冠鷲 (*Spilornis cheela*) 及東方蜂鷹 (*Pernis ptilorhynchus*)。研究結果證實日行性掠食者會藉由小型鳴禽所發出的群聚滋擾叫聲來標定領角鴞的位置並捕食之（方唯軒，2017）。

教育推廣現狀：繁殖直播/窗殺

台灣猛禽研究會於 2015 年開始，每年於鳳頭蒼鷹繁殖季時，在鳳頭蒼鷹巢位附近架設直播錄影設備，開啟網路育雛「實境秀」，最高紀錄，曾創下超過 200 萬人同時在線上共襄盛舉的「收視率」，也創造更多猛禽與人的都市連結性。

此外，台灣猛禽研究會於 2017 年開始執行猛禽救傷業務，救援過程發現高達 20%猛禽是因為撞窗受傷而引起關注。過去在國內對窗殺少有關注，但北美卻已推行窗殺研究與防治近 60 年，同處亞洲的南韓近 10 年來也高度重視野鳥窗殺議題。窗殺為野鳥因人為因素導致死亡的主要原因之一，每年在全球造成數十億隻野鳥死亡。因此，台灣猛禽研究會創立野鳥窗殺博物館，並獲綠獎、臺北市動物保護處、臺北市立動物園等單位的支持，開始推廣野鳥窗殺防治，並且也鼓勵民眾目擊野鳥撞玻璃狀況，可上傳資料至「野鳥撞玻璃回報 (Reports on Bird-Glass Collisions)」或是「台灣路死動物觀察網 」，累積資料（野鳥窗殺博物館）。

研究單位

台灣猛禽研究會、臺中市野生動物保育學會

2025 年 13th ARRCN 研討會發表

Wang, L. M. (2025a). Investigating the Importance of Glass Collision Injuries in Raptors: A Retrospective Analysis of Raptor Rescue Cases from 2017 to 2024 in the Raptor Rehabilitation Station in Taiwan. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

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社群媒體

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20. 赤腹鷹

IUCN 紅皮書：LC

臺灣鳥類紅皮書：NLC

台灣發表

族群趨勢

台灣猛禽研究會於墾丁秋季猛禽遷徙的調查，從 1989 年起已累積超過 30 年的監測資料。調查在恆春半島社頂自然公園凌霄亭進行，由 2 位觀察員記錄每日過境猛禽的物種、數量與飛行特徵。調查結果顯示，赤腹鷹族群自調查初期以來增加約 45%，自 2016 年起呈顯著上升，遷徙期間也延後約兩天（Tsai et. al., 2025b）。

2004-2025 年歷年赤腹鷹過境數量及主要過境期（台灣猛禽研究會，2025）。

-草稿-

遷徙/衛星追蹤

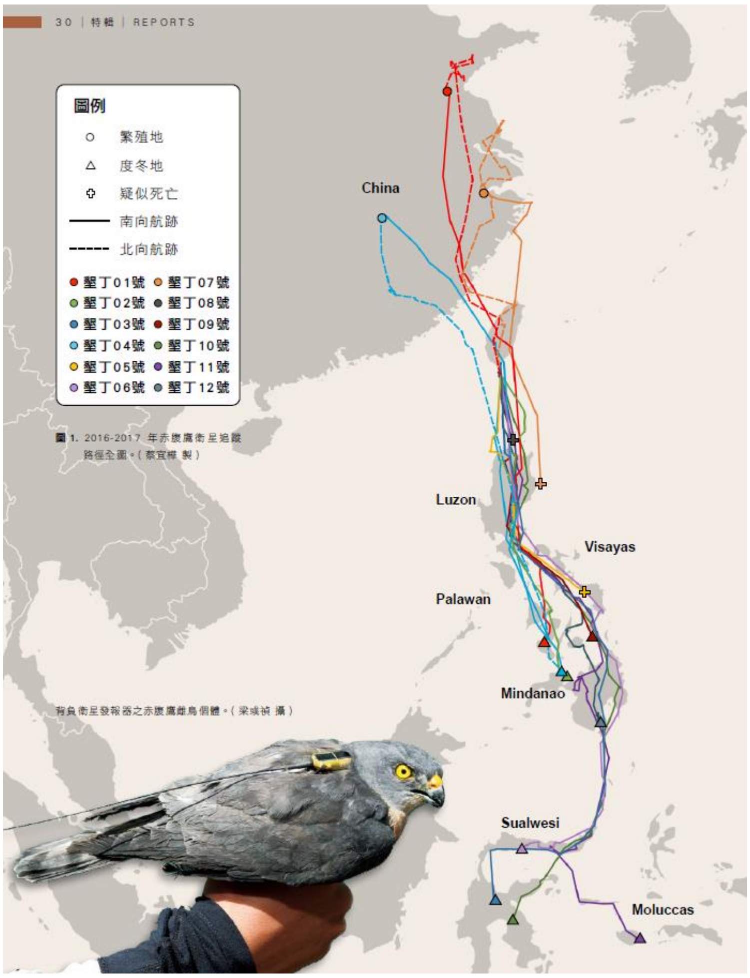
2016-2017 年間，台灣猛禽研究會與嘉大棲地生態研究室合作，在墾丁繫放赤腹鷹，替 12 隻赤腹鷹上無線電發報器，這些赤腹鷹個體的遷徙路線為：秋季從中國東北向南，經過台灣海峽，來到台灣，接著飛越巴士海峽，到菲律賓或印尼蘇拉威西及摩鹿加群島度冬，春季則幾乎沿著原本路線遷徙（蔡岱樺等，2018）。

不過在韓國繁殖的赤腹鷹則走了不同的路線。2019-2024 年間，嘉大棲地生態研究室與韓國合作，於韓國繫放並衛星追蹤 41 隻赤腹鷹，其中 22 隻（53.7%）提供至少一條完整的南北遷徙路徑。追蹤結果顯示赤腹鷹呈現迴圈遷徙模式（loop migration pattern），並具有明顯季節性路線。

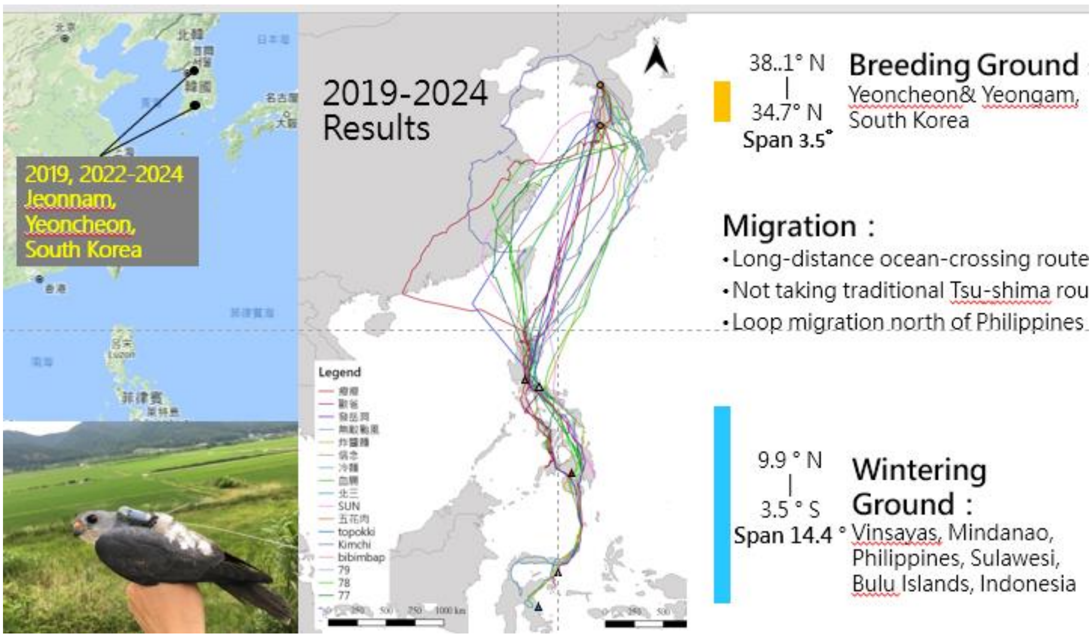
在秋季，這些個體從韓國出發的時間為 9 月中至下旬，較大陸的個體遷徙時間晚， 並進行兩次海上長距離遷徙（700-1,400 公里），這需要日間與夜間飛行的結合。 22 隻個體中，僅 5 條路徑（19.2%）途經台灣，絕大多數（20 條，76.9%）經琉球群島停留（12 隻在沖繩，8 隻在宮古島）後，南下至菲律賓與印尼。1 隻個體偏離遷徙線飛往中國，可能與颱風有關。這些結果表明，台灣墾丁國家公園的猛禽計數可能僅代表韓國繁殖族群的一小部分。

春季時，來自 6 隻個體的 7 條北向路徑走大陸路線，避開主要的水域遷徙。其中 6 隻赤腹鷹穿越中國黃海，1 隻經過北韓。

這種不對稱性表明，季節性風向模式和停留棲地的可用性會影響路線的選擇。順風的東北風可能促進秋季的海上遷徙，而春季遷徙則依賴陸地熱氣流和中途停留補給站（Tsai et. al., 2025a）。



2016-2017 於台灣墾丁繫放之赤腹鷹遷徙路線圖（蔡岱樺等，2018）。



2019-2024 年間於韓國繫放之赤腹鷹遷徙路線圖（Tsai et. al., 2025a）。圖片來源：研討會 O3 簡報。

棲地環境

嘉大學棲地生態研究室於 2019-2024 年間與韓國慶熙大學合作，衛星追蹤 41 隻赤腹鷹，韓國慶熙大學藉由分析 GPS 資料，用以了解赤腹鷹的棲地利用與活動範圍動態對於釐清物種的生態需求、識別關鍵棲地。

赤腹鷹的繁殖期活動範圍，如果用 AKDE 方法分析，得到中位數：95%利用分布為 20.4 公頃（四分位距 IQR：14.0-30.6 公頃）、75%為 10.0 公頃（IQR：6.3-12.7 公頃）、50%為 4.5 公頃（IQR：2.9-6.6 公頃）。使用 MCP 方法，則估得中位活動範圍為 22.2 公頃（IQR：15.5－26.6 公頃）。這些結果與 2012 年透過直接觀察法所報告的活動範圍估值（19.0 與 26.2 公頃，n=2）相近。

不論是哪個方法估得的數據，都明顯大於 1975 年研究的 2.7 公頃，可能反映棲地劣化迫使個體擴大搜尋範圍以獲取資源。棲地組成分析指出，森林與農地（含水稻田）佔活動範圍約 90%，且所有個體展現高度一致的棲地依賴模式。繁殖巢位一貫位於緊鄰水稻田的森林邊緣，森林提供築巢環境，而水稻田為主要覓食來源，顯示赤腹鷹對低地森林谷地—水稻田複合棲地的高度依賴（Go et. al., 2025 ）。

研究單位

台灣猛禽研究會、嘉大棲地生態研究室、屏科大鳥類生態研究室、高雄醫學大學生物醫學暨環境生物學系陳炤杰副教授研究室

2025 年 13th ARRCN 研討會發表

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政府報告

族群趨勢

台灣猛禽研究會，2025。2025 墾丁國家公園秋季遷徙猛禽調查結果總覽。Facebook。 https://www.facebook.com/RRGTaiwan/posts/pfbid0YfrAVL1qRkhu9aJZRgyrPaZnW1gqTZwEaKQu8J2872AEazbaDDnXtjS78aGfWAE1l

遷徙

蔡若詩（2022）。赤腹鷹不同族群遷移路徑及遺傳分化的探討。國家科學及技術委員會補助專題研究計畫報告。

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國際發表

期刊

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Choi, C. Y., Nam, H. Y., Park, C. R., & Lee, W. S. (2018). Life cycle of *Anthracophora rusticola* (Coleoptera: Cetoniidae) from the commensal nests of Chinese Sparrowhawks (*Accipiter soloensis*). *Journal of Asia-Pacific Entomology*, *21*(1), 25-28.

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形質測量

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21. 日本松雀鷹

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NLC

台灣發表：無

國際發表

期刊

生態棲位/競爭

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遷徙

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棲地環境

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形質測量

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Kang, S. G., & Hur, W. H. (2017). New moult pattern in diurnal raptors: primary moult pattern of the Japanese Sparrowhawk *Accipiter gularis*. *Ringing & Migration*, *32*(1), 28-36.

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22. 松雀鷹

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NLC

台灣發表

繁殖

詹香蘭（2020）曾於 2019 年 5 月 24 日至 6 月 18 日在西拉雅國家風景區觀察一巢松雀鷹的繁殖行為。這個巢構築在相思樹中層。公母鳥一天餵食四次以上，每餐間隔 4 小時，偶爾 2 小時一次，若公鳥一直未送餐，母鳥會飛到巢外頭呼喚公鳥。在大約 15 日齡時，雛鳥開始出現鼓翼、展翅、跳躍等練飛動作，有時候也會短程非到巢位左側另一棵相思樹上。約 28 日齡時，已經可以飛到更遠的樹上了，大約一個月的時間，幼鳥逐漸離巢。

食性

台灣大學生態學與演化生物學研究所在 1995-2002 年對北台灣森林進行鳳頭蒼鷹與松雀鷹的巢位獵物樣本分析。調查結果發現，松雀鷹雖與鳳頭蒼鷹共域，但兩者捕食之獵物體型有所差距。鳳頭蒼鷹有較高的獵物多樣性與食性寬度，而松雀鷹則以體型較小之獵物為主食，主要以鳥類為主，且有明顯月份變化，在昆蟲較多的月份，將主要獵食對象轉移至熊蟬（Huang et. al., 2004; 黃光瀛等，2008）。不過在 Chang et. al., 2008 在太魯閣國家公園的觀察報告中，曾目擊一隻雌性松雀鷹捕食體型顯著大於自身的鳥類——台灣山鷓鴣，並詳細記錄進食的過程。

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繁殖

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食性

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23. 北雀鷹

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

期刊

族群趨勢

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遷徙

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棲地環境

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分子親緣

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威脅

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24. 蒼鷹

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

期刊

族群趨勢

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播遷/活動模式

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棲地環境

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分子親緣

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分類

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風機議題

Husby, M. (2024). Wind farms and power lines reduced the territory status and probability of fledgling production in the Eurasian goshawk *Accipiter gentilis*. *Diversity*, *16*(2), 128.

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25. 黑鳶

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NVU 易危

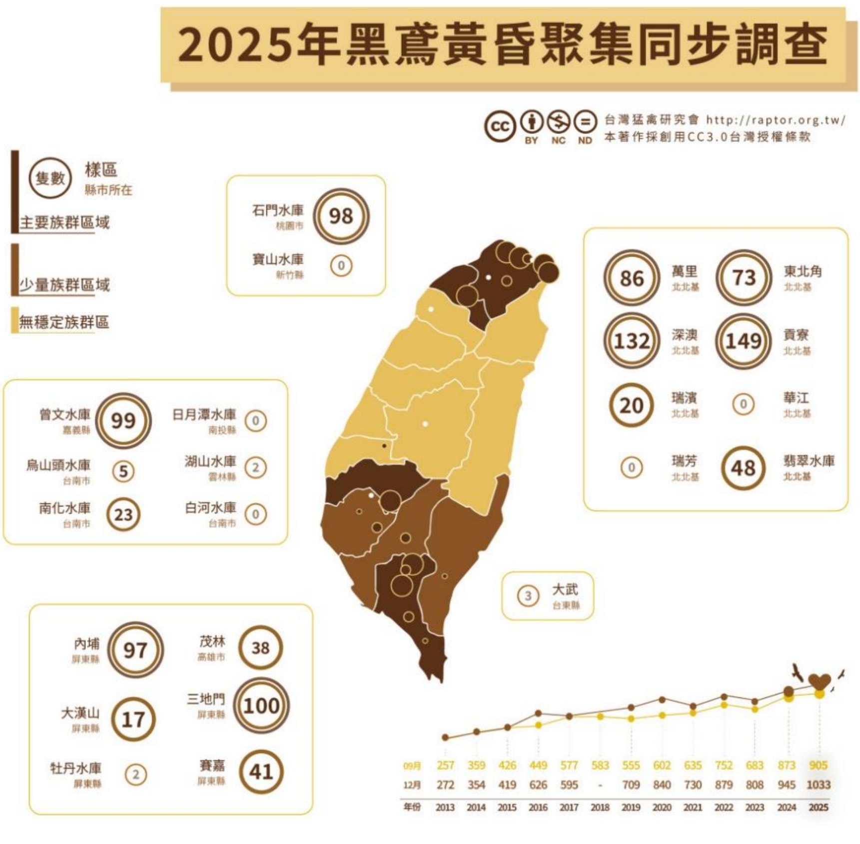
台灣發表

族群趨勢/分布/毒害/教育推廣現況

回顧過去二十年黑鳶研究，台灣黑鳶族群被證實因棲地破壞與二次毒害而劇烈下降，1995 年紀錄不到 200 隻，僅分布在基隆港、北海岸少數地區與屏東平原地帶。

自 2004 年起，基隆市野鳥學會啟動系統性保育計畫，並與台灣猛禽研究會及屏科大鳥類生態研究室組成研究團隊，2012 年從衛星追蹤的黑鳶身上檢驗出農藥加保扶及滅鼠藥，確認毒害為最大威脅。2013 年猛禽會啟動全台黑鳶黃昏聚集同步調查，以夜棲地計數來監測族群趨勢。2015 年的紀錄片《老鷹想飛》及「老鷹紅豆」計畫提升公眾意識並推廣生態農業，取消全國性滅鼠週免費發放老鼠藥。2016 年起，啟動衛星追蹤計畫分析移動模式與棲地變化，並輔以實地調查提升族群監測精準度。2017 年開始禁止高濃度加保扶的使用。

2025 年黑鳶同步調查的結果顯示，9 月族群數達 905 隻，12 月包含遷徙族群增至 1033 隻，較 2013 年的 272 隻顯著增加，顯示目前的保育策略有效。隨著族群漸趨穩定，2020 年啟動黑鳶巢位直播專案，2025 年進行群眾募資以提升公眾參與。（台灣猛禽研究會，2025; Lin et. al., 2025a；Hong et. al., 2019; Hong et. al., 2018）。



2025 年黑鳶黃昏聚集同步調查黑鳶族群趨勢與分布圖（台灣猛禽研究會，2025）

-草稿-

繁殖/巢位選擇

屏科大鳥類生態研究室於 2021 年的黑鳶繁殖季，紀錄屏東縣 30 個黑鳶巢位中 1 巢位尺度（500 公尺）；2 活動範圍尺度（5 公里）兩個不同層級的巢位，分析黑鳶的巢位選擇偏好，並建立巢位預測模型。

結果發現，在巢位尺度下，巢位的選擇與最近建物的距離、與溪流的距離較近；而活動範圍尺度下，巢位距離森林邊界距離、最近夜棲點較近，並且顯著選擇森林覆蓋面積大的地區。巢位預測模型在巢位尺度中，巢址選擇受到鄰近人為活動、海拔、坡度等影響；活動範圍尺度中，黑鳶巢址選擇會受群聚習性影響（黃筠傑，2022）。

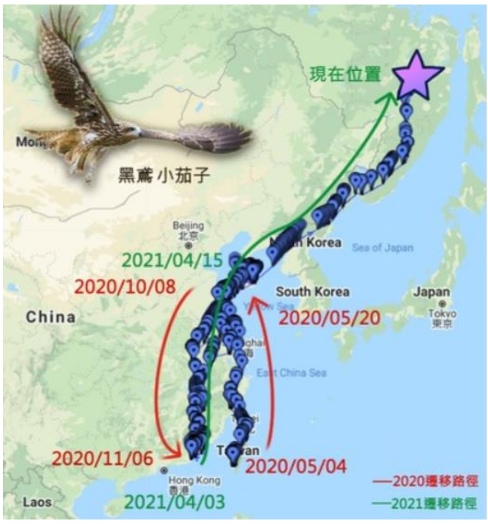
食性

黑鳶為兼性食腐性（facultative scavengers）猛禽，能在多樣化棲地中生存，舉凡農田、零散林地、河岸、養殖場及港口上空等。然而，繁殖期（初冬至初夏），繁殖對傾向防衛領域，變得較不群居，使觀察雛鳥食性變得困難。傳統調查有直接觀察及收集巢中殘餘食物或食繭等方法，但常被認為成本高或過於干擾。

為解決此問題，屏科大鳥類生態研究室於 2020-2023 年的黑鳶繁殖季，在台灣南部針對 16 對繁殖對的 18 個巢址設置自動相機，共收集 2,223 件獵物資料。平均每巢記錄 123.5±39 件獵物，親鳥每天平均運回巢 2.5±0.7 件獵物。不同棲地獵物組成差異甚大，鳥類為最常見獵物（49.9±15.7%）、魚類次之（30.2±14.9%）、哺乳類佔 10.4±5.9%。靠近水域的巢址，魚類比例較高；鳩鴿科鳥類則常在林地及農田巢址被捕食。對以種子為食的鳥類的高捕食率，可能解釋 1980 年代農田廣泛使用加保扶（carbofuran）後，黑鳶族群劇烈下降的原因。不同棲地食性差異顯示本物種多功能性，小型族群可在二次毒害威脅下生存，並隨生態友善農業推廣逐步回升（Huang et. al., 2025）。

遷徙/衛星追蹤

黑鳶在東亞族群的現況與遷徙習性仍缺乏研究。過去，臺灣的黑鳶族群被認為是特有亞種 *M. migrans formosanus*，不過 2020-2021 年的衛星追蹤結果，首次證實台灣出現具遷徙行為之黑鳶個體（可能屬亞種 *M. m. lineatus*）。該個體（命名小茄子）在南臺灣因受滅鼠藥及加保扶毒害，在救傷後進行兩次春季與兩次秋季遷徙，在中國東南方度冬，兩個夏季則分別遷徙至山東半島與俄羅斯遠東地區繁殖。第二個夏季期間，其活動範圍達 135,477 km²，顯示其具高度移動能力。此發現反映東亞黑鳶族群的高度流動性，並凸顯跨國合作保育的重要性（Lin et. al., 2025b; 屏科大鳥類生態研究室，2020）。

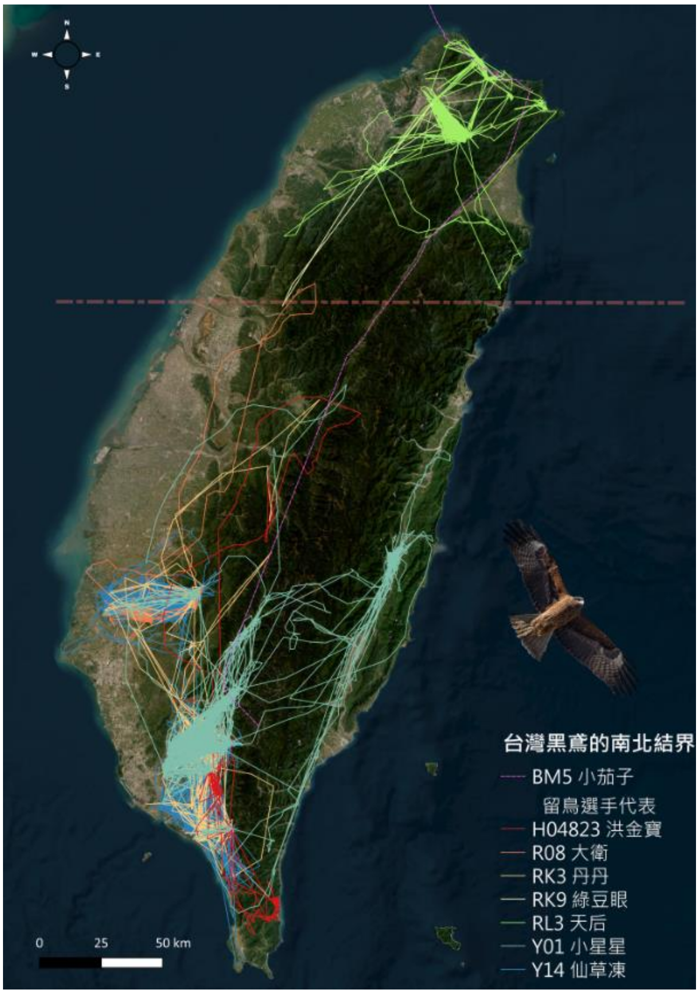


首次證實臺灣黑鳶有遷徙族群的黑鳶小茄子衛星追蹤路線圖（陳崑福，2021。圖為屏科大鳥類生態研究室提供）

播遷/活動模式/衛星追蹤

從 2016 年開始，在林保署支持下，由屏科大鳥類生態研究室與台灣猛禽研究會合作的衛星追蹤計畫，共在台灣南北繫放 46 隻黑鳶，除了 2020-2021 其中一隻遷徙個體小茄子外，其餘黑鳶個體皆為臺灣留鳥。

追蹤這些留鳥後，發現南北族群並沒有交流。北部追蹤個體綠豆眼移動到最南邊的紀錄為苗栗卓蘭，其次是跨越中央山脈最北段，也曾跑去北海岸的天后。南部追蹤個體移動最北的紀錄為在曾文水庫出生的大衛，曾經跑到苗栗泰安一帶；另外還有三隻個體最北到南投仁愛鄉；這之中，也有一天活動範圍從高屏地區跨越中央山脈來到花蓮的小星星等（屏科大鳥類生態研究室，2024）。



臺灣留鳥黑鳶的活動模式圖（屏科大鳥類生態研究室，2024）。

分子親緣

近年來，臺灣黑鳶在保育努力下族群逐漸恢復，不過在經歷瓶頸效應後，遺傳多樣性預期會顯著降低，且目前野外觀察紀錄，確實已記錄到近親繁殖與後代畸形的案例。為了進一步理解黑鳶的遷徙族群的規模，以及臺灣黑鳶是否有獨立的亞種，屏科大鳥類生態研究室、台灣猛禽研究會、屏科大生物資源研究所等單位，於 2019 年展開跨國合作，以 2012-2024 年共 115 份來自台灣北部與南部的黑鳶之粒線體 DNA 與微衛星標記，比較東北亞、日本、澳洲籍印度等地，分析族群地理及族群遺傳結構（Andreyenkova et al., 2024）。

透過與亞種東北亞和日本黑鳶 *M. m. lineatus* 和印度黑鳶 *M. m. govinda* 的比較，結果支持 *M. m. formosanus* 作為獨立亞種地位的分子證據。此外，北部黑鳶身上有日本黑鳶的基因型，也有東北亞黑鳶的基因型，而南部黑鳶部分有東北亞基因型，也有台灣專有的特殊基因

型。根據台灣北部與南部的黑鳶族群衛星追蹤資料，預測南北族群間的基因交流程度低。由於台灣亦存在遷徙族群，微衛星基因座的遺傳多樣性預測為中度。

這也反映台灣黑鳶在經歷二次毒害之後複雜的族群血緣歷史——台灣本身族群的減少，與東北亞族群擴散至台灣並逐步融合的證據（Tsai et al., 2025; Andreyenkova et al., 2024）。

研究單位

屏科大鳥類生態研究室、台灣猛禽研究會

2025 年 13th ARRCN 研討會發表

Huang, Y. C., Lin, H. S., Hong, S. Y., Shie J. E., Wang, W. I., Choi, W. S., Chung, M. C., Sun, Y. H. (2025). Nestling Diet of Black Kites (*Milvus migrans*) across Different Nesting Habitats in Southern Taiwan. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

Lin, H. S., Hong, S. Y., Huang, Y. C., Tsai, Y. H., Shie J. E., Wang, W. I., Tseng, C. W., Sun, Y. H. (2025a). Twenty Years of Black Kite Conservation in Taiwan: From Scientific Monitoring to Conservation Actions. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

Tsai, Y. H., Huang, Y. C., Hong, S. Y., Lin, H. S., Hung, K. H. (2025). Phylogeography and Population Genetic Structure Analysis of Raptors: A Case Study of the Black Kite Subspecies (*Milvus migrans formosanus*). The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

Lin, H. S., Huang, Y. C., Hong, S. Y., Sun, Y. H. (2025b). Migration Routes of a Rescued Black Kite (*Milvus migrans*) along the Coast of East Asia. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

期刊

分子親緣

Andreyenkova, N. G., Hong, S. Y., Lin, H. S., Iwami, Y., Kirillin, R. A., Literák, I., ... & Karyakin, I. V. (2024). Genetic relationships of populations of the Black Kite *Milvus migrans* (Accipitriformes: Accipitridae) in the east of its range in Asia and Australia. *Zootaxa*, *5523*(1), 83-99.

毒害

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Hong, S. Y., H. S. Lin, B. A. Walther, J. E. Shie, and Y. H. Sun. (2018). Recent Avian Poisonings Suggest a Secondary Poisoning Crisis of Black Kites During the 1980s in Taiwan. Journal of Raptor Research, 52(3), 326-337.

洪孝宇、林惠珊、孫元勳，2015。殺鼠劑究竟毒死誰? 從一隻黑鳶的墜落談起。*自然保育季刊*, (90), 4-13。

論文

播遷/活動模式

魏心怡，2018。臺灣黑鳶 (*Milvus migrans*) 幼鳥的播遷、活動範圍與棲地利用。屏東科技大學野生動物保育研究所碩士論文。

棲地環境

黃筠傑，2022。屏東地區黑鳶 (*Milvus migrans*) 的巢位選擇。屏東科技大學野生動物保育研究所碩士論文。

許雅玟，2018。農業作業對屏東地區黑鳶 (*Milvus migrans*) 覓食活動的影響。屏東科技大學野生動物保育研究所碩士論文。

毒害

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社群媒體

族群趨勢

台灣猛禽研究會，2025 年 12 月 29 日。2025 年度全台黑鳶黃昏聚集同步調查。https://raptor.org.tw/research/content/219

播遷/活動模式

屏科大鳥類生態研究室，2024 年 12 月 8 日。黑鳶在台灣的南北結界。Facebook。https://www.facebook.com/iwcraptor/posts/pfbid0w85nxpEBmXUBz3bpHApRW7Vks69u99b7Eb9ej6a99me7gkchjt6etAhEYtMaSvSTl

遷徙

屏科大鳥類生態研究室，2020 年 10 月 21 日。小茄子的一天（衛星追蹤）。Facebook。https://www.facebook.com/iwcraptor/posts/3759301164080625/?locale=zh_TW

陳崑福，2021 年 5 月 13 日。東亞研究第一隻！黑鳶「小茄子」野放周年　穿越平壤直衝俄羅斯。Etoday 新聞網。https://pets.ettoday.net/news/1980602

影片

梁皆得，2016。老鷹想飛（紀錄片），采昌國際多媒體。

國際發表

期刊

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播遷/活動模式

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遷徙

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棲地環境

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民族鳥類學

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書籍

Ansari, M. A. A. (2023). *BLACK KITE Milvus migrans*. Ashok Yakkaldevi.

Onrubia, A., & Martín, B. (2021). Black kite *Milvus migrans*. In *Migration Strategies of Birds of Prey in Western Palearctic* (pp. 165-179). CRC Press.

26. 栗鳶

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

期刊

族群趨勢

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棲地環境

Khaleghizadeh, A., Santangeli, A., & Anuar, S. (2014). Clear-cutting decreases nest occupancy of Brahminy Kite Haliastur indus in a managed mangrove forest of Southeast Asia. *Ocean & Coastal Management*, *93*, 60-66.

Khaleghizadeh, A., & Anuar, S. (2014). Nest tree selection by the Brahminy Kite Haliastur indus in a Rhizophora mangrove forest. *Tropical Zoology*, *27*(2), 40-52.

行為研究

Khaleghizadeh, A., & Anuar, S. (2019). Comparative behavioral ecology of the White-Bellied Sea Eagle and Brahminy Kite (Aves: Accipitriformes) in Northwestern Malaysia. *Journal of Animal Diversity*, *1*(1), 41-55.

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保育政治

Villegas, J. P., Clarido, A. P., Enobio, V. D., Lumpapac, J. D., & Ibañez, J. C. (2021). Local Perception, Values, and Conservation Attitude towards Brahminy Kites (Haliastur indus Boddaert, 1783) in Tugbok District, Davao City, Philippines. *Asian Journal of Biodiversity*, *12*(1).

研究方法

Canilao, M. A. P. (2023). Compact, Consumer Off the Shelf Remotely Piloted Aircraft Systems (COTS-RPAS) in Observing Haliastur indus, the Kali, or Brahminy Kites. *Qeios*.

27. 白尾海鵰

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表

公民科學

台灣偶爾會有白尾海鵰出沒的紀錄，特別的是從 2002 年開始，就一直有白尾海鵰成鳥出現在宜蘭太平山的翠峰湖、翡翠水庫及其下游的新店廣興的紀錄，至今已經 23 年了。許多人都推測這是同一隻個體，夏季棲息於涼爽的翠峰湖，冬季則降遷至廣興一代，臉書甚至有個白尾海鵰觀察社團，讓許多愛鳥人士留下這隻推測已有 27 歲的「海鵰爺爺」觀察紀錄。

期刊

曾建偉，2012。稀有猛禽報告-墾丁國家公園首筆白尾海鵰發現記錄。台灣猛禽研究, (13), 49-51。
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社群媒體

白尾海鵰觀察紀錄站，臉書社團：
https://www.facebook.com/groups/285409127681612/?locale=zh_TW

國際發表

期刊

族群趨勢

Heuck, C., Herrmann, C., Schabo, D. G., Brandl, R., & Albrecht, J. (2017). Density-dependent effects on reproductive performance in a recovering population of White-tailed Eagles *Haliaeetus albicilla*. *Ibis*, *159*(2), 297-310.

Treinys, R., Dementavičius, D., Rumbutis, S., Švažas, S., Butkauskas, D., Sruoga, A., & Dagys, M. (2016). Settlement, habitat preference, reproduction, and genetic diversity in recovering the white-tailed eagle *Haliaeetus albicilla* population. *Journal of Ornithology*, *157*, 311-323.

繁殖/生活史

Dementavičius, D., Rumbutis, S., & Treinys, R. (2021). Spatial and temporal variation in breeding performance in the increasing White-tailed Eagle *Haliaeetus albicilla* population to the east of the Baltic Sea. *Bird Study*, *68*(4), 462-476.

Bekmansurov, R. K. (2020). Dynamics of the Onset of White-Tailed Eagle (*Haliaeetus albicilla*) Breeding in the Central Part of the Volga–Kama Region and Possible Explanations. *Biology Bulletin*, *47*, 791-800.

食性/捕食行為

Dementavičius, D., Rumbutis, S., Virbickas, T., Vaitkuvienė, D., Dagys, M., & Treinys, R. (2020). Spatial and temporal variations in the White-tailed Eagle *Haliaeetus albicilla* breeding diet revealed by prey remains. *Bird Study*, *67*(2), 206-216.

Nadjafzadeh, M., Hofer, H., & Krone, O. (2016). Sit-and-wait for large prey: foraging strategy and prey choice of White-tailed Eagles. *Journal of Ornithology*, *157*, 165-178.

生態棲位

Bregnballe, T., Tofft, J., Kotzerka, J., Lehikoinen, A., Rusanen, P., Herrmann, C., ... & Kouzov, S. A. (2022). Occurrence and behaviour of White-tailed Eagles *Haliaeetus albicilla* in Great Cormorant Phalacrocorax carbo sinensis colonies in countries around the Baltic Sea. *Ardea*, *109*(3), 565-582.

Myran, I. W. (2021). *Interactions between white-tailed eagle Haliaeetus albicilla, seabirds and tourism; how the breeding success of the endangered black-legged kittiwake Rissa tridactyla is affected* (Master's thesis, UiT Norges arktiske universitet).

播遷/活動模式

Probst, R., Schmidt, M., McGrady, M., & Pichler, C. (2024). GPS Tracking Reveals the White-Tailed Eagle *Haliaeetus albicilla* as an Ambassador for the Natura 2000 Network. *Diversity*, *16*(3), 145.

Engler, M., & Krone, O. (2022). Movement patterns of the White-tailed Sea Eagle (*Haliaeetus albicilla*): Post-fledging behaviour, natal dispersal onset and the role of the natal environment. *Ibis*, *164*(1), 188-201.

Bragin, E. A., Poessel, S. A., Lanzone, M. J., & Katzner, T. E. (2018). Post-fledging movements and habitat associations of White-tailed Sea Eagles (*Haliaeetus albicilla*) in Central Asia. *The Wilson Journal of Ornithology*, *130*(3), 784-788.

同位素研究

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分子親緣

Hansen, C. C. R., Láruson, Á. J., Rasmussen, J. A., Ballesteros, J. A. C., Sinding, M. H. S., Hallgrimsson, G. T., ... & Pálsson, S. (2023). Genomic diversity and differentiation between island and mainland populations of white-tailed eagles (*Haliaeetus albicilla*). *Molecular Ecology*, *32*(8), 1925-1942.

行為研究

Mee, A., Heardman, C., & Nygård, T. (2021). Sibling Aggession and Brood Reduction in White-Tailed Eagles (*Haliaeetus albicilla*). *Journal of Raptor Research*, *55*(4), 652-655.

重新引入議題

Mee, A., Breen, D., Clarke, D., Heardman, C., Lyden, J., McMahon, F., ... & O'Toole, L. (2016). Reintroduction of white-tailed eagles *Haliaeetus albicilla* to Ireland. *Irish Birds*, *10*(3), 301-314.

保育政治

Mayhew, M., Convery, I., Armstrong, R., & Sinclair, B. (2016). Public perceptions of a white-tailed sea eagle (*Haliaeetus albicilla* L.) restoration program. *Restoration Ecology*, *24*(2), 271-279.

考古人類學

Zeiler, J. T. (2019). The white-tailed eagle (*Haliaeetus albicilla*) in the Netherlands: changing landscapes, changing attitudes. *Archaeological and Anthropological Sciences*, *11*(12), 6371-6375.

風機議題

Halgunset, G. S. (2024). *Estimating collision risk for white tailed eagles (Haliaeetus albicilla) in onshore wind power environments–Application of spatial modelling frameworks and predictive mapping* (Master's thesis, Norwegian University of Life Sciences).

獸醫學

Sun, J., Covaci, A., Bustnes, J. O., Jaspers, V. L., Helander, B., Bårdsen, B. J., ... & Eulaers, I. (2020). Temporal trends of legacy organochlorines in different white-tailed eagle (*Haliaeetus albicilla*) subpopulations: a retrospective investigation using archived feathers. *Environment International*, *138*, 105618.

28. 白腹海鵰

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表

台灣偶爾會出現白腹海鵰的身影，第一筆正式紀錄是 1988 年的蘭嶼，台灣島的第一筆紀錄則是 2011 年在墾丁龍鑾潭，接著每隔幾年就會看到白腹海鵰出現在河口、濕地或是較內陸的水庫區域，例如 2014 年的曾文水庫。

期刊

王李廉，2016。稀有猛禽報告-嘉義曾文水庫的白腹海鵰。*台灣猛禽研究*, (16), 61-63。
劉川，2011。稀有猛禽報告-台灣本島第 1 筆白腹海鵰紀錄。*台灣猛禽研究*, (12), 53-55。

國際發表

期刊

族群趨勢

Dennis, T. E., & Detmar, S. A. (2018). A review of White-bellied Sea Eagle distribution and population stability over time in South Australia. *South Australian Ornithologist*, *43*, 55-72.

繁殖/生活史

Singor, M. (2024). White-bellied Sea-Eagle breeding sites in southwest Western Australia. *Western Australian Naturalist*, *33*, 3.

Byju, H., Raveendran, N., & Mathiyazhagan, A. J. (2023). Powerline pylons: an unusual nesting success of White-bellied Sea-Eagle *Haliaeetus leucogaster* (Gmelin, 1788)(Aves: Accipitriformes:

Accipitridae) from Ramanathapuram, southeastern coast of India. *Journal of Threatened Taxa*, *15*(7), 23610-23614.

食性/捕食行為

Mo, M., Wrightson, C., Waterhouse, D. R., Hayler, P., & Hayler, A. (2017). Predation by White-bellied Sea-Eagles' *Haliaeetus leucogaster*'on birds. *Victorian Naturalist, The*, *134*(2), 43-47.

棲地環境

Neema, A. S., Prusty, B. A. K., Gajera, N. B., & Kurve, P. N. (2021). Nesting site studies of the White-bellied Sea-Eagle (*Haliaeetus leucogaster* Gmelin, 1788) along Konkan Coast, Dist. Ratnagiri, MS, India. *Ecology, Environment and Conservation*, *27*, 108-115.

Oyedele, D. T., Sah, S. A. M., Zainudin, M. S. M. M., Ibrahim, W. M. M. W., & Latip, N. S. A. (2019). Statistical analysis of topographic characteristics and nest-site preference of the White-Bellied Sea-Eagle (*Haliaeetus leucogaster*) in Penang National Park, Malaysia. *Songklanakarin Journal of Science and Technology*, *41*, 899-906.

行為研究

Khaleghizadeh, A., & Anuar, S. (2019). Comparative behavioral ecology of the White-Bellied Sea Eagle and Brahminy Kite (Aves: Accipitriformes) in Northwestern Malaysia. *Journal of Animal Diversity*, *1*(1), 41-55.

論文

Thomson, V. K. (2021). *Sea Change for Australia's Coastal Raptors: The Cost of Urban Living* (Doctoral dissertation, Griffith University).

29. 毛足鵟

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

研究單位

臺中市野生動物保育學會（機場救傷）

國際發表

期刊

繁殖/生活史

Curk, T., Kulikova, O., Fufachev, I., Wikelski, M., Safi, K., & Pokrovsky, I. (2022). Arctic migratory raptor selects nesting area during the previous breeding season. *Frontiers in Ecology and Evolution*, *10*, 865482.

食性/捕食行為

-草稿-

Cieśluk, P., Cmoch, M., & Kasprzykowski, Z. (2023). Hunting Site Behaviour of Sympatric Common Buzzard *Buteo buteo* and Rough-Legged Buzzard *Buteo lagopus* on Their Wintering Grounds. *Animals*, *13*(17), 2801.

Pokrovsky, I., Ehrich, D., Fufachev, I., Ims, R. A., Kulikova, O., Sokolov, A., ... & Yoccoz, N. G. (2020). Nest association between two predators as a behavioral response to the low density of rodents. *The Auk*, *137*(1), ukz060.

生態棲位

Pokrovsky I, Ehrich D, Ims RA, Kondratyev AV, Kruckenberg H, Kulikova O, Mihnevich J, Pokrovskaya L, Shienok A. (2015). Rough-legged buzzards, Arctic foxes and red foxes in a tundra ecosystem without rodents. *PLoS One* 18;10(2):e0118740.

遷徙

Yamaguchi, N. M., Hiraoka, E., Hijikata, N., & Higuchi, H. (2017). Migration routes of satellite-tracked Rough-legged Buzzards from Japan: the relationship between movement patterns and snow cover. *Ornithological Science*, *16*(1), 33-41.

棲地環境

Galipeau, P., Franke, A., Leblond, M., & Bêty, J. (2019). Multi-scale selection models predict breeding habitat for two Arctic-breeding raptor species. *Arctic Science*, *6*(1), 24-40.

Rozhon, G. C. (2018). Sex-specific habitat selection of Rough-legged Hawks (*Buteo lagopus*) wintering in western North America.

Beardsell, A., Gauthier, G., Fortier, D., Therrien, J. F., & Bêty, J. (2017). Vulnerability to geomorphological hazards of an Arctic cliff-nesting raptor, the rough-legged hawk. *Arctic Science*, *3*(2), 203-219.

Beardsell, A., Gauthier, G., Therrien, J. F., & Bêty, J. (2016). Nest site characteristics, patterns of nest reuse, and reproductive output in an Arctic-nesting raptor, the Rough-legged Hawk. *The Auk: Ornithological Advances*, *133*(4), 718-732.

形質測量

Rosenfield, R. N., Evans, D. L., Wiens, T. P., & Frater, P. N. (2022). Are there changes in morphometrics of migratory juvenile Rough-legged Hawks (*Buteo lagopus*) in north-central North America?. *The Wilson Journal of Ornithology*, *134*(1), 138-144.

Clark, W. S., & Bloom, P. H. (2016). Plumages by sex of adult and Basic III Rough-legged Hawks (*Buteo lagopus*). *The Wilson Journal of Ornithology*, *128*(4), 867-873.

論文

繁殖/生活史

Andersson, M. (2021). *Prey delivery, prey handling and circadian rhythm at two Rough-legged buzzard (Buteo lagopus) nests as revealed by use of video monitoring* (Master's thesis, Norwegian University of Life Science, Ås).

書籍

遷徙

Agostini, N. (2021). Rough-legged buzzard *Buteo lagopus*. In *Migration Strategies of Birds of Prey in Western Palearctic* (pp. 180-183). CRC Press.

30. 歐亞鵟

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

期刊

族群趨勢

Gryz, J., & Krauze-Gryz, D. (2019). The common buzzard *Buteo buteo* population in a changing environment, Central Poland as a case study. *Diversity*, *11*(3), 35.

食性/捕食行為

Cieśluk, P., Cmoch, M., & Kasprzykowski, Z. (2023). Hunting Site Behaviour of Sympatric Common Buzzard *Buteo buteo* and Rough-Legged Buzzard *Buteo lagopus* on Their Wintering Grounds. *Animals*, *13*(17), 2801.

Panek, M. (2023). Predation of young brown hares (*Lepus europaeus*) by common buzzards (*Buteo buteo*) in western Poland. *European Journal of Wildlife Research*, *69*(6), 110.

Swan, G. J., Bearhop, S., Redpath, S. M., Silk, M. J., Padfield, D., Goodwin, C. E., & McDonald, R. A. (2022). Associations between abundances of free-roaming gamebirds and common buzzards *Buteo buteo* are not driven by consumption of gamebirds in the buzzard breeding season. *Ecology and Evolution*, *12*(5), e8877.

Francksen, R. M., Whittingham, M. J., Ludwig, S. C., & Baines, D. (2016). Winter diet of Common Buzzards *Buteo buteo* on a Scottish grouse moor. *Bird Study*, *63*(4), 525-532.

Sidorovich, A. A., Ivanovskij, V. V., Sidorovich, V. E., & Solovej, I. A. (2016). Landscape-related variation in the diet composition of the common buzzard (*Buteo buteo*) in Belarus. *Raptor Journal*, *10*(1), 65-74.

棲地環境

Cieśluk, P., Morelli, F., & Kasprzykowski, Z. (2024). Comparison of hunting site strategies of the common buzzard *Buteo buteo* in open landscapes and along expressways. *PeerJ*, *12*, e18045.

Kamarauskaitė, A., Dementavičius, D., Skuja, S., & Treinys, R. (2022). Common Buzzard, *Buteo buteo*, nest site selection pattern in relation to stands and their location factors in Central Lithuania, Central Eastern Europe. *Baltic Forestry*, *28*(2).

Panek, M. (2021). Does habitat diversity modify the dietary and reproductive response to prey fluctuations in a generalist raptor predator, the Eurasian buzzard *Buteo buteo*?. *Birds*, *2*(1), 114-126.

Baltag, E. Ş., Petrencu, L., Bolboacă, L. E., & Sfîcă, L. (2018). Common Buzzards *Buteo buteo* wintering in Eastern Romania: Habitat use and climatic factors affecting their abundance. *Acta Ornithologica*, *53*(1), 1-12.

行為研究

Cieśluk, P., & Kasprzykowski, Z. (2024). Differences in the flight initiation distance near expressways and in open farmland in wintering Common Buzzards (*Buteo buteo*). *The European Zoological Journal*, *91*(2), 778-786.

毒害

Ozaki, S., Movalli, P., Cincinelli, A., Alygizakis, N., Badry, A., Carter, H., ... & Walker, L. (2024). Significant turning point: common buzzard (*Buteo buteo*) exposure to second-generation anticoagulant rodenticides in the United Kingdom. *Environmental Science & Technology*, *58*(14), 6093-6104.

保育政治

Parrott, D. (2015). Impacts and management of common buzzards *Buteo buteo* at pheasant Phasianus colchicus release pens in the UK: a review. *European Journal of Wildlife Research*, *61*, 181-197.

書籍

Väli, Ü., & Mirski, P. (2021). Eurasian buzzard *Buteo buteo*. In *Migration Strategies of Birds of Prey in Western Palearctic* (pp. 188-199). CRC Press.

Walls, S., & Kenward, R. (2020). *The common buzzard*. Bloomsbury Publishing.

31. 東方鵟

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NLC

台灣發表

形質

2023 年最後一隻收到的動物是隻大鵟（*Butro hemilasius*），這隻大鵟入侵到民眾家的雞舍而且吃掉一隻日本雞，該大鵟在檢查無大礙後野放，留下珍貴的形值資料，也讓我們知道大鵟究竟有多大。臺灣比較常見的鵟屬猛禽是東方鵟（*B. japonicus*），東方鵟的體重大約是 600-800 公克，而大鵟的體重則是 1738 公克，是小東方的 3 倍，大東方的 2 倍，體型上有些懸殊。另外，大鵟的跗趾上有毛，東方鵟則沒有。頭部的差異則沒有很明顯（臺中市野生動物保育學會，2024）。

研究單位

臺中市野生動物保育學會（機場救傷）

東方鵟與大鵟的形質比較（臺中市野生動物保育學會，2024）。

社群媒體

臺中市野生動物保育學會，2024 年 1 月 30 日。 大鵟究竟有多大？（大鵟與東方鵟比較）。Facebook。
https://www.facebook.com/permalink.php?story_fbid=pfbid0yG83TsnXP3hXxd6HjH2nkQBxHJv8c6WeqEdNBm5eVJnGmwQhrrr6XPAxrjixqMxDl&id=100064278565542

國際發表

期刊

食性/捕食行為

Hayama, M., & Yui, M. (2023). Eastern Buzzard *Buteo japonicus toyoshimai* breeding on the Ogasawara Islands depend on non-native rats as a food source. *Ornithological Science*, *22*(2), 123-135.

遷徙

Nakahara, T., Nagai, K., Iseki, F., Yoshioka, T., Nakayama, F., & Yamaguchi, N. M. (2022). GPS tracking of the two subspecies of the eastern buzzard (*Buteo japonicus*) reveals a migratory divide along the Sea of Japan. *Ibis*, *164*(4), 1192-1200.

Hijikata, N., Yamaguchi, N. M., Hiraoka, E., Nakayama, F., Uchida, K., Tokita, K. I., & Higuchi, H. (2022). Satellite tracking of migration routes of the eastern buzzard (*Buteo japonicus*) in Japan through Sakhalin. *Zoological science*, *39*(2), 176-185.

分子親緣

Nagai, K., Tokita, K. I., & Nakayama, F. (2020). Discovery of a novel mtDNA sequence in the eastern buzzard (*Buteo japonicus*) in Japan. *Journal of Raptor Research*, *54*(3), 287-294.

Nagai, K., Nakayama, F., Tokita, K. I., & Kawakami, K. (2019). Genetic Structure and Diversity of Two Populations of the Eastern Buzzard (*Buteo japonicus japonicus* and *B. j. toyoshimai*) in Japan. *Zoological science*, *36*(6), 471-478.

32. 大鵟

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表

形質

2023 年最後一隻收到的動物是隻大鵟（*Buteo hemilasius*），這隻大鵟入侵到民眾家的雞舍而且吃掉一隻日本雞，該大鵟在檢查無大礙後野放，留下珍貴的形值資料，也讓我們知道大鵟究竟有多大。臺灣比較常見的鵟屬猛禽是東方鵟（*B. japonicus*），東方鵟的體重大約是 600-800 公克，而大鵟的體重則是 1738 公克，是小東方的 3 倍，大東方的 2 倍，體型上有些懸殊。另外，大鵟的跗蹠上有毛，東方鵟則沒有。頭部的差異則沒有很明顯（臺中市野生動物保育學會，2024）。

東方鵟與大鵟的形質比較（臺中市野生動物保育學會，2024）。

研究單位

臺中市野生動物保育學會（機場救傷）

社群媒體

臺中市野生動物保育學會，2024 年 1 月 30 日。 大鵟究竟有多大？（大鵟與東方鵟比較）。Facebook。
https://www.facebook.com/permalink.php?story_fbid=pfbid0yG83TsnXP3hXxd6HjH2nkQBxHJv8c6WeqEdNBm5eVJnGmwQhrrr6XPAxrjixqMxDl&id=100064278565542

國際發表

期刊

繁殖/生活史

Rahman, M. L., Purev-ochir, G., Batbayar, N., & Dixon, A. (2016). Influence of nest box design on occupancy and breeding success of predatory birds utilizing artificial nests in the Mongolian steppe. *Conservation Evidence*, *13*, 21-26.

Chen, W., Jiang, L., You, Z., & Chen, M. (2015). Breeding biology of the upland buzzard (*Buteo hemilasius*) on the Tibetan Plateau. *Journal of Raptor Research*, *49*(3), 320-324.

Yosef, R., Gombobaatar, S., & Bortolotti, G. R. (2013). Sibling competition induces stress independent of nutritional status in broods of Upland Buzzards. *Journal of Raptor Research*, *47*(2), 127-132.

Gombobaatar, S., Odkhuu, B., Yosef, R., Gantulga, B., Amartuvshin, P., & Usukhjargal, D. (2010). Reproductive ecology of the Upland Buzzard (*Buteo hemilasius*) on the Mongolian steppe. *Journal of Raptor Research*, *44*(3), 196-201.

Gombobaatar, S., Odkhuu, B., Reuvan, Y., Gantulga, B., Amartuvshin, B., & Usukhjargal, D. (2010). Do Nest Materials and Nest Substrates affect the Breeding of *Buteo hemilasius* in the Mongolian Steppe? *Erforschung biologischer Ressourcen der Mongolei* 11: 213-219.

棲地環境

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同位素

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33. 草鴞

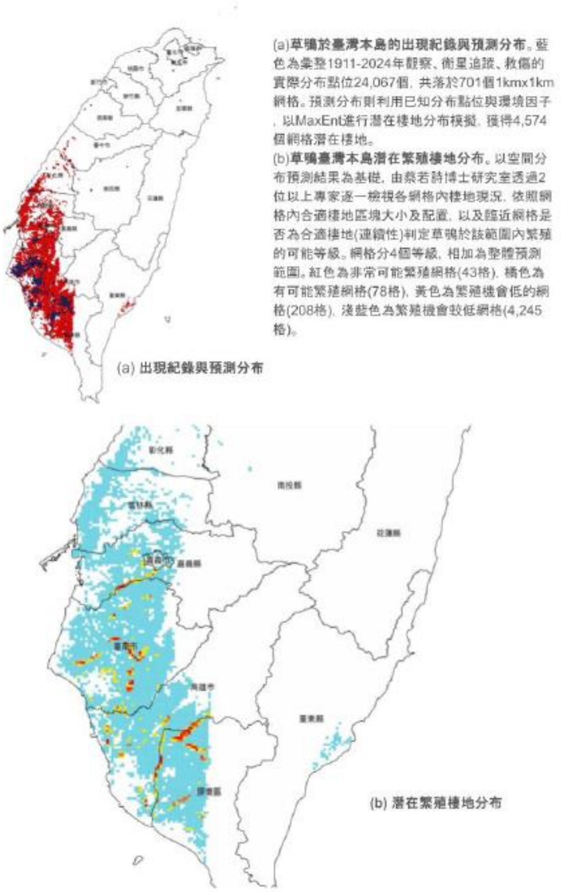
IUCN 紅皮書：LC
臺灣鳥類紅皮書：NEN 瀕危

台灣發表

族群趨勢與分布

歷史資料顯示，日據時期時，草鴞已經相當稀少。1950-1980 年代，中部大肚山、八卦山曾有多筆草鴞繁殖紀錄，但近二十年內未曾有過繁殖紀錄。1990 年代，臺灣本島西南部丘陵及平原有多筆紀錄，幾乎各縣市皆曾發現過草鴞。嘉大棲地生態研究室於 2015-2017 年在臺灣嘉義縣至屏東縣展開調查，目前已知台南新化區、山上區，高雄旗山區、燕巢區等月世界地形，以及台南沙崙農場、曾文溪、高屏溪沿線為已知分布熱點，八掌溪、岡山農場、台南及屏東機場皆有不少紀錄。南部熱點之外，大肚山、田寮洋、濁水溪、嘉義農場、桃園機場有零星紀錄。不過根據 2018 年中部地區的系統調查顯示，上述有零星紀錄的地區，佔據率仍遠低於南部熱區。此外，草鴞分布預測模型分析，雲林沿海、蘭陽平原及花東縱谷為潛在棲地，但仍缺乏調查資料。

族群趨勢方面，仍缺乏資料。嘉大棲地生態研究室的繁殖族群估算，推估臺灣南部共有 158 對繁植草鴞。而根據 2020-2023 年高屏溪流域的調查資料顯示，共記錄到 19 個巢區，有 48 隻雛鳥成功孵育，顯示該區域族群穩定。總而言之，儘管部分熱區族群穩定，仍缺乏長期資料累積，以了解其族群趨勢（農業部林業及自然保育署、農業部生物多樣性研究所，2025）。



草鴞出現紀錄、預測分布及潛在繁殖分布圖（農業部林業及自然保育署、農業部生物多樣性研究所，2025）。

繁殖/生活史

2021-2023 年在高屏溪與曾文水庫的草鴞，於 8 月下旬開始求偶，每窩 3-6 顆蛋，孵蛋期 32-34 天，雛鳥約 42 天離開巢位，並在巢區附近停留 30-70 天，之後逐漸建立夜間活動區域。草鴞在地面築巢，通常會在高於一公尺的草叢或灌叢底層的淺凹處築巢，巢區隱密，由於親鳥踩踏，雛鳥所在巢室會形成隧道般的通道。草鴞通常利用白茅草地築巢，也會利用南美蟛蜞菊、大黍、大花咸豐草等植物組成的非典型草生地繁殖，但此類植群結構較白茅差，易受倒伏、割草干擾影響繁殖成功率。繁殖期間親鳥消失，可能與鼠藥中毒、誤中鳥網等有關，繁殖失敗則與犬隻干擾、機械割草、放牧牛隻踩踏等有關（農業部林業及自然保育署、農業部生物多樣性研究所，2025）。

食性

嘉大棲地生態研究室於 2019-2023 年間，對草鴞 234 個食繭進行分析，顯示草鴞主要以小型哺乳類為主（占總獵物的 98.4%），草鴞獵物包含囓齒類、鼩鼱類，以及少量無法辨識的蛙類、昆蟲與鳥類。不同景觀區域的獵物組成存在顯著差異，冗餘分析（RDA）顯示姬鼠屬（Apodemus）偏好森林，小鼠屬（Mus）偏好農田，麝鼩屬（Crocidura）偏好灌木及裸露地，研究結果支持草鴞為機會性掠食者的假說，會依據景觀條件調整獵物選擇（Lu et. al., 2025; 農業部林業及自然保育署、農業部生物多樣性研究所，2025）。

活動模式/衛星追蹤/棲地環境

2018-2024 年間，嘉大棲地生態研究室與臺南市野生動物保育學會合作的草鴞衛星追蹤結果顯示，幼鳥活動範圍較廣，平均每日移動距離 0.75±0.80 公里與夜間活動範圍 4.11±3.34 平方公里，均顯著高於成鳥（平均每日移動距離為 0.36±0.64 公里；夜間活動範圍為 2.08±1.93 平方公里）。而成鳥中有配偶的個體活動範圍最小，顯示幼鳥處於探索階段，無配偶成鳥則傾向頻繁更換棲息地（Tsai et al., 2025）。

儘管個體間的棲地使用存在顯著差異，大部分夜間 GPS 定位（68±17%）位於早期演替草地，其次為農田（14±12%）、果園（6±13%），魚塭與鹽田也是其重要的覓食棲地。草地為夜間最主要且唯一的棲息棲地，維持或營造適合草鴞的棲地為保育關鍵（Tsai et al., 2025）。

2024 年 7 月 25 日，凱米颱風登陸台灣，為中南部地區帶來豪雨，河水暴漲導致氾濫平原內的草地與農田被破壞。衛星追蹤顯示，居住於氾濫平原的草鴞在颱風過後，會暫時放棄被淹沒的棲地，部分個體在水退後返回。覓食個體也會暫時避開該區域覓食。根據颱風前後的同步調查，7 月中曾文溪下游共紀錄 12 隻草鴞，颱風過後一個月，僅記錄到 5 隻個體，皆集中在河口附近。洪水沉積大量泥沙，造成草地覆蓋率下降 73.4%、農田減少 19.8%，顯示重大洪水事件會導致暫時性棲地喪失，且會改變草鴞的棲地使用模式（Lyu et. al., 2025）。

聲學研究

嘉大棲地生態研究室於 2023-2024 年進行草鴞被動聲學監測研究，發現草鴞全年皆有鳴叫，但鳴叫高峰出現在日落後兩小時與日出前兩小時，且 5 月至 9 月鳴叫活動最頻繁，對應繁殖季晚期雛鳥離巢及繁殖前期配對行為（Chang & Tsai, 2025）。

研究方法/行為研究/棲架

屏科大鳥類生態研究室透過人工棲架結合自動相機監測草鴞，發現設置棲架可大幅提升觀察草鴞的機會，甚至可透過相機拍攝腳環進行個體辨識，同時，也可與生態農業推廣結合，提供農田鼠害防治的作用，並支持保育。至 2024 年為止，南臺灣已設置超過 100 組棲架，其中 75%的棲架在三個月內即觀察到猛禽活動，其中包含草鴞，顯示人工棲架在自動化監測與生態農業推廣上具有高應用潛力（Hong, 2025）。

此外，根據人工棲架上的自動相機監測顯示，草鴞通常在繁殖期的 5 和 11 月，比較有機會看到草鴞攜帶獵物到棲架上食用。平常較少觀測到，推測為草鴞使用棲架的目的為社交休息，常透過自動相機的影像看到草鴞在棲架上抓癢、鳴叫等，而草鴞通常捕抓到獵物後會在地面上直接處理獵物（周育楷，2024）。

教育推廣現況：棲地營造、生態友善給付

高雄市野鳥學會從 2017 年開始，向國有財產署南區分署認養高雄燕巢草鴞棲地，成為第一個國有土地保育草鴞之案例。曾發現有草鴞育雛，不過區內卻有大量銀合歡與南美蟛蜞菊入侵，因不利於草鴞育雛使用，因此 2020 年，林保署屏東分署與高雄市野鳥會合作，使用大型機具搭配人力移除，清除 0.5 公頃的銀合歡根系，發現目前白茅草的恢復狀態良好。後續，2021 年，林保署屏東與嘉義分署，與水利署河川局協調，對於草鴞潛在棲地周圍，進行外來種移除，並進行草鴞棲地營造及維護（農業部林業及自然保育署，n.d.）。

屏科大鳥類生態研究室於 2017 年開始在高屏地區架設人工棲架，並搭配自動相機，紀錄猛禽行為。2021 年起，林保署實施「瀕危物種與重要棲地生態服務給付推動方案生態友善給付」方案，草鴞列為生態服務給付優先推動物種之一，鼓勵草鴞潛在棲地地區的農友經營友善農業，並透過人工棲架的方式，進行農田猛禽（包含草鴞）的觀察監測（農業部林業及自然保育署，n.d.）。

研究單位

屏科大鳥類生態研究室、嘉大棲地生態研究室、臺南市野生動物保育學會、臺中市野生動物保育學會、高雄市野鳥學會

2025 年 13th ARRCN 研討會發表

Lu, C. Y., Chang, Y. R., Lyu, J. J., Hong, S. Y., Tsai, J. S. (2025). Landscape Influence on Diet Composition of Australasian Grass-Owl (*Tyto longimembris*) in Southern Taiwan: Insight from Pellet Analysis. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

Hong, S. Y. (2025). Using Artificial Perches for Raptor Monitoring and Promoting Ecological Farming. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

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曾翌碩，2022。草鴞救護安置原則建立計畫。行政院農業委員會林務局 111 年度林業管理計畫執行成果報告。

林瑞興、蔡若詩， 2022。 2022 年草鴞保育行動計畫。行政院農業委員會林務局、行政院農業委員會特有生物研究保育中心。

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34. 黃嘴角鴞

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NLC

台灣發表

棲位/共域/聲學研究

黃嘴角鴞和鵂鶹均為中低海拔森林常見鳥種，兩者都以大型昆蟲、小型哺乳類、小型鳥類、蛙、蜥蜴為食，也都會使用天然樹洞繁殖。不過，東華大學在花蓮山區使用可編程的自動錄音機收錄一年的夜間資料，並以生物音智慧辨識與標記系統 Sound Identification and Labeling Intelligence for Creatures (SILIC)萃取出二種鳥類的鳴唱聲。發現在鳴聲棲位上，兩者確實有明顯區隔，且鳴叫次數與樣區、林相、月份、時段皆有顯著的相關性。黃嘴角鴞通常是日落至日出前鳴叫；鵂鶹則是黃昏與清晨的時間。透過聲音，也發現兩者的繁殖期不同，黃嘴角鴞為 2-3 月繁殖(鳴叫高峰期)，另一個鳴叫高峰期出現在 8-9 月，推測為幼鳥離巢後，其他成鳥為了鞏固領域，發出聲音宣告領域所有權。鵂鶹的鳴叫高峰期則是在 5 月。從鳴叫次數可推測，黃嘴角鴞的族群較大，且更常出現在次生林中（謝宜樺，2021）。

除了在花蓮山區的監測外，農業部生物多樣性研究所利用被動聲學監測（Passive Acoustic Monitoring, PAM），在玉山國家公園南段南橫公路沿線三個山區林地監測站收集聲學資料。錄音期間為 2021 及 2023 年，每日從下午 4 點至隔日上午 8 點，每 3 分鐘錄 1 分鐘，累計約 11,320 小時音訊資料。並同樣透過 SILIC 系統，自動辨識出鵂鶹 76,588 次鳴叫，以及黃嘴角鴞 412,934 次鳴叫。每小時鳴叫活動率（Vocalization Activity Rate, VAR）分析顯示，兩個物種的鳴叫高峰分別出現在 2 月至 5 月及 8 月至 11 月。值得注意的是，鵂鶹的每小時鳴叫活動率與月相變化呈現高度相關，在滿月期間及月亮位於天頂時顯著增加；而黃嘴角鴞則未呈現此模式（Wu et. al., 2025）。

由於貓頭鷹調查高度依賴鳴叫的可偵測性，這些結果提供了物種特異性的田野調查時間建議。被動聲學監測的研究方法，也揭示出猛禽複雜時間模式上的有效性，並突顯其作為長期理解夜行性鳥類行為的重要工具。

棲地環境

嘉大棲地生態研究室於 2017 年春季 3-4 月及秋季 9-10 月，在中南部淺山地區進行黃嘴角鴞與領角鴞在檳榔園及森林棲地的監測調查。結果顯示，黃嘴角鴞在海拔 1200 公尺以下淺山地區黃嘴角鴞數量隨海拔上升而增加，相較起領角鴞，黃嘴角鴞對人為干擾較敏感，在秋季活動比春季低，且更喜歡利用次生林的環境（梁哲豪，2019）。

研究單位

嘉大棲地生態研究室、東華大學自然資源與環境學系許育誠副教授研究室、農業部生物多樣性研究所

2025 年 13th ARRCN 研討會發表

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35. 領角鴞

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NLC

台灣發表

繁殖/食性

領角鴞對各種環境的適應性都很強，因此分布廣泛，從低海拔森林到中海拔山區皆有蹤跡。林文隆（2003）在 1995-2002 年間於台灣中部森林紀錄總共 20 巢樹洞繁殖的領角鴞，發現領角鴞的繁殖期為 3-4 月及 7 月，其中以 3 月繁殖巢數最多。雖然研究觀察主要繁殖季為 3 月，不過其實全台各地的非正式紀錄中，領角鴞全年皆可繁殖。

領角鴞的產卵數和孵化率都相當高，每巢卵數平均約為 4±0.8 顆，受精卵需平均 27.8±1.8 天孵化。但孵化的幼雛約只有一半個體可以成功離巢（每巢平均 2.9±1.2 隻幼雛孵出，孵化率 72.5%，平均會有 1.6±1.4 隻幼鳥離巢，離巢率 55.2%），主要跟遭遇天敵有關，天敵例如蛇、赤腹松鼠、刺鼠、鼬獾、白鼻心都會吃領角鴞的蛋。鼬獾白鼻心等也會吃幼雛，尤其當這些雛鳥不小心摔到地面時。就算是已經離巢的小鴞，也可能因為不太會躲藏而被鳳頭蒼鷹捕抓（林文隆，2003）。

為了解全球暖化對領角鴞繁殖的影響，農業部生物多樣性研究所救傷站從落巢幼鳥，回推該巢的繁殖時間，以此分析繁殖時間與氣溫的相關性。研究發現領角鴞的繁殖時間與前一年 11 月的月均溫有顯著相關，如果前一年 11 月的氣溫上升，則隔年的繁殖時間將會提前（洪孝宇等，2010）。

此外，近年來，領角鴞也有逐漸適應城市的現象，開始會在城市環境中繁殖，不過城市中只有少部分校園、公園有老樹形成的天然樹洞可使用，因此領角鴞也會使用松鼠舊巢、大

王椰子葉基、檳榔花叢等，民宅廚房抽油煙機的通風口也是曾有過的紀錄。城市中的領角鴞繁殖時間早於在森林中繁殖的領角鴞，推測與食物資源較為豐富有關（鄭薏如，2004；林文隆，2017）。

食性/捕食行為

城市中的領角鴞主要捕食麻雀、白頭翁、紅鳩、玄鼠 (*Rattus rattus*)和臭鼩 (*Suncus murinus*)，蟑螂等昆蟲也是常見的獵物。向對而言，森林中的領角鴞則主要捕食兩棲爬蟲與大型昆蟲為主，其次才是鳥類或老鼠（鄭薏如，2004；林文隆，2017）。

近年來屏科大鳥類生態研究室的人工棲架的設置與自動相機監測發現，領角鴞在平原及農田中也有廣泛利用棲架的行為，主要使用棲架獵食，通常站立在棲架上不移動，專注在觀察獵物上，以嚙齒類為主食，其次才是昆蟲，發現獵物後，時常捕抓後，將獵物帶到棲架上食用。領角鴞整晚都會捕老鼠，目前最高紀錄月均最高可捕食 60 隻（台東水稻田棲架紀錄）（Hong, 2025; 周育楷，2024；蔡穎詩，2022）。

在行為方面，由於領角鴞也會捕食小型鳥類，小型鳥類面對捕食者領角鴞，會採取群體滋擾反應——發出滋擾鳴聲或靠近攻擊，而一旦領角鴞被滋擾，更容易面臨領角鴞的捕食者——鳳頭蒼鷹的捕食風險（方唯軒，2017 ）。因此，領角鴞在面對小型鳥類滋擾時，會出現豎起耳羽、身體拉長的僵直姿勢，以降低小型鳥類滋擾的次數及發現的機率（楊雅文，2017；陳宏昌，2013）。

救傷

台灣猛禽研究會自 2017 年起持續進行猛禽救傷工作，期間對領角鴞也有系統性觀察與監測。2017-2024 年間，領角鴞在遭玻璃撞擊的夜行性猛禽中占比最高（45.31%），主要臨床症狀為眼部損傷。整體遭玻璃撞擊的猛禽住院平均為 26 天，中位數 11 天，經治療後有七成以上個體成功野放。值得注意的是，體況較佳的猛禽在撞擊玻璃後反而更易當場死亡，未能進入救援系統，因此僅統計救援個體可能低估玻璃撞擊對領角鴞的實際影響（Wang, 2025a）。

在農藥與殺鼠劑風險方面，台灣猛禽研究會於 2021-2024 年間，共收集 115 隻猛禽樣本進行殘留檢測。領角鴞檢出率達 48%（n=25），顯示其在野外的二次中毒風險相當高。對於高風險物種，即使未出現明顯中毒或貧血症狀，建議也應在救傷過程中預防性施用兩週以上的維他命 K，以避免凝血障礙（Wang, 2025b）。

教育推廣現狀：人工巢箱/棲架/窗殺

人工棲架配合自動相機監測的研究方法不僅可以提供領角鴞族群動態資料，也顯示領角鴞對農田生態服務與生物防治的重要性，例如控制嚙齒動物，有助於生態農業的推廣。自 2022 年政府推行生態給付政策以來，農民可免費設置棲架並獲補助，促進猛禽活動與農田生態保育的結合（Hong, 2025）。

天然樹洞的減少，讓領角鴞繁殖受阻，為了讓領角鴞有地方繁殖，台灣各地都開始架設人工巢箱。透過在巢箱內或外架設自動相機，不但可以成為一種監測方法，同時也能將育雛的過程紀錄下來，有利於持續推動校園、農田等環境教育及生態友善農法（國立屏東科技大學高教深耕計畫，2023；遠雄人壽，2023；陳佳利等，2018）。

此外，台灣猛禽研究會於 2017 年開始執行猛禽救傷業務，救援過程發現高達 20%猛禽是因為撞窗受傷而引起關注。過去在國內對窗殺少有關注，但北美卻已推行窗殺研究與防治近 60 年，同處亞洲的南韓近 10 年來也高度重視野鳥窗殺議題。窗殺為野鳥因人為因素導致死亡的主要原因之一，每年在全球造成數十億隻野鳥死亡。因此，台灣猛禽研究會創立野鳥窗殺博物館，並獲綠獎、臺北市動物保護處、臺北市立動物園等單位的支持，開始推廣野鳥

窗殺防治，並且也鼓勵民眾目擊野鳥撞玻璃狀況，可上傳資料至「野鳥撞玻璃回報 (Reports on Bird-Glass Collisions)」或是「台灣路死動物觀察網 」，累積資料（野鳥窗殺博物館）。

研究單位

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-草稿-

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36. 蘭嶼角鴞

IUCN 紅皮書：NT
臺灣鳥類紅皮書：NNT 接近受脅

台灣發表

族群趨勢/分布

蘭嶼角鴞（*Otus elegans botelensis*）是琉球角鴞（又稱優雅角鴞）（*Otus elegans*）下面的一個亞種，僅分布在蘭嶼。琉球角鴞的其他三個亞種，分別分布在琉球群島、大東群島，以及菲律賓巴丹群島。根據劉小如博士從 1985 年開始長達 20 年的研究，保守估計，蘭嶼島上的蘭嶼角鴞族群約在 1000 隻左右。蘭嶼角鴞在數量有下降的趨勢，主要為人為開發、原始林面積縮小有關（劉小如，1988）。另由於蘭嶼島上沒有會主動挖掘樹洞的動物存在，因此必須仰賴昆蟲、真菌等方式自然促成樹枝腐朽，因此樹洞的形成速度較為緩慢，加上頻繁颱風地震造成的破壞，也都間接導致天然樹洞的消失（曾翌碩，2010）。

繁殖/生活史

蘭嶼角鴞是一種不會自行鑿洞的樹洞營巢性鳥類（secondary cavity-nesting birds），其繁殖成功與否受到巢洞可獲得性及品質的影響。對蘭嶼角鴞而言，合適的巢洞為離地面較高、洞內乾燥平緩且體積較大的樹洞，偶爾也會被發現在人工廢棄建物上營巢。蘭嶼角鴞通常在 1 月開始建立領域，並求偶，因此這段時間的鳴唱行為會很頻繁；若遇上暖冬，繁殖時間會提早。蘭嶼角鴞會重複使用相同的樹洞，其中有 57%僅使用了一年，14.3%使用兩年，只有 28.5%的樹洞會被使用三年以上。不管一棵樹上有多少個洞，一棵樹在同一時間裡從來沒有超過一個蘭嶼角鴞巢（Severinghaus, 2007; Severinghaus & Rothery, 2001; 吳采諭，2001）。

此外，不論繁殖季或非繁殖季，蘭嶼角鴞的領域範圍都有重疊，相鄰的貓頭鷹不會同時使用其領域內的共享區域，因此，頻繁的鳴唱可能是為了避免與鄰居發生潛在的衝突而產生

的行為。而非這個領域的蘭嶼角鴞可以在被占領的領地內暫時覓食休息（Severinghaus, 2000）。

食性

蘭嶼角鴞幾乎不吐食繭，因此要搞清楚牠們平常都吃些什麼只能從糞便中略窺一二，牠們主要以大型昆蟲為食，偶爾吃蜘蛛、兩棲爬蟲類、小型鳥類、鼩鼱或小型鼠類。體型較小的公鴞更習慣捕抓空中飛蟲，而體型稍大的母鴞似乎更偏好吃陸地上的節肢動物（Hu et. al., 2023; Lee & Severinghaus, 2004）。

播遷/活動模式

蘭嶼角鴞幼鳥獨立後會離開巢區向其他地方擴散，部分成鳥的繁殖地點甚至會每年都變動。其活動模式與季節密切相關，蘭嶼角鴞會在蘭嶼島內做季節性移動，繁殖季時會湧入繁殖區的森林之中，密度極高，夏末時則遷移到非繁殖區度冬的森林邊緣或草原上（Hu et. al., 2023; Severinghaus, 2002; 劉小如，2003）。

分子親緣/微衛星基因座

利用篩選開發出來之微衛星基因座作為遺傳標記，進行蘭嶼角鴞的親子鑑定。比對來自 108 個家庭、共 200 隻幼鳥的基因型，一共只發現來自二個家庭的三隻幼鳥，其基因型和餵養牠們的親鳥不相符。配合野外調查的記錄，並比對所有成鳥的微衛星基因型資料，確認其中一巢的一隻幼鳥是母鳥和該樹洞的前擁有者發生偶外受精所產生。另一巢的二隻庶出幼鳥，則是來自鄰近樹洞的繁殖鳥。換句話說，蘭嶼角鴞雖然大多是一夫一妻制，但還是會有「外遇」。

另外，比對琉球群島與蘭嶼各島上的優雅角鴞各島嶼遺傳多樣性與親緣地理，發現優雅角鴞在北部島嶼內的遺傳多樣性較高、偏遠島嶼內的族群遺傳多性較低。所有樣本可以分成南北二大系群，顯示南北二族群曾經過很長期的隔離。大部分島嶼族群間有明顯的族群分化，且最近一次冰期結束迄今，在南、北琉球的角鴞族群量都呈現成長的趨勢，推測可能是因為冰期結束後，這些地區降雨量增加，造成適合優雅角鴞棲息的森林增加所致（Hsu et. al., 2006a; Hsu et. al., 2006b; 許育誠，2005; Hsu, 2003）。

教育推廣現狀：生態旅遊/聲學研究

蘭嶼的森林是蘭嶼角鴞主要的棲息地。近年來因為旅遊業發展，使得聚落附近的森林和農地轉變為旅館或餐廳等設施，森林棲地則逐漸減少。此外，蘭嶼角鴞傳統上被達悟族人視為惡靈的化身，但近期也因為旅遊發展，使得夏季夜間觀賞蘭嶼角鴞成為一項旅遊收入。不過，大量遊客在蘭嶼角鴞的繁殖季湧入森林，可能帶來噪音及燈光等人為干擾。因此，東華大學使用排程式自動錄音設備，收集蘭嶼夜間的聲景，以此分析遊客對蘭嶼角鴞鳴聲行為是否造成影響。

研究結果發現，蘭嶼角鴞的鳴聲自 3 月起開始，隨著繁殖季的開始而大量增加，與蘭嶼每年遊客數量開始增加的時間相同；大部分遊客的夜觀活動都集中在上半夜，且幾乎只在森林入口處附近，極少進入森林內部。當有遊客出現的情況下，蘭嶼角鴞的鳴唱頻度會增加，推測遊客的夜觀行為刺激蘭嶼角鴞的領域行為。

研究建議，鳴聲是夜行性鳥類溝通的重要工具，繁殖期間過多的鳴唱行為代表蘭嶼角鴞必須花費更多能量，並減少覓食和繁殖行為。目前蘭嶼的森林夜觀活動對蘭嶼角鴞而言，不是可永續利用的旅遊型態（許育誠，2022）。

研究單位

東華大學自然資源與環境學系許育誠副教授研究室

政府報告

許育誠，2022。建置人之島永續發展環境治理網絡-旅遊發展對蘭嶼角鴞的影響（子計畫五）。國家科學及技術委員會 111 年補助專題研究計畫報告（MOST 110-2621-M-259-007）。

劉小如，1988。蘭嶼角鴞之生態研究與經營管理。行政院農業委員會林務局（77 年生態研究第 022 號）計畫執行成果報告。

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Severinghaus, L. L., & Rothery, P. (2001). The survival rate of Lanyu Scops Owls *Otus elegans botelensis*. *Ibis*, *143*(3), 540-546.

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食性/捕食行為

Hu, C. H., Yang, M. M., Lin, C. C., Yen, A., & Liu, L. (2023). Habitat Fauna and Ant Indicators for Insectivorous Scops Owl (*Otus elegans botelensis*) in Lanyu. *Hwa Kang Journal of Agriculture*51:25-4.

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播遷/活動模式

劉小如，2003。蘭嶼角鴞的移動與擴散。*台灣猛禽研究*, (1), 1-10。

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分子親緣

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Hsu, Y. C., Li, S. H., Lin, Y. S., & Severinghaus, L. L. (2006b). Microsatellite loci from Lanyu scops owl (*Otus elegans botelensis*) and their cross-species application in four species of Strigidae. *Conservation Genetics*, *7*, 161-165.

Hsu, Y. C., Severinghaus, L. L., Lin, Y. S., & Li, S. H. (2003). Isolation and characterization of microsatellite DNA markers from the Lanyu scops owl (*Otus elegans botelensis*). *Molecular Ecology Notes*, *3*(4), 595-597.

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棲地環境

吳采諭，2001。蘭嶼角鴞（*Otus elegans botelensis*）的巢洞選擇。國立台灣大學動物學研究所碩士論文。

分子親緣

許育誠，2005。優雅角鴞分子生態研究。國立臺灣大學生態學與演化生物學研究所博士論文。

科普文章

曾翌碩，2010。達悟人口中的都都霧：蘭嶼角鴞。環境資訊中心。https://e-info.org.tw/node/59627#google_vignette

國際發表

期刊

族群趨勢

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繁殖/生活史

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播遷/活動模式

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環境棲地

Inoue, T., Matsumoto, M., Yoshida, T., & Washitani, I. (2019). Spatial patterns of the Ryukyu Scops Owl's *Otus elegans* breeding success and forest landscape factors on Amami-Ōshima Island.

分子親緣

Sawada, A., Iwasaki, T., & Takagi, M. (2019). Fine-scale spatial genetic structure in the Minami-daito Island population of the Ryukyu scops owl *Otus elegans*. *Journal of Zoology*, *307*(3), 159-166.

形質測量

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聲音研究

Takagi, M. (2020). Vocalizations of the Ryukyu Scops Owl *Otus elegans*: individually recognizable and stable. *Bioacoustics*, *29*(1), 28-44.

37. 東方角鴞

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NNT 接近受脅

台灣發表：無

國際發表

期刊

繁殖/生活史

刘春红、周梦妍、李忠秋，2016。红角鸮的食性及育雏行为初报. *动物学杂志*, *51*(6), 1106-1109。

No, S. H., Baek, C. Y., You, Y. H., & Cho, S. R. (2015). A study on breeding ecology and nest characteristics of oriental scops owl (Otus sunia stictonotus) in South Korea. *Journal of Ecology and Environment*, *38*(4), 415-424.

生態棲位

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環境棲地

Sureshmarimuthu, S., Babu, S., Honnavalli, N. K., & Rajeshkumar, N. (2023). Where do the Tropical Owls Roost: Multiscale Habitat Variables Explain Roost Site Selection by Two Sympatric Otus Species in the Andaman Archipelago, India. *Acta Ornithologica*, *57*(2), 181-196.

分子親緣

Zhou, C., Chen, Y., Hao, Y., Meng, Y., Yue, B., & Zeng, T. (2019). Characterization of the complete mitochondrial genome and phylogenetic analysis of Otus sunia (Strigiformes: Strigidae). *Mitochondrial DNA Part B*, *4*(1), 804-805.

行為研究

Sureshmarimuthu, S., Babu, S., Kumara, H. N., & Rajeshkumar, N. (2021). Factors influencing the flush response and flight initiation distance of three owl species in the Andaman Islands. *Journal of Threatened Taxa*, *13*(11), 19500-19508.

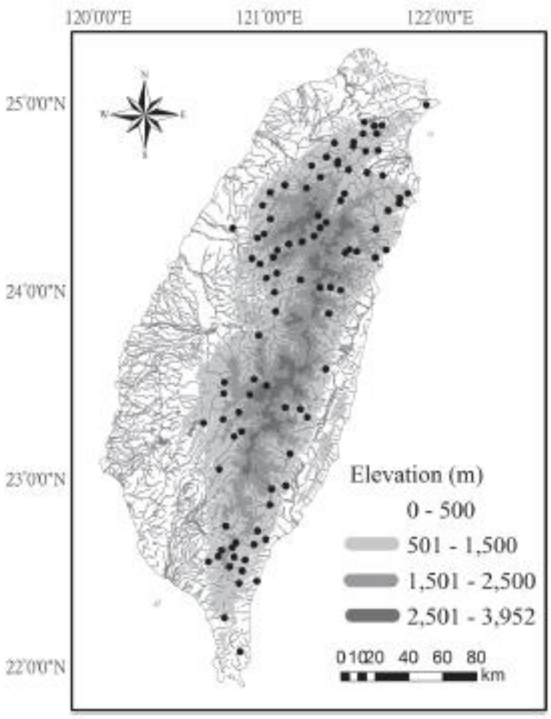
38. 黃魚鴞

IUCN 紅皮書：LC

台灣發表

族群趨勢/分布

根據屏科大鳥類生態研究室於 1992-2007 年的調查資料與訪談蒐集，共獲得 127 筆紀錄，最後整合成 91 個不同的黃魚鴞領域，結果顯示台灣全島山區均有黃魚鴞分布，北至新北貢寮，南至南仁山保護區，而武陵的七家灣溪則是其分布海拔最高的地區。黃魚鴞的分布主要與流量穩定的山區溪流有關，且偏好原始天然林。不過雖然黃魚鴞的分布紀錄遍布全台，但因生態調查不容易，因此其族群數量和趨勢變化至今仍不易準確評估（Hong et al., 2013; 洪孝宇、孫元勳，2008; 洪孝宇、孫元勳，2007）。



1993-2006 年黃魚鴞分布圖（Hong et al., 2013）。

繁殖/生活史/食性

黃魚鴞大約在 2-4 月間產卵育雛，一窩 1-2 顆蛋，孵化期約為 35 天，雌鳥負責孵蛋，雄鳥負責覓食。幼鳥孵化後大約 56-60 天離巢，也就是大約 5 月底前後。離巢後，6-7 月仍會逗留在離巢不遠的森林內，此時仍是親鳥餵養。9-11 月已逐漸往溪邊活動，活動範圍已可超過 3 公里，不過仍接受親鳥照養，之後才會逐漸播遷建立自己的領域（孫元勳、吳幸如，2014）。

食性

黃魚鴞的食繭中時常可看到甲殼類（澤蟹、毛蟹、蝦類）、魚類、兩棲類（盤古蟾蜍）、哺乳類（鼠類、鼴鼠）、爬蟲類及鳥類（例如樹鵲、巨嘴鴉）等，此外，黃魚鴞也會在山上溪邊的養鱒場守株待兔，於養鱒場熄燈後，去魚場捕食鱒魚，不過，捕抓成功率僅三成（孫元勳、吳幸如，2014；Sun et al., 2006; Sun et al., 2004）。

播遷/活動模式

屏科大鳥類生態研究室於 2010-2015 年，在武陵地區以無線電追蹤 6 隻黃魚鴞成鳥及 4 隻幼鳥。在繁殖期間，雄鳥的移動範圍顯著大於雌鳥，反映雄鳥負責供應食物、雌鳥負責育

雛的分工行為。幼鳥離巢 4 個月內幾乎都在巢區附近活動，移動距離雌鳥平均 1.23 ± 1.71 km；雄鳥則是 1.41 ± 1.15 km。離巢 7-8 個月後獨立，不過仍在出生地附近徘徊，8-29 個月後的夜晚活動距離與成鳥沒有顯著差異，平均 2.59 ± 1.86 km，不過仍顯著小於成鳥 3.70 ± 2.38 km（p = 0.001）。離巢後三年，已記錄到其中一隻在親鳥的領域附近與其他個體配對（劉依昕，2015；孫元勳、吳幸如，2014）。

研究方法/棲架

隨著人工棲架技術漸趨成熟，主要架設在農田地區。2024 年起，屏科大鳥類生態研究室第一次嘗試在七家灣溪溪流沿岸架設猛禽棲架，搭配紅外線自動相機，成功拍攝到多次黃魚鴞停在棲架上的畫面，並記錄到黃魚鴞吃臺灣白甲魚進食。雖黃魚鴞在七家灣溪的研究已累積二十年資料，但偵測到黃魚鴞一直都不適容易的事情，棲架作為鳥類新調查方法，不僅可以直接觀察到猛禽、作為偵測調查工具，也可以分析猛禽食性，可做為未來黃魚鴞監測的新方法，研究團隊表示「這麼簡單的方法，以前竟然沒想到」（屏科大鳥類生態研究室，2025）。

研究單位

屏科大鳥類生態研究室、台灣猛禽研究會

期刊

分布

Hong, S. Y., Sun, Y. H., Wu, H. J., & Chen, C. C. (2013). Spatial distribution of the Tawny Fish-owl *Ketupa flavipes* shaped by natural and man-made factors in Taiwan. *Forktail*, *29*(1), 48-51.

洪孝宇、孫元勳，2008。黃魚鴞何處尋？談黃魚鴞在台灣的海拔分布模式。*自然保育季刊 62*:67-71。

洪孝宇、孫元勳，2007。黃魚鴞的分佈現況與族群概估。*野生動物保育彙報及通訊* 11(1):19-26。

食性/棲地環境

Sun, Y. H., Wang, Y., & Tseng, Y. S. (2006). Food habits of Tawny Fish-owls in Sakatang stream, Taiwan. *Journal of Raptor Research*, *40*(2), 111-119.

Sun, Y. H., Wu, H. J., & Wang, Y. (2004). Tawny Fish-owl predation at fish farms in Taiwan. *Journal of Raptor Research*, *38*(4), 5.

Sun, Y. H., Wang, Y., & Lee, C. F. (2000). Habitat Selection by Tawny fish-owls. *Raptor Res*, *34*(2), 102-107.

論文

劉依昕，2015。武陵地區黃魚鴞(*Ketupa flavipes*)之移動模式與幼鳥播遷。屏東科技大學野生動物保育研究所碩士論文，49 頁。

汪辰寧，2013。武陵地區黃魚鴞(*Ketupa flavipes*)育雛食性及活動模式。屏東科技大學野生動物保育研究所碩士論文，39 頁。

洪孝宇，2007。黃魚鴞在台灣的分布模式。屏東科技大學野生動物保育研究所碩士論文，91 頁。

書籍

孫元勳、吳幸如，2014。暗夜迷禽：黃魚鴞。雪霸國家公園管理處。

社群媒體

屏科大鳥類生態研究室，2025 年 2 月 7 日。棲架又有親鳥種啦，這次是我們的老朋友，七家灣溪的黃魚鴞！！Facebook。
https://www.facebook.com/iwcraptor/posts/pfbid02gty8DggnnNF2PQJ2bRgeSeuo32iB119HiaZUPs3pgaLEGrjKTVaXx5dJhYPjmvyrl?locale=zh_TW

https://www.facebook.com/iwcraptor/videos/1148018110054353/

39. 鵂鶹

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NNT 接近受脅

台灣發表

繁殖/生活史/食性

台中地區鵂鶹大約在 3 月開始求偶配對，鳴叫高峰期持續到 4 月底為止。完成配對個體會雌雄一同活動，尋找巢洞場所，會使用天然樹洞及次級巢洞，鵂鶹窩卵數為 3-5 顆。鵂鶹在繁殖期間主要為夜間獵食，育雛期間攜回的獵物以昆蟲為主，其次是蛙類和爬蟲類，其餘為小型鳥類與哺乳類。昆蟲中又以熊蟬、騷蟬為主（78%），其次是蜻蜓、金龜。幼雛 3-4 日齡開眼，7-10 日活動力增加，平均 20 天即離巢。育雛期間，鵂鶹攻擊性強烈，大約距離巢 3 公尺，便會發出警告聲，接著便會衝上前以爪攻擊（曾翌碩、林文隆，2012）。

行為/滋擾反應

由於會捕食鳥類，鵂鶹容易遭受燕雀目小型鳥類的滋擾攻擊，嘉大棲地研究室 2017-2018 年的研究顯示，小型燕雀目鳥類在不同季節面對鵂鶹時，採取了不同的滋擾策略，在繁殖季時，鳥群明顯更傾向靠近鵂鶹，並有攻擊行為出現，因此研究推測相較於非繁殖季採取鳴聲滋擾等較安全的方式抵抗鳥群，繁殖季較具攻擊性是因為該地區鵂鶹在繁殖季期間更傾向捕食鳥類（陳達智，2019）。

面對鳥群的攻擊，鵂鶹頭後方有一對看起來像眼睛的「假眼」花紋，可以用來分散即降低鳥類的注意力和攻擊的風險。不過在另一個 2020-2021 年嘉大棲地研究室的研究則顯示，相較起看到鵂鶹本身，聽到鵂鶹叫聲，更容易讓鳥群起滋擾反應，且在非繁殖季時，鳥群不一定會因為聽到其他鳥群的滋擾叫聲而產生反應，但若鵂鶹有發出鳴叫聲，鳥群便會產生滋擾反應，或許反應小型鳥類面對鵂鶹捕食者時，聽到鵂鶹聲音才是主要刺激訊號（尤冠智，2021）。

棲位/共域/聲學研究

黃嘴角鴞和鵂鶹均為中低海拔森林常見鳥種，兩者都以大型昆蟲、小型哺乳類、小型鳥類、蛙、蜥蜴為食，也都會使用天然樹洞繁殖。不過，東華大學在花蓮山區使用可編程的自

動錄音機收錄一年的夜間資料，並以生物音智慧辨識與標記系統 Sound Identification and Labeling Intelligence for Creatures (SILIC)萃取出二種鳥類的鳴唱聲。發現在鳴聲棲位上，兩者確實有明顯區隔，且鳴叫次數與樣區、林相、月份、時段皆有顯著的相關性。黃嘴角鴞通常是日落至日出前鳴叫；鵂鶹則是黃昏與清晨的時間。透過聲音，也發現兩者的繁殖期不同，黃嘴角鴞為 2-3 月繁殖(鳴叫高峰期)，另一個鳴叫高峰期出現在 8-9 月，推測為幼鳥離巢後，其他成鳥為了鞏固領域，發出聲音宣告領域所有權。鵂鶹的鳴叫高峰期則是在 5 月。從鳴叫次數可推測，黃嘴角鴞的族群較大，且更常出現在次生林中（謝宜樺，2021）。

除了在花蓮山區的監測外，台灣生物多樣性中心以利用被動聲學監測（Passive Acoustic Monitoring, PAM），在玉山國家公園南段南橫公路沿線三個山區林地監測站收集聲學資料。錄音期間為 2021 及 2023 年，每日從下午 4 點至隔日上午 8 點，每 3 分鐘錄 1 分鐘，累計約 11,320 小時音訊資料。並同樣透過 SILIC 系統，自動辨識出鵂鶹 76,588 次鳴叫，以及黃嘴角鴞 412,934 次鳴叫。每小時鳴叫活動率（Vocalization Activity Rate, VAR）分析顯示，兩個物種的鳴叫高峰分別出現在 2 月至 5 月及 8 月至 11 月。值得注意的是，鵂鶹的每小時鳴叫活動率與月相變化呈現高度相關，在滿月期間及月亮位於天頂時顯著增加；而黃嘴角鴞則未呈現此模式（Wu et. al., 2025）。

由於貓頭鷹調查高度依賴鳴叫的可偵測性，這些結果提供了物種特異性的田野調查時間優化建議。被動聲學監測的研究方法，也揭示出猛禽複雜時間模式上的有效性，並突顯其作為長期理解夜行性鳥類行為的重要工具。

形質/換羽

根據追蹤鵂鶹幼鳥兩年，並與博物館標本數據進行結合，研究證實鵂鶹的顏色變化與年齡有關。鵂鶹在孵化後 2-3 個月，會從最初紅褐色的雛鳥羽毛，轉變為孵化後 4-7 個月的鉛灰色，頭上的斑點也會越來越細小，研究因此否定過往鵂鶹的多態性假說（Lin et. al., 2014）。

研究單位

嘉大棲地生態研究室、東華大學自然資源與環境學系許育誠副教授研究室、臺中市野生動物保育學會、臺南市野生動物保育學會

2025 年 13th ARRCN 研討會發表

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期刊

許育誠、鄭勝文、徐中琪、蔡佩芳，2013。太魯閣國家公園中海拔地區領鵂鶹意外捕獲記錄。*台灣猛禽研究*, (14), 57-59。

繁殖/生活史

曾翌碩、林文隆，2012。鵂鶹 (*Glaucidium brodiei pardalotum*) 的繁殖生物學。*野生動物保育彙報及通訊*, *16*(4), 34-40。

形質測量

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論文

謝宜樺，2021。兩種共域夜行性鳥類的鳴聲棲位區隔。國立東華大學碩士論文。

尤冠智，2021。捕食者與核心物種之視覺及聽覺訊號在鳥類滋擾反應中的影響。國立嘉義大學生物資源學系碩士論文。

陳達智，2019。台灣燕雀目鳥類對鵂鶹(*Glaucidium brodiei*)的群聚滋擾反應。國立嘉義大學生物資源學系碩士論文。

國際發表

期刊

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40. 縱紋腹小鴞

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

期刊

族群趨勢

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繁殖/生活史

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食性/捕食行為

Saada, I., Hammouda, A., Romanowski, J., & Selmi, S. (2024). Little owls (*Athene noctua*) shift their diet towards nocturnal beetles in an arid North African area. *African Journal of Ecology*, *62*(2), e13270.

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Kolendrianou, M., Mitsainas, G. P., Tzortzakaki, O., Katsiyiannis, P., Vythoulkas, T., Patrou, M., & Iliopoulos, G. (2022). Hunger sweetens the beans: evidence of opportunistic feeding behaviour of the little owl (Scopoli 1769) from Peloponnese, Greece. *Raptor Journal*, *16*(1), 57-67

Kayahan, A., & Tabur, M. A. (2016). Diet Composition of Little Owl (*Athene noctua* Scopoli, 1769) in Turkey. *Pakistan Journal of Zoology*, *48*(4).

李叶, 张翔, & 时磊. (2016). 阿尔金山国家级自然保护区纵纹腹小鸮食性的季节变化. *四川动物*, (3), 351-355.

播遷/活動模式

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棲地環境

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Bušina, T. (2021). Reinforcement of declining little owl (*Athene noctua*) population: A peculiar case of post-release habitat selection and underground roosting. *Global Ecology and Conservation*, *28*, e01656.

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生態功能

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行為研究

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形質測量

Pellegrino, I., Cucco, M., Calà, E., Boano, G., & Pavia, M. (2020). Plumage coloration and morphometrics of the Little Owl *Athene noctua* in the Western Palearctic. *Journal of Ornithology*, *161*(4), 1071-1081.

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書籍

Van Nieuwenhuyse, D., van Harxen, R., & Johnson, D. H. (2023). *The little owl: Population dynamics, behavior and management of Athene noctua*. Cambridge University Press.

41. 褐林鴞

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NNT 接近受脅

台灣發表

族群趨勢/分布/分類異動

喜馬拉雅林鴞（*Strix newarensis*）與褐林鴞（*Strix leptogrammica*）原被視為同種不同亞種，König 等（1999）基於形態上的差異將兩者拆開成 2 個獨立物種，台灣分布的應為褐林鴞。以下文獻的內容，若是分類拆分前的研究，便依照作者原文章內容，以喜馬拉雅林鴞稱之。

喜馬拉雅林鴞主要棲息於海拔 900-2600 公尺的闊葉林及針闊葉混合林中，不過在北部及東部地區，會出現在 300-800 公尺、較為低海拔的闊葉林中。根據林文宏於 1997 年出版的《台灣鳥類發現史》書中的整理，喜馬拉雅林鴞在台灣的首次記錄為斯文豪於 1858 年在大屯火山地區發現喜馬拉雅林鴞，1990 年代，孫元勳在新北市金山區進行黃魚鴞調查時訪談當地耆老，也曾聽聞耆老聽過喜馬拉雅林鴞的叫聲。時隔 150 年後的 2008 年，林宗以在大屯火山地區做調查時，聽到喜馬拉雅林鴞的典型鳴聲，留下一筆珍貴的再發現紀錄（林宗以，2011）。

繁殖/生活史/食性

林文隆等人於 1996、2003 及 2004 年，在海拔 900-2600 公尺的闊葉森林內發現 3 個喜馬拉雅林鴞的巢。每巢產 1-2 顆卵，幼鴞孵化後大約 25-27 天離巢，離巢之後會在巢區附近直徑 1000 公尺範圍內活動達 4-5 個月。繁殖期間，親鳥餵食以哺乳動物為主，最大宗獵物為大赤鼯鼠與白面鼯鼠。親鳥狩獵會採取低處定點守候、高處尾隨追擊以及洞口守候等 3 種捕食行為（林文隆、曾惠芸、王穎、陳明德，2008）。

有關褐林鴞的繁殖研究非常少，後續一直到 2021 年，屏科大鳥類生態研究室在屏東山區偶然發現褐林鴞的繁殖巢位，位於一棵巨木頂端折斷形成的天然巢洞，於是架設自動相機紀錄育雛全過程。有趣的是，過往許多人在山林間常聽見褐林鴞的聲音，都會形容像是嬰兒哭聲或是鬼哭聲，經過這次自動相機錄影紀錄，研究團隊發現這個聲音是雌鳥臥巢照顧幼雛期間，催促雄鳥送食物的乞食聲。這次紀錄不但為褐林鴞生活史多一筆紀錄外，也錄製許多褐林鴞繁殖季時的聲音與行為（屏科大鳥類生態研究室，2023）。

研究單位

屏科大鳥類生態研究室、台灣大學生態學與演化生物學研究所、台灣猛禽研究會、臺中市野生動物保育學會

期刊

林宗以，2011。大屯火山群喜馬拉雅林鴞的再發現。*台灣猛禽研究* (11): 44-47。

林文隆、曾惠芸、王穎、陳明德，2008。喜馬拉雅林鴞 (*Strix newarensis*) 繁殖生態學: 繁殖, 食性與捕食行爲描述。*特有生物研究 10*(2), 13-24.

論文

唐一中，2004。褐林鴞與灰林鴞回播對白面鼯鼠鳴叫行為的影響。國立屏東科技大學野生動物保育研究所碩士論文。

影片

屏科大鳥類生態研究室，2023 年 8 月 28 日。中元節最應景的猛禽--褐林鴞育雛觀察。Facebook。https://www.facebook.com/iwcraptor/videos/1398560724427804/

國際發表

期刊

棲地環境

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形質測量/解剖學

Choudhary, O. P., Arya, R. S., Kalita, P. C., Doley, P. J., Rajkhowa, T. K., & Kalita, A. (2019). Comparative Gross Morphological Studies on the Os-Coxae of Crested Serpent Eagle (*Spilornis cheela*) and Brown Wood Owl (*Strix leptogrammica*). *Journal of Animal Research*, *9*(3), 439-442.

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救傷

Hareesh, T. S., Gunaga, R. P., Sathish, B. N., Hegade, Y., & Vasudeva, R. (2013). Report on a Treatment of an injured Brown Wood Owl *Strix leptogrammica indranee* Sykes from Karnataka, India. *ZOO'S PRINT*, *28*(10), 16-17.

42. 東方灰林鴞

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NNT 接近受脅

台灣發表

族群趨勢/分布/分類異動

東方灰林鴞（*Strix nivicola*）原本被認為與灰林鴞（*Strix aluco*）同種，2011 年 8 月，美國康乃爾大學鳥類研究室發布 Clements 世界鳥類名錄第 6.6 版，將灰林鴞分布於喜馬拉雅山脈的亞種 *S. a. nivicola* 提升為物種 *Strix nivicola*。不過此時台灣的灰林鴞族群依然被認為是灰林鴞（*Strix aluco*）下的亞種。後在 2012 年 8 月 20 日，Clements 研究團隊在 ebird 網頁發布鳥種分類的更新消息，承認之前的誤植，台灣的應為東方灰林鴞下面的特有亞種，學名為 *Strix nivicolum yamadae*（林大利，2013）。以下文獻的內容，若是分類更動前的研究，則依照作者原文章內容，以灰林鴞稱之。

東方灰林鴞在台灣的族群量稀少，估計族群量在 250-1000 隻，主要分布在中、高海拔山區的闊葉林和針闊葉混合林之中（原始文獻為方，2005；引用自林大利，2013）。

食性

林文隆等人（2007）在 2000-2005 年間，在台灣中部高海拔山區道路邊緣調查灰林鴞，共蒐集 180 顆食繭。食繭內共發現 7 種哺乳類，分別為台灣森鼠（*Apodemus semotus*）、黑腹絨鼠（*Eothenomys melanogaster*）、高山白腹鼠（*Niviventer culturatus*）、小麝鼩

-草稿-

（*Crocidura horsfieldi*）、松鼠科（*Sciuridae*）、條紋松鼠（*Tamiops maritimus*）與小鼯鼠（*Belomys pearsoni*）；鳥類共計 6 類群，分別為山雀科（*Paridae*）、畫眉科（*Timaliidae*）、鶯科（*Sylviidae*）、燕雀目（*Passeriformes*）、鴞形目中的黃嘴角鴞（*Otus spilocephalus*）與鵂鶹（*Glaucidium brodiei*）、鷹屬（*Accipiter sp.*）猛禽等；也有兩棲爬蟲及昆蟲的殘骸。其中以台灣森鼠比例最高（43.9%），山雀科鳥類次之。灰林鴞在夏、秋兩季主要以哺乳類為主食，春、冬兩季鳥類的比例增加，可能與山區植被季節變化有關，冬季道路邊緣植物枯萎掩蔽度降低，鼠類減少使用道路邊緣廊道，也因為冬季落葉，而使夜棲休息的鳥類隱蔽度降低，增加鳥類捕食比例（林文隆、王穎、曾惠芸，2007）。

活動模式/棲地環境

屏科大鳥類生態研究室於 2009 年 3-8 月調查塔塔加地區灰林鴞出現在道路邊緣的情形，發現灰林鴞喜歡選擇道路邊緣的里程牌、方形交通牌誌、小型反光牌誌等交通牌誌站立其上，偶爾發現站立於樹枝上，使用坐等型覓食策略。3 月份時灰林鴞出現在道路邊緣頻度最低，之後隨著月份逐漸增加出現頻率，可能與 3 月份為灰林鴞孵卵期有關，使灰林鴞目擊次數降低（曾建偉、孫元勳，2011）。

研究單位

臺中市野生動物保育學會、臺南市野生動物保育學會

期刊

林大利，2013。臺灣特有亞種灰林鴞的分類歸屬，*自然保育季刊*(81): 63-69。

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43. 長耳鴞

IUCN 紅皮書：LC

臺灣鳥類紅皮書：NA 不適用

台灣發表：無

研究單位

臺中市野生動物保育學會（機場救傷）

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棲地環境

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44. 短耳鴞

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表

食性

短耳鴞幾乎 90%的食性為鼠類，在 2003-2004 年於彰化縣福寶地區與嘉義縣鰲鼓溼地進行短耳鴞食繭的研究中，兩地共收集 89 個短耳鴞食繭，其中獵物包含赤背條鼠（*Apodemus agrarius*）、月鼠（*Mus caroli*）、小黃腹鼠（*Rattus losea*）、白齒鼩（*Crocidura spp*）、鬼鼠（*Bandicota indica*）、小雲雀（*Alauda gulgula*）和蝗蟲（*Hieroglyphus sp.*）（曾翌碩、林文隆、孫元勳，2007）。

衛星追蹤/活動模式/棲地環境

臺灣師範大學生命科學系分析臺中市野生動物保育學會從臺灣機場防鳥擊網繫放救傷資料中，2007-2015 年的短耳鴞資料，並衛星追蹤 11 隻野放的短耳鴞在臺灣度冬地的活動模式。在臺灣度冬的短耳鴞族群性別明顯以雌性居多（75%），根據國外研究顯示，短耳鴞在遷徙時，有雌性偏向性，越低緯度的地區，雌性比例就越高，可能與到達時間假說有關，也就是佔據繁殖地附近的度冬地（緯度越北），能使雄性更早北返，因而能率先選擇品質較好的繁殖巢區；目前確定台灣是短耳鴞最南端的度冬地點，而台灣的度冬族群為目前已發表資料中，性別偏差比例最高的族群（Tseng et. al., 2017; 曾威，2016）。

台灣度冬的短耳鴞剛抵達台灣時，短時間內會逗留在一個核心區域（高地點忠誠），數日後，便會出現遊牧性，也就是每日常距離移動到不同的地區以覓食。在棲地選擇上，白天偏好植被零散的高草地，有助於避開人類干擾與天敵威脅；夜晚則偏好農業區域，偶爾使用草地，以捕食鼠類（Tseng et. al., 2017; 曾威，2016）；此外，都市地區的尚未動工的重劃區域，也是短耳鴞會使用的棲地（郭志榮、張光宗、張元昱、許中熹，2023）。

臺中市野生動物保育學會則從 2018 年持續衛星追蹤短耳鴞的遷徙路徑，判斷會飛抵台灣度冬的短耳鴞族群有兩個主要遷徙路徑，分別為從台灣出海，飛經中國東南沿海，最後抵達俄羅斯的中國大陸線；以及遷徙經過琉球群島、日本、韓國，最後抵達俄羅斯的日本海洋線，來回八千公里（郭志榮、張光宗、張元昱、許中熹，2023）。

形質/性別/機場救傷

臺灣師範大學生命科學系與臺中市野生動物保育學會對 198 隻，其中 163 隻來自 15 個機場的短耳鴞救傷個體，其餘 35 隻為博物館保存標本，比對其形質數據，並進行性別染色體或性線上的 DNA 蛋白基因檢測，發現雌性在初級飛羽、次級飛羽及最外層的尾羽上有更多的橫線，翼下黃棕色的覆蓋率較高，且頭長、喙長、跗骨長和體重的數值較大，此性別形質檢測準確率高（活體 95.9%；標本 94.3%），可供做未來短耳鴞性別判斷（Chen et al., 2024）。

研究單位

臺中市野生動物保育學會、臺灣師範大學生命科學系林思民教授研究室

期刊

Chen, K. H., Yang, Y. C., Tseng, W., Lin, S. M., & Lin, W. L. (2024). Revisiting an Old Issue: Sex Identification of Short-Eared Owls (*Asio flammeus*) at an Asian Wintering Site. *Journal of Raptor Research*. 58(3), 319-328.

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影片

郭志榮、張光宗、張元昱、許中熹，2023 年 3 月 25 日。短耳鴞的來台旅程｜八千公里的遷徙之路。我們的島。

國際發表

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族群趨勢

Gahbauer, M. A., Miller, R. A., Paprocki, N., Morici, A., Smith, A. C., & Wiggins, D. A. (2021). Status and monitoring of Short-eared Owls (*Asio flammeus*) in North and South America. *Airo*, *29*, 115-142.

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食性

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播遷/活動模式

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Calladine, J., Hallgrimsson, G. T., Morrison, N., Southall, C., Gunnarsson, H., Jubete, F., ... & Mougeot, F. (2024). Remote tracking unveils intercontinental movements of nomadic Short-eared Owls (*Asio flammeus*) with implications for resource tracking by irruptive specialist predators. *Ibis*166(3):896-908.

棲地環境

Calladine, J., Southall, C., Wetherhill, A., & Morrison, N. (2024). Use of dwarf shrubland–grassland mosaics by a nomadic predatory bird: the Short-eared Owl *Asio flammeus*. *Journal of Ornithology*, 1-11.

Miller, R. A., Buchanan, J. B., Pope, T. L., Carlisle, J. D., Moulton, C. E., & Booms, T. L. (2022). Short-Eared Owl land-use associations during the breeding season in the western United States. *Journal of Raptor Research*, *56*(3), 273-286.

Gahbauer, M. A., Booms, T. L., Novak, P. G., Schlesinger, M. D., Takats-Priestley, L., & Keyes, K. L. (2021). Movements and habitat selection of Short-eared Owls (*Asio flammeus*) in North America. *Airo*, *29*, 95-114.

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繁殖

Wang, O. (2022). *Breeding ecology and management of pueo (Hawaiian Short-eared Owl, Asio flammeus sandwichensis)*. University of Hawai'i at Manoa.

棲地環境

Wilhite, C. J. (2021). *Population dynamics and habitat use of the Pueo (Hawaiian Short-eared Owl; Asio flammeus sandwichensis)*. University of Hawai'i at Manoa.

民族鳥類學

Stormcrow, K. A. P. (2023). *Indigenous knowledge and factors influencing detectability of Pueo (Hawaiian Short-eared Owl, Asio flammeus sandwichensis)* (Doctoral dissertation).

45. 褐鷹鴞

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NLC

台灣發表

繁殖/生活史/分類

褐鷹鴞複合群（*Ninox scutulata*），廣泛分布東南西伯利亞、北韓、日本、臺灣、菲律賓、摩鹿加及小巽他群島等地區。後在 2002 年被分為三個獨立物種：*N. scutulata*、*N. randi*、*N. japonica*。其中 *N. japonica* 分布於遠東地區，有兩個亞種：分布於東南西白利亞、朝鮮半島、中國東北和中部、日本本島的遷徙族群 *N. j. japonica*，及分布在臺灣和琉球群島的定居族群 *N. j. totogo*（模式產地蘭嶼）（King, 2002; 引用自 Lin et. al., 2012）。

過往文獻提出臺灣同時存在定居和遷徙族群，林文隆 2012 年發表於 1999-2009 年間在台灣中部地區觀察的褐鷹鴞繁殖生態，發現臺灣褐鷹鴞的繁殖期與日本紀錄的不同，臺灣於 2 月中開始配對，3 月產卵、繁殖季節為 7 個月；相較之下，日本遷徙個體的繁殖季僅 4 個月。臺灣與日本的褐鷹鴞族群在繁殖季節上有顯著差異，推測遷徙和留鳥族群可能已發展出不同的適應與遺傳分化狀況了（Lin et. al., 2012）。

分類/分子親緣

後續分析 77 個樣本的粒線體細胞色素 b 的基因，確定臺灣有兩個褐鷹鴞族群，應可拆分成兩個亞種：一個為遷徙群，僅於每年 9-隔年 5 月的非繁殖季節出現，與北亞和飛抵蘭嶼的 *N. j. japonica* 為相同亞種；第二個為在臺灣島上全年均有分布，在繁殖季期間唯一的留鳥族群，每年的 3-4 月開始繁殖，推測時間差異可能已促成兩個族群的生殖隔離。因此，研究建議應將 *N. j. totogo* 視為無效分類單元，並將臺灣的留居族群視為一個獨特的隱存譜系（Lin et. al., 2013）。

食性/捕食行為

褐鷹鴞以大型昆蟲為主食，偶爾捕食小型鳥類。褐鷹鴞夏秋兩季常會於夜晚在路燈旁邊等待昆蟲聚集，採取坐等型策略以覓食，發現昆蟲後會出現飛捉的捕食行為；冬季昆蟲變少後，會於森林中以潛獵策略捕食小型鳥類等獵物（林文隆，2004；林文隆、葉金彰，2004）。

屏科大鳥類生態研究室於 2017 年開始，在臺灣各地架設人工棲架及自動相機，記錄到褐鷹鴞利用棲架來覓食，使用頻度以 11 月最高，推測為冬候鳥剛抵達臺灣，時常使用棲架覓食；部分褐鷹鴞留鳥可能因為冬季降遷，因而使用平地人工棲架。褐鷹鴞使用棲架時，主要捕食大型昆蟲，以鱗翅目為大宗，尤其是飛蛾，其餘獵物有記錄到蝙蝠及鳥類。使用高峰期為 18 時，時常在棲架上轉頭緊盯獵物並飛出去捕食之（Hong, 2025; 周育楷，2024）。

研究單位

臺中市野生動物保育學會、屏科大鳥類生態研究室

2025 年 13th ARRCN 研討會發表

Hong, S. Y. (2025). Using Artificial Perches for Raptor Monitoring and Promoting Ecological Farming. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

期刊

繁殖/生活史

Lin, W. L., Lin, S. M., & Tseng, H. Y. (2012). Breeding ecology of the Northern Boobook *Ninox japonica totogo* in central Taiwan. *Forktail*, *28*, 164-166.

分子親緣

Lin, W. L., Severinghaus, L. L., Tseng, H. Y., & Lin, S. M. (2013). Genetic differentiation between migratory and sedentary populations of the Northern Boobook (*Ninox japonica*), with the discovery of a novel cryptic sedentary lineage. *Journal of Ornithology*, *154*, 987-994.

食性

林文隆，2004。褐鷹鴞捕食行為與食物豐度之關聯性。*台灣猛禽研究* 2:1-10。

林文隆、葉金彰，2004。台灣中部褐鷹鴞(*Ninox scutulata*)捕食大型昆蟲類食餌之研究。*特有生物研究* 6(2)：19-26。

論文

周育楷，2024。 東方草鴞、領角鴞、褐鷹鴞在猛禽棲架上的行為模式。屏東科技大學野生動物保育研究所學位論文。

國際發表

期刊

Sadanandan, K. R., Tan, D. J., Schjølberg, K., Round, P. D., & Rheindt, F. E. (2015). DNA reveals long-distance partial migratory behavior in a cryptic owl lineage. *Avian Research*, *6*, 1-7.

論文

김한규. (2015). Food-niche Partition and Sexual Dimorphism of Northern Boobooks (*Ninox japonica*) and Oriental Scops Owls (*Otus sunia*) in Korea. Master's theses of the Department of Forest Sciences, Seoul National University.

46. 紅隼

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NVU 易危

台灣發表

遷徙

紅隼（*Falco tinnunculus*）廣泛分布於歐亞大陸，是台灣常見的冬候鳥。牠偏好草地及農地等開闊棲地，但也能出現在懸崖與建築物上。機場因具備大片開闊空間，也會被度冬中的紅隼利用。

2022 年 4 月，一隻雌紅隼成鳥因撞上誘捕網而在台北松山機場被救傷。復原後，研究團隊為其配戴 GPS/GSM 發報器，以調查其地點忠誠度與遷移路徑。該鳥於 4 月 13 日在台北市北投區野放，短暫停留於桃園市大園區與中壢區後，又回到松山機場附近，並於 4 月 23 日自新北市淡水區起飛，之後降落於中國福建省平潭島，並沿著中國海岸線往北飛行，於 5 月 14 日抵達山東省煙臺海陽市磐石店鎮，在當地度過繁殖季。

南返遷移自 9 月 14 日開始，沿黃海岸抵達浙江省台州及溫州後，越過東海。9 月 18 日牠在新北市石門區登陸，接著移動至台北市松山區，包括松山機場範圍內。不幸的是，這隻紅隼於 10 月 11 日因與飛機相撞而死亡。

本次追蹤共持續 183 天，取得 5,571 筆有效定位資料。在遷移期間，這隻紅隼完成兩段長距離跨海飛行：一段是春季自台灣跨越台灣海峽至中國福建，另一段是秋季自中國江蘇跨越黃海至山東。

雖然追蹤因碰撞事件提前終止，但所收集的資料完整記錄了牠的北返與南返遷移路線，並顯示其對越冬地具有高度地點忠誠性。本研究為紅隼遷徙生態提供了重要的參考資料，也為未來相關研究奠定基礎（Wang et. al., 2025）。

生態棲位/競爭

根據 2002-2017 年全臺八個不同機場的觀測資料及 2000-2019 年來自 21 個 eBird 熱點網格資料顯示，隨著黑翅鳶數量越來越多，度冬紅隼的數量則遞減，出現族群更替的現象，由於這兩種猛禽皆以鼠類為主食，兩種猛禽有較高的生態棲位重疊度，且根據實驗證實，黑翅鳶確實對紅隼的存在表現出高度攻擊性。總結來說，臺灣黑翅鳶的擴散正顯著壓縮紅隼冬季遷徙來臺的棲地利用空間（Chen et. al., 2022）。

研究單位

台灣猛禽研究會、臺中市野生動物保育學會

2025 年 13th ARRCN 研討會發表

Wang, L. L., Tsai D. H., Lin, S. M., Tu K. Y., Lin J. C. (2025). Tracking the Migration of the Eurasian Kestrel Using GPS Transmitters: A Case Study from a Northern Taiwan Airport. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

期刊

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國際發表

期刊

繁殖

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Kasprzykowski, Z., Rzępała, M., & Golawski, A. (2021). The effect of local weather conditions and nest box location on the reproduction of the Common Kestrel (*Falco tinnunculus*) in the farmland of eastern Poland. *Ornis Fennica*, *98*(3), 97-104.

Kabeer, B., Bilal, S., Abid, S., Mehmood, A., Asadi, M. A., Jilani, M. J., & Hejcmanová, P. (2021). Determining population trend and breeding biology of common kestrel (*Falco tinnunculus*) at Sir Bani Yas Island of emirates. *JAPS: Journal of Animal & Plant Sciences*, *31*(2).

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飲食

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Carrillo, J., González-Dávila, E., & Ruiz, X. (2017). Breeding diet of Eurasian kestrels *Falco tinnunculus* on the oceanic island of Tenerife. *Ardea*, *105*(2), 99-111.

Anushiravani, S., & Sepehri Roshan, Z. (2017). Identification of the breeding season diet of the Common Kestrel, *Falco tinnunculus* in the north of Iran. *Zoology and Ecology*, *27*(2), 114-116.

Orihuela-Torres, A., Perales, P., Rosado, D., & Pérez-García, J. M. (2017). Feeding ecology of the Common Kestrel *Falco tinnunculus* in the south of Alicante (SE Spain). *Revista Catalana d'Ornitologia*, *33*, 10-16.

遷徙

徐沛卓、许青，2023。基于卫星追踪的东北地区红隼冬季家域及移动特点。*野生动物学报*, *44*(3)。

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生態棲地

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生態棲位

Tulis, F., Slobodník, R., Langraf, V., Noga, M., Krumpálová, Z., Šustek, Z. & Krištín, A.(2017). Diet composition of syntopically breeding falcon species Falco vespertinus and *Falco tinnunculus* in south-western Slovakia. *Raptor Journal*, 11(1):15-30.

同位素

Jones, G. C. A., Woods, D., Broom, C. M., Panter, C. T., Sutton, L. J., Drewitt, E. J. A., & Fathers, J. (2024). Fine-Scale Spatial Variation in Eurasian Kestrel *Falco tinnunculus* Diet in Southern England Revealed from Indirect Prey Sampling and Direct Stable Usotope Analysis. *Ardea*, *112*(1), 129-141.

論文

Laursen, T. (2022). *Temporal patterns of main and alternative prey deliveries at a Eurasian kestrel (Falco tinnunculus) nest* (Master's thesis, Norwegian University of Life Sciences, Ås).

47. 紅腳隼

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

國際發表

期刊

繁殖/生活史

Burner, R. C., Gombobaatar, S., van Els, P., Burner, L. R., Usukhjargal, D., & Bayasgalantselmeg, M. (2019). Nesting ecology of solitary-nesting Amur Falcons (*Falco amurensis*) in central Mongolia. *Journal of Field Ornithology*, *90*(3), 266-276.

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食性

Feng, L., Li, J., Qin, H., Liu, Y., Wu, H., Feng, J., & Jiang, T. (2022). Feeding behavior innovation increases foraging efficiency in the Amur falcon but may be a threat to Asian particolored bats. *Ecology and Evolution*, *12*(9), e9272.

遷徙

Tamir, T., Kimsing, A. T., & Mize, D. (2024). D'Ering Memorial Wildlife Sanctuary, a significant flyway and a preferred stopover (refuelling) site during the return migration of the Amur Falcon *Falco amurensis* (Radde, 1863). *Journal of Threatened Taxa*, *16*(3), 24967-24972.

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棲地環境

Alexander, J., & Symes, C. T. (2016). Temporal and spatial dietary variation of Amur Falcons (*Falco amurensis*) in their South African nonbreeding range. *Journal of Raptor Research*, *50*(3), 276-288.

分子親緣

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保育政治

Kudalkar, S., & Veríssimo, D. (2024). From media campaign to local governance transition: Lessons for community-based conservation from an Amur falcon hunting ban in Nagaland, India. *Conservation Science and Practice*, e13191.

48. 灰背隼

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表：無

研究單位
台灣猛禽研究會、金門縣野生動物救援暨保育協會（救傷）

國際發表

期刊

食性

Buchanan, J. B. (2024). Hunting in a Crowded Sky: Merlins Utilize In-Flight Cover of Aggregating Bird Species. *Journal of Raptor Research* 58(4):1-4.

Burroughs, J. (2020). Geophagy by a Wild Merlin. *Journal of Raptor Research*, *54*(3), 326-326.

Kozma, J. M. (2016). Commensal Foraging of a Merlin and an American Kestrel with Sharp-Shinned Hawks. *Journal of Raptor Research*, *50*(2), 228-230.

生態棲位

Ivanovskij, V. V., & Sidorovich, A. A. (2018). Niche separation between the Merlin (*Falco columbarius*) and the Eurasian Hobby (*Falco subbuteo*) nested on pine bogs of northern Belarus. *Вестник ТвГУ. Серия" Биология и экология*, (1), 103-112.

遷徙

Bourbour, R. P., Aylward, C. M., Tyson, C. W., Martinico, B. L., Goodbla, A. M., Ely, T. E., ... & Hull, J. M. (2021). Falcon fuel: metabarcoding reveals songbird prey species in the diet of juvenile Merlins (*Falco columbarius*) migrating along the Pacific Coast of western North America. *Ibis*, *163*(4), 1282-1293.

Agostini, N. (2021). Merlin *Falco columbarius*. In *Migration Strategies of Birds of Prey in Western Palearctic* (pp. 238-240). CRC Press.

棲地環境

Lusby, J., Corkery, I., McGuiness, S., Fernández-Bellon, D., Toal, L., Norriss, D., ... & O'Halloran, J. (2017). Breeding ecology and habitat selection of Merlin *Falco columbarius* in forested landscapes. *Bird Study*, *64*(4), 445-454.

分子親緣

Martinico, B. L., Sage, G. K., Gravley, M. C., Talbot, S. L., Bourbour, R. P., Hull, A. C., ... & Hull, J. M. (2023). Population genetics and phylogeography of North American Merlins (*Falco columbarius*) in the post-DDT era. *Ibis*, *165*(3), 862-874.

行為研究

Warkentin, I. G. (2024). Footedness in merlins: Raptors perching in a cold climate. *Laterality*, 1-14.

Graves, G. R. (2022). Merlin Takes Hummingbird in Flight over Lake. *Journal of Raptor Research*, *56*(2), 265-266.

Smith, D. R. (2017). Novel Winter Bathing Behavior by a Merlin (*Falco columbarius*). *Maryland Birdlife*, *66*(1), 20-22.

論文

Martinico, B. L. (2019). *Population Genetics and Phylogeography of Merlins (Falco columbarius) in North America* (Master's thesis, University of California, Davis).

49. 燕隼

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NA 不適用

台灣發表

族群趨勢

墾丁秋季猛禽遷徙調查於台灣最南端的恆春半島進行。自 1989 年起已累積超過 30 年的資料。計數工作於社頂自然公園的凌霄亭進行，由兩位觀察員每日（惡劣天氣除外）使用

10x42 雙筒望遠鏡掃描天空，記錄所有飛行方向與高度合理的猛禽並辨識至物種層級。結果顯示，東亞海洋遷徙路線的兩個主要物種：灰面鵟鷹與赤腹鷹皆呈現族群成長趨勢。除此之外，燕隼的數量則在年度間有顯著波動，但尚無明顯趨勢（Tsai et. al., 2025）。

衛星追蹤/遷徙

台灣猛禽研究會曾在 2020 年，在救傷野放的燕隼身上綁上衛星發報器追蹤。這隻燕隼從高雄出海後，跨越南海，沿著陸地飛行來到緬甸，在緬甸逗留幾天後，全速前進穿越孟加拉灣，只花了兩天時間就登入印度，雖然最後訊號斷了，但已經足以看出牠在海上迅速飛行的高超本事，也為東亞地區留下一筆難得的燕隼衛星追蹤研究紀錄（台灣猛禽研究會，2021）。

研究單位

台灣猛禽研究會、屏科大鳥類生態研究室

2025 年 13th ARRCN 研討會發表

Tsai, Y.-H., Lee, I-H., Lin, C.-K., Tseng, C.-W. (2025). Long-Term Monitoring of Migratory Raptors in Taiwan: Population Trends and Conservation Implications. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

社群媒體

台灣猛禽研究會，2021 年 11 月 4 日。燕隼衛星追蹤。Facebook。
https://www.facebook.com/RRGTaiwan/photos/a.153076078042074/5258258917523739/?type=3&source=48

臺中野生動物保育學會，2015 年 10 月 17 日。遊隼與燕隼體型比較。Facebook。
https://www.facebook.com/permalink.php/?story_fbid=865390390245670&id=137169663067750

國際發表

期刊

食性

Stanton, D. J. (2016). Predation of dawn-swarming bats by Eurasian Hobby (*Falco subbuteo*). *Journal of Raptor Research*, *50*(3), 317-319.

生態棲位

Ivanovskij, V. V., & Sidorovich, A. A. (2018). Niche separation between the Merlin (*Falco columbarius*) and the Eurasian Hobby (*Falco subbuteo*) nested on pine bogs of northern Belarus. *Вестник ТвГУ. Серия" Биология и экология*, (1), 103-112.

遷徙

Bogliani, G. (2021). Eurasian hobby *Falco subbuteo*. In *Migration Strategies of Birds of Prey in Western Palearctic* (pp. 241-245). CRC Press.

分子親緣

Gou, X., Li, S., Wang, C., Peng, C., Hu, C., Zhang, M., & Su, H. (2021). Complete mitochondrial genome of Eurasian Hobby *Falco subbuteo* (Falconiformes: Falconidae) and phylogenetic analyses. *Mitochondrial DNA Part B*, *6*(3), 1273-1275.

50. 遊隼

IUCN 紅皮書：LC
臺灣鳥類紅皮書：NNT 接近受脅

台灣發表

族群趨勢

墾丁秋季猛禽遷徙調查於台灣最南端的恆春半島進行，自 1989 年起已累積超過 30 年的資料。計數工作於社頂自然公園的凌霄亭進行，由兩位觀察員每日（惡劣天氣除外）使用 10x42 雙筒望遠鏡掃描天空，記錄所有飛行方向與高度合理的猛禽並辨識至物種層級。結果顯示，遊隼的數量較早期增加了 18%（Tsai et. al., 2025）。

食性/捕食行為

遊隼曾被自動相機監測記錄到在高屏溪斜張橋上有夜間獵食的行為，分析遊隼利用橋塔時段發現呈現雙峰形式。一於 05：00-09：00 之間，另一位於 19：00-23 :00 之間。橋塔亦為遊隼重要之貯食地點，他們經常回來取用之前留下的獵物。在 140 筆活動事件中， 至少有 3 隻不同個體帶回 44 隻獵物，其中 79.5%的獵物是於 19：00-22：00 之間所帶回，僅有 20.5% 是於白天所帶回，這些獵物非常新鮮，有些甚至還是活的。

觀察顯示遊隼於高屏溪橋全天均活動獵食，尤其是在夜間更為頻繁。獵物被捉帶回橋塔的時間明顯由日間延後到夜間，可能是一種利用橋上裝飾照明大燈的行為適應（黃光瀛等，2006）。

研究單位

台灣猛禽研究會、臺中市野生動物保育學會、基隆市野鳥學會

2025 年 13th ARRCN 研討會發表

Tsai, Y.-H., Lee, I-H., Lin, C.-K., Tseng, C.-W. (2025). Long-Term Monitoring of Migratory Raptors in Taiwan: Population Trends and Conservation Implications. The 13th ARRCN & 7th Taiwan Raptor Symposium, Taipei, Taiwan.

期刊

黃光瀛、劉小如、邱銘源，2006。日行性遊隼於高屏溪橋之夜間獵食行為，台灣猛禽研究, (6), 12-17。

紀錄片

沈錦豐，2021。遊隼的故事，基隆市野鳥學會。

國際發表

期刊

族群趨勢

Kéry, M., Banderet, G., Müller, C., Pinaud, D., Savioz, J., Schmid, H., ... & Monneret, R. J. (2022). Spatio-temporal variation in post-recovery dynamics in a large Peregrine Falcon (*Falco peregrinus*) population in the Jura mountains 2000–2020. *Ibis*, *164*(1), 217-239.

Ponnikas, S., Ollila, T., & Kvist, L. (2017). Turnover and post-bottleneck genetic structure in a recovering population of Peregrine Falcons *Falco peregrinus*. *Ibis*, *159*(2), 311-323.

Sonsthagen, S. A., Williams, J. C., Drew, G. S., White, C. M., Sage, G. K., & Talbot, S. L. (2017). Legacy or colonization? Posteruption establishment of peregrine falcons (*Falco peregrinus*) on a volcanically active subarctic island. *Ecology and Evolution*, *7*(1), 107-114.

Bruggeman, J. E., Swem, T., Andersen, D. E., Kennedy, P. L., & Nigro, D. (2016). Multi-season occupancy models identify biotic and abiotic factors influencing a recovering Arctic Peregrine Falcon *Falco peregrinus* tundrius population. *Ibis*, *158*(1), 61-74.

繁殖/生活史

AlAli, A. M., Abbas, Y. A., & Nassar, F. S. (2024). Climate Change and Its Impacts on Saker (*Falco cherrug*) and Peregrine (*Falco peregrinus*) Falcons: How the Changes Will Affect Their Migration, Diet, Offspring, and Conservation Efforts. *Journal of Ecohumanism*, *3*(8), 228-237.

McKinnon, R. A., Hedlin, E., Hawkshaw, K., & Mathot, K. J. (2024). Food supplementing peregrine falcon (*Falco peregrinus tundrius*) nests increases reproductive success with no change in mean parental provisioning rate. *Royal Society Open Science*, *11*(9), 240576.

Schneider, L. M., de Oliveira Santos, C., Lima, L. M., & Hingst-Zaher, E. (2023). Peregrine falcon *Falco peregrinus* in Brazil: natural history through the lens of citizen science. *Ornitología Neotropical*, *34*(1), 29-39.

McGrady, M. J., Hines, J. E., Rollie, C. J., Smith, G. D., Morton, E. R., Moore, J. F., ... & Oli, M. K. (2017). Territory occupancy and breeding success of Peregrine Falcons *Falco peregrinus* at various stages of population recovery. *Ibis*, *159*(2), 285-296.

Kettel, E. F., Gentle, L. K., & Yarnell, R. W. (2016). Evidence of an urban Peregrine Falcon (*Falco peregrinus*) feeding young at night. *Journal of Raptor Research*, *50*(3), 321-323.

Zabala, J., & Zuberogoitia, I. (2015). Breeding performance and survival in the peregrine falcon *Falco peregrinus* support an age-related competence improvement hypothesis mediated via an age threshold. *Journal of Avian Biology*, *46*(2), 141-150.

食性

Varland, D. E., Buchanan, J. B., Fleming, T. L., Kenney, M. K., & Vanier, C. (2018). Scavenging as a food-acquisition strategy by Peregrine Falcons. *The Journal of Raptor Research*, *52*(3), 291-308.

Tornberg, R., Korpimäki, V. M., Rauhala, P., & Rytkönen, S. (2016). Peregrine Falcon (*Falco peregrinus*) may affect local demographic trends of wetland bird prey species. *Ornis Fennica*, *93*(3), 172-185.

Time, B. E. (2016). Hunting activity by urban Peregrine Falcons (*Falco peregrinus*) during autumn and winter in south-west Norway. *Ornis Norvegica*, *39*, 39-44.

Choi, C. Y., & Nam, H. Y. (2015). Diet of Peregrine Falcons (*Falco peregrinus*) in Korea: food items and seasonal changes. *Journal of Raptor Research*, *49*(4), 376-388.

遷徙

Dell'Omo, G. (2021). Peregrine falcon *Falco peregrinus*. In *Migration Strategies of Birds of Prey in Western Palearctic* (pp. 251-254). CRC Press.

Beingolea, O., & Arcilla, N. (2020). Linking Peregrine Falcons'(*Falco peregrinus*) Wintering Areas in Peru with Their North American Natal and Breeding Grounds. *Journal of Raptor Research*, *54*(3), 222-232.

棲地環境

Mak, B., Francis, R. A., & Chadwick, M. A. (2021). Breeding habitat selection of urban peregrine falcons (*Falco peregrinus*) in London. *Journal of Urban Ecology*, *7*(1), juab017.

分子親緣

Weaving, A., Jackson, H. A., Nicholls, M. K., Franklin, J., & Vega, R. (2021). Conservation genetics of regionally extinct peregrine falcons (*Falco peregrinus*) and unassisted recovery without genetic bottleneck in southern England. *Conservation Genetics*, *22*(1), 133-150.

Wink, M. (2018). Phylogeny of Falconidae and phylogeography of Peregrine Falcons. *Ornis Hungarica*, *26*(2), 27-37.

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