# 15TH MEETING OF THE EUROPEAN ORNITHOLOGISTS' UNION

Bangor, Wales, 18-22 August 2025

# 15th EOU Meeting, Bangor, Wales

## 18-22 August 2025

# Saturday 16th August

# Pre-congress symposium: Migratory Landbirds Study Group (MLSG)

09:00 - 17:00 Saturday, 16th August, 2025

Reichel

Conveners: Will Cresswell, Ivan Maggini

The MLSG and the COST Action EUFLYNET will be hosting a symposium on migratory land bird research on the weekend before the EOU conference of August 16th and 17th 2025. The symposium will consist of a first day (the 16th) hosted by the COST Action, focussed on information exchange to facilitate the production of a toolkit to identify and prioritise effective management actions for migrant land birds along the flyway. The second day will be a more typical MLSG pre-EOU day, with invited talks, speed talks from ALL attendees and workshops to facilitate the networking aims of the MLSG. The MLSG – Migratory Landbird Study Group – is a network to connect people working on migrant landbirds, whether pure research or their conservation, to facilitate both (http://migrantlandbirds.org). The COST action arose from the MLSG and is part of these aims. The MLSG has now run successful pre-EOU conference symposia since 2015. These symposia have helped build the community of researchers necessary to tackle flyway scale problems, and are particularly focussed on establishing the links that help early career researchers make a difference. It is a friendly and relaxed environment to network, giving everyone an equal opportunity to showcase themselves and their work. Many important collaborations and much research started here!

# Sunday 17th August

# Pre-congress symposium: Migratory Landbirds Study Group (MLSG)

09:00 - 17:00 Sunday, 17th August, 2025

Reichel

Conveners: Will Cresswell, Ivan Maggini

The MLSG and the COST Action EUFLYNET will be hosting a symposium on migratory land bird research on the weekend before the EOU conference of August 16th and 17th 2025. The symposium will consist of a first day (the 16th) hosted by the COST Action, focussed on information exchange to facilitate the production of a toolkit to identify and prioritise effective management actions for migrant land birds along the flyway. The second day will be a more typical MLSG pre-EOU day, with invited talks, speed talks from ALL attendees and workshops to facilitate the networking aims of the MLSG. The MLSG – Migratory Landbird Study Group – is a network to connect people working on migrant landbirds, whether pure research or their conservation, to facilitate both (http://migrantlandbirds.org). The COST action arose from the MLSG and is part of these aims. The MLSG has now run successful pre-EOU conference symposia since 2015. These symposia have helped build the community of researchers necessary to tackle flyway scale problems, and are particularly focussed on establishing the links that help early career researchers make a difference. It is a friendly and relaxed environment to network, giving everyone an equal opportunity to showcase themselves and their work. Many important collaborations and much research started here!

# Monday 18th August

# Pre-congress symposium: BOU Woodland birds

09:00 - 17:00 Monday, 18th August, 2025

LR4

Convener: Stuart Sharp

Woodland birds comprise a broad spectrum of species that offer excellent model systems for a diverse range of key topics, including phenology and climate change, migration, habitat loss and urbanisation, invasive species, and disease ecology. They include some of the best-studied birds on the planet (e.g. great tit, pied flycatcher), but also enigmatic and declining species (e.g. white-backed woodpecker, western capercaillie). In recent years, woodlands across Europe have come under increasing threat, and birds have become important flagship species for research on habitat degradation, rewilding and forestry management. Many have suffered severe declines or range restrictions; in the UK, for example, woodland species are currently the fastest declining group of birds despite significant increases in woodland cover. As such, this symposium offers a timely opportunity to bring together members from the many active research groups working on woodland birds, with great potential to discuss emerging topics in ecology and conservation. It is likely to be of interest to a wide range of ornithologists from across Europe.

# Plenary lecture - Tim Birkhead: Fifty years of Guillemot *Uria aalge* studies on Skomer Island, Wales

18:00 - 19:00 Monday, 18th August, 2025

Reichel

Chair: Mark Mainwaring

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**Plenary 1** **Fifty years of Common Guillemot studies on Skomer Island, Wales**

Tim Birkhead ORCID iD

University of Sheffield, Sheffield, United Kingdom

**Abstract**

In the 1930s the Common Guillemot *Uria aalge* population on Skomer Island, Pembrokeshire, comprised around 100,000 pairs. By the 1940s the population had undergone a 95% decline and by 1972, when my study started, the population was down to just 2,000 pairs. The aim of the study has been to understand the Guillemot's population biology and what drives both decreases and increases in numbers. From 1980, the population began to increase and has since continued to do so at about 5% per annum, and in 2022, around 21,000 pairs were present on the island. Estimates of adult and immature survival, based on annual re-sightings of colour-ringed individuals, together with measures of reproductive success, have allowed us to model this population increase. However, in 2023 the increase came to abrupt halt when bird flu resulted in massive mortality. By continuing to monitor the population we were able in 2024, to quantify and disentangle the various ways bird flu has impacted the Guillemot population. Maintaining a long-term study like this is not a trivial exercise and in fifty years on working on Skomer each year, I have learned as much about people as I have about Guillemots.

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# Tuesday 19th August

# Plenary lecture - Will Cresswell: Understanding migration - Theoretical and conservation challenges that can unite us along flyways

09:00 - 10:00 Tuesday, 19th August, 2025

PL5

Chair: Richard Holland

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**Plenary 2** **The challenge of migration**

Will Cresswell ORCID iD

University of St Andrews, St Andrews, United Kingdom

**Abstract**

Migration presents many challenges. We need to understand how migration routes can develop and change with our incredibly variable climate, past and future. These long-standing big questions about migration are now being routinely answered as our theoretical understanding of migration has moved forward rapidly with increasing technological ability to track birds. But we need to apply this knowledge to conserve declining migrant populations throughout their annual cycles, across changing habitats, in both space and time. This is particularly urgent as the Anthropocene brings unprecedented rapid changes to habitats and climate. Although our understanding of migration is advancing rapidly, the application of this knowledge to conservation is not. Multiple migrant species with different ecologies, different key points of their annual cycle, across many countries, make single issue, “magic bullet” solutions rare. The majority of species present us with the major challenge of having to think outside of the traditional ornithology box. We need to carry out truly collaborative and interdisciplinary research that involves stakeholders in all countries and continents along flyways, and we need to provide the type of research and knowledge transfer that can address sustainable development goals.

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# Symposium 1: Linking social and ecological aspects of urban ornithology

10:30 - 12:00 Tuesday, 19th August, 2025

MALT

Conveners: Riccardo Alba and Jan Grünwald

This symposium will explore the challenges of bird research and conservation in urban environments, focusing on the interactions between avian species and human populations. By introducing the concept of the luxury effect, we will examinate how socioeconomic status may influence urban bird diversity. We will then discuss how birds adapt their behaviour to urban settings and explore the social roles of urban birds, from bird feeders to birdwatching, as well as the cultural ecosystem services that birds provide. The session will emphasize the importance of bird-friendly initiatives for fostering biodiversity and wellbeing in urban areas and how urban landscapes can be designed to support both avian communities and human well-being in more sustainable, liveable cities.

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10:35 - 11:00

**S1 Keynote Linking Socioeconomic Status and Urban Biodiversity: Are Rich Areas Species-Rich?**

Dan Chamberlain ORCID iD[1], Irene Regaiolo[1], Francesca Cochis[1], Riccardo Alba[1], Enrico Caprio[1], Péter Batáry[2], Arjun Amar[3], Dominic Henry[4], Chevonne Reynolds[5]

[1]University of Turin, Turin, Italy. [2]Centre for Ecological Research, Alkotmány, Hungary. [3]Fitzpatrick Institute of African Ornithology, University of Cape Town, Cape Town, South Africa. [4]Department of Statistical Sciences, University of Cape Town, Cape Town, South Africa. [5]University of the Witwatersrand, Johannesburg, South Africa

**Abstract**

Urban biodiversity, though usually depauperate, provides many benefits to the urban human population. However, there is much evidence to suggest that access to biodiversity is correlated with socioeconomic status (SES) within cities. In other words, the rich are more likely to derive benefits from biodiversity than the poor. The positive correlation between biodiversity and SES is thus a form of environmental justice which should be confronted if we are to succeed in addressing sustainable development goals. In this presentation, I review the evidence for the biodiversity-SES correlation in cities worldwide based on a comprehensive global database, with a particular focus on birds. I then identify some of the factors that drive this relationship, including species provenance (i.e. native or alien), urban habitat (e.g. green space, private gardens, urban matrix), regional climate and national economic context. Identifying cities where there is no such correlation may give us insights into how to better address the environmental injustice caused by the biodiversity-SES relationship at a broader scale. Based this information, I propose potential strategies to better plan urban settlements so that access to biodiversity and the benefits it provides can be more equitably distributed across different socioeconomic contexts, thus benefitting all levels of urban society.

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11:00 - 11:15

**S1-1 COVID-19 lockdown effects on the foraging strategies of a facultative scavenger**

Benedetta Catitti ORCID iD[1], Ying-Chi Chan ORCID iD[1], Damien Farine ORCID iD[2,3,4], Steffen Oppel ORCID iD[1], Florian Orgeret ORCID iD[5], Patrick Scherler ORCID iD[1], Matthias Tschumi ORCID iD[1], Stephanie Witczak ORCID iD[1], Martin Grüebler ORCID iD[1]

[1]Swiss Ornithological Institute, Sempach, Switzerland. [2]University of Zurich, Zurich, Switzerland. [3]Australian National University, Canberra, Australia. [4]Max Planck Institute of Animal Behavior, Konstanz, Germany. [5]La Rochelle University, La Rochelle, France

**Abstract**

Human activity plays a crucial role in shaping the availability, distribution and dynamics of resources available to animals. Some species, such as scavengers, are behaviourally adapted to exploit the spatiotemporal dynamics of man-made resources, but their response to sudden changes in resource abundance remains poorly understood. The COVID-19 lockdown offered a unique opportunity to investigate these dynamics, as reduced human activity altered resources available for scavengers. In this study, we examined how lockdown-induced reductions in human mobility affected the foraging behaviour of an avian facultative scavenger, the red kite (*Milvus milvus*), by decreasing the amount of roadkill. We hypothesized that with fewer carcasses available, red kites would decrease their use of roads for scavenging. By analysing GPS tracking data from 173 non-breeding individuals over four years, we found that red kites significantly reduced their use of roads during lockdown, and that selection for roads was generally higher when natural food availability was low. Conversely, while kites generally avoided anthropogenic feeding areas (e.g., private gardens) in pre-lockdown years, they showed increased use of these sites during lockdown. Our findings highlight the extent to which abrupt changes in human activity can drive rapid behavioural shifts in wildlife.

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11:15 - 11:30

**S1-2 From Birdfeeders to Birdwatching: The Subtle Social Role of Urban Birds**

Piotr Tryjanowski ORCID iD

Poznań University of Life Sciences, Pozna, Poland

**Abstract**

Urban birds shape our cities in ways that go beyond ecology, influencing social interactions, mental well-being, and even urban planning. This talk explores how human practices like bird feeding support urban bird populations but also alter their behaviors and ecological roles. Birdwatching, while a valuable scientific and recreational activity, has broader implications—offering stress relief, fostering a sense of community, and deepening our connection to nature in city environments. By designing urban spaces with biodiversity in mind—through green corridors, native plants, and bird-friendly structures—we can create cities that benefit both people and wildlife. Throughout the talk, I will present examples from across Europe, situating them within a global context to highlight the similarities and differences in how urban birds are perceived and engaged with worldwide. Importantly, I will address both the advantages and challenges of studying and observing birds in cities, from the unintended consequences of feeding practices to the role of citizen science in shaping conservation efforts. Understanding the nuanced social role of urban birds allows us to rethink our relationship with wildlife and build cities that support both ecological integrity and human well-being.

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11:30 - 11:45

**S1-3 Cultural ecosystem services of birds – the role of human cognition**

Christoph Randler

University of Tübingen, Tübingen, Germany

**Abstract**

Birds provide fabulous ecosystem services towards humans; their song and appearance enhance our well-being. This talk sheds light on the positive influence of the bird environment on our health and well-being. Studies have tested both, by experimental manipulations and survey studies that there is an influence of either bird species richness / diversity or of perceived species richness and naturalness. However, following classical theories, such as the ART and SRT, the relationship between human well-being and bird diversity is usually considered to be an unconscious one. Recent studies, however, showed that cognition, and psychological individual differences in humans significantly are related to restoration and health benefits. Moreover, more generally, psychological effects provide an important aspect of variance. Therefore, we suggest moving the field further by including these human individual differences into studies rather than just focusing on bird diversity itself.

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11:45 - 12:00

**S1-4 Birds as Bridges: Behavioural Adjustments of Urban Birds for Inclusive and Sustainable Cities**

Peter Mikula ORCID iD

TUM School of Life Sciences, Technical University of Munich, Freising, Germany. Institute for Advanced Study, Technical University of Munich, Garching, Germany. Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Prague, Czech Republic

**Abstract**

Urban environments are expanding at an unprecedented rate, transforming natural landscapes into bustling cities. As a result, wildlife species are increasingly facing human-transformed landscapes and invading urban areas. Birds are some of the most visible urban dwellers, interacting with humans in parks, cemeteries, and other green spaces. The behavioural adjustments are presumably crucial for successful coexistence of birds with humans. In this presentation, I will delve into the behavioural adjustments of birds inhabiting urban areas, focusing mainly on their tolerance towards humans through their human-driven escape responses. Through a deeper understanding of these dynamics, we can develop urban design strategies that promote positive human–bird interactions, thereby enriching urban biodiversity and enhancing the quality of life for city dwellers.

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# Symposium 2: Eco-evolutionary responses in bird coloration under anthropogenic environmental changes: from processes to mechanisms

10:30 - 12:00 Tuesday, 19th August, 2025

LR2

Conveners: Arianna Passarotto and Chiara Morosinotto

Birds exhibit remarkable diversity in their coloration, which serves a multitude of biological functions, such as communication, thermoregulation and crypsis. By being strongly adaptive and readily observable, avian coloration can provide early evidence for evolutionary responses to changes in the environment. However, despite growing research endeavour, many questions remain unanswered. For example, it is still unclear whether environmental changes may upend selective processes, favouring colorations previously considered less adaptive, and whether different environmental challenges might generate conflictual responses as they may affect different biological functions. This symposium aims to gather researchers working on different global environmental challenges (e.g., climate change, urbanization, pollution) and different aspects of bird coloration, and foster a discussion on eco-evolutionary changes in bird colour phenotypes. The goal is to highlight recent advancements in our understanding of both the potential for human-induced changes to modify processes acting on coloration, and the possible mechanisms underpinning bird phenotypic responses. Focal areas for research will cover, but will not be limited to, the effects of different stressors on coloration as well as whether different species exhibit similar responses to the same environmental challenges, or, on the contrary, (colour) phenotypic responses are species-specific.

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10:35 - 11:00

**S2 Keynote Colour polymorphism as a biomarker for adaptations to global change**

Patrik Karell ORCID iD

Novia University of Applied Sciences, Raseborg, Finland. Lund University, Lund, Sweden

**Abstract**

In order to understand if and how populations are able to respond to global environmental change we need a holistic understanding of specific study systems where we can identify not only large scale distribution patterns, but also the selective pressures and ecological circumstances that create these patterns. Studies on variation in plumage colouration can be useful in order to understand how environmental change affects selection pressures and the evolutionary and ecological consequences thereof. This is because theory predicts that heritable colour morphs are adaptations to different environments. Using our study system, the colour polymorphic tawny owl, I will show how the brown and the grey colour morph are differently sensitive to winter climate and how this connects to colour morph specific life histories and evolutionary responses in the population. Second I will present our results linking these morph-specific life histories to differential physiological profiles and prey use of the morphs. I will also show how winter landscapes affect detectability of the morphs and discuss how differences in physiology, behaviour and protective coloration form these distinctive colour phenotypes. Lastly I will show how the distribution of tawny owl colour morphs is changing in time and space across the species range in relation to climate. Altogether, our results suggest that colour polymorphism can be used as a bioindicator of environmental change and constitute an example of a species responding rapidly to climate change.

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11:00 - 11:15

**S2-1 Citizen science observations reveal spatial and temporal patterns of colour variation in the Common Buzzard (Buteo buteo)**

Kaspar Delhey ORCID iD[1], Elena Frederika Kappers ORCID iD[2,3], Mihai Valcu ORCID iD[1], Christiaan Both ORCID iD[2], Bart Kempenaers ORCID iD[1]

[1]Department of Ornithology, Max Planck Institute for Biological Intelligence, Seewiesen, Germany. [2]Conservation Ecology Group, Groningen Institute of Evolutionary LifeScience, University of Groningen, Groningen, Netherlands. [3]Altenburg & Wymenga Ecological Consultancy, Feanwâlden, Netherlands

**Abstract**

Common buzzards (Buteo buteo) show high levels of colour variation, ranging from dark brown to almost white, but what maintains this variation is not well understood. We compiled a large dataset of citizen science observations to map buzzard colour variation across Europe, test for potential environmental drivers, and assess temporal colour variation during the last two decades. Buzzard colour variation is geographically structured: light-coloured buzzards are mainly found in North-Central Europe, intermediate-coloured buzzards are more common in the eastern Mediterranean region and the British Isles, while darker buzzards are more common in the Iberian Peninsula and Brittany. Environmental effects explain only limited amounts of variation, with lighter coloured buzzards found in areas with low forest cover, and higher precipitation. We found marked temporal decreases in the proportion of dark- and light-coloured buzzards and increases in intermediate-coloured buzzards between 2000 and 2022, leading to a reduction in colour variation over time. Increases in intermediate-coloured buzzards match temporal trends reported for a Dutch population and studies showing that intermediate-coloured buzzards have higher fitness. Field studies should establish whether selection against colour extremes is evident in other parts of the range and identify the mechanisms responsible, while phylogeographic genetic analyses are needed to disentangle the effects of historical contingency and local adaptation on colour variation in this species.

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11:15 - 11:30

**S2-2 Bird colours in urban mosaic - a multicity study on two passerine species**

Katarzyna Janas ORCID iD[1], Marion Chatelain ORCID iD[2], Michela Corsini ORCID iD[3], Łukasz Wardecki[4], Justyna Szulc[5], Marta Szulkin ORCID iD[6]

[1]Museum and Institute of Zoology, Polish Academy of Sciences, Warsaw, Poland. [2]Universität Innsbruck, Tirol, Austria. [3]Eurac Research, Bolzano, Italy. [4]The Polish Society for the Protection of Birds (OTOP), Warsaw, Poland. [5]University of Gdańsk, Gdańsk, Poland. [6]Institute of Evolutionary Biology Faculty of Biology, University of Warsaw, Warsaw, Poland

**Abstract**

Urban environments are characterized by markedly altered conditions, which could exert a negative impact on the organisms that inhabit them. Among the phenotypic traits most sensitive to urbanization is the colourful plumage of birds. One of the best studied examples might be the urban dullness phenomenon, described for carotenoid-based traits. However, melanin-based and structural colouration are still understudied in the context of urbanization. Furthermore, much research focused on the changes in mean trait expression, while the effect on phenotypic variation, vital from the eco-evolutionary perspective, was rarely studied in this context. Here, we examined urbanization-driven differences in expression and phenotypic variation of carotenoid-based, melanin-based and structural colours of two urban adapters, the great tit (*Parus major*) and the blue tit (*Cyanistes caeruleus*). We sampled birds from six habitat types along urban – forest gradients, replicated in eight Polish cities. We found species-specific decrease in mean carotenoid chroma of great tit breast plumage in urbanized habitats. This trait was also characterized by higher phenotypic variation, which could result from greater environmental heterogeneity in cities. In the blue tit carotenoid-based feathers, the only effect was reduced brightness in the city centres. Interestingly, we also observed that structurally coloured blue tit tails were brighter in more urbanized sites. However, we found no evidence for urban-associated effects in great tit melanin-based traits. Our study highlights the importance of exploring a broader spectrum of species and incorporating phenotypic variations in colour traits colour traits to deepen our understanding of the eco-evolutionary processes occurring in urban systems.

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11:30 - 11:45

**S2-3 Plastic response in egg coloration to urbanization and temperature gradients**

Liliana D'Alba ORCID iD[1], Gerben Debruyn ORCID iD[2], Jolien Van Malderen[2], Luc Lens[2], Frederick Verbruggen[2]

[1]Naturalis Biodiversity Center, Leiden, Netherlands. [2]Universiteit Gent, Gent, Belgium

**Abstract**

Bird eggs exhibit a striking diversity of colors and patterns, serving functions from predation avoidance to thermoregulation. Eggshell reflectance extends beyond visible wavelengths into the ultraviolet (UV) and thermogenic near-infrared (NIR) regions, yet this aspect remains largely unexplored. This study examines natural intraspecific variation in eggshell reflectance across temperature gradients in wild populations of two gull species. We analyzed eggs from six mixed colonies of lesser black-backed (*Larus fuscus*) and herring gulls (*Larus argentatus*) along the Belgian coast, where microclimate conditions correlate with urbanization. We predicted that eggs in hotter, more urbanized sites would show increased reflectance, particularly in the NIR region. Egg brightness obtained with photography and spectrophotometry from over 1,600 eggs collected across four breeding seasons revealed that eggs in highly urbanized areas were more reflective and had reduced maculation compared to those from rural, vegetated sites. Additionally, eggs laid during the hottest year of our study were significantly brighter than those from cooler seasons. Brighter eggshells may aid embryo development in urban nests by helping to prevent overheating during the hot summer months when temperatures can reach hazardous levels. Our findings also suggest that eggshell reflectance is a plastic trait, rapidly adapting to environmental changes. Our study provides new insights into how phenotypic egg traits contribute to

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11:45 - 12:00

**S2-4 Do tawny owl color morphs distribute differently along urbanized and fragmented habitats? A broad-scale appraisal.**

Chiara Morosinotto[1], Charlotte Perrault[2], Arianna Passarotto[3], Katja Koskenpato[4], Ruslan Gunko[5], Jon Brommer[2], Julien Terraube[6], Petra Sumasgutner[7], Rui Lourenço[8], Arjun Amar[9], Elie Gaget[10], Gabriella Leighton[9], Patrik Karell[5]

[1]University of Padova, Padova, Italy. [2]University of Turku, Turku, Finland. [3]University of Glasgow, Glasgow, United Kingdom. [4]University of Helsinki, Helsinki, Finland. [5]Novia University of Applied Sciences, Raseborg, Finland. [6]Office français de la biodiversité, Juvignac, France. [7]University of Wien, Wien, Austria. [8]University of Evora, Evora, Portugal. [9]University of Cape Town, Cape Town, South Africa. [10]Tour du Valat - Research Institute for the Conservation of Mediterranean Wetlands, Arles, France

**Abstract**

In colour polymorphic species, different colour morphs are often associated with variation in suites of traits such as camouflage efficiency, aggressiveness, diet, and immune response. These morph-specific differences may cascade into a different habitat use, as would be expected if colour polymorphism in natural populations is maintained by morphs occupying distinct ecological niches. Colour morphs may therefore respond differently when new niches are formed, especially under environmental changes. In particular, urbanization may provide new resources that, however, might not be exploited equally by the morphs as one of them may, for instance, be more cryptic in certain habitats or light conditions, and thus have a higher advantage in urban areas. Here, we combined data from over 1000 individuals, collected from ringing stations and road kills as well as pictures available online, to study the factors affecting the spatial distribution of the two colour morphs (grey and brown) of tawny owl (*Strix aluco*) in relation to urban environments across Europe. We compared tawny owl distribution according to habitat fragmentation, light pollution and overall urbanization gradient estimated from satellite images. In addition to a latitudinal and longitudinal variation in the distribution of colour morphs, we expect to detect an increase in the frequency of the brown morph around urban environments, as novel urban stressors might favour the selection of the melanistic morph, which cope

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# Symposium 3: Migratory birds and artificial light at night: from research to policy

10:30 - 12:00 Tuesday, 19th August, 2025

LR3

Conveners: Baptise Schmid, Yana Yakushina, and Pablo Capilla-Lasheras

Artificial light at night (ALAN) can drastically alter the environment of migratory birds, both on their breeding grounds, non-breeding grounds and during their migratory journeys. ALAN can therefore disrupt the birds' evolved response to natural changes in environmental light. For example, light is an important cue for determining the circa-annual cycle of birds, and birds use it to orientate during their migratory flights. The scale of the problem has been recognised by the Bonn Convention on Migratory Species (CMS), which aims to identify knowledge gaps and develop guidelines to reduce the impact of light pollution on migratory species. This symposium aims to present the latest research on the effects of ALAN on migratory birds, identify research gaps, and to improve our understanding of how to adapt research projects in order to translate research results into policy and legislation.

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10:35 - 11:00

**S3 Keynote The Fragile Night: Legal Protection of the Nocturnal Environment and Biodiversity**

Yana Yakushina ORCID iD

University of Ghent, Ghent, Belgium

**Abstract**

In recent years, light pollution has gained increasing attention on various political agendas, from local to international governmental levels. Scientific research has highlighted the adverse impacts of light pollution on the environment, habitats, ecosystems, and numerous species, including migratory birds. These research findings became one of the key drivers behind the introduction of new regulatory measures and amendments to existing environmental frameworks aimed at mitigating the negative effects of artificial light at night (ALAN). Many countries have also begun incorporating light pollution targets into their political strategies, such as National Biodiversity Strategies and Action Plans (NBSAPs). The international political agenda has long served as a platform for addressing emerging global challenges that require collective action, both at the international and national levels. At the international level, discussions on combating light pollution were initiated by the United Nations Environment Programme (UNEP) Convention on the Conservation of Migratory Species (CMS), which adopted the Light Pollution Guidelines for Wildlife. However, the issue remains largely unrecognised, and no unified regulatory framework has been established to tackle the challenges posed by ALAN. Advancing legal recognition of the problem requires coordinated action.This presentation explores the key regulatory approaches to protecting the environment and biodiversity from the harmful effects of ALAN. It presents examples of the national regulation and examines ongoing efforts within the UNEP. Furthermore, it outlines potential future developments to strengthen environmental conservation efforts and reduce the increasing levels and widespread impacts of light pollution.

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11:00 - 11:15

**S3-1 Shedding light on skyglow: understanding the role of light on nocturnal behaviour**

Jitse Creemers ORCID iD[1,2], Marcel Eens ORCID iD[2], Michiel Lathouwers ORCID iD[3,4], Richard Schnürmacher ORCID iD[2,5], Ruben Evens ORCID iD[1]

[1]Unversité Catholique de Louvain, Louvain-la-Neuve, Belgium. [2]University of Antwerp, Wilrijk, Belgium. [3]Hasselt University, Diepenbeek, Belgium. [4]University of Namur, Namur, Belgium. [5]Comenius University Bratislava, Bratislava, Slovakia

**Abstract**

Throughout evolutionary history, animals have adapted their behaviour to predictable light-dark cycles, such as the diel and lunar cycles. These natural rhythms regulate essential activities, including foraging, navigation, and social interactions. However, since the industrial revolution, Artificial Light at Night (ALAN) has profoundly disrupted these patterns by artificially brightening the night sky. The resulting loss of natural darkness affects critical behaviours in both diurnal and nocturnal species.

While the effects of direct light sources, such as streetlights, on local nocturnal habitats are well recognised, ALAN also generates skyglow, a diffuse, widespread illumination of the nocturnal sky caused by the scattering of upward-directed light in the atmosphere. As one of the most pervasive forms of sensory pollution, skyglow now brightens over 90% of the earth's inhabited land surface. Unlike localised artificial lighting, skyglow extends far beyond urban areas, infiltrating even remote natural habitats and altering entire ecosystems. Its impact is particularly pronounced on overcast nights when atmospheric water particles reflect and amplify skyglow, masking natural lunar brightness patterns that many species rely on for behavioural cues.

Our research group aims to unravel the effects of skyglow on nocturnal species, such as the European Nightjar (*Caprimulgus europaeus*), a visually-orienting nocturnal insectivore that uses subtle changes in moonlight to regulate its behaviour and activity. By understanding how natural light and skyglow influence their movement, foraging, migration, song activity, and overall fitness we provide key insights into the ecological impacts of skyglow and raise awareness for its impact on nocturnal ecosystems worldwide.

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11:15 - 11:30

**S3-2 A Rising Global Pollutant: The Effects of Light Pollution on Migratory Animal Behavior**

Carolyn Burt ORCID iD[1], Kyle Horton ORCID iD[1], Jeffrey Kelly ORCID iD[2]

[1]Colorado State University, Fort Collins, USA. [2]University of Oklahoma, Norman, USA

**Abstract**

Light pollution poses a global threat to biodiversity, particularly for migratory species, some of which traverse hemispheric distances. In North America alone, it is estimated that up to one billion migratory birds die annually due to building collisions, with light pollution serving as an amplifying agent. Research across spatial scales reveals the multifaceted effects of artificial light on migratory species, ranging from local scales through collisions with lit structures, at regional scales by altering stop-over sites and aerial connectivity of the night sky, and at macroscales through exposure to sky glow and altered phenology. These threats extend beyond species active at night — broadening the scope of this threat. While solutions like dimming lights may seem straightforward, implementing broad behavioral changes requires coordinated collective action. Thus, the overuse and expansion of artificial light at night has emerged from complex social, economic, and political factors, making it a societal problem that negatively impacts wildlife and people. Emerging tools for measuring light pollution and its impacts, as well as improved ecological forecasting techniques, present new pathways for conservation.

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11:30 - 11:45

**S3-3 Nocturnally migrating songbirds encounter patchy light pollution along the east Adriatic coast.**

Simon Hirschhofer ORCID iD[1,2], Ranacher Peter ORCID iD[1], Robert Weibel ORCID iD[1], Barbara Helm ORCID iD[2], Sanja Barišić ORCID iD[3], Davor Ćiković ORCID iD[3], Baptiste Schmid ORCID iD[2]

[1]University of Zurich, Department of Geography, Zürich, Switzerland. [2]Swiss Ornithological Institute, Sempach, Switzerland. [3]Croatian Academy of Sciences and Arts, Institute of Ornithology, Zagreb, Croatia

**Abstract**

Nocturnal bird migration is suspected to be influenced by artificial nighttime lighting. Artificial lights are assumed to interact with birds' orientation, which has been observed to cause disorientation, leading to cumulative exhaustion or, in extreme cases, to fatal collisions due to attraction by light. These effects may be particularly pronounced after crossing geographic barriers such as large bodies of water, where the contrast between illuminated and dark areas is especially high.

To investigate this phenomenon, we deployed four ornithological radars in pairs along the Croatian Adriatic coast, where sea-crossing migrants during the spring migration are confronted with the emergence of patchy light pollution after flying across relative darkness. Over two years of avian migration monitoring, we examined the influence of light pollution by comparing urban and rural sites while accounting for atmospheric conditions. We modelled migratory responses in terms of migration intensity, airspeed, and flight altitude.

Our findings suggest that migration intensity at light polluted sites is slightly elevated, and that birds show behavioural signs of light-dependent disorientation, including reduced airspeeds and lower flight altitudes. These results highlight that dynamic and temporally adaptive lighting strategies could be an effective approach to mitigating the impact of artificial illumination on nocturnal avian migrants.

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11:45 - 12:00

**S3-4 Using weather radar data to study effects of the light pollution on bird migration**

Jutta Leyrer ORCID iD[1], Vladislaw Kosarev ORCID iD[1], Ann-Kathrin Ziegler ORCID iD[1], Cristina Nazzari[2], Kristine Meise[2]

[1]BioConsult SH, Husum, Germany. [2]Common Wadden Sea Secretariat, Wilhelmshaven, Germany

**Abstract**

Within the Interreg North Sea project Darker Sky, we investigate the possibility to use weather radar data to monitor bird migration on a regional scale and to study the influence of light pollution on bird migration along coastal areas of the North Sea. We use raw data from the weather radar located on Borkum island, Germany, available on the German Meteorological Service (Deutscher Wetterdienst) data portal. We apply digital filtering methods of R package bioRad to the original data to separate bird signals from other echoes. To investigate the influence of artificial sources of light and weather conditions on the dynamic of bird migration over the southern North Sea, we compare areas with contrasting light pollution intensities. Data on light pollution are taken from satellite observations and local measurements on the ground with Sky Quality Meters (SQM). Our results will support the implementation of measures to reduce light pollution.

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# Symposium 4: Avian mitochondria - Powering ecology, evolution, and conservation

10:30 - 12:00 Tuesday, 19th August, 2025

LR4

Conveners: Molly Ohse, Chloe Hadjadji, Pierre Bizé, and Antoine Stier

Fundamental, still-unanswered questions in ecology and evolutionary biology are related to the understanding of which mechanisms rule individual growth, reproduction, and survival. Mitochondria, also well-known as the powerhouse of the cell, are the organelles responsible for energy production in eukaryote cells through oxidative phosphorylation. It sets the efficiency to which food is converted into cellular energy, and thus how this energy is invested in overall maintenance and fitness. Oxidative phosphorylation produces up to 90% of the energy to fuel cells and therefore individuals. Recent research suggested that variation in their functioning, efficiency, and density might account for a large part of inter-individual differences in performance. Mitochondrial traits are expected to vary over life, particularly when influenced by extrinsic factors such as changes in diet, increased exposure to pollutants, or introduction of pathogen infections. Future efforts in conservation focus on preserving genetic diversity such as that associated with intra-individual variation in mitochondria, recognizing the importance of resilience and plasticity of species in rapidly changing environments.

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10:35 - 11:00

**S4 Keynote Mitochondrial biology as a key mechanism linking reduced size and warmer nest temperatures in seabird nestlings**

Stefania Casagrande ORCID iD

Max Planck Institute for Biological Intelligence, Seewiesen, Germany

**Abstract**

The relatively rapid reduction in body size across various populations in response to global warming suggests that this phenomenon is not solely driven by evolutionary processes, but might also result from developmental plasticity. High temperatures might contribute to this by inducing physiological adjustments that influence growth during early life. One potential pathway for such adjustments involves mitochondrial modifications in response to elevated temperatures, which may alter the efficiency of metabolic energy production—a phenomenon that remains inadequately investigated, particularly in endotherms. In this talk, I will discuss how blood mitochondrial bioenergetics and the proteomic profile linked to mitochondrial functionality are associated with reduced body size in nestling shearwaters (*Calonectris diomedea*) raised in warmer nests during a year characterized by a prolonged heatwave. The inefficiency in mitochondrial function, linked to smaller body size, was also associated with the downregulation of cellular growth factors and growth-promoting pathways, alongside an increased concentration of glycolysis enzymes and their up-regulators. By examining the relationships between environmental temperature, mitochondrial function and developmental outcomes, I aim to shed some light on the physiological adjustments that developing free-living birds, and potentially other endotherms, may undergo in response to extreme heat events.

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11:00 - 11:15

**S4-1 Changes in diet composition affect energy metabolism at several biological scales in Japanese quail**

Elisa Thoral ORCID iD[1,2], Maria Correia ORCID iD[1,3], Malin Holmberg[1], Hong-Lei Wang ORCID iD[4], Martin N Andersson ORCID iD[4], Imen Chamkha ORCID iD[5], Eskil Elmér ORCID iD[5], Caroline Isaksson ORCID iD[1], Andreas Nord ORCID iD[1]

[1]Lund University, Department of Biology, Evolutionary Ecology and Infection Biology, Lund, Sweden. [2]La Rochelle Université, LIENSs, La Rochelle, France. [3]University of Jyväskylä, Department of Biological and Environmental Science, Jyväskylä, Finland. [4]Lund University, Department of Biology, Sensory Biology, Lund, Sweden. [5]Lund University, Department of Clinical Sciences, Mitochondrial Medicine, Lund, Sweden

**Abstract**

Changes in diet composition can affect energy metabolism and animals' capacity to deal with thermal challenges. In particular, the quantity and functional type of fatty acids in food can influence both metabolism and thermoregulation in endotherms. To better understand how changes in fatty acids circulating levels could affect energy metabolism in birds, we experimentally manipulated diet composition in Japanese quail by supplementing the food with saturated or unsaturated fatty acids. As a positive control, we included a diet with DNP, a chemical mitochondrial uncoupler. We measured changes in circulating fatty acids over time and metabolism at whole-individual and cellular levels at the end of the experiment. Since mitochondria mainly drive energy production and oxygen consumption in individuals, we also examined how diet influenced the link between individual and mitochondrial metabolism. Specifically, we assessed resting metabolic rate and shivering activity of pectoral muscle under cold stress, and then mitochondrial respiration in blood and liver. Our results showed that circulating fatty acid proportions changed over time according to diet. Surprisingly, fatty acid supplementation did not increase mitochondrial metabolism in either tissue. Ongoing analysis of data obtained at the individual level will provide further insight into effects of diet on birds' metabolism. The results of this study will allow us to better characterize ability of birds to respond to environmental constraints, such as acute thermal variations, at several biological scales.

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11:15 - 11:30

**S4-2 Convergent and time-dependent evolutionary changes in mitochondrial function in high-altitude waterfowl**

Neal Dawson ORCID iD

University of Glasgow, Glasgow, United Kingdom

**Abstract**

High-altitude environments require that animals meet the metabolic $O_2$ demands for locomotion and thermogenesis in $O_2$-thin air, but the degree to which metabolic changes have arisen across independent high-altitude lineages or the speed at which such changes arise is unclear. We examined seven high-altitude waterfowl that have inhabited the Andes (3812–4806 m elevation) over varying evolutionary time scales, to elucidate changes in biochemical pathways of energy metabolism in flight muscle relative to low-altitude sister taxa. In a separate experiment, we also examined the mitochondrial physiology that facilitates performance at altitude by comparing the respiratory capacities of permeabilised fibers in the flight muscle and gastrocnemius muscle of highland and lowland waterfowl. Convergent changes across high-altitude taxa included increased hydroxyacyl-coA dehydrogenase and succinate dehydrogenase activities, decreased lactate dehydrogenase, pyruvate kinase, creatine kinase, and cytochrome c oxidase activities, and increased myoglobin content. ATP synthase activity increased in only the longest established high-altitude taxa, whereas hexokinase activity increased in only newly established taxa. Mitochondrial function generally declined in highland taxa vs. lowland taxa with highlanders showing lower overall respiration rates across all respiration states. Our data suggest that increases in capacity for beta oxidation, changes in capacity across glycolysis, and adjustments in mitochondrial function are common strategies to cope with the challenges of high altitudes, but that longer time scales of evolutionary adaptation can be required to fully converge upon the ultimate high-altitude phenotype.

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11:30 - 11:45

**S4-3 Mitochondrial function and avian migration: Lessons from a partial migrant**

Pablo Salmón ORCID iD[1], Alexander T. Baugh ORCID iD[2], Martin Wikelski ORCID iD[3], Miriam Liedvogel ORCID iD[1], Jesko Partecke ORCID iD[3]

[1]Institute of Avian Research "Vogelwarte Helgoland", Wilhelmshaven, Germany. [2]Swarthmore College, Swarthmore, USA. [3]Max Planck Institute of Animal Behavior, Radolfzell, Germany

**Abstract**

The proximate mechanisms underlying migratory performance remain poorly understood. Migratory animals, particularly birds, undergo profound physiological and phenotypic changes to meet the high energetic demands of migration. While energy is the fundamental currency of life, fuelling biological processes at every level of organisation, and mitochondria are the organelles responsible for its production, the role of mitochondrial traits in migration has received little attention. In this study, we investigated the relationship between mitochondrial physiology and migratory behaviour in Eurasian blackbirds (*Turdus merula*). Using a common garden setup, we measured blood mitochondrial bioenergetics in the same individuals during both Winter and Spring migration from populations with varying migratory propensities, sedentary, partially migratory and fully migratory. Our results suggest population-specific differences in mitochondrial maximum capacity, providing new insights into how mitochondrial function may shape life history strategies. These findings highlight the potential role of mitochondrial bioenergetics in migratory behaviour and emphasise the need to further studies explore its links with migratory performance.

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11:45 - 12:00

**S4-4 Cascading effects of mercury on mitochondrial traits and individual fitness in a wild population of European dippers (*Cinclus cinclus*)**

Molly Ohse[1,2], Antoine Stier ORCID iD[3], Blandine Doligez ORCID iD[4], Pierre Bize ORCID iD[1,2]

[1]Schweizerische Vogelwarte, Sempach, Switzerland. [2]Université de Lausanne, Lausanne, Switzerland. [3]Université de Strasbourg, CNRS, Institut Pluridisciplinaire Hubert Curien, Strasbourg, France. [4]Université de Lyon, CNRS, Laboratoire de Biométrie et Biologie Evolutive, Villeurbanne, France

**Abstract**

Mercury is a toxic metal able to travel and bioaccumulate in food webs. In aquatic ecosystems, mercury is converted to a more toxic form, methylmercury, known for its negative impacts on wildlife fitness, though causes and pathways from a cellular to population level remain largely unexplored. Mitochondria are maternally inherited organelles responsible for converting food into cellular energy, which can then be invested in organism growth or reproduction. Because pollutants, such as mercury, have been shown to disrupt mitochondrial function, we investigated cascading effects of mercury exposure on mitochondrial function and growth in an apex riverine bird, the European dipper (*Cinclus cinclus*). We conducted a partial cross-fostering between pairs of nests starting 2 days after hatching, for which we also had measures of feather mercury in both parents. At day 12, we measured mitochondrial traits in red blood cells (RBCs) from 231 chicks and 55 nests. Results indicate that variation in chicks' RBC mitochondrial traits (oxidative phosphorylation and proton leak) are foremost explained by chicks' nest of origin and maternal mercury concentration rather than their rearing nest. Furthermore, RBC mitochondrial proton leak was negatively related to tarsus length in 12-day-old chicks. Altogether, these findings suggest (i) genetics and/or early maternal effects appear to play a key role explaining mitochondrial variation in dipper chicks, and (ii) changes in mitochondrial traits may account for changes in offspring phenotype. These findings underscore the importance of understanding early-life environmental exposures and their potential long-term impacts on wildlife in contaminated ecosystems.

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# Plenary lecture - Antica Culina: Collaborative and robust bird research - why and how

13:30 - 14:30 Tuesday, 19th August, 2025

PL5

Chair: Alfonso Marzal

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**Plenary 3 Collaborative and robust bird research - why and how**

Antica Culina ORCID iD

Ruder Boskovic Institute, Zagreb, Croatia. NIOO-KNAW, Wageningen, Netherlands

**Abstract**

Many of us entered research driven by a deep curiosity about nature and a desire to expand our understanding of the world—often with the goal of applying this knowledge to areas such as conservation. However, the current scientific system is structured in a way that prioritizes publication over the pursuit of unbiased, high-quality research. This misalignment, coupled with cognitive biases, can lead to flawed studies and misleading conclusions. Further, it can lead to a biased set of research topics, often conducted on a biased set of species or habitats, that are considered worth publishing. In this talk, I will provide a brief overview of the challenges posed by the existing research and reward system, as well as the potential benefits of transitioning to a more reliable framework. I will particularly focus on the importance of FAIR (Findable, Accessible, Interoperable, and Reusable) data and argue for its role in not only increasing the quality of research, and collaboration, but also in reducing inequalities among research groups. Finally, I will offer practical tips for enhancing research robustness through open science and related practices. These include use of FAIR and open data, integrative methods of evidence synthesis, strategies to reduce the risk of bias, study registration, and open software.

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# Poster pitches 1

14:30 - 15:00 Tuesday, 19th August, 2025

PL5

Chair: Katherine Jones

14:30 - 14:32

**PP-1 Parenting in the city: differences in incubation behaviour between ground-breeding and rooftop-breeding Herring Gulls**

Jolien Van Malderen ORCID iD[1,2,3], Luc Lens ORCID iD[1], Wendt Müller ORCID iD[2], Frederick Verbruggen ORCID iD[1], Eric Stienen ORCID iD[3]

[1]Ghent University, Ghent, Belgium. [2]University of Antwerp, Antwerp, Belgium. [3]Research institute for Nature and Forest, Brussels, Belgium

**Abstract**

Incubation is a critical phase in avian reproduction, ensuring optimal embryo development by maintaining stable egg temperatures. Off-bouts – periods when eggs are left unattended – can expose embryos to extreme temperatures. Prolonged cooling can halt embryo development, while excessive heat can be lethal. Driven by habitat loss and predation pressure, Herring Gulls (*Larus argentatus*) have increasingly shifted from ground-nesting in coastal colonies to nesting on urban rooftops. Urban environments, characterised by the heat island effect and heat-absorbing surfaces, may elevate the risk of egg overheating, potentially influencing incubation behaviour and fitness. Yet the effects of incubation in this novel thermal environment remain largely unstudied. In this study, we used temperature loggers placed inside nests to investigate whether rooftop-breeding individuals adapt their incubation behaviour in response to the increased risk of egg overheating compared to ground-nesting individuals. We examined off-bout frequency and duration and assessed the impact on egg temperature variation, hatching success and chick size at hatching. Our results indicate that rooftop-breeding gulls have a lower number of off-bouts, reducing the time that the eggs are left unattended, likely to reduce the risk of egg overheating. This behavioural adaptation shortens the incubation duration, but we found no effects on hatching success or chick size at hatching. These findings suggest that rooftop-breeding individuals invest more time in incubation on a daily basis to achieve similar reproductive outcomes as ground-breeding individuals, potentially increasing the cost of parental care in urban environments.

14:32 - 14:34

**PP-3 Heavy Construction vs Light Recreation: Impacts of Disturbance Types on the Abundance of Roosting Waders in Bangor Harbour, North Wales.**

Samuel Prettyman[1], Mark Mainwaring[1], Hannah Smith[2], Kristen Crandell[1]

[1]Bangor University, Bangor, United Kingdom. [2]RSPB, Bangor, United Kingdom

**Abstract**

Coastal developments such as flood defences are altering coastlines around the UK at an increasing rate due to rising sea levels. However, our understanding of how these developments influence the abundance of waders roosting in coastal areas remains poor. In Bangor harbour, North Wales, we quantified the abundance of roosting waders and disturbance events across four non-breeding seasons, representing 692 diurnal high tides that spanned the construction period of two major developments. We quantified disturbance from humans walking on favoured roost sites and the construction of a flood defence scheme and sewage storage facility adjacent to the same sites. During the construction period (the third and fourth seasons of the study), recreational disturbance on roost sites was reduced as the construction site restricted public access to the harbour. Waders appeared to habituate to the sight and sound of regular construction work within the harbour. However, recreational disturbances (e.g., anglers) occurring every 5.2 days were found to suppress the abundance of Oystercatcher *Haematopus ostralegus* within the harbour by 94%. A significant lag period was also observed, with the abundance

of waders suppressed for several days following each isolated disturbance event. We conclude that, paradoxically, construction of coastal infrastructure can mitigate the effects of human disturbance by reducing recreational usage of coastal habitats. This study provides novel insight into the dramatic increase in wader abundance that can be observed when recreational disturbance is removed. This highlights the pressing need for meaningful protection of favoured roost sites from human recreation.

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14:34 - 14:36

**PP-5 Nest-Building in a Changing Environment: The Role of Age and Plastic Availability in Eurasian Magpies**

Mercedes Molina-Morales ORCID iD[1], Alejandra García[1], Gonzalo Muñoz-Arroyo ORCID iD[2]

[1]University of Granada, Granada, Spain. [2]University of Cádiz, Cádiz, Spain

**Abstract**

Many bird species incorporate anthropogenic materials (ANMs) into their nests. From an ecological perspective, several hypotheses have been proposed to explain the use of anthropogenic materials in avian nests. The 'availability hypothesis' suggests that birds use the most commonly available materials in their nesting environment to construct their nests. In contrast, the 'age hypothesis' proposes that the use of ANMs in breeding attempts increases with the age of the nest builder. Here, we examine the occurrence of anthropogenic nest materials in 2024 and test whether these two hypotheses explain the use of ANMs in a population of Eurasian magpies (*Pica pica*), which has been monitored for 17 years in an agroecosystem with diverse land uses and crop types. Our results show that magpies incorporate anthropogenic materials exclusively into the nest lining. Notably, black plastic strings were present in 97.6% of the linings. When considering the age of the breeding individuals (first-time breeders vs. adults), we found significant differences in plastic selection. Pairs composed of two adults show a significant increase in the percentage of plastic in the lining as plastic availability in the surroundings rises. In contrast, mixed-age pairs, consisting of one adult and one first-time breeder, maintain or even slightly decrease the proportion of plastic used, despite the increase in plastic availability. These findings suggest that experience and age-related behavioral differences influence the selection of nest materials in magpies.

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14:36 - 14:38

**PP-7 UrBio: Engaging Citizens in Monitoring Urban Biodiversity**

Francesca Cochis ORCID iD[1,2], Irene Regaiolo[1,2], Riccardo Alba[1,2], Luca Ilahiane[3,2], Diego Rubolini[3,2], Dan Chamberlain[1,2], Enrico Caprio[1,2]

[1]Department of Life Sciences and Systems Biology, University of Turin, Turin, Italy. [2]NBFC, National Biodiversity Future Center, Palermo, Italy. [3]Department of Environmental Sciences and Policies, University of Milan, Milan, Italy

**Abstract**

Urban biodiversity plays a crucial role in sustaining ecosystem functions, supporting environmental health, and enhancing human well-being within cityscapes. As urbanization progresses, various species, such as birds and mammals, adapt to urban habitats, forming unique synanthropic communities. However, rapid urban development leads to environmental transformations that drive the decline of some species while favouring the proliferation of others, often perceived as problematic. Updating population estimates and identifying the ecological and anthropogenic factors behind species success or decline is crucial, as these dynamics remain poorly understood. Large-scale biodiversity monitoring is key to addressing these challenges, yet traditional surveys have limited temporal and spatial coverage. The UrBio project, funded by the NextGeneration EU programs (NBFC and MUSA), leverages citizen science to assess urban bird diversity across Italy. Since its launch, 1,101 contributors—including naturalists and birdwatchers—have recorded 272,675 observations from 1,102 cities, documenting 390 taxonomic units (species/subspecies) via Ornitho.it and the Naturalist app. These data enable analysis of urban biodiversity patterns at an outstanding scale, linking presence data with environmental variables, from the local level to multi-city analyses, each representing a unique urban context. By analyzing large-scale data, this study aims to identify key drivers of urban bird populations in Italy. The findings will uncover patterns guiding targeted conservation efforts and informing urban planning strategies. This collaborative effort bridges the gap between academia and

the public, fostering environmental awareness and contributing to the sustainable management of urban ecosystems, demonstrating the power of citizen science in advancing ecological research.

14:38 - 14:40

**PP-9 Gaze strategy in free diving Humboldt penguins (*Spheniscus humboldti*)**

Gintaras Malmiga ORCID iD[1,2], Eglė Vaitulevičiūtė[1], Pavel Kulikov[3], Mindaugas Mitkus ORCID iD[1]

[1]Life Sciences Center, Vilnius University, Vilnius, Lithuania. [2]State Scientific Research Institute Nature Research, Vilnius, Lithuania. [3]Lithuanian Sea Museum, Klaipėda, Lithuania

**Abstract**

When navigating through complex environments animals must quickly acquire specific set of information to reconstruct a three-dimensional view of their surroundings and execute necessary maneuvers. Fast-moving animals acquire such information from optic flow on the retina during self-motion. Translational optic flow allows to estimate relative distances between objects and direction of movement. However, rotational optic flow hinders this estimation during head or body turns. To counteract this, animals evolved gaze stabilization strategies. In flight bird use rapid head saccades to stabilize translational optic flow, but whether such behaviour exists underwater is unknown. In this study we investigated gaze stabilization strategy in free-diving Humboldt penguins (*Spheniscus humboldti*) during U-shaped turns in an outdoor pool. We used seven synchronized and calibrated underwater cameras to capture penguins from different angles at 240 fps for 3D videography. We tracked the base and the tip of the beak to reconstruct head movement in 3D space. We show, for the first time, that rapid head saccades are used by birds in underwater gaze stabilization, as observed in flying birds, but with lower angular velocity. Furthermore, turn radius and diving speed affected number of saccades in a turn, whereas only diving speed affected angular velocity of saccades. These findings suggest that Humboldt penguins adapt their visual-motor strategies to ensure stable vision underwater.

14:40 - 14:42

**PP-13 Larger woodlands with more native trees and less conifer plantation support greater populations of a marsh tits *Poecile palustris*, a declining forest specialist**

Richard Broughton[1], Marta Maziarz[2]

[1]UK Centre for Ecology & Hydrology, Wallingford, United Kingdom. [2]Museum and Institute of Zoology PAS, Warsaw, Poland

**Abstract**

Forest specialist birds are in widespread decline in Europe. In Britain, Marsh Tits are an indicator species of mature native woodlands, but have suffered 80% population declines since the 1960s. We assessed whether habitat degradation during the 20th Century, through woodland fragmentation and conversion of native broadleaved woodland to conifer plantations, could have impacted Marsh Tit populations. We surveyed the number of occupied Marsh Tit territories in 74 woodland patches of 1–296 ha in England, comprising purely native broadleaved woodland or with varying coverages of conifer plantations (0–89%). We show that the number of Marsh Tit territories increases with woodland patch size, but coniferized woods hold far fewer Marsh Tit territories than deciduous woods. The density of Marsh Tit territories also decreases with an increasing proportion of conifer plantation in a wood. This implies that historical conversion of native broadleaved woodland to conifer plantation may have had a significant impact on Marsh Tit abundance. However, we also show that many of the larger coniferized woodlands tend to be in state ownership, meaning that conservation action to significantly improve habitat for woodland birds (like Marsh Tits) may be more straightforward and achievable than if they were in multiple private ownership.

14:42 - 14:44

**PP-15 Development and Validation of Microplastic Extraction from Feces of the White-Throated Dipper (*Cinclus cinclus*)**

Simona Berta[1,2], Agnès Saulnier ORCID iD[3], Adrian Grunder[2], Blandine Doligez ORCID iD[4], Denise M Mitrano ORCID iD[5], Pierre Bize ORCID iD[3]

[1]ETH, Zürich, Switzerland. [2]Institute of Geography, University of Bern, Bern, Switzerland. [3]Swiss Ornithological Institute, Sempach, Switzerland. [4]CNRS, Department of Biometry and Evolutionary Biology (LBBE), University of Lyon 1, Villeurbanne, France. [5]Department of Environmental Systems Science, ETH Zürich, Zürich, Switzerland

**Abstract**

Plastic pollution is a major environmental concern today, due to the large quantities of plastic that have been and are still being released into the environment as a result of poor waste management. This phenomenon is further exacerbated by the fragmentation of plastic debris into microplastics (MP) and nanoplastics (NP), which are then ingested or inhaled by most living organisms. To better understand the consequences of plastics exposure and ingestion by wildlife, there is an urgent need to develop protocols for reliably extracting and quantifying PM in biological matrices. In this study, we present a method for extracting MPs from the feces of the White-throated Dipper (*Cinclus cinclus*), a sentinel bird species for river ecosystems. The development of the method required extensive testing to overcome the challenges of separating MPs from complex biological matrices. The final protocol involved two cycles of Fenton reaction followed by density separation with sodium bromide. MP recovery rates during the different separation steps were validated using MP-doped feces, in which rare metal elements, quantifiable by mass spectrometry, were inserted into the MPs (i.e. polyethylene terephthalate: PET and polypropylene: PP; 63-125 µm). Our trial-and-error and validation work has highlighted the key factors for maximizing PM extraction from complex matrices, and we hope this knowledge will provide a foundation for standardized and reliable MPs extraction techniques in bird feces.

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14:44 - 14:46

**PP-17 Advancing cooperative breeding research with an integrative, peer-reviewed and updatable Cooperative-Breeding Database (Co-BreeD)**

Maike Woith ORCID iD[1], Yitzchak Ben Mocha ORCID iD[1,2,3]

[1]Department of Biology, University of Konstanz, Konstanz, Germany. [2]Center for the Advanced Study of Collective Behaviour, University of Konstanz, Konstanz, Germany. [3]Zukunftskolleg, University of Konstanz, Konstanz, Germany

**Abstract**

The study of cooperative breeding increasingly relies on comparative meta-analyses, yet concerns about data accuracy persist. We introduce the Cooperative-Breeding Database (Co-BreeD, N >450 samples, >293 bird and mammal species), which is designed to address these concerns through: (i) a sample-based approach linking biological data to specific locations and periods, (ii) a peer-reviewed data entry protocol, and (iii) continuous updates for accuracy. This database enables more precise, intra- and inter-species comparative analyses of cooperative breeding. We illustrate Co-BreeD's potential by presenting key biological results, with a special emphasis on sociality in birds. To expand the dataset, we invite attendees to contribute field data on parental care and in return offer co-authorship on Co-BreeD's next methodological paper.

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14:46 - 14:48

**PP-19 Combining Stable Isotopes ($^{2}H$, $^{34}S$) in Feathers with Geolocator tracking to Reveal Moult Migration Strategies in the Common Starling (*Sturnus vulgaris*)**

Elza Marija Zacmane ORCID iD[1], Viesturs Vīgants ORCID iD[1], Ance Priedniece ORCID iD[1], Oskars Keišs ORCID iD[1], Ivo Dinsbergs ORCID iD[1], Māris Jaunzemis ORCID iD[1], Valts Jaunzemis ORCID iD[1], Martins Briedis ORCID iD[1,2]

[1]University of Latvia, Faculty of Medicine and Life Sciences, Institute of Biology, Laboratory of Ornithology, Riga, Latvia. [2]Swiss Ornithological Institute, Department of Bird Migration, Sempach, Switzerland

**Abstract**

Moult is an energetically costly but essential event in the annual cycle of birds that can coincide with migration. Moult strategies show intraspecific variation, but the factors driving this variation and its consequences are poorly understood due to the lack of methods for tracking many individuals throughout the annual cycle. We investigated the use of stable isotopes ($^{2}H$, $^{34}S$) in feathers to reveal the presence or absence of moult migration of Common Starlings (*Sturnus vulgaris*), cross-validating our results with geolocator tracking. Feather samples from adult birds breeding in Latvia (moulting on-site or exhibiting moult migration) and Germany (moulting on-site) were analysed for isotope levels (n = 368), while a portion of individuals from Latvia were tracked by multi-sensor geolocators (n = 28). Tracked individuals that conformed to moult migration spread between southern Baltics and northern Germany in summer where they moulted. Overall, our results showed different isotopic signatures of $^{2}H$ and $^{34}S$ for Latvian (moulting on-site) and German populations, supporting spatial variation in moult locations. However, isotope values for a group of Latvian geolocator-tracked birds that exhibited moult migration closely resembled those from birds known to moult in Germany. This separation enabled us to assign a migration strategy for a portion of Latvian starlings that could not be tracked by other means. These findings demonstrate the potential of combined isotopic and tracking approaches to study individual movement patterns in birds. Notably, our study contributes to the emerging use of $^{34}S$ as a novel tool in avian migration research.

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14:48 - 14:50

**PP-21 Nocturnal roosting behaviour of Common Starlings *(Sturnus vulgaris)* during the breeding season**

Valts Jaunzemis ORCID iD[1], Ivo Dinsbergs ORCID iD[1], Oskars Keišs ORCID iD[1], Māris Jaunzemis ORCID iD[1], Ance Priedniece ORCID iD[1], Viesturs Vīgants ORCID iD[1], Elza Marija Zacmane ORCID iD[1], Martins Briedis ORCID iD[1,2]

[1]University of Latvia, Faculty of Medicine and Life Sciences, Institute of Biology, Laboratory of Ornithology, Riga, Latvia. [2]Swiss Ornithological Institute, Department of Bird Migration, Sempach, Switzerland

**Abstract**

Roosting site selection during the breeding season is a critical part of avian reproductive strategies that can affect predation risk and reproductive success. While females are foremost responsible for incubation and care of nestlings in most species, males may adopt different nocturnal roosting strategies, potentially reflecting trade-offs between parental investment and survival. Investigating these behavioural patterns can provide key insights into the dynamics of parental roles and species-specific breeding strategies. In this study, we used GPS and multi-sensor geolocator tracking to examine the nocturnal roosting behaviour of breeding Common Starlings *Sturnus vulgaris* at three nest box sites in Latvia. Pressure recordings from geolocators indicated that males consistently roost outside the nest box throughout the breeding season, while females remain in the nest only during incubation and early chick-rearing period. GPS tracking data revealed that nocturnal roosting sites were found in reedbeds as far as 10 km from the breeding site with individuals commuting daily. Individuals from the same breeding colony roosted together and mixed with birds from other nearby breeding sites. These findings contribute to a broader understanding of avian breeding ecology and parental behaviour.

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14:50 - 14:52

**PP-23 To cross or not to cross… the Gulf of Lion: bird migration characteristics monitored by radar at the coast.**

Baptiste Schmid[1], Hélène Schopper[2], Cyprien Daide[2], Camille Assali[2], Vincent Delcourt[2]

[1]Swiss Ornithological Institute, Sempach, Switzerland. [2]Biotope, Mèze, France

**Abstract**

In Autumn, millions of birds migrating south along the Rhone valley reach the Mediterranean Sea at the Gulf of Lion. They can decide either to continue their journey straight South, thus crossing the western Mediterranean basin, or to deviate their flight direction and follow the coastline towards the Iberic peninsula. We monitored over three years the migration intensity and flight direction of migratory birds at nine costal locations around the Gulf of Lion using two BirdScan MR1 (ornithological) radars. While one radar remained in The Camargue for the entire study period, the other was moved weekly from one site to the next during the first two years and then installed close to Agde for the third year. Migration intensity was surprisingly low in la Camargue, but most birds passing over the radar flew towards the open sea. Highest migration intensities were registered west of the Camargue. There, flight direction either strongly aligned with the coast or indicated short-distance overflight of the Gulf of Lion, but few birds were heading towards the open sea. Combined with recorded flight height, flight direction over sites brings new insights into postnuptial migration strategies in western Mediterranean. These results were integrated in the MigraLion project, aiming to map bird movements at the Gulf of Lion in the prospects of offshore windfarms development.

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14:52 - 14:54

**PP-25 Explaining the Migratory Behaviour of Pied Flycatchers (Ficedula Hypoleuca)**

Andrew Doyle, Christine Howard ORCID iD

Durham University, Durham, United Kingdom

**Abstract**

Every year, billions of birds undertake long-distance migrations across continents and oceans in search of seasonal resources. However, this global phenomenon is under threat. Climate, land-use change, and overexploitation are all recognised as driving large-scale declines in migratory birds. Identifying the causes of these declines is particularly challenging, as migratory birds rely on multiple locations throughout their annual cycle, making the assessment of key threats across breeding, wintering, and stopover sites a complex but critical task. Advancements in geolocation tracking now provide individual movement data of long-distance songbird migrants, enabling the validation of the Spatially Explicit Adaptive Migration Model (SAMM)—a novel mechanistic individual-based modelling framework. By integrating environmental variables, species-specific energetics, and flight range predictions, we develop SAMM to simulate the migratory behaviour of European Pied Flycatchers (Ficedula hypoleuca), a well-studied yet vulnerable long-distance migrant. Through alignment with observed tracking data, the SAMM identifies the key environmental factors and individual state variables shaping migration decisions. Here we show how migration route, timing and stopover behaviour can be predicted to identify fluctuations in energy dynamics due to the energetic costs of migration, resource availability, and physiological responses to the environment such as thermoregulation. This novel approach enhances our ability to predict individuals' future migratory responses under changing climatic conditions and the drivers of population declines. Explaining and predicting migratory behaviour of a long-distance migrant, such as highly valuable stopover locations, will provide critical insights into future conservation strategies.

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14:54 - 14:56

**PP-27 Heat dissipation capacity modulates Mediterranean songbirds' activity during heat waves but not their body temperature**

Marta Precioso ORCID iD[1], Elena García-López de Haro ORCID iD[1], Erick González-Medina ORCID iD[2,1], Julián Cabello-Vergel ORCID iD[1], María Espinosa-Colín ORCID iD[1], Jorge S. Gutiérrez ORCID iD[1], Auxiliadora Villegas ORCID iD[1], Jose A. Masero ORCID iD[1]

[1]University of Extremadura, Badajoz, Spain. [2]Universidad Complutense, Madrid, Spain

**Abstract**

Heat dissipation limit theory (HDL) suggests that animals with higher capacity to dissipate metabolic heat can allocate more energy to other activities, such as foraging. This limitation could be especially important in animals inhabiting challenging environments such as the Mediterranean basin, where extreme heat events are becoming increasingly frequent. Here, we experimentally increased heat dissipation capacity in two species of Mediterranean songbirds - the house sparrow (*Passer domesticus*) and the great tit (*Parus major*) - by trimming their ventral feathers during the summer of 2023, a period marked by extreme high temperatures (>40ºC). We recorded their body temperature and the number of visits to a feeder using implanted temperature-sensitive passive integrated transponder (PIT) tags and RFID readers.Our results revealed species-specific responses to the treatment. Body temperature did not differ between trimmed and control individuals although trends varied by species. Regarding the foraging activity, trimmed great tits showed higher activity than controls, including during extreme high temperatures (>40ºC), while trimmed house sparrow consistently showed reduced activity compared to controls. Our results suggest that songbirds modulate their activity depending on their heat dissipation capacity, but this modulation is species-specific. This is the first experimental evidence in wild Mediterranean songbirds of how increased heat dissipation capacity may influence foraging activity under extreme thermal stress.

# Oral session 1: Migration 1

15:30 - 17:00 Tuesday, 19th August, 2025

MALT

Chair: Sissel Sjöberg

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15:30 - 15:45

**Oral 1-1 How extreme migratory connectivity in the UK breeding population of the Common Nightingale helps us to understand both the potential causes of its population decline and the methodological constraints that may impede our understanding of patterns of migratory connectivity.**

Chris Hewson ORCID iD, Maire Kirkland ORCID iD

British Trust for Ornithology, Thetford, United Kingdom

**Abstract**

Understanding the distribution of breeding populations of migratory animals in the non-breeding period is important for understanding their response to environmental change. High connectivity (low non-breeding population dispersion) may lower resilience to climate change and increase vulnerability to habitat loss within their range. Very high levels of connectivity are reportedly rare, but this conclusion may be limited by methodology. Using multiple tracking methods, we demonstrate extremely high connectivity in a strongly declining peripheral breeding population of a long-distance migrant, the Common Nightingale in the UK. Non-breeding population dispersion was lower than for previously tracked populations of this and other species and likely lower than can usually be detected by light-level geolocation, the main tracking method for small bodied species. Extremely low levels of population mixing were also detected, so any impacts on this population on the non-breeding grounds are unlikely to be shared with more distant breeding populations, corresponding to the observed patterns of European population change. According to an SDM using independent field data, this population's non-breeding grounds had lower suitability than others and likely declined before the period we were able to assess. These results support hypotheses that climatic and habitat-related deterioration of non-breeding grounds contributes to population declines in peripheral and high-connectivity breeding populations of long-distance migrants, including the one studied here. They also suggest that further data collected using tracking methods with less inherent error than light level geolocation are required to assess whether high connectivity is more common than has hitherto been appreciated.

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15:45 - 16:00

**Oral 1-2 One sense or two? Birds can use magnetic cues associated with direction finding to locate their position**

Richard Holland ORCID iD[1], Florian Packmor[2], Dmitry Kishkinev[3], Henrik Mouritsen[4], Thomas Zechmeister[5]

[1]Bangor University, Bangor, United Kingdom. [2]Lower Saxon Wadden Sea National Park Authority, Wilhelmshaven, Germany. [3]Keele University, Keele, United Kingdom. [4]University of Oldenburg, Oldenburg, Germany. [5]Biological Station Lake Neusiedl, Illmitz, Austria

**Abstract**

Migratory birds are able to navigate over great distances with remarkable accuracy. The mechanism they use to achieve this feat is thought to involve two distinct steps: locating their position (the "map") and heading towards the direction determined (the "compass"). For decades, this map-and-compass concept has shaped our perception of navigartion in animals, although the nature of the map remains debated. However, some recent studies suggest the involvement of the Earth's magnetic field in the map step. Here, we tested whether migratory songbirds, Eurasian reed warblers (*Acrocephalus scirpaceus*), can determine their position based on two magnetic field components that are also associated with direction finding, magnetic inclination and magnetic declination. During a virtual magnetic displacement experiment, the birds were exposed to altered magnetic inclination and magnetic declination values that would indicate a displacement from their natural migratory corridor, but the total intensity

of the field remained unchanged, creating a spatial mismatch between these components. The response was a change in the birds' migratory direction consistent with a compensatory re-orientation. This suggests that birds can extract positional as well as directional information from these cues, even when they are in conflict with another component of the magentic field. It remains to be seen whether birds use the total intensity of Earth's magnetic field for navigation. Previous evidence suggests that magnetic cues in the map step are detected by a different sensory system than those in the compass step. However, this discovery raises a new question: one sense or two?

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16:00 - 16:15

**Oral 1-3 Movement ecology throughout the full annual cycle of three migratory swift species breeding in Israel**

Daniel Bloche ORCID iD[1], Itai Bloch ORCID iD[1], Christoph Meier ORCID iD[2], Nir Sapir ORCID iD[1]

[1]Department of Evolutionary and Environmental Biology and Institute of Evolution, University of Haifa, Haifa, Israel. [2]Swiss Ornithological Institute, Sempach, Switzerland

**Abstract**

Movement throughout the annual cycle evolved as an adaptation to seasonality across different bird species with a continuum of migration strategies and behaviours at the non-breeding range. Despite its significance for migratory populations, we poorly understand avian movement ecology, including migration timing, routes, and non-breeding movements in relation to environmental variables. This is particularly true for migratory swift populations from the understudied Levant area. To address this knowledge gap, we tracked Common (*Apus apus*), Pallid (*Apus pallidus*), and Alpine Swifts (*Tachymarptis melba*) from breeding colonies in Israel, using light-level geolocation. These highly mobile, insectivorous swift species maintain a distinctive aerial lifestyle throughout their annual cycle. Common Swifts had the shortest breeding period, yet longer than Northern populations. Throughout the non-breeding season, they tracked high vegetation greenness, with some individuals performing long-distance movements but showing distinct between-individual variation in itinerancy. Pallid Swifts showed a hitherto undescribed longitudinal itinerancy pattern, moving from the Central Sahel to the east, following a complex pattern of vegetation and rainfall. Additionally, we observed a prolonged stopover at the eastern coast of the Red Sea during spring migration. Alpine Swifts had a substantially longer breeding range residency, both compared to the other two swift species and to other Alpine Swift populations. Unlike the other species, their non-breeding range was rather stationary and short, seemingly avoiding rainfall periods throughout their annual cycle. Our findings highlight species- and population-specific movement strategies shaped by environmental conditions, providing essential information for conserving migrants under global changes.

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16:15 - 16:30

**Oral 1-4 Songbirds shift from vector navigation during their first autumn to true goal navigation during later migrations**

Morrison Pot ORCID iD[1,2], Timm Wild[3], Marcel Visser[1,2], Barbara Helm[4], Anna Gagliardo[5], Kasper Thorup[6], Henk van der Jeugd[1], Martin Wikelski[3,7]

[1]Netherlands Institute of Ecology (NIOO-KNAW), Wageningen, Netherlands. [2]Groningen Institute for Evolutionary Life Sciences (GELIFES), Groningen, Netherlands. [3]Max Planck Institute of Animal Behaviour, Radolfzell, Germany. [4]Swiss Ornithological Institute, Sempach, Switzerland. [5]Univeristy of Pisa, Pisa, Italy. [6]University of Copenhagen, Copenhagen, Denmark. [7]University of Konstanz, Konstanz, Germany

**Abstract**

Migratory birds are able to accurately find back their wintering and breeding locations, even when these are far apart. They therefore must have a navigational mechanism that allows individuals to compensate for displacement caused by, for instance, wind conditions experienced *en route*. Because achieving such so-called *true goal navigation* requires experiences obtained at these areas, juveniles are thought to migrate to the wintering quarters by using inborn *vector navigation* programs, i.e., they use a seasonally appropriate heading for their migration flight. As a consequence, inexperienced juveniles should be unable to compensate for displacement. But as these juveniles have experienced their natal area, they are predicted to shift to more accurate true goal navigation from

the first spring onwards. Displacement experiments with free-flying birds have thus far, however, shown inconsistent results. We experimentally displaced common starlings (*Sturnus vulgaris*) from an autumn stopover site in the Netherlands to distant and unfamiliar areas in Germany and Spain and followed their individual movements using Internet of Things tracking tags. We show that, on average, displaced adults, but not displaced juveniles adjusted their migratory direction towards goal areas in the North Sea area and the United Kingdom. However, in the following spring, we were unable to show that the mean migration direction of displaced juveniles differed significantly from that of non-displaced starlings. It thus remains unclear when songbirds shift from an inborn vector navigation program to true goal navigation.

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16:30 - 16:45

**Oral 1-5 Biotic and abiotic factors drive circadian migration strategies in northern pintails across the Eurasian flyway**

Devon Cevenini ORCID iD[1,2], Daniele Baroni ORCID iD[2], Marco Basso[3], Jacopo G. Cecere ORCID iD[2], Federico De Pascalis ORCID iD[2], Alessandro Franzoi ORCID iD[2,4], Simona Imperio ORCID iD[2], Lucio Panzarin[5], Andrea Pilastro ORCID iD[1,6], Simone Pirrello ORCID iD[2], Fernando Spina[2,7], Lorenzo Serra ORCID iD[2]

[1]Università degli Studi di Padova, Dipartimento di Biologia (DiBio), Padova (PD), Italy. [2]Area per l'Avifauna Migratrice (BIO-AVM), Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), Ozzano Emilia (BO), Italy. [3]Via Gianbattista Verci 25/4 35128, Padova (PD), Italy. [4]Ufficio Ricerca e Collezioni museali, Muse – Museo delle Scienze, Trento (TN), Italy. [5]Via Giacomo Leopardi 5 30020, Venezia (VE), Italy. [6]National Biodiversity Future Center, Palermo (PA), Italy. [7]Via Francesco Verrotti 32 65126, Pescara (PE), Italy

**Abstract**

Birds may exhibit significant plasticity in their circadian migration patterns, adapting to diverse environments encountered along flyways. In dabbling ducks, conflicting evidence supports their classification as either nocturnal or facultative diurnal-nocturnal migrants, with limited understanding of the factors driving such substantial behavioural variation. We investigated how biotic (e.g. across biomes) and abiotic (daylight variation) factors influenced individual movement patterns during pre-breeding migration of GPS-tracked northern pintails (*Anas acuta*) tagged in late winter in the Adriatic (Italy). Complete tracks were retrieved for 26 pintails (n=28 migration events) migrating along the Eurasian flyway to their breeding areas (spread between ca. 46°-70° N and 23°- 73° E). Our study revealed remarkable variability in migration distance, duration, and speed. Pintails covered distances from 2'400 up to 7'800 km between February and June, averaging 65 km/day (maximum 830 km/d for active migration segments). Earlier departing birds travelled longer distances, with timing and stopover behaviour primarily influenced by season. While active migration was predominantly nocturnal overall, we observed a marked shift to strictly diurnal (higher sun altitude) migration within the tundra biome (beyond the boreal forest treeline). This shift was not solely due to the steep reduction in dark hours as individuals migrated northeast. Rather, it likely stemmed from factors such as the increasing urgency to reach breeding grounds and an adaptation to ecological contexts favouring daytime migration.

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16:45 - 17:00

**Oral 1-6 GPS-tracking reveals strong individual heterogeneity in migratory movements of Mediterranean Gulls throughout Europe**

Ioannis Kalaitzakis ORCID iD[1,2], Federico De Pascalis ORCID iD[2], Lorenzo Serra ORCID iD[2], Jacopo G. Cecere ORCID iD[2], Simone Pirrello ORCID iD[2], Simona Imperio ORCID iD[2], Aurélien Besnard ORCID iD[3], Jocelyn Champagnon ORCID iD[4], Olivier Duriez ORCID iD[3], Stéphane Hippolyte[5], Frédéric Jiguet ORCID iD[6], Dominik Marchowski ORCID iD[7], Joachim Siekiera[8], Marcin Sidelnik[9], Eric Stienen ORCID iD[10], Diego Rubolini ORCID iD[1]

[1]Dipartimento di Scienze e Politiche Ambientali, Università degli Studi di Milano, Milan, Italy. [2]Area Avifauna Migratrice, Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), Ozzano dell'Emilia, Italy. [3]CEFE, Univ Montpellier, CNRS, EPHE, IRD, Montpellier, France. [4]Tour du Valat, Research Institute for the Conservation of Mediterranean Wetlands, Arles, France. [5]Conservatoire d'espaces naturels Centre-Val de Loire, Orléans, France. [6]Centre d'Ecologie et des Sciences de la Conservation, MNHN, CNRS, Sorbonne Université, Paris, France. [7]Ornithological Station, Museum and Institute of Zoology, Polish Academy of Sciences, Gdańsk, Poland. [8]Siekiera, Independent Researcher, Żywocice, Poland. [9]Nature Conservation Foundation "Na Skrzydłach", Warszawa, Poland. [10]Research Institute for Nature and Forest (INBO), Brussels, Belgium

**Abstract**

Non-breeding movements, including migration, can vary greatly among and within avian populations. For instance, many species are partial migrants, including individuals that perform long-distance or short-distance migrations, as well as others that reside around the breeding site year-round. The Mediterranean gull (*Ichthyaetus melanocephalus*) is an opportunistic feeder and partially migratory species, whose heterogeneity in migratory tactics and year-round habitat use have been poorly investigated. By GPS-tracking more than 50 individuals from populations located in Belgium, France, Italy, and Poland across multiple migration episodes, we investigated the variability in non-breeding movements within and among populations. We characterized non-breeding movement patterns through several parameters and identified a unified framework for characterizing migrants and residents. Gulls showed heterogeneity within and among populations in the direction and distance travelled, while the main wintering sites of migrants across populations were located along the English Channel and the Iberian Peninsula. Our results, the first spanning across the range of the species, revealed that distinct migration tactics coexist within populations and that their frequency can vary among populations. We argue that such behavioural heterogeneity might increase the species' resilience in the face of rapidly changing environmental conditions.

# Oral session 2: Life histories and development 1

15:30 - 17:00 Tuesday, 19th August, 2025

LR2

Chair: Andreas Nord

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15:30 - 15:45

**Oral 2-1 Effects of parental effort on lifetime reproductive success in a long-lived raptor**

Steffen Oppel ORCID iD[1], David Jenny[1], Julia Hatzl[1], Kamran Safi ORCID iD[2], Petra Sumasgutner ORCID iD[3], Klaus Bliem[4], Enrico Bassi ORCID iD[5], Matthias Tschumi ORCID iD[1], Martin Grüebler ORCID iD[1]

[1]Schweizerische Vogelwarte, Sempach, Switzerland. [2]Max Planck Institut for Ornithology, Radolfzell, Germany. [3]University of Vienna, Vienna, Austria. [4]Forststation Schlanders, Schlanders, Italy. [5]Parco Nazionale dello Stelvio, Bormio, Italy

**Abstract**

To maximize their fitness, organisms need to balance timing decisions that can affect fitness parameters in different directions. A typical trade-off concerns the investment into current reproduction and the potential cost in survival and future reproduction. We quantified the fitness costs of parental care duration in Golden Eagles (*Aquila chrysaetos*) breeding in the European Alps. Juvenile eagles (n=65) were tracked with GPS transmitters to determine parental care duration as the period between fledging and permanently departing from the parental territory. We estimated the effect of parental care duration on juvenile survival probability and the productivity of parents in the following year. The lifetime fitness of adult eagles was simulated as the number of offspring surviving to recruitment age produced over a 20-year reproductive lifespan for two different levels of parental effort. We found that parental care duration ranged from 16 to 260 days and had no detectable effect on the survival of juvenile birds. However, the probability of raising offspring in the following year decreased with increased parental effort, decreasing from 20% to 9% when parental care was extended by three months. When considering both productivity and offspring survival, individuals with high parental effort produced 66% fewer offspring (median=1, range 0-5) that survived to recruiting age compared to those with low parental effort (median=3, range 0-7). We therefore speculate that long parental care durations indicate low individual quality, and are a compensation mechanism by parents to maintain survival probability of their offspring.

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15:45 - 16:00

**Oral 2-6 Embryonic avian skeletal development and spherulitic calcium trafficking assessed in ovo by multiscale 3D imaging**

Marc McKee[1], Shumeng Jia[1], Maeva Halgrain[2], Maris Schneider[3], Sophie Rehault-Godbert[2], Natalie Reznikov[1]

[1]McGill University, Montreal, Canada. [2]INRAE, Nouzilly, France. [3]University of Western Ontario, London, Canada

**Abstract**

The avian egg is perfect – strong enough to withstand the weight of the incubating parent, thin enough for pipping, porous enough for respiration and yet impenetrable to pathogens. Moreover, it contains all the nutrients required for embryonic growth through to hatching. We explored embryonic skeletal development dynamics in *layer* and *broiler* chickens *in ovo*, whose selection for divergent traits may affect postnatal bird welfare. We used 3D X-ray tomographic imaging (μCT) of fertilized/incubated eggs to track skeletal maturation over time. In the broiler eggs, the early embryos and yolks were initially larger than those of the layer eggs. However, in both strains, skeletal mineralization started on incubation day E11. Leg and jaw bones were slightly larger in broiler embryos, but layer embryos caught up from this initial lag in mineralization by incubation day E15. The timing of the layer embryonic growth acceleration coincided with the known functional activation of the chorioallantoic membrane to release calcium from the eggshell on day E13. In both strains, by day E15, we visualized in 3D by X-ray microscopy thousands-upon-thousands of spherulitic (10-30μm), calcium-containing (as confirmed by energy-dispersive spectroscopy, EDS) inclusions within the yolk sac and allantoic fluid. These water-soluble inclusions become

sparse at E17. The inclusions from the yolk sac are rich in phosphorus (confirmed by EDS). In summary, prehatch skeletal maturation seems to be robustly regulated, with the combined activities of the chorioallantois and yolk sac, comprising a formidably effective system for trafficking mineral ions from the shell to the developing embryo

16:00 - 16:15

**Oral 2-2 Early is relative — fitness consequences of the absolute and relative timing of reproduction in three species of hole-nesting birds**

Alex Sutton[1], Nikole Freeman[1], Joseph Burant[2]

[1]Bangor University, Bangor, United Kingdom. [2]Netherlands Institute of Ecology, Wageningen, Netherlands

**Abstract**

Life history theory posits animals should optimize their timing of reproduction to maximize their fitness. For birds living in seasonal environments, the optimal timing of reproduction will depend on the timing and width of peak food availability. Individuals may optimize their reproductive success, both in absolute terms and relative to their contemporaries, by timing egg laying such that food availability is increasing or near its zenith during the critical stages of offspring development. However, shifting abiotic and biotic conditions, such as climate and food availability, may affect changes in the fitness consequence of early laying. We examined the effects of absolute and relative timing of reproduction on multiple components of fitness using 68 years of data from long-term studies of three hole-nesting birds; Eurasian Blue Tit, Great Tit, and European Pied Flycatcher. Consistent with our theoretical framework and previous work in these study populations, we show that while lay dates have advanced the fitness consequences of early laying are species-specific and vary through time. In general, brood size, number of fledglings, and offspring recruitment were positively influenced by absolutely early lay dates (save for the most extreme), but there were negative effects of laying either earlier or later than the average conspecific breeding in the same year. Female survival was less influenced by lay date. Thus, selection on the absolute and relative timing of egg laying influences lifetime reproductive success, favouring increasingly earlier lay dates, while fitness is maximized by individuals who optimize their timing to annual conditions.

16:15 - 16:30

**Oral 2-3 Female hole-nesting birds adjust their incubation behaviour in response to local and short-term microclimatic variation**

Joseph Burant ORCID iD

Netherlands Institute of Ecology, Wageningen, Netherlands

**Abstract**

Incubation of eggs is a costly energetic investment that poses a major selective force on the behaviour of nesting birds.The costs of incubation vary with external forces like ambient temperature and intrinsic factors like clutch size, and incubating females are known to adjust their behaviour in response to environmental conditions like temperature and precipitation. Often, however, there is a disconnect between the scales at which behavioural and environmental data are collected, which may result in significant amounts of environmentally-induced variation between individuals being attributed to environmental data that does not capture individuals' local experience. We have been piloting custom Arduino-based sensors for the high-frequency monitoring of incubation behaviours (nest attentiveness, frequency and duration of on-bouts) and environmental conditions (temperature and humidity inside and outside the nest) in nest box-breeding Great Tits (Parus major) and Pied Flycatchers (Ficedula hypoleuca). We show that females adjust their incubation behaviours in response to local environmental variation experienced on multiple time scales. Overall, females who experienced warmer local temperatures altered their nest attendance in four key ways: they were more likely to leave the nest in the short-term, spent a smaller proportion of their time incubating, made on-bouts of shorter duration, and were off the nest more frequently. Our results highlight the insights that can be gained by testing for environmental effects on the spatial and temporal scales on which incubating females perceive them, at the nest.

16:30 - 16:45

**Oral 2-5 Preen oil compositional variability and functional potential in free-living birds**

Veronika Gvoždíková Javůrková ORCID iD[1,2], Maureen I. Baars ORCID iD[1], Adéla Fraňková[3], Tyrsa Veld[1], Maurine W. Dietz ORCID iD[1], Joana F. Salles ORCID iD[1], Irene B. Tieleman ORCID iD[1]

[1]Groningen Institute for Evolutionary Life Sciences, University of Groningen, Groningen, Netherlands. [2]Institute of Vertebrate Biology of the Czech Academy of Sciences, Brno, Czech Republic. [3]Czech University of Life Sciences Prague, Faculty of Agrobiology, Food and Natural Resources, Prague, Czech Republic

**Abstract**

Preen gland is an accessory skin gland producing secretions with diverse functional potentials in birds, ranging from feather waterproofing to putative olfactory and antimicrobial functions. However, the olfactory and antimicrobial functions of preen oil and the effect of sociality and habitat humidity on the overall chemical composition of preen oil and its functional potential have been little studied. We analysed the complete volatile organic compound (VOC) and fatty acid (FA) profiles in preen oils collected from >370 individuals of 33 bird species and ≈ 120 individuals of 13 bird species, respectively. VOC and FA profiles varied considerably between species, and using a random forest approach, we mapped 25 VOCs (≈ 30% of all detected VOCs) that varied in abundance in preen oil with respect to habitat, sociality and sex. Although the origin of preen oil VOCs remains poorly understood, we found that 39% of all detected VOCs were known microbially derived VOCs (mVOCs), supporting the hypothesis of a microbially driven origin of preen oil compounds. We also found that 24% of all detected VOCs and all dominant FAs are capable of antimicrobial activity. Functional enrichment analysis revealed a primary association of the detected VOCs with the olfactory pathway and sensory perception. Our results indicate the important role of preen oil VOCs in sensory and olfactory perception in birds and show that habitat humidity, sociality and sex may influence preen oil composition. We also highlight the potentially important contribution of microorganisms in the synthesis of preen oil antimicrobial and chemosignalling compounds.

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16:45 - 17:00

**Oral 2-6 The microbial environment of the nest shapes offspring gut microbial colonization during development**

David Diez-Méndez ORCID iD[1,2], Leonardo Ré Jorge[2,3], Inga Freiberga[2,3], Jitka Lasková[2,3], Katerina Sam[2,3]

[1]NIOO - KNAW, Wageningen, Netherlands. [2]University of South Bohemia, České Budějovice, Czech Republic. [3]Biology Centre of the Czech Academy of Sciences, České Budějovice, Czech Republic

**Abstract**

Bacterial colonization of the gut is a crucial event in early-life that shapes the phenotype of host individuals. Nestlings hatch with nearly sterile guts that are rapidly colonized by bacteria until these communities reach a relatively stable configuration shortly before a nestling fledges. Previous studies have highlighted the key role of the nest microbial environment, parental gut microbiome and dietary bacteria in the colonization process. However, most data on the sources of colonization are correlative or, when collected experimentally, cannot distinguish whether the microbiome originates from the nest, parents or diet. In our study, we attempted to decipher the sources of colonization in a Great tit *(Parus major)* population by performing a partial cross-fostering experiment halfway through the developmental period, in which we exchanged not only half-broods but also the nests. In this way, we created groups of four experimental nests where we could assign microbiome sources according to the nest, siblings and parents. We also tested whether the vertical transfer of the microbiome from the parents comes mainly from their guts, as is usually assumed, or whether the microbiome from feathers and saliva plays a role. We found that the nest microbiome is the major player in colonizing the nestling guts and shaping the microbial communities, with an unexpected contribution from the maternal body microbiome. Overall, microbial colonization was biased towards maternal sources (indirect and direct), while paternal transmission of microbiomes was limited. This suggests that species-specific sexual roles during reproduction are crucial for offspring gut colonization dynamics.

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# Oral session 3: Behavioural ecology 1

15:30 - 17:00 Tuesday, 19th August, 2025

LR3

Chair: Mark Mainwaring

15:30 - 15:45

**Oral 3-1 Does age drive behavioural variability in response to the environment in Adélie penguins?**

Linnet Jessell[1], Louise Emmerson[2], Colin Southwell[2], Natasha Gillies[1], Jonathan Potts[3], Samantha Patrick[1]

[1]University of Liverpool, Liverpool, United Kingdom. [2]Australian Antarctic Division, Hobart, Australia. [3]University of Sheffield, Sheffield, United Kingdom

**Abstract**

Individual-level behavioural variability is thought to be crucial for the ability to adapt to climate change as it allows individuals to respond to rapid changes in environmental conditions. There is evidence that an individual's degree of behavioural variability can fluctuate during its lifetime; specifically, juveniles of many species tend to be more variable in their behaviour that adults. Younger individuals for example may display more variable behaviour as they learn strategies that are most beneficial. However, it remains unclear whether the amount of environmental variability experienced during the early years shapes the relationship between age and variability. Changes in environmental conditions can reduce and redistribute prey availability which in turn, often elicit changes in foraging behaviour. Here, we use data on known-age Adélie penguins from a long-term study in east Antarctica to explore how within-individual foraging trip duration variability changes with age and with respect to the environmental conditions in early life and during breeding. We predict that individuals will become less variable as they age, but that greater environmental variability in early life will slow the canalization of foraging behaviour. By exploring within-individual changes throughout the lifetime of an Adélie penguin, we can explore the link between environmental variability and species responses in the face of extreme environmental changes.

15:45 - 16:00

**Oral 3-2 Stay or go? Breeding dispersal under predation pressure in the common eider**

Ida Hermansson ORCID iD[1,2], Mikael von Numers[1], Kim Jaatinen[3], Jens Skog[4], Markus Öst[1,5]

[1]Åbo Akademi University, Turku, Finland. [2]Tvärminne Zoological Station, University of Helsinki, Hanko, Finland. [3]Finnish Environment Institute, Helsinki, Finland. [4]Centre for Economic Development, Transport and the Environment, Turku, Finland. [5]Novia University of Applied Sciences, Ekenäs, Finland

**Abstract**

Breeding dispersal, or movement between successive breeding sites, is insufficiently understood. A 'win-stay, lose-switch' (WSLS) strategy may facilitate predator avoidance, but such responses may be modulated by individual traits. We studied the drivers of breeding dispersal within and between breeding islands in female common eiders (*Somateria mollissima*) – a ground-nesting site-fidelic sea duck – in the northern Baltic Sea. Rapidly increasing predation on this population led us to expect an increase in dispersal over time. Using data spanning 21 years (2003-2023), we investigated which individual traits (nest success, age, body condition, boldness, relative brain size) and environmental factors (predation risk, breeding density) that influenced breeding dispersal. Within-island breeding dispersal distances showed moderate repeatability ($r$ = 0.45), dropping to 0.20 after accounting for significant fixed effects – highlighting the roles of environmental context and individual characteristics in dispersal decisions. Consistent with the WSLS strategy, dispersal distances within islands and the likelihood of switching islands increased following predator-induced breeding failure and years with high island-specific nest predation risk. Older females switched islands less frequently, likely due to accumulated experience and age-dependent anti-predator strategies. Island switching was also more likely in years with abundant white-tailed sea eagles (*Haliaeetus albicilla*), the main predator of adult eiders, suggesting that dispersing females are capable of perceiving predation risk beyond the immediate nest surroundings. Although philopatry can increase

vulnerability to predation, flexible dispersal strategies may facilitate population persistence in this endangered population under intense predation. Future studies should assess the fitness outcomes of dispersal across diverse predation landscapes.

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16:00 - 16:15

**Oral 3-3 How Taiga Bean Geese Respond to Temperature Fluctuations During Wintering**

Lisa Vergin ORCID iD, Kevin Kuhlmann Clausen, Jesper Madsen

Aarhus University, Department of Ecoscience, Aarhus, Denmark

**Abstract**

Suitable foraging habitats are essential for migratory birds during their wintering period, as well as alternative staging areas to which they can relocate, e.g. due to changes in weather conditions. In our study, we examined movements and habitat use of Taiga Bean Geese (*Anser fabalis fabalis*) wintering in Denmark. We used GPS tracking data to investigate temperature-related shifts from and to the main wintering site of the geese. Individuals responded to cold temperatures by leaving the main area for cold-weather refuges further south in Denmark, returning once conditions became milder again. By focusing on the most used cold-weather refuge, we analysed habitat use as well as energy intake and expenditure on the key foraging grounds (agricultural fields and semi-natural pasture) to better understand the role and importance of the different habitats. We investigated the proportional use of winter cereal fields of GPS-tracked Taiga Bean Geese in relation to daily average temperatures, and collected food and faecal samples on winter cereals and pastures during both cold and mild weather condition. The results showed an increased use of winter cereals when temperatures dropped. Moreover, during cold periods, the geese appeared to only be able to maintain a positive energy balance on winter cereals, which could explain the increased use in low temperatures. Our study underlines the importance of ensuring the availability of refuges during winter that can meet the energetic needs of geese across different weather situations, which are important factors for future conservation efforts for Taiga Bean Geese.

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16:15 - 16:30

**Oral 3-4 Social information use increases with decreasing temperatures in a passerine bird**

Emil Isaksson[1], Jan Wijmenga[2], Alexis Chaine[3], Roslyn Dakin[4], Julien Martin[5], Kimberley Mathot[2]

[1]University of Vienna, Vienna, Austria. [2]University of Alberta, Edmonton, Canada. [3]Station d'Ecologie Théorique et Expérimentale du CNRS, Moulis, France. [4]Carleton University, Ottawa, Canada. [5]University of Ottawa, Ottawa, Canada

**Abstract**

Individuals may gather information about foraging opportunities by directly sampling the environment (asocial information) or inferring it from the foraging success of congeners (social information). Social information may allow individuals to avoid time and energy costs associated with asocial sampling while foraging, which can be particularly important when environmental factors such as low temperatures increase the risk of starvation. Food acquisition is a significant determinant of survival for small, overwintering birds, and they are thus expected to be plastic in their asocial and social information use in relation to environmental conditions to acquire food. We tested this context-dependent use of social information in 8 flocks of wild black-capped chickadees (*Poecile atricapillus*, N=153 individuals) foraging at intermittently filled feeders over a winter period with temperatures ranging from −11.0°C to 5.5°C. We used network-based diffusion analysis to estimate the relative use of asocial and social information. In accordance with our prediction, the chickadees showed higher reliance on social information with lower temperatures. This study provides a first look into the immediate and reversible plasticity of social information use of wild birds in relation to low ambient temperature, a great challenge for small overwintering passerines.

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16:30 - 16:45

**Oral 3-5 Wandering albatrosses from Crozet have slightly altered their interaction rate with fisheries over more than a decade**

Ewen Le Scornec ORCID iD, Henri Weimerskirch, Karine Delord, Julien Collet

Centre d'Etudes Biologiques de Chizé, Villiers-en-Bois, France

**Abstract**

Fisheries attract large numbers of foraging seabirds and pose a major conservation threat through bycatch and collisions, questioning the plausibility of evolutionary rescue scenarios. A common proxy to assessing reliance on fisheries and bycatch risk is quantifying time spent near vessels. These proxies are often based on static snapshots, and/or do not differentiate opportunities from attraction to fisheries thus little adapted to investigate behavioural plasticity and adaptive responses to changing conditions. Yet interactions occur in dynamic environments (e.g., varying vessel density and weather), and how seabirds adjust their interaction rates remains unclear. This study examines inter-annual variations in encounter and interaction rates in the wandering albatross (*Diomedea exulans*), an opportunistic predator known to follow fishing vessels. In the Indian Ocean, this species likely underwent counter-selection against interaction behaviours in the late 20th century, while recent legislative changes have variably altered bycatch risk and food availability across different fisheries. Using 509 GPS tracks from wandering albatrosses breeding on Crozet Island over nine years, we combined movement data with fishing vessel tracking via Automatic Identification System. This fine-scale data enables to differentiates “encounters” (co-occurrence within detection range) from “interactions” (close, prolonged co-occurrence). Preliminary results show interannual variation in interaction time, suggesting behavioural adjustments over time. Encounter rates follow similar trends, despite stable vessel density, suggesting shifts in large-scale bird movement patterns rather than variations in attraction levels. Further analyses will explore differences across fleets and individual traits (age, sex, reproductive success) to better understand how seabirds adjust their responses to fisheries.

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16:45 - 17:00

**Oral 3-6 Responding to pressure: Changes in air pressure as anticipatory cues for changing weather conditions**

Wesley Hochachka ORCID iD, Tom Auer ORCID iD, Cynthia Crowley, Daniel Fink ORCID iD, Shawn Ligocki ORCID iD, Lauren Oldham Jaromczyk, Orin Robinson ORCID iD, Amanda Rodewald ORCID iD, Matt Strimas-Mackey ORCID iD, Chris Wood

Cornell University, Ithaca, USA

**Abstract**

By anticipating changes in weather, rather than reacting to changes as they are occurring, birds should more effectively deal with changing weather conditions. Migrating birds have been shown to be able to anticipate appropriate atmospheric conditions for migration by sensing changes in air pressure. We asked whether changing air pressure is being used by birds to alter their behaviors in contexts other than migration. To examine this question, we combined records of bird observations from eBird with information about meteorological conditions at the times that these observations were being made, to look for changes in detection rates of birds (i.e. changes in behaviours, such as singing rates, that affect availability for detection) with changes in air pressure. For diverse passerine bird species, the rate and direction of change in air pressure at the time of observation was associated with variation in detectability of these species. The patterns of change in detectability are consistent with alterations in the activities of birds in response to changing air pressure, rather than with changes in observers’ ability to detect birds (such as lower detection rates with higher wind speeds). While we have found evidence that birds are altering their behaviours in response to changes in air pressure, the patterns of association between detectability and air pressure qualitatively differed among species, suggesting that changes in detectability are associated with changes in different behaviour across bird species.

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# Oral session 4: Anthropogenic effects 1

15:30 - 17:00 Tuesday, 19th August, 2025

LR4

Chair: Crinan Jarrett

15:30 - 15:45

**Oral 4-1 Noisy but illuminated areas near roads create attractive habitats for a common nocturnal raptor**

Giuseppe Orlando ORCID iD[1], Luca Nelli ORCID iD[1], Paul Baker[1,2], David Anderson[3], Katy Anderson[4], Maria Bogdanova[5], Davide Dominoni ORCID iD[1]

[1]University of Glasgow, Glasgow, United Kingdom. [2]Glasgow Caledonian University, Glasgow, United Kingdom. [3]Dave Anderson Ecology Ltd., Callander, United Kingdom. [4]Forestry and Land Scotland, Aberfoyle, United Kingdom. [5]UK Centre for Ecology & Hydrology, Penicuik, United Kingdom

**Abstract**

Anthropogenic noise and artificial light at night (ALAN) are expanding globally, acting as pervasive sensory pollutants that can disrupt wildlife behaviour. Despite the nocturnal landscape has been becoming brighter and noisier, the impact of these pollutants on sedentary nocturnal species, such as owls, remains poorly documented. Most owls hunt at night by hearing and may use roadside areas as hunting grounds, where prey availability is estimated to be high. However, since noise pollution impairs owl prey detection, the use of these areas might depend on the co-occurring levels of light and noise. In this study, we hypothesized owls' attraction to roads when the levels of light are high, so that they might overrule the negative effect of noise during hunting. Using biologgers equipped with GPS and light sensors, we tracked breeding Tawny Owls (*Strix aluco*) to examine the interplay between roads, noise and light. We found that owl occurrence increased in noisy areas near roads only when light levels were high. Further from roads, where noise levels decreased, owls preferred darker areas. These findings suggest that Tawny Owls might switch from acoustic to visual cues to hunt near roads. Here, unlike in quieter sites further from roads, owls might try to use lit sources over their hearing to catch the prey due to the high levels of noise. Importantly, these findings indicate that illuminated areas near roads may function as ecological traps and increase the risk or vehicle collisions, which is a common concern for owl conservation.

15:45 - 16:00

**Oral 4-2 Carry-over effects of non-breeding mercury exposure and influence of age on the breeding success of an endangered gadfly petrel**

Alice Dalla Pieta[1,2], Joana Romero[2], Roberto Vento[1], Francesco Ventura[3], Carina Gjerdrum[4], Paco Bustamante[5], Jeremy Madeiros[6], Letizia Campioni[7,8]

[1]Wageningen University and Research, Wageningen, Netherlands. [2]NIOZ, Den Burg, Texel, Netherlands. [3]Biology Department, Woods Hole Oceanographic Institution, Woods Hole, USA. [4]Canadian Wildlife Service, Dartmouth, Canada. [5]Littoral Environnement et Sociétés, La Rochelle, France. [6]DENR - Department of Environment and Natural Resources, Ministry of Home Affairs, Bermuda, Bermuda. [7]Department of Conservation Biology and Global Change, Doñana Biological Station, Seville, Spain. [8]Ornis Italica, Rome, Italy

**Abstract**

Understanding the factors influencing reproductive outcomes in endangered species is critical for a successful conservation action, particularly for species recovering from severe population declines and with small populations. The Bermuda petrel *Pterodroma cahow*, an endangered migratory gadfly petrel endemic to the western North Atlantic, is slowly rebounding from a historical bottleneck but continues to experience low breeding success. Identifying the drivers of these reproductive challenges is essential for ensuring its long-term recovery. This aim of this study is to investigate intrinsic factors and carry-over effects from the non-breeding season influencing the hatching success in the endangered Bermuda petrel during the subsequent breeding season. We examined factors such as parental age and non-breeding mercury exposure in approximately 30% and 20% of the entire

breeding population, respectively. Our findings indicated that hatching success probability declines with parental age and mercury exposure during the non-breeding season, suggesting that both factors negatively contribute to the breeding success of this small population of only 165 breeding pairs. Mercury concentrations in females did not seem to affect egg size, indicating that this heavy metal could instead affect the development of the embryo. Our findings suggest that the advanced age and mercury concentration contribute to the low breeding success of this population, revealing the sublethal effects of mercury exposure and a carry-over effect of winter contamination of adults on subsequent reproductive success. These results underscore the importance of addressing environmental factors year-round for effective conservation.

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16:00 - 16:15

**Oral 4-3 Effect of urban environment on the sperm quality of two passerines**

Zsófia Tóth ORCID iD[1], Szabolcs T Nagy[2], Melissah Rowe[3], Chanyeong Park[1], Susana Garcia Dominguez[1], Caroline Isaksson[1]

[1]Biology Department, Lund University, Lund, Sweden. [2]Hungarian University of Agriculture and Life Sciences, Keszthely, Hungary. [3]Department of Animal Ecology, NIOO-KNAW, Wageningen, Netherlands

**Abstract**

The decline of many bird species worldwide has been attributed to factors associated with urbanisation, such as pollution, which has been linked to reduced reproductive performance. Medical studies have shown that the percentage of sperm DNA fragmentation (a measure of DNA damage) is higher in polluted areas compared with less polluted or non-polluted areas, leading to miscarriages in women or infertility in men. Sperm DNA damage can be one of the causes of hatching failure in birds, however we do not know if the level of sperm DNA damage differ between urban and rural environments. Therefore, we studied the level of sperm DNA damage along an urbanisation gradient in Blue and Great tits in southern Sweden, expecting that the birds living in urban area would have higher sperm DNA damage. We found that Blue tits had higher sperm DNA damage than Great tits. However, contrary to our expectations, we found higher sperm DNA damage in rural environment, but only in Blue tits. Our findings are the first to show that sperm DNA damage exists in a wild bird species, and raise the question of how urban birds can maintain better sperm DNA integrity than rural birds.

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16:15 - 16:30

**Oral 4-4 Towards a biodiversity-friendly agriculture: parcel-scale ground vegetation management affects densities of avian functional groups in vineyards**

Maurizio Odicino ORCID iD, Mattia Brambilla ORCID iD

University of Milan, Milan, Italy

**Abstract**

Wild species provide many ecosystem services in farmed areas, supporting production. Vineyards are often highly intensive crops, and management practices strongly affect biodiversity and birds in particular. Implementing fine-scale sustainable management should be more feasible compared to landscape-scale policies, but the impact of management actions at the parcel scale has been seldomly addressed by previous research. In this study, we investigate the effects of parcel-scale management practices on different avian functional groups in an isolated hill located in Southern Lombardy (N Italy). We show the positive effects of practices that increase habitat heterogeneity compared to intensive practices. Inter-row alternate mowing shows a positive relation with the abundance of seed eaters and a negative relation with the abundance of potential grape eaters. Patches of bare ground promoted seed eaters' abundance and the overall number of species, while irrigation has a negative effect on different variables. Moreover, our results suggest that vineyards may act as a surrogate habitat for insectivore birds. Our study shows that easy to implement fine-scale measures can be an effective tool to support bird communities and the associated ecosystem services. Combining these practices with landscape-scale management policies will help maximize the balance between ecosystems services and disservices mediated by biodiversity and also meet the targets of EU's policies.

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16:30 - 16:45

**Oral 4-5 Context matters: post-fledging movements and survival in juvenile European blackbirds along an urban-forest gradient.**

Iván Alejandro González Andazola[1], Noémi Pallás[1], Judit Szabados[1], Dmitry Kishkinev ORCID iD[2], Zoltán Németh ORCID iD[1]

[1]University of Debrecen, Debrecen, Hungary. [2]Keele University, Staffordshire, United Kingdom

**Abstract**

Fledgling survival and movement behavior are critical aspects of avian life history, shaping population dynamics and ecological interactions. This study examines factors influencing post-fledging movements and apparent survival in European Blackbird (*Turdus merula*) fledglings. Using radio telemetry, we tracked fledglings across an urbanization gradient to assess the effects of body mass, brood size, clutch size, sex, and nest urbanization score, a measure of urbanization at the nest site, on movement patterns and survival. Urbanization score was not a strong predictor of dispersal distance, as fledglings from urbanized nests moved similarly to those from less urbanized areas. However, survival probabilities differed across sites, with fledglings from forested areas exhibiting higher survival than those from urbanized sites. Previous nest monitoring efforts (2018–2024) revealed an opposite trend, with higher nest failure in forested (82%) than urban nests (74%), indicating that factors influencing survival shift across developmental stages. Daily movement distances did not differ significantly across sites yet, clutch size and brood size influenced their movements, with fledglings from larger clutches and broods traveling farther. Additionally, sex had no effect on movement, indicating similar patterns between males and females. These findings emphasize the important role of natal habitat in early survival while showing that urbanization does not strongly constrain fledgling movement. Understanding these patterns is essential for assessing population dynamics and species in human-altered landscapes.

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16:45 - 17:00

**Oral 4-6 Effects of artificial light on the behavioural actvity budgets of free-roaming nightjars**

Tobias Knieps ORCID iD[1], Eddy Ulenaers[2], Jitse Creemers ORCID iD[3], Michiel Lathouwers ORCID iD[4], Richard Schnürmacher ORCID iD[5], Ruben Evens[3]

[1]University of Bielefeld, Bielefeld, Germany. [2]Agentschap Natuur en Bos, Brussels, Belgium. [3]Catholic University of Louvain, Louvain-la-Neuve, Belgium. [4]INBO (Research Institute for Nature and Forest), Brussels, Belgium. [5]University of Antwerp, Antwerp, Belgium

**Abstract**

Natural light cycles are increasingly, and substantially, altered by artificial light at night (ALAN). Many species, including the crepuscular, visually hunting European Nightjar (*Caprimulgus europaeus*) align their behaviour with the available light. We used supervised machine learning (XGBoost) to identify four different behavioural classes (resting, singing, flying, leaping) within the data from biologgers attached to nightjars and constructed a detailed time use sequence over the course of the night. Combined with multiple data sources, this provides a comprehensive picture of the nightjars' behavioural response to ALAN. Biologgers were deployed on 41 nightjars and recorded GPS coordinates and acceleration during 263 nights in the breeding seasons from 2020 to 2023. Three-dimensional acceleration data was processed with XGBoost to identify behaviours, while GPS data contributed to labelling and mapping behaviours to land cover types. The study sites varied in light pollution levels, yet moon and sun luminance, and temporal variation in skyglow explained most variation in available light. Linear mixed-effects models indicated a dependency of multiple behaviours, particularly movement, on the moon phase. However, this dependency diminished with high skyglow, i.e., high cloud cover (a proxy for skyglow). Nightjars were as active in the nights lit up by skyglow as in the nights lit up by the moon. This generally leads to more possibilities for nightjars to be active, and indicates that overcast nights resemble the light environment of nights with a full moon. These findings could help integrate light pollution mitigation into wildlife conservation strategies.

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# Oral session 5: Conservation 1

15:30 - 17:00 Tuesday, 19th August, 2025

LR5

Chair: Attila Fülöp

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15:30 - 15:45

**Oral 5-1 High-resolution maps to support the conservation of endangered grassland bird species**

Nica Huber, Claire Lischer, Stephanie P. M. Michler, Hubert Schürmann, Reto Spaar, Urs G. Kormann

Swiss Ornithological Institute, Sempach, Switzerland

**Abstract**

Spatial data on species distributions, habitats, and other relevant factors are a pre-requisite for the spatial prioritization of conservation actions. However, for practitioners dedicated planning-tools must be at an adequate spatial resolution.

Grassland birds are of particular conservation concern in Switzerland due to agricultural intensification and infrastructure development, particularly at higher elevations. Here we developed a standardized workflow to create high-resolution, national-scale maps for the habitat potential and confirmed presence and absences of conservation-relevant grassland birds. The workflow combines high-resolution environmental data, expert assessments, observation data from systematic surveys and opportunistic citizen science data. We applied the workflow to develop maps for five conservation-relevant grassland species at higher elevations: Whinchat, Skylark, Woodlark, Tree Pipit and Meadow Pipit, and a map combining all five species. The maps are limited to grassland-dominated habitats in mountain zones I-IV and the summer pasture areas and are at a resolution of 10x10m across Switzerland. They allow a quick and efficient assessment of the occurrence and suitable breeding habitats at the national scale. Stakeholders from nature and landscape conservation can use the maps in the planning of conservation measures and for evaluating their efficiency (e.g. action plans, local species promotion projects), in spatial planning or in assessing conflicting objectives in infrastructure and conservation projects. The maps are accessible online for free through a dedicated website, together with accompanying documentations. Adaptable to many species of conservation concern, the presented workflow harnesses recent developments in citizen science and environmental data to provide an easily-accessible tool for conservation planning.

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15:45 - 16:00

**Oral 5-2 Management, topography and landscape contribute to shape avian communities in Alpine semi-natural grasslands**

Emanuela Granata ORCID iD[1], Giacomo Assandri[2], Alessandro Franzoi[3], Paolo Pedrini[3], Mattia Brambilla[1,4]

[1]Milan University, Department of Environmental Science and Policy, Milan, Italy. [2]Dipartimento di Scienze e Innovazione Tecnologica, Università del Piemonte Orientale “Amedeo Avogadro”, Alessandria, Italy. [3]Ufficio Ricerca e Collezioni museali, Ambito Biologia della Conservazione, MUSE – Museo delle Scienze, Trento, TN, Italia (Research and Museum Collections Office, Conservation Biology Unit, MUSE – Science Museum, Trento, TN, Italy), Trento, Italy. [4]CRC Ge.S.Di.Mont, Milan University, EDOLO, Italy

**Abstract**

Grasslands are among the biodiversity-richest habitats in Europe and play a key role for biological conservation. Nevertheless, they are declining and degrading due to abandonment, conversion and intensification. Many grassland species have declined and those who refuged from intensification in mountain grasslands are now threatened by environmental and climate changes. We investigated the relationship between grassland-breeding bird communities (species richness and the abundance of functional groups) and landscape, topography, and management across 169 transects in the Italian Alps, along environmental and management gradients. Our findings indicate that all these factors shape avian communities, albeit with varying degrees of importance. Among

management variables, the presence of intensively managed valley-floor grasslands had the strongest impact, negatively affecting all insectivores, particularly vegetation-dwelling insectivores, while positively influencing granivorous and pest species. Subsidies related to the Common Agricultural Policy appeared in only a few models and mostly had negative effects. Landscape features emerged as the most frequent predictors. Broadleaved forests had a positive effect on overall species richness and vegetation-dwelling insectivores but negatively influenced the number of grassland species as well as ground-dwelling insectivores and granivorous birds. Apple orchards had a negative impact on species richness and all insectivore categories. Alpine grasslands promoted grassland species while negatively affecting other groups. Future policies should revise agricultural subsidies to promote biodiversity-oriented management while ensuring the conservation of low-intensity grasslands. Preserving ecologically functional grasslands only at high elevations is insufficient to maintain biodiversity and its associated ecosystem services. Policies should therefore promote grassland biodiversity conservation at all elevations.

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16:00 - 16:15

**Oral 5-3 Making the most of wetlands: evaluation of factors driving habitat quality of constructed wetlands for declining waterfowl species in unprotected boreal landscapes**

Prakhar Rawal ORCID iD[1], Toni Laaksonen ORCID iD[1], Tuomas Seimola ORCID iD[2], Veli-Matti Väänänen[3], Ineta Kačergytė ORCID iD[4], KS Gopi Sundar ORCID iD[5], Andreas Lindén ORCID iD[2]

[1]University of Turku, Turku, Finland. [2]Natural Resources Institute Finland (LUKE), Helsinki, Finland. [3]University of Helsinki, Helsinki, Finland. [4]Swedish University of Agricultural Sciences, Uppsala, Sweden. [5]Seva Mandir, Udaipur, India

**Abstract**

Over the past few decades, Europe has put in significant efforts to restore and construct wetlands to halt ongoing losses. These endeavors require considerable time, investment, and effort, making it crucial to ensure that they are highly efficient in meeting their objectives, one of which is biodiversity conservation. A large proportion of Finnish waterfowl breed in unprotected agricultural and forestry landscapes, making their conservation even more challenging. We monitored waterfowl communities at 146 constructed wetlands in such unprotected landscapes across Finland. We studied the effects of various habitat and landscape (at two spatial scales) variables on four waterfowl metrics – species richness, breeding pair abundance, brood abundance, and mean brood size. We also investigated how these metrics vary as wetlands age over time. We found wetlands with larger perimeters, more islands, and a higher abundance of gull species to support greater species richness and abundance of pairs and broods. They also vary non-linearly with age, initially increasing and reaching a peak, before declining and eventually becoming unpredictable. Additionally, for these three metrics, landscape variables calculated at a larger scale (2 km buffer) were more important than at a finer scale (200 m buffer), while it was the opposite for brood size. Wetlands with higher urban cover at the finer scale had smaller mean brood sizes. Such results provide important feedback to wetland construction and restoration efforts, ensuring future projects can maximize their biodiversity conservation outcomes.

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16:15 - 16:30

**Oral 5-4 Overabundance & Undercommunication – The Case of Orkney's Greylag Geese**

Felicitas Pamatat[1], Ana Payo Payo[2], Nils Bunnefeld[3], Thomas Bodey[1]

[1]University of Aberdeen, Aberdeen, United Kingdom. [2]Universidad Complutense de Madrid, Madrid, Spain. [3]University of Stirling, Stirling, United Kingdom

**Abstract**

Conflicts between wildlife conservation and agricultural productivity are increasing globally, particularly where overabundant species impact livelihoods. In Orkney, Scotland, managing Greylag Geese (*Anser anser*) has become a focal point of such conflict. The resident Greylag population has increased by 2,600% over the last two decades, with geese damaging grass and barley crops, key to the region's agricultural economy, upon which 10% of Orcadians rely directly. Despite years of intensive recreational winter culling (targeting both migrants and residents) and rifle shooting for summer crop protection, management has not yet achieved sustainable control of

the Greylag population. Efforts to integrate stakeholders (including conservation organizations, government bodies, shooting parties, and farmers) into the decision-making have been ongoing but with limited success. To investigate the perceived threats and ideal management solutions, we conducted semi-structured interviews with farmers, conservationists, and government employees. Our results indicate that differences in perceived threats (e.g., crop loss due to geese) and proposed solutions (e.g., increased culling strategies) are often less significant than the misalignments in communication and engagement between local stakeholders (e.g., farmers) and management organizations (e.g., NatureScot). These include a lack of transparency, inconsistent messaging, and limited stakeholder involvement in the policy development, undermining trust and collaboration. Our findings highlight the critical role of effective communication and meaningful stakeholder engagement in wildlife management. Addressing these gaps is essential for improving Greylag Goose management in Orkney and informing conflict mitigation in other regions facing similar conservation-agriculture tensions, particularly in island communities where ecological and economic vulnerabilities are amplified.

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16:30 - 16:45

**Oral 5-4 Supplementary winter feeding is associated with higher recruitment rates in a scavenging bird of prey**

Carina Nebel ORCID iD[1,2], Ida Penttinen ORCID iD[1], Toni Laaksonen ORCID iD[1]

[1]University of Turku, Turku, Finland. [2]Turku Collegium for Science, Medicine and Technology, Turku, Finland

**Abstract**

Supplementary feeding is a widely used conservation strategy to increase food availability during periods of scarcity, especially in scavenging species. Although it has been shown to improve fitness, the full extent of its advantages and disadvantages remains poorly understood. In the Baltic Sea region, the recovery of the white-tailed eagle (*Haliaeetus albicilla*) from near-extinction was assisted by a supplementary feeding scheme during winter. We examined whether individual feeder usage was associated with recruitment probability into the population. At a feeding site in Southwest Finland, food was offered during winter and visiting individuals were identified based on their unique rings. Additionally, we identified individuals by genotypes extracted from feathers collected from ringed nestlings and from adult feathers collected from nest sites between 2003-2012 and 2008-2023, respectively. By matching nestling and adult genotypes, we infer recruitment and relate it to individual feeder usage. Our findings reveal that there was high individual variability in feeder usage and that higher visitation rate resulted in higher recruitment rates. While individual impacts were substantial, increasing recruitment from 15% to 43%, the estimated population-level increases from this one feeder can be considered small, from 15% to 16%. We demonstrate that supplementary winter feeding had the potential to aid the recovery of the white-tailed eagle in the region by increasing the recruitment of individuals born into the population, although estimating the full effect of supplementary food for the population would require further analyses.

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16:45 - 17:00

**Oral 5-5 Expanding protected area coverage for migratory birds could improve long-term population trends**

Jennifer Border[1], James Pearce-Higgins[1], Chris Hewson[1], Christine Howard[2], Philip Stephens[2], Stephen Willis[2], Richard Fuller[3], Jeffrey Hanson[4], Henk Sierdsema[5], Ruud Foppen[6], Lluís Brotons[7,8], Gabriel Gargallo[7,8], Daniel Fink[9], Stephen Baillie[1]

[1]British Trust for Ornithology, Thetford, United Kingdom. [2]Durham University, Durham, United Kingdom. [3]university of queensland, Brisbane, Australia. [4]Carleton University, Ottawa, Canada. [5]Sovon, Nijmegen, Netherlands. [6]Radboud University, Nijmegen, Netherlands. [7]Catalan Ornithological Institute, Barcelona, Spain. [8]European Bird Census Council, Prague, Czech Republic. [9]Cornella, New York, USA

**Abstract**

Populations of many migratory taxa have been declining over recent decades. Although protected areas are a cornerstone for conservation, their role in protecting migratory species can be incomplete due to these species dynamic distributions. Here, we use a pan-European citizen science bird occurrence dataset (EurobirdPortal) with Spatiotemporal Exploratory Modelling to assess how the weekly distributions of 30 passerine and near passerine

species' overlap with protected areas in Europe and compare this to range adjusted policy protection targets. Thirteen of our 30 species were inadequately covered by protected areas for some, or all, of the European part of their annual cycle under our target based on the 2020 Convention on Biodiversity framework and none were adequately covered under our target based on the 2030 Convention on Biodiversity framework. Species associated with farmland had the lowest percentage of their weekly distribution protected. The percentage of a species' distribution within protected areas was positively correlated with its long-term population trend, even after accounting for confounding factors, suggesting a positive influence of protected areas on long-term trends. This emphasises the positive contribution that an informed expansion of the European protected area system could play for the future conservation of migratory land birds.

# Poster session 1 (odd IDs)

17:00 - 19:00 Tuesday, 19th August, 2025

PJ/Powis

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**PP-1 Parenting in the city: differences in incubation behaviour between ground-breeding and rooftop-breeding Herring Gulls**

Jolien Van Malderen ORCID iD[1,2,3], Luc Lens ORCID iD[1], Wendt Müller ORCID iD[2], Frederick Verbruggen ORCID iD[1], Eric Stienen ORCID iD[3]

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**Abstract**

Incubation is a critical phase in avian reproduction, ensuring optimal embryo development by maintaining stable egg temperatures. Off-bouts – periods when eggs are left unattended – can expose embryos to extreme temperatures. Prolonged cooling can halt embryo development, while excessive heat can be lethal. Driven by habitat loss and predation pressure, Herring Gulls (*Larus argentatus*) have increasingly shifted from ground-nesting in coastal colonies to nesting on urban rooftops. Urban environments, characterised by the heat island effect and heat-absorbing surfaces, may elevate the risk of egg overheating, potentially influencing incubation behaviour and fitness. Yet the effects of incubation in this novel thermal environment remain largely unstudied. In this study, we used temperature loggers placed inside nests to investigate whether rooftop-breeding individuals adapt their incubation behaviour in response to the increased risk of egg overheating compared to ground-nesting individuals. We examined off-bout frequency and duration and assessed the impact on egg temperature variation, hatching success and chick size at hatching. Our results indicate that rooftop-breeding gulls have a lower number of off-bouts, reducing the time that the eggs are left unattended, likely to reduce the risk of egg overheating. This behavioural adaptation shortens the incubation duration, but we found no effects on hatching success or chick size at hatching. These findings suggest that rooftop-breeding individuals invest more time in incubation on a daily basis to achieve similar reproductive outcomes as ground-breeding individuals, potentially increasing the cost of parental care in urban environments.

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**PP-3 Heavy Construction vs Light Recreation: Impacts of Disturbance Types on the Abundance of Roosting Waders in Bangor Harbour, North Wales.**

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**Abstract**

Coastal developments such as flood defences are altering coastlines around the UK at an increasing rate due to rising sea levels. However, our understanding of how these developments influence the abundance of waders roosting in coastal areas remains poor. In Bangor harbour, North Wales, we quantified the abundance of roosting waders and disturbance events across four non-breeding seasons, representing 692 diurnal high tides that spanned the construction period of two major developments. We quantified disturbance from humans walking on favoured roost sites and the construction of a flood defence scheme and sewage storage facility adjacent to the same sites. During the construction period (the third and fourth seasons of the study), recreational disturbance on roost sites was reduced as the construction site restricted public access to the harbour. Waders appeared to habituate to the sight and sound of regular construction work within the harbour. However, recreational disturbances (e.g., anglers) occurring every 5.2 days were found to suppress the abundance of Oystercatcher *Haematopus ostralegus* within the harbour by 94%. A significant lag period was also observed, with the abundance of waders suppressed for several days following each isolated disturbance event. We conclude that, paradoxically, construction of coastal infrastructure can mitigate the effects of human disturbance by reducing recreational usage of coastal habitats. This study provides novel insight into the dramatic increase in wader abundance that can be

observed when recreational disturbance is removed. This highlights the pressing need for meaningful protection of favoured roost sites from human recreation.

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**PP-5 Nest-Building in a Changing Environment: The Role of Age and Plastic Availability in Eurasian Magpies**

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**Abstract**

Many bird species incorporate anthropogenic materials (ANMs) into their nests. From an ecological perspective, several hypotheses have been proposed to explain the use of anthropogenic materials in avian nests. The 'availability hypothesis' suggests that birds use the most commonly available materials in their nesting environment to construct their nests. In contrast, the 'age hypothesis' proposes that the use of ANMs in breeding attempts increases with the age of the nest builder. Here, we examine the occurrence of anthropogenic nest materials in 2024 and test whether these two hypotheses explain the use of ANMs in a population of Eurasian magpies (*Pica pica*), which has been monitored for 17 years in an agroecosystem with diverse land uses and crop types. Our results show that magpies incorporate anthropogenic materials exclusively into the nest lining. Notably, black plastic strings were present in 97.6% of the linings. When considering the age of the breeding individuals (first-time breeders vs. adults), we found significant differences in plastic selection. Pairs composed of two adults show a significant increase in the percentage of plastic in the lining as plastic availability in the surroundings rises. In contrast, mixed-age pairs, consisting of one adult and one first-time breeder, maintain or even slightly decrease the proportion of plastic used, despite the increase in plastic availability. These findings suggest that experience and age-related behavioral differences influence the selection of nest materials in magpies.

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**PP-7 UrBio: Engaging Citizens in Monitoring Urban Biodiversity**

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**Abstract**

Urban biodiversity plays a crucial role in sustaining ecosystem functions, supporting environmental health, and enhancing human well-being within cityscapes. As urbanization progresses, various species, such as birds and mammals, adapt to urban habitats, forming unique synanthropic communities. However, rapid urban development leads to environmental transformations that drive the decline of some species while favouring the proliferation of others, often perceived as problematic. Updating population estimates and identifying the ecological and anthropogenic factors behind species success or decline is crucial, as these dynamics remain poorly understood. Large-scale biodiversity monitoring is key to addressing these challenges, yet traditional surveys have limited temporal and spatial coverage.The UrBio project, funded by the NextGeneration EU programs (NBFC and MUSA), leverages citizen science to assess urban bird diversity across Italy. Since its launch, 1,101 contributors—including naturalists and birdwatchers—have recorded 272,675 observations from 1,102 cities, documenting 390 taxonomic units (species/subspecies) via Ornitho.it and the Naturalist app. These data enable analysis of urban biodiversity patterns at an outstanding scale, linking presence data with environmental variables, from the local level to multi-city analyses, each representing a unique urban context. By analyzing large-scale data, this study aims to identify key drivers of urban bird populations in Italy. The findings will uncover patterns guiding targeted conservation efforts and informing urban planning strategies. This collaborative effort bridges the gap between academia and the public, fostering environmental awareness and contributing to the sustainable management of urban ecosystems, demonstrating the power of citizen science in advancing ecological research.

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### PP-9 Gaze strategy in free diving Humboldt penguins (*Spheniscus humboldti*)

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**Abstract**

When navigating through complex environments animals must quickly acquire specific set of information to reconstruct a three-dimensional view of their surroundings and execute necessary maneuvers. Fast-moving animals acquire such information from optic flow on the retina during self-motion. Translational optic flow allows to estimate relative distances between objects and direction of movement. However, rotational optic flow hinders this estimation during head or body turns. To counteract this, animals evolved gaze stabilization strategies. In flight bird use rapid head saccades to stabilize translational optic flow, but whether such behaviour exists underwater is unknown. In this study we investigated gaze stabilization strategy in free-diving Humboldt penguins (*Spheniscus humboldti*) during U-shaped turns in an outdoor pool. We used seven synchronized and calibrated underwater cameras to capture penguins from different angles at 240 fps for 3D videography. We tracked the base and the tip of the beak to reconstruct head movement in 3D space. We show, for the first time, that rapid head saccades are used by birds in underwater gaze stabilization, as observed in flying birds, but with lower angular velocity. Furthermore, turn radius and diving speed affected number of saccades in a turn, whereas only diving speed affected angular velocity of saccades. These findings suggest that Humboldt penguins adapt their visual-motor strategies to ensure stable vision underwater.

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### PP-13 Larger woodlands with more native trees and less conifer plantation support greater populations of a marsh tits *Poecile palustris*, a declining forest specialist

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**Abstract**

Forest specialist birds are in widespread decline in Europe. In Britain, Marsh Tits are an indicator species of mature native woodlands, but have suffered 80% population declines since the 1960s. We assessed whether habitat degradation during the 20th Century, through woodland fragmentation and conversion of native broadleaved woodland to conifer plantations, could have impacted Marsh Tit populations. We surveyed the number of occupied Marsh Tit territories in 74 woodland patches of 1–296 ha in England, comprising purely native broadleaved woodland or with varying coverages of conifer plantations (0–89%). We show that the number of Marsh Tit territories increases with woodland patch size, but coniferized woods hold far fewer Marsh Tit territories than deciduous woods. The density of Marsh Tit territories also decreases with an increasing proportion of conifer plantation in a wood. This implies that historical conversion of native broadleaved woodland to conifer plantation may have had a significant impact on Marsh Tit abundance. However, we also show that many of the larger coniferized woodlands tend to be in state ownership, meaning that conservation action to significantly improve habitat for woodland birds (like Marsh Tits) may be more straightforward and achievable than if they were in multiple private ownership.

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### PP-15 Development and Validation of Microplastic Extraction from Feces of the White-Throated Dipper (*Cinclus cinclus*)

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**Abstract**

Plastic pollution is a major environmental concern today, due to the large quantities of plastic that have been and are still being released into the environment as a result of poor waste management. This phenomenon is further exacerbated by the fragmentation of plastic debris into microplastics (MP) and nanoplastics (NP), which are then ingested or inhaled by most living organisms. To better understand the consequences of plastics exposure and ingestion by wildlife, there is an urgent need to develop protocols for reliably extracting and quantifying PM in biological matrices. In this study, we present a method for extracting MPs from the feces of the White-throated Dipper (*Cinclus cinclus*), a sentinel bird species for river ecosystems. The development of the method required extensive testing to overcome the challenges of separating MPs from complex biological matrices. The final protocol involved two cycles of Fenton reaction followed by density separation with sodium bromide. MP recovery rates during the different separation steps were validated using MP-doped feces, in which rare metal elements, quantifiable by mass spectrometry, were inserted into the MPs (i.e. polyethylene terephthalate: PET and polypropylene: PP; 63-125 µm). Our trial-and-error and validation work has highlighted the key factors for maximizing PM extraction from complex matrices, and we hope this knowledge will provide a foundation for standardized and reliable MPs extraction techniques in bird feces.

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### PP-17 Advancing cooperative breeding research with an integrative, peer-reviewed and updatable Cooperative-Breeding Database (Co-BreeD)

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**Abstract**

The study of cooperative breeding increasingly relies on comparative meta-analyses, yet concerns about data accuracy persist. We introduce the Cooperative-Breeding Database (Co-BreeD, N >450 samples, >293 bird and mammal species), which is designed to address these concerns through: (i) a sample-based approach linking biological data to specific locations and periods, (ii) a peer-reviewed data entry protocol, and (iii) continuous updates for accuracy. This database enables more precise, intra- and inter-species comparative analyses of cooperative breeding. We illustrate Co-BreeD's potential by presenting key biological results, with a special emphasis on sociality in birds. To expand the dataset, we invite attendees to contribute field data on parental care and in return offer co-authorship on Co-BreeD's next methodological paper.

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### PP-19 Combining Stable Isotopes (²H, ³⁴S) in Feathers with Geolocator tracking to Reveal Moult Migration Strategies in the Common Starling (*Sturnus vulgaris*)

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**Abstract**

Moult is an energetically costly but essential event in the annual cycle of birds that can coincide with migration. Moult strategies show intraspecific variation, but the factors driving this variation and its consequences are poorly understood due to the lack of methods for tracking many individuals throughout the annual cycle. We investigated the use of stable isotopes (²H, ³⁴S) in feathers to reveal the presence or absence of moult migration of Common Starlings (*Sturnus vulgaris*), cross-validating our results with geolocator tracking. Feather samples from adult birds breeding in Latvia (moulting on-site or exhibiting moult migration) and Germany (moulting on-site) were analysed for isotope levels (n = 368), while a portion of individuals from Latvia were tracked by multi-sensor geolocators (n = 28). Tracked individuals that conformed to moult migration spread between southern Baltics and northern Germany in summer where they moulted. Overall, our results showed different isotopic signatures of ²H and ³⁴S for Latvian (moulting on-site) and German populations, supporting spatial variation in moult locations. However, isotope values for a group of Latvian geolocator-tracked birds that exhibited moult migration closely resembled those from birds known to moult in Germany. This separation enabled us to assign a migration strategy for a portion of Latvian starlings that could not be tracked by other means. These findings demonstrate the potential of combined isotopic and tracking approaches to study individual movement patterns in birds. Notably, our study contributes to the emerging use of ³⁴S as a novel tool in avian migration research.

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### PP-21 Nocturnal roosting behaviour of Common Starlings *(Sturnus vulgaris)* during the breeding season

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**Abstract**

Roosting site selection during the breeding season is a critical part of avian reproductive strategies that can affect predation risk and reproductive success. While females are foremost responsible for incubation and care of nestlings in most species, males may adopt different nocturnal roosting strategies, potentially reflecting trade-offs between parental investment and survival. Investigating these behavioural patterns can provide key insights into the dynamics of parental roles and species-specific breeding strategies. In this study, we used GPS and multi-sensor geolocator tracking to examine the nocturnal roosting behaviour of breeding Common Starlings *Sturnus vulgaris* at three nest box sites in Latvia. Pressure recordings from geolocators indicated that males consistently roost outside the nest box throughout the breeding season, while females remain in the nest only during incubation and early chick-rearing period. GPS tracking data revealed that nocturnal roosting sites were found in reedbeds as far as 10 km from the breeding site with individuals commuting daily. Individuals from the same breeding colony roosted together and mixed with birds from other nearby breeding sites. These findings contribute to a broader understanding of avian breeding ecology and parental behaviour.

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**PP-23 To cross or not to cross… the Gulf of Lion: bird migration characteristics monitored by radar at the coast.**

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**Abstract**

In Autumn, millions of birds migrating south along the Rhone valley reach the Mediterranean Sea at the Gulf of Lion. They can decide either to continue their journey straight South, thus crossing the western Mediterranean basin, or to deviate their flight direction and follow the coastline towards the Iberic peninsula. We monitored over three years the migration intensity and flight direction of migratory birds at nine costal locations around the Gulf of Lion using two BirdScan MR1 (ornithological) radars. While one radar remained in The Camargue for the entire study period, the other was moved weekly from one site to the next during the first two years and then installed close to Agde for the third year. Migration intensity was surprisingly low in la Camargue, but most birds passing over the radar flew towards the open sea. Highest migration intensities were registered west of the Camargue. There, flight direction either strongly aligned with the coast or indicated short-distance overflight of the Gulf of Lion, but few birds were heading towards the open sea. Combined with recorded flight height, flight direction over sites brings new insights into postnuptial migration strategies in western Mediterranean. These results were integrated in the MigraLion project, aiming to map bird movements at the Gulf of Lion in the prospects of offshore windfarms development.

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**PP-25 Explaining the Migratory Behaviour of Pied Flycatchers (Ficedula Hypoleuca)**

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**Abstract**

Every year, billions of birds undertake long-distance migrations across continents and oceans in search of seasonal resources. However, this global phenomenon is under threat. Climate, land-use change, and overexploitation are all recognised as driving large-scale declines in migratory birds. Identifying the causes of these declines is particularly challenging, as migratory birds rely on multiple locations throughout their annual cycle, making the assessment of key threats across breeding, wintering, and stopover sites a complex but critical task. Advancements in geolocation tracking now provide individual movement data of long-distance songbird migrants, enabling the validation of the Spatially Explicit Adaptive Migration Model (SAMM)—a novel mechanistic individual-based modelling framework. By integrating environmental variables, species-specific energetics, and flight range predictions, we develop SAMM to simulate the migratory behaviour of European Pied Flycatchers (Ficedula hypoleuca), a well-studied yet vulnerable long-distance migrant. Through alignment with observed tracking data, the SAMM identifies the key environmental factors and individual state variables shaping migration decisions. Here we show how migration route, timing and stopover behaviour can be predicted to identify fluctuations in energy dynamics due to the energetic costs of migration, resource availability, and physiological responses to the environment such as thermoregulation. This novel approach enhances our ability to predict individuals' future migratory responses under changing climatic conditions and the drivers of population declines. Explaining and predicting migratory behaviour of a long-distance migrant, such as highly valuable stopover locations, will provide critical insights into future conservation strategies.

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### PP-27 Heat dissipation capacity modulates Mediterranean songbirds' activity during heat waves but not their body temperature

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**Abstract**

Heat dissipation limit theory (HDL) suggests that animals with higher capacity to dissipate metabolic heat can allocate more energy to other activities, such as foraging. This limitation could be especially important in animals inhabiting challenging environments such as the Mediterranean basin, where extreme heat events are becoming increasingly frequent. Here, we experimentally increased heat dissipation capacity in two species of Mediterranean songbirds - the house sparrow (*Passer domesticus*) and the great tit (*Parus major*) - by trimming their ventral feathers during the summer of 2023, a period marked by extreme high temperatures (>40ºC). We recorded their body temperature and the number of visits to a feeder using implanted temperature-sensitive passive integrated transponder (PIT) tags and RFID readers. Our results revealed species-specific responses to the treatment. Body temperature did not differ between trimmed and control individuals although trends varied by species. Regarding the foraging activity, trimmed great tits showed higher activity than controls, including during extreme high temperatures (>40ºC), while trimmed house sparrow consistently showed reduced activity compared to controls. Our results suggest that songbirds modulate their activity depending on their heat dissipation capacity, but this modulation is species-specific. This is the first experimental evidence in wild Mediterranean songbirds of how increased heat dissipation capacity may influence foraging activity under extreme thermal stress.

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### PP-29 Justifying Conservation: Defining site-specific conservation objectives for birds in Croatia

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**Abstract**

The EU Birds Directive is a fundamental pillar of nature conservation in the EU. In order to maintain or restore populations and habitats of threatened and other migratory bird species, EU member states are required to designate Special Protection Areas (SPAs) as an integral part of the Natura 2000 network. At these sites we must set clear, specific, measurable, reportable, realistic and comprehensive coservation objectives which correspond to the ecological requirements of bird species of EU Community interest. In doing so, we must justify these objectives to all relevant sectors that they affect. Croatia set out to define such conservation objectives for each of 122 naturally occuring bird species of Community interest across its 38 SPAs. For each species on each site we first defined whether the goal was to maintain its current state or to restore a more favorable conservation state according to reported population trends. We then set target population numbers and the amount of suitable habitats required to reach or maintanin these populations. Where possible we also defined further attributes regarding habitat quality and other ecological requirements for each species. The process of defining site-specific conservation objectives highlights the importance for legislators and decision-makers to have access to clear and quantifyable ecological studies of habitat preference and use, conservation pressures and threats, as well as of the efficacy of conservation measures for bird populations.

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### PP-31 Adapting under heat: exploring the effects of heatwaves on seabird foraging ecology and breeding success

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**Abstract**

In a human-driven climate change, global temperatures are on the rise, triggering rapid transformation in habitats and posing significant challenges to the resilience of biodiversity. Extreme climatic events, particularly heatwaves, have been associated with alarming impacts on wild populations, with studies highlighting substantial effects in the breeding biology among bird species (i.e. reduced hatching success and chick survival, increased parental effort). Seabirds, sentinel species of marine ecosystems, are particularly susceptible, with their foraging and breeding behaviour intricately linked to oceanic conditions. This work aims to assess how heatwaves can impact seabird populations, with a comparative study using three model species: Cory's shearwaters (*Calonectris borealis*), a pelagic and burrow-nesting species, Audouin's gulls (*Ichthyaetus audouinii*) and little tern (*Sternula albifrons*), two coastal and ground-nesting species. Exploiting a combination of movement-tracking techniques, such as GMS-GPS and accelerometers, behavioural observation and long-term dataset, we will investigate the effect of heatwaves on the breeding period of seabirds. The study is designed as a step-by-step survey of breeding, to have a complete understanding of the processes threatening these species. We will account the carry-over effects of winter heatwaves on nesting, focusing on incubation behaviour, using temperature loggers, and growing of chicks until fledging. Chick provisioning will be assessed both through direct surveys at nests and monitoring of the at-sea foraging behaviour of parents from biologging. A detailed knowledge of the critical points during breeding can help us understand how climate change can impact the population of apex predators like seabirds, and therefore entire ecosystems.

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### PP-33 What shapes avian communities in Indian cities?

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**Abstract**

Despite rapid growth in urban ecology research, tropical urban ecosystems remain understudied. Most studies focus on parks and wetlands and are typically confined to a single large city, while smaller cities and common urban environments, such as street vegetation and built-up areas, receive little attention. To fix this knowledge gap, we surveyed bird communities across 16 medium-sized cities in Karnataka, India, using point counts within a 100m buffer, excluding parks and wetlands to assess birds persisting throughout urban landscapes. We examined three community metrics—species richness, abundance, and Shannon diversity—in relation to environmental factors. The number of motor vehicles had the strongest negative impact on species richness and diversity, likely due to noise and air pollution. In contrast, greenery extent (tree and shrub cover) in 100m buffer around the counting point positively influenced species richness and diversity, emphasizing the role of urban street vegetation in maintaining biodiversity. Additionally, we analysed the relationships of species occurrence (percentage of points occupied) and abundance (number of individuals) to species ecological traits. Generalist species, particularly those with low diet specialization, were more widespread and abundant, indicating that urban environments favour flexible foragers. This pattern aligns with findings from well-studied regions, suggesting that similar processes shape urban bird communities globally. Our results underscore the dual pressures of urbanization—pollution and habitat loss—while reinforcing the conservation value of urban greenery. Expanding green spaces in Indian cities could help sustain avian diversity despite increasing urban pressures.

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### PP-35 Illegal persecution of tagged red kites and other raptor species in Europe based on high-resolution GPS telemetry tracking

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**Abstract**

The LIFE EUROKITE project aims to reduce the anthropogenic causes of mortality of the red kite. To effectively protect European species such as the red kite, a detailed understanding of anthropogenic and non-anthropogenic influences, especially the causes of mortality, is required. Within project, we study the anthropogenic causes of mortality by applying high-resolution GPS telemetry tracking that allows fast and exact locating of dead birds. Information to determine these causes is however complex, which calls for a standardized approach. We introduce the LIFE EUROKITE Assessment Protocol (LEAP), a framework for determining timing, locations and causes of mortality in GPS-tagged birds. Between 2013 and 2025, 3,557 raptor individuals of 7 species (3,165 red kites, 101 white-tailed eagles, 97 black kites, 79 imperial eagles, 50 honey buzzards, 43 botted eagles and 22 ospreys) were tagged with solar-powered GPS satellite tags in 19 countries across Europe with the help of many project partners and cooperation partners. From this a total of 1,795 individuals (1,680 red kites, 37 black kites, 31 white-tailed eagles, 29 imperial eagles, 18 honey buzzards) were tagged within the LIFE EUROKITE project. The first results of the LIFE EUROKITE project show, that illegal persecution of tagged birds (shooting, poisoning, trapping) is one of the biggest threats for those species. So far, 296 tagged birds have died due to illegal activities.

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**PP-37 Using Ebba2 data to predict the future abundance distributions of Europe's breeding birds**

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**Abstract**

Global change poses a significant threat to global biodiversity. Numerous studies have investigated the impacts of global change on biodiversity, but most rely on presence/absence data, confining their conclusions to only one simplified aspect of biodiversity. Incorporating species abundance data provides a more detailed understanding, as it accounts for biotic factors. We used species abundance data from the second European Breeding Bird Atlas (EBBA2) to evaluate the projected impacts of global change on the breeding bird populations across Europe. The abundance data was modelled using a Poisson distribution within a Bayesian framework. Our results are assumed to give realistic predictions on abundance per grid cell in 2050, thus indicating future abundance hotspots for common European breeding bird species. The results show varying patterns of change across species: some are predicted to decrease in abundance, while others are expected to increase. Similarly, range shifts show no consistent directional pattern, with some species moving southward and others northward, with an average shift of approximately 0.5 km per year. Our findings would facilitate complementing the protected sites network to optimize the Europe-wide protection of common breeding birds. Additionally, our findings emphasize the need for

targeted conservation efforts, such as prioritization strategies, to enhance the resilience of bird populations to future global changes.

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**PP-39 Unravelling nest exclosures utility to manage a Kentish plover (*Anarhynchus alexandrinus*) imperiled population: lessons from ten years of monitoring**

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**Abstract**

Due to their conservation status, many wildlife species undergo intensive management to enhance their survival probabilities. In ground-nesting birds, nest predation is the primary driver of nest failure. Concerns over nest predation have prompted the implementation of various management strategies, including predator removal and physical exclusion of predators from nests and breeding sites. Although studies evaluating the effectiveness of nest exclosures across different ground-nesting species have yielded mixed results, the majority report a significant increase in nest success rates. Despite these findings, concerns persist about the overall efficacy of nest cages as a tool for enhancing population growth rates. During 2015-2024 we monitored 981 Kentish plover nests at NW Iberian breeding beaches with varying treatments. We examined the effectiveness of 3 types of nest management: predator-exclusion cage (1,2 m high and 2–3 m in diameter, constructed of 50 x 100 mm welded wire and covered with flexible bird netting) (n=545); human-exclusion fencing (psychological fencing, twine with informative sign) (n=156); and unexclosed nests (n=280). Mean nest survival was markedly higher for predator-exclosed nests than for human-exclosed and unexclosed nests. Egg hatching success decreased with the level of nest protection (unexclosed=0.98 ± 0.01; human-exclosed=0.96 ± 0.02; predator exclosed=0.95 ± 0.01) and survival to fledging was higher for chicks hatched from human-exclosed nests (0.54 ± 0.08) than for unexclosed (0.45 ± 0.06) and predator-exclosed nests (0.36 ± 0.02). We analyse the influence of biotic and abiotic factors on nest fate under the 3 treatments and evaluated the suitability of exclosures for population maintenance.

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**PP-41 The migration of the Eurasian Woodcock (*Scolopax rusticola* L.) in the Carpathian Basin at the turn of the 19–20th centuries**

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**Abstract**

There are few data sets in bird migration research that go back more than a century. The Carpathian Basin is one of the exceptions, where spring return data for migratory birds were intensively collected and published between 1894 and 1926. One of the most numerous records was that of the Eurasian Woodcock (*Scolopax rusticola*) (n = 7344), which provided an opportunity to study the timing of migration of the species and the influence of different environmental and geographical factors on migration. We used a generalized additive model (GAM) to explore migratory patterns by using environmental and geographical variables. In years when the weather was colder and snowier, the birds migrated weeks later than in years with milder weather. This may be due to the availability of earthworms, which are the most important food for the species. In areas at lower altitudes, migration occurred earlier than in mountainous areas, which may also be due to the different weather. Furthermore, a two-week difference was observed between the south-western and north-eastern parts of the Carpathian Basin. This difference is still present nowadays, but the timing of migration has shifted earlier than in the past, probably due to climate change. It would also be important to compare the historical data with recent data to gain a better understanding of the effects of climate change on the migration of the Eurasian Woodcock.

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**PP-43 Spatiotemporal Dynamics, Evolutionary History and Zoonotic Potential of Moroccan H9N2 Avian Influenza Viruses from 2016 to 2021**[v]

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**Abstract**

The H9N2 virus continues to spread in wild birds and poultry worldwide. At the beginning of 2016, the H9N2 Avian influenza virus (AIV) was detected in Morocco for the first time; despite the implementation of vaccination strategies to control the disease, the virus has become endemic in poultry in the country. The present study was carried out to investigate the origins, zoonotic potential, as well as the impact of vaccination on the molecular evolution of Moroccan H9N2 viruses. Twenty-eight (28) H9N2 viruses collected from 2016 to 2021 in Moroccan poultry flocks were isolated and their whole genomes sequenced. Phylogenetic and evolutionary analyses showed that Moroccan H9N2 viruses belong to the G1-like lineage and are closely related to viruses isolated in Africa and the Middle East. A high similarity among all the 2016-2017 hemagglutinin sequences was observed, while the viruses identified in 2018-2019 and 2020-2021 were separated from their 2016-2017 ancestors by long branches. Mutations in the HA protein associated with antigenic drift and increased zoonotic potential were also found. The Bayesian phylogeographic analyses revealed the Middle East as being the region where the Moroccan H9N2 virus may have originated, before spreading to the other African countries. Our study is the first comprehensive analysis of the evolutionary history of the H9N2 viruses in the country, highlighting their zoonotic potential and pointing out the importance of implementing effective monitoring systems.

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**PP-45 Jetlagged birds lose their way: evidence for phase-shift and sun-compass orientation during rapid longitudinal flights in wild shearwaters**

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**Abstract**

Many birds rely on compass cues to guide foraging and migration over thousands of kilometres. How they are able to account for compass error to maintain a consistent bearing remains an enigmatic question. Compass errors have the potential to shape the global migration routes of birds and these patterns might reveal how animals use compass cues in the wild. In particular, many diurnal birds rely on the time-compensated sun-compass, using their endogenous clock to account for the apparent movement of the sun across the sky. Yet long-distance migratory birds might experience jetlag-like phase shifts when travelling longitudinally (across 'time zones'). This discrepancy between local time and the endogenous clock would induce orientation error when using a time-compensated sun-compass. These deflections, though small, could accumulate and cause migratory birds to end up hundreds of kilometres off course. Despite these predictions and the wealth of animal movement data, evidence for the role of phase shifts and associated sun-compass error in shaping animal movements remains elusive. We use a large GPS tracking dataset from free-ranging Manx shearwaters (*Puffinus puffinus*) breeding in the UK and foraging up to 1000km into the Atlantic to show that shearwaters are subject to phase shifts during their rapid longitudinal homing flights and use the sun-compass to orient throughout homing, including in combination with compass-independent cues along coastlines.

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### PP-47 The importance of uncertainty propagation in population models

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**Abstract**

Predicting future population trajectories is a key challenge for population management, infrastructure planning, and conservation. Matrix population models, which describe the demographic behaviour of a population based on age or stage through discrete time, are one tool that can address this challenge. Uncertainty accumulates at multiple levels in these predictive models and failing to account for all sources leads to a large amount of ignored variability in the model's predicted outcomes. Despite the importance of uncertainty for matrix population models, we have found that complete uncertainty propagation is rarely achieved (31% of papers). But how important is this omission? Our simulation study has demonstrated that even with moderate levels of uncertainty, incomplete propagation introduces bias for predicted population growth rates. We also showed that omitting uncertainty can substantially alter conclusions, particularly for small estimated changes in population size.

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### PP-49 Autumn migration of corncrakes (*Crex crex*) from the Baltic coast to Africa

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**Abstract**

Nine males of corncrake were captured during mating displays at different locations in the Kaliningrad Region of Russia in May – July 2022-2024. All birds were tagged by ICARUS satellite tags (5 g). Two males remained at the tagging site and the remaining birds moved between display locations in June and July. The distance between consecutive display sites varied between 5 and 132 km. Usually the movement between display sites was performed in a single night, but the maximum distance movement took three consecutive nights. Four males were tracked long enough to identify their migratory departures that occurred on 24.09.2022, 23.09.2023, 31.08.2024 and 02.09.2024. The birds moved southwards and alternated nocturnal flights with stopovers. The main movements occurred quickly, 2951 km in 4 nights from Bulgaria to Sudan and 4062 km in 8 nights from Romania to Sudan. The longest daily movement was 862 km. Three birds stopped sending data from the Sahel in Sudan. One corncrake reached its winter quarters in Uganda and Tanzania in late December. The distance from the breeding site to the winter area was 6755 km. Autumn migration can be subdivided into four stages: 1) nocturnal flights of 20 to 500 km with stopovers within Europe; 2) a succession of nocturnal flights across ecological barriers without stopovers from the Black Sea to the optimal habitats south of the Sahara; 3) long stopover in the tropical zone of Africa; 4) intra-African movements by a succession of nocturnal flights to the equatorial wintering area.

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### PP-51 Describing the flight characteristics of free flying Australian birds using a high speed automatic camera trap.

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**Abstract**

Avian flight characteristics are inconsistently and imprecisely described for most species. There is a need for more accessible methods that record data from undisturbed free flying birds and that allow for unattended deployment. This study introduces an inexpensive high speed camera trap that detects birds faster than conventional passive infrared (PIR) based camera traps and then captures high frame-rate video of their passing motion. It captures more observations than conventional camera traps and generates less empty video than continuous recording. The cameras were deployed at locations in Australia where target species are known to reliably occur or have predictable flight behaviour. Depending on access and topography, the cameras were positioned for either a lateral or ventral view. Wing-beat frequency, wing-beat pattern, species, speed, altitude/distance and other

characteristics were extracted from the resulting videos using frame analysis. The results from the camera trap were compared with published radar and video results for species that have previously been characterised. Flight characteristics of some Australian species were quantified for the first time. The camera system offers a new continuous machined based observation method for surveying species and capturing flight observations. It has potential applications beyond avian flight studies, such as species surveys, augmenting acoustic surveys and flight height surveys for wind energy projects.

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**PP-53 Climate in eastern and western Africa sequentially shapes spring passage of long-distance migrants at the Baltic coast in Europe**

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**Abstract**

Migrant passerines have been arriving in Europe ever earlier, in response to earlier springs. But for trans-Saharan migrants we expect the climate at their wintering quarters should influence their spring arrival timing in Europe. We tested that using daily ringing data from mistnetting at the spring stopover site Bukowo (N Poland). From these data we derived an Annual Anomaly (AA) of subsequent stages of the spring passage (23 March–15 May) over 1982–2024 for Blackcap, Lesser Whitethroat, Willow Warbler and Chiffchaff. Using multiple regression, we determined the effects of 14 large-scale climate indices in Africa and Europe, i.e. Indian Ocean Dipole (IOD), Southern Oscillation Index (SOI), North Atlantic Oscillation (NAO), Sahel Precipitation Anomaly (PSAH), Sahel Temperature Anomaly (TSAH), and the Scandinavian Pattern (SCAND), during breeding, autumn, winter and spring, on the timing of subsequent cohorts of these migrants arriving in spring at Bukowo. In Chiffchaff, IOD in Aug–Oct and Nov–Mar influenced mostly late spring migrants, but the whole passage in the other species. SOI in Nov-Mar, which operates in southern Africa, influenced only early cohorts of Willow Warblers arriving at Bukowo. In all species, NAO, PSAH and TSAH influenced various stages of spring passage. These sequential effects of these climate factors on subsequent cohorts of spring migrants suggest that Bukowo hosts a mixture of populations arriving from different regions in Africa. We suggest the phenological shifts in spring passage for species with wide wintering ranges are driven by climatic variation in both Africa and Europe.

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**PP-55 Life in a relationship - five years of tracking the Caspian Gull pair (Interrex-Rings transmitters)**

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**Abstract**

The Caspian Gull *Larus cachinnans* is a socially monogamous species in which male and female make a large investment in parental care. One adult male (Gucio) and his mate (Alice) were both equipped with a GPS/GSM-transmitter (provided by INTERREX-RINGS) in the breeding colony in Southern Poland. The transmitters (23 g) were charged by solar panels and recorded the birds' geographical location during five years. The typical time interval between data collection sites was 10 minutes, but during flight, the intervals were as short as every 20 seconds due to the use of the innovative BOOST function. Every year the birds nested in the same place in the colony. Every year during the breeding season, the birds usually foraged in the same places. The feeding area during breeding period of the male and female only slightly overlapped. Male foraged mainly on a rubbish dump (17 km from the colony). Female foraged mainly on a rubbish dump (24 km from the colony), in carp ponds, along rivers and in agricultural fields (maximum ~30 km from the breeding place). Male wintered close to the breeding colony while female moved further away. Equipping pair of birds with transmitters enables comparison of foraging patterns during the breeding season, synchronisation of behaviour and comparison of wintering sites.

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**PP-57 Influence of temperature and rainfall on the timing of the spring migration of Eurasian Wren Troglodytes troglodytes through the southern Baltic coast**

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**Abstract**

Temperature and rainfall are main climate factors that shape spring phenology of birds in Europe. We examined effects of these factors in four regions in Europe, on the spring migration timing of the medium-distance migrant, Eurasian wren on the southern Baltic coast over 60 years. We modelled their effects on the timing of start, median and end of wren's spring passage at the bird ringing station Hel (N Poland) during 1964-2023. Over 60 years, the start, median and end dates of spring passage at Hel were early after warm autumn, winter or spring, but delayed after increased rainfall in autumn and winter in the central and northern Europe. Analogous climate conditions in the southern and south-western Europe had opposite effects on the timing of passage. High spring rainfall in the central and southern Europe in most cases delayed timing of spring passage. We assume that temperature and rainfall in these regions influence the timing of wren's spring passage through the effect of these climate factors on food availability, individual fitness, migration distance and proportion of juveniles among migrants. We suggest that different effects of climate factors operating in various regions of Europe, on the timing of wren's spring passage are the result of varied humidity and thus different insect abundances for wren's in these regions. Our findings indicate that phenology of wren's spring migration is shaped by a combination of carry-over effects of several environmental factors that affect wrens in regions where they reside at different stages of their life.

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**PP-59 Proforestation and biodiversity: effects of forest management abandonment on tree-related microhabitats and on the bird community.**

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**Abstract**

Proforestation is increasingly recognized as an effective strategy for biodiversity conservation. The abandonment of forest management allows trees to grow and deadwood to accumulate, leading to a more complex forest structure. This increased complexity enhances habitat heterogeneity, which can support a higher biodiversity. In this context, our study aims to test the effect of forest management abandonment on tree-related microhabitats (hereafter TreMs), widely recognized as key indicators for biodiversity, and on the bird community. Furthermore, this study investigates the relationship between the richness and density of TreMs and bird populations, identifying which categories have the greatest impact on their abundance, richness and diversity. We selected three study areas: two located in Alpine forests (one inner-Alpine and one outer-Alpine) and one located in a Mediterranean forest. In each area, we identified three forest stands with different management histories: one actively managed, a second where the latest management intervention was more than 30 years ago, and a third abandoned for at least 60 years. In each stand, we established nine plots where we collected dendrometric and TreMs data. The bird community has been surveyed through 10 minutes point counts, within a 50-meter radius and excluding flyovers. We found a positive effect of proforestation on forest specialist species, as well as a correlation of certain TreMs types on overall bird abundance and diversity. Our findings contribute to understanding the ecological implications of forest management abandonment and its potential role in bird conservation.

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**PP-61 The importance of spring migration monitoring: detecting population changes and phenological shifts in soaring birds at a major flyway bottleneck, the Strait of Gibraltar.**

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**Abstract**

Migratory bottleneck monitoring in the Strait of Gibraltar provides critical insights into global-scale population trends and phenological responses to anthropogenic pressures. While most monitoring efforts have focused on post-nuptial migration, spring migration monitoring offers key advantages: it primarily involves adult birds, reducing demographic noise; occurs over a longer period, minimizing weather-related variability; follows straighter routes once they reach the European continent, avoiding double counting, and serves as a proxy for breeding populations, aligning with census data. Therefore, standardized spring counts effectively track breeding population dynamics across the Western Palearctic flyway, enabling precise demographic assessments. In this context, we conducted intensive counts between February 15 and May 15, following a standardised protocol (De la Cruz et al., 2011). We compared migration rate (number of birds per hour) and the cumulative frequency to respectively assess population and phenological changes during two periods separated by 14 years: Period 1 (2008–2009) and Period 2 (2022–2023). We found a significant population increase in five species (Milvus migrans, Circaetus gallicus, Hieraaetus pennatus, Ciconia ciconia, and Ciconia nigra), while Pernis apivorus and Neophron percnopterus showed no significant changes. Additionally, we observed a general trend towards earlier migration across most species, which was statistically significant, except for Circaetus gallicus. However, interannual variability played a notable role in these patterns. These findings underscore the importance of a standardized spring monitoring scheme in a key migratory hotspot, demonstrating its value as an essential tool for detecting global population and phenological shifts.

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**PP-63 Do movement patterns of avian predators indicate functional heterogeneity in forest ecosystems?**

Ülo Väli ORCID iD[1,2], Josephine Couet ORCID iD[3], Jaan Grosberg[2], Paweł Mirski ORCID iD[1,2]

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**Abstract**

Maintenance of functional heterogeneity of forests, essential for vitality of ecosystems, is a main challenge for sustainable forestry; however, assessment of ecosystem functioning is often complicated. Ecosystems are often efficiently evaluated with reference to bioindicators, such as birds. For instance, avian predators are considered good surrogates for landscape heterogeneity and biodiversity; yet previous inconsistent results indicate the need for a further development of this method. We have started a project aiming to analyse how movement patterns of raptors depend on forest structure and thus indicate functional heterogeneity in forest ecosystems. We address this question in a large forest complex, the Białowieża Forest, consisting of parts with different protection regimes and management histories. To reach the aim, (1) bioindicator values characterising habitat quality (home range size, daily movements, diet and fecundity) in the two model species (a dietary generalist Common Buzzard and a specialist Northern Goshawk) will be estimated; (2) data on structure and heterogeneity of forests with various impact of management will be compiled at microhabitat (stand) and macrohabitat (landscape matrix) level; (3) statistical models explaining relationship between forest heterogeneity parameters and bioindicator values, and thus characterising functional heterogeneity of forests will be developed. In the conference, preliminary results will be presented and briefly discussed.

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**PP-65 Adaptive responses linking tree and bird phenology of forest species**

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**Abstract**

Phenological changes are widespread responses to climate change. In birds, the advancement of breeding timing in specialist forest species such as great and blue tits is a well-documented strategy to synchronise egg hatching with shifts in the peak availability of caterpillars. If this response is adaptive and vegetation dynamics are a reliable predictor of resource availability, we would expect stronger selection for earlier breeding timing in habitats with narrower breeding seasons and more pronounced shifts in vegetation green-up, typically in deciduous forests and at higher latitudes. However, while growing evidence suggests that bird phenology is lagging behind optimal food peaks, it remains unclear whether intra-specific variation in phenological mismatch is driven by environmental cues at both global and local scales, such as seasonality or forest type. Here we use long-term breeding data at the individual level from multiple populations of great and blue tits within the SPI-Birds Network and Database as a model system to explore the applicability of global land cover dynamics in estimating shifts in the green-up peak

of forest areas over time, linked to trends in laying dates. By examining the correlation between yearly peaks in vegetation green-up and optimal breeding timing –defined as the laying date that maximises fitness estimated by fitness curves– across Europe, we aim to present a case study that elucidates the role of tree phenology in shaping species' responses to climate change across their geographic range, providing insights into broader patterns of phenological adaptation.

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**PP-67 Telomere dynamics in relation to sexual selection, longevity and fitness: a case study on a small migratory passerine**

Andrea Novelli ORCID iD, Manuela Caprioli, Roberto Ambrosini ORCID iD, Alessandra Costanzo ORCID iD, Diego Rubolini ORCID iD, Marco Parolini ORCID iD, Andrea Romano ORCID iD

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**Abstract**

Understanding molecular mechanisms underlying interindividual differences in lifespan, lifetime fitness, and sexual traits, is crucial to understand life-history evolution. Although telomere length (TL) and its attrition rate (ΔTL) have been suggested to be potential biomarkers of somatic state and maintenance, most studies in the wild have focused on short-term links between telomeres, survival, and fitness, while their long-term implications and role in sexual selection remain little explored. Here, we aimed to investigate TL and ΔTL in nestling and adult barn swallows (*Hirundo rustica*) to assess: 1) environmental and parental factors influencing early-life TL; 2) annual and long-term survival as well as seasonal and lifetime reproductive success in relation to nestling and adult TL and ΔTL; 3) the association between TL and the expression of a sexually selected trait (i.e. the length of the outermost tail feathers). Nestling TL decreased with brood size and paternal age, indicating potential effects of developmental conditions and paternal ageing. Furthermore, longer early-life TL predicted higher long-term survival, supporting the possibility of natural selection on TL in early life. In adults, TL longitudinally declined with age, but neither TL nor ΔTL predicted annual survival and fitness. Similarly, TL at one year was unrelated to lifespan or lifetime fitness (i.e. total number of fledglings). However, in females, shorter TL was associated with longer tails, suggesting a sex-dependent reproductive cost on telomeres. Our results indicate that TL may predict survival early in life but not in adulthood, where it may instead reflect trade-offs between reproduction and physiological maintenance

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**PP-69 Accuracy of Acoustic Individual Identification in Birds**

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**Abstract**

Acoustic individual identification represents a non-invasive method for monitoring wildlife. The accuracy of acoustic individual identification in birds is influenced by multiple steps in the process. By conducting a search in Web of Science and SCOPUS using the keywords ("acoustic" & "bird" & "individ*"), a total of 133 articles encompassed 600 studies across 114 bird species on acoustic individual identification were collected. Our study analyzed various factors affecting the accuracy of acoustic individual identification and aims to provide reference for the application of this technique. The main findings are as follows. 1) The mean accuracy of identifying individual birds was 79.0% ± 19.0%, ranging from 3.3% to 100%. 2) Studies validating identification accuracy using training set data achieved significantly higher accuracy (82.8% ± 18.0%) than those using a separate validation set (76.4% ± 19.3%; t-test, $P < 0.001$). 3) No significant difference in accuracy was found between studies using active recording and those using passive recording devices (t-test, $P = 0.387$). 4) The linear discriminant function was the most widely used, accounting for 69.2% of studies. More complex algorithms did not significantly improve accuracy compared to DFA (t-test, $P = 0.160$). 5) No correlation was found between the ratio of vocalization units per individual and identification accuracy (linear regression, $P = 0.968$). 6) The longer the time span of recordings used to construct the classification algorithm, the higher the accuracy of individual identification obtained (linear regression, $P < 0.001$).

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**PP-71 Variability and consequences of maternal effects in urban and rural blue tits and great tits**

Josefa Bleu ORCID iD[1], Anouk Martin[2], Anouk Pellerin[2], Mathieu Leroux-Coyau ORCID iD[2], Clotilde Biard ORCID iD[2]

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**Abstract**

Human induced rapid environmental changes represent a challenge for wildlife. One possible mechanism for rapid adaptation is phenotypic plasticity, a large part of which depends on maternal effects. In birds, maternal prenatal investment, particularly in eggs, is critical for the development and success of young, and may therefore play an important role in the response to environmental changes. In cities, birds are exposed to multiple challenges, such as chemical, noise and light pollution, nutritional restrictions… Our aim is to investigate whether maternal effects differ between urban and rural populations, and whether they are related to differences in reproductive success within each habitat, using bird model species of urban ecology: blue tits (*Cyanistes caeruleus*) and great tits (*Parus major*). We focused in particular on the lysozyme content of albumen. Egg lysozyme is an important maternal component of innate immunity and is known to protect embryonic development from microbial infection and to influence offspring survival. We collected eggs from nests located in both urban and forest sites over 14 years (2010-2024, 2020 excluded). Lysozyme concentrations were measured in more than 800 blue tit eggs and 1000 great tit eggs. We expect a positive correlation with reproductive success, which could be affected by urbanisation. Indeed, given the potential stressors in urban areas we hypothesize that the immune function may be altered in urban populations compared to their forest counterparts. Our study will provide insights into the adaptive mechanisms of birds to urbanisation and contribute to our broader understanding of wildlife immunity.

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**PP-73 Phylogenetic and ecological factors shaping feather and preen gland bacteriomes and their functional properties**

Maureen Baars ORCID iD[1], Veronika Gvoždíková Javůrková[1,2], Maurine W. Dietz[1], Joana Falcao Salles[1], B. Irene Tieleman[1]

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**Abstract**

Diverse bacterial communities found in the preen gland and on the feathers of several bird species are hypothesized to synthesize volatile organic compounds and antimicrobial compounds, potentially contributing to host olfactory communication and antimicrobial defence. To date, little is known about host phylogenetic and ecological factors that influence feather and preen gland bacteriome composition and their functional properties, including the production of volatile organic compounds in preen oil. Given the functional roles of the bacteriomes, we expected that preen gland and feather bacteriomes are shaped by their host traits, such as habitat type and social system. We aimed to determine the composition of feather and preen gland bacteriomes, in relation to host phylogeny and differences in sociality and habitat humidity. To this end, we sampled feathers and preen oil from 530 individuals of 40 temperate bird species varying in degrees of sociality and habitat humidity conditions. We found that preen oil and feather bacteriome diversity and composition significantly vary among bird species, where preen oil bacteriomes show a phylogenetic signal. Host sociality and habitat humidity affected feather bacteriomes, but not preen oil bacteriomes.

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### PP-75 Seasonal and individual variation in Borrelia garinii infections in a population of Great Tits

Jens Zarka ORCID iD[1], Dieter Heylen ORCID iD[1], Manoj Fonville[2], Hein Sprong ORCID iD[2], Erik Matthysen ORCID iD[1]

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**Abstract**

Like other wild animals, small songbirds can play an important role as reservoir of zoonotic infections, including vector-borne pathogens. Notably, songbirds are the main reservoir for *Borrelia garinii*, the bacteria that causes some of the most severe forms of Lyme disease in humans. Here we report on an extensive three-year study examining infectiousness of wild-caught Great Tits with *B. garinii* through xenodiagnosis. Xenodiagnosis implies that pathogen-free vectors (here larval ticks) are allowed to feed on a bird, after which they are screened for bird to tick transmission of the pathogen. Results show high but varying degrees of infectiousness (i.e. capacity of the host to infect vectors) in two of three breeding seasons (20 to 50% of all birds tested) but low to very low (10% or less) in other seasons including summer, autumn and winter. Data from repeatedly tested birds do not support the existence of prolonged systemic infections lasting more than a few weeks or months. Infection rates were consistently higher in one of three studied woodlots for reasons not yet identified. We will present outcomes of an ongoing analysis on individual variation in infectiousness whereby we will focus on two breeding seasons with high infection rates. We will investigate whether infectiousness can be explained by individual characteristics (e.g. age, sex, body condition, natural tick infestations), brood and environmental characteristics, and tick abundance at territory level.

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### PP-77 Passive acoustic monitoring of urban bird activity in Hamburg, Germany

Veronika Samotskaya ORCID iD[1,2], Grigory Evtukh[1,2], Nicholas Friedman ORCID iD[2]

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**Abstract**

Bioacoustic methods for species detection and ecosystem monitoring have advanced significantly in the twenty-first century. Miniaturized recording devices and improved data storage have made acoustic monitoring a key tool in biodiversity research, aiding in tracking habitat loss, pollution, species introductions, and climate change. Software developments now enable large-scale acoustic data processing, including soundscape indices and automated species identification. Although acoustic monitoring is widely used across various environments, urban areas remain underrepresented in bioacoustic research. We investigated how urbanization affects birds distributed around Hamburg by establishing a network of passive acoustic monitoring stations in urban green spaces. A pilot study in 2023 provided baseline data, followed by full-scale monitoring in 2024 at nine sites. We collaborated with local nature reserves and former landfill sites, ensuring diverse habitat representation. To complement the acoustic data, we conducted point count surveys to compare estimates of species diversity, abundance, and density. Species identification was performed using BirdNET, a convolutional neural network-based classifier that detects bird vocalizations in 3-second segments. In our presentation, we describe which bird species were detected using BirdNET and compare these results to point count surveys. We also examine diversity patterns across sites in an urban setting.

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### PP-79 Dynamics of a Raptor Community under Intraguild Predation

Kai-Philipp Gladow ORCID iD[1], Nayden Chakarov ORCID iD[1], Jonas Beck[2], Patrick B. Langthaler[2], Oliver Krüger[1]

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**Abstract**

The presence of apex predators has been shown to influence community structure drastically. An important part of this is the shift in behaviour of other species. The understanding of such changes is scarce because recordings of (behavioural) reactions towards lost species are rarely done. This is especially important for predators experiencing predation pressure themselves, known as intraguild predation. Re-colonizations offer the unique possibility to fill this knowledge gap. In our long-term study area, we monitor the populations of different birds of prey for more than 30 years now. Since 2002, Eurasian eagle owls are re-colonizing the area as apex predators, leading to changes in behaviour and reproductive strategies of common buzzards and northern goshawks. Furthermore, increase in the number of breeding red kites might be facilitated by the dynamics in the community. Buzzards were tested at how they react to the apex predator, the eagle owl, and to goshawks during chick-rearing. We show that both predators have a great influence on the aggression level of buzzards, but eagle owls are spatially more avoided. We also present how tolerance of red kites by buzzards enables red kites to increase in breeding pairs despite high breeding niche overlap.

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### PP-81 Assessing the Effects of UAV Noise on Birds: A Playback Experiment Approach

Sam Barrett ORCID iD, Glen Hancocks ORCID iD, Marc Green ORCID iD, Antonio J Torija ORCID iD, Amy Leedale ORCID iD, Mike Wood ORCID iD

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**Abstract**

Advancements in unoccupied aerial vehicle (UAV) technology has revolutionised commercial operations, with applications ranging from drone deliveries and precision agriculture to the emerging field of urban air mobility. Previous research has demonstrated the adverse effects of anthropogenic disturbance on wildlife. However, the ecological impact of UAVs remains poorly understood, with the effects of their unique noise profile so far receiving insufficient research. As the market for commercial UAVs continues to expand, there is an urgent need to assess how these technologies may affect wildlife. This study aims to establish a foundational understanding of how UAV noise impacts birds, which have been selected as a focal taxa due to their widespread distribution, sensitivity to acoustic disturbance and shared airspace with UAVs. Here, the development of an automated speaker system capable of remote operation is discussed, alongside a summary of preliminary findings demonstrating its practical application. To assess how bird activity may be affected by UAV noise, we conducted playback experiments at feeding stations and recorded the response of birds to control and UAV noise using trail cameras and passive acoustic recorders. Trials occurred twice daily, alternating between a white noise control treatment and a UAV noise experimental treatment, over six days. This work represents a vital step toward understanding the ecological consequences of UAV noise and highlights the need for further research to inform noise mitigation strategies. By identifying noise-related

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### PP-83 Using combined techniques to uncover movement and foraging strategies of Alpine Swift.

Alex Brighten ORCID iD[1], Ana Payo-Payo[2], Pierre Bize[3], Thomas Bodey[1]

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**Abstract**

Insectivorous birds rely on resource patches that fluctuate in time and space due to weather conditions and other environmental factors. The forecast increase in unpredictable weather and continuing insect declines resulting from ongoing anthropogenic change, mean it is crucial to understand aerial insectivore resource and habitat use given its central impact on productivity and survival. Biologging technology has dramatically enhanced our understanding of these species' movement strategies, including revealing significant levels of individual variation.

However, we know little about how these individual-level differences drive variation in key demographic parameters. At fine and coarse scales respectively, we combine cutting-edge biologging (GPS, multi-sensor geolocators) and dietary analyses (DNA metabarcoding, stable isotopes) to investigate individual Alpine Swift *Tachymarptis melba* resource use. We link this to a rich life-history dataset to uncover demographic consequences of individual variation in foraging and movement strategies in the context of changing prey availability and an increasingly unpredictable climate.

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**PP-85 The modern changes of migration status of Great White Egret *Egretta alba* in mainland part of Ukraine**

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**Abstract**

Great White Egret is a common breeding, migratory and partly wintering bird in Ukraine. In the second half of 20th century, the species invaded the whole northern territory of Ukraine going along the Dnieper River from the near sea regions upstream to its upper parts. At that time, the species was usually recorded as rare and spatial wintering bird in Azov-Black Sea region. At the beginning of 2000-s only water bodies supplied with warm waters from sewage treatment plants were more regular wintering sites for them (as in Kyiv as well). However, later on the birds also observed at the suburbs at other towns where unfrozen waters situated. Only during the last years, the White Herons regularly observed as wintering species at many other areas not only close to the Dnieper River and its tributaries but at another water bodies. It can be the results of global climate changes. During short term of cooling, the herons do not fly away but continue to stay at the places of mass concentrations of different waterfowls especially Mallards *Anas platyrhynchos*. Usually local people supply birds with food but only during long-term cold snap, they migrate to the South.

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**PP-87 Genomic insights into stress response and local adaptations to climate in Willow warblers**

Finja Strehmann ORCID iD[1], Susanne Jenni-Eiermann ORCID iD[2], Keith Larson ORCID iD[3], Hannah Watson ORCID iD[1], Staffan Bensch ORCID iD[1]

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**Abstract**

Environmental changes critically influence physiological processes, particularly in species with broad geographic distributions. The Willow Warbler (*Phylloscopus trochilus*) in Sweden consists of two subspecies *(P. t. trochilus* and *P. t. acredula*), which exhibit distinct stress responses linked to differences in breeding latitude and climatic conditions. While the southern subspecies shows an elevated glucocorticoid response to acute stress, the northern subspecies appears to suppress glucocorticoid secretion, potentially to maintain reproductive investment within the constraints of a short breeding season. Their genomes differ in just three chromosomes, with an inversion on chromosome three particularly correlating with breeding latitude and elevation. To investigate the genetic basis of stress response variation, we will collect blood samples from Willow Warblers in the hybridization zone of northern Sweden. By integrating physiological and genomic data, we aim to determine whether the observed divergence in stress responses is genetically determined, epigenetically regulated, or a plastic response to environmental conditions. Understanding these mechanisms is crucial for assessing species resilience to climate change and contributes to broader discussions on the interplay between physiology, genetic variation, and evolutionary processes in vertebrates.

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**PP-89 Bone content in pellets and calcium assimilation vary during growth in tawny owls (*Strix aluco*)**

Arianna Passarotto ORCID iD[1,2,3], Patrik Karell ORCID iD[2,3], Chiara Morosinotto ORCID iD[4,5,2,3]

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**Abstract**

Owls can expel indigestible parts of their prey in the form of pellets, which have been traditionally used to study diet preferences through the identification of prey remains. However, pellets might provide a larger set of information on physiological processes, for example on growth, as they are produced by both young and adults. In this study, we used captive-reared tawny owls (*Strix aluco*) to investigate whether bone content in pellets changes over time and how it relates with (skeletal) growth. To this end, we collected pellets and measured arm length at different ages post-fledging and analysed the relationship between the proportion of bones and calcium (Ca) content in pellets, as Ca is a vital element during growth. Accordingly, we expect younger owls to digest more bones to assimilate the Ca they need, regurgitating pellets with lower bone content. Conversely, older owls would eject a higher number of bones to reduce Ca absorption given that Ca becomes toxic in large quantities. In line with these expectations, we found a positive relationship between bone content and age, with older owls producing pellets with more bones. Moreover, analyses revealed that the proportion of bones in the pellets explains the increase in arm length and is strongly associated with the amount of Ca in pellets, suggesting that bone content could be used as a proxy of Ca assimilation during growth. Our findings show that the study of pellets allows getting novel insights on important aspects of a species' physiology.

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**PP-91 Habituation process of the white-breasted guineafowl *Agelastes meleagrides* Bonaparte, 1850 in the Taï National Park, southwestern Cote d'Ivoire (West Afria)**

N'Da Konan Martin BROU, Hilaire Yaokokoré-Béibro

University Felix Houphouet-Boigny, Abidjan, Côte d'Ivoire

**Abstract**

The habituation of a group of white-breasted guineafowl *Agelastes meleagrides* Bonaparte 1850, a IUCN vulnerable species, and endemic to the Upper Guinea forest of West Africa, has been successfully carried out in the Taï National Park , in Cote d'Ivoire, for a subsequent ethological study. From May to July 2017, two months of continuous human presence with a group of 16 individuals was carried out. The method applied was inspired by that practiced for non human-primates. We used direct observations (sight) often using binoculars and indirect observations (vocalization) to establish contact with the group followed. To assess progress during the habituation process, a four-step code from fear to ignorance was established to accept human presence. A total 61-day follow-up effort was done and at the end of it, the guineafowl no longer feared our presence in their immediate environment. The different stages of the established habituation code were reached in a few days of follow-up. For an estimated approach distance of about 20 m at the beginning of the monitoring, it gradually decreased over time until it reached plus or minus 7 m at the end of the process. This habituation, one of the the first carried out on the white-breasted guineafowl in the wild, has allowed a better understanding of the habits of the species, which will facilitate future studies on other aspects of their life history.

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**PP-93 Dangers of the night: unveiling the predator landscape of the Black-tailed godwit**

Rienk Fokkema ORCID iD[1], Egbert van der Velde[1], Marie Stessens[1], Daan Bos[2], Ondřej Belfín[1], Margje de Jong[1], Jos Hooijmeijer[1], Theunis Piersma[1,3]

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**Abstract**

For ground breeding Black-tailed godwits (*Limosa limosa limosa*) predation is a fact of life to which they have adapted. In recent decades however nest losses of godwits have increased in Northwestern Europe. The reasons for this are thought to be manifold and tied to agricultural intensification, among which an increase in the number of predators that godwits have to face. To gain insight into (1) the predator community in the agricultural landscape and (2) how the presence of potential godwit nest predators in the landscape relates to actual nest predation rates, we deployed a large array of camera traps. We did so in a long-term monitored godwit population in Southwest-Friesland, the Netherlands, breeding in an industrialized dairy farming landscape of 11,500-ha. We unveiled a large mammalian community of predator species of which the effects on godwit nesting success were dynamic over the study years. Knowledge on the complex links between meadow birds and the predator community is key to assess the impact of targeted meadow bird conservation measures.

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**PP-95 To breed or not to breed? Potential links between early-life and future reproductive status**

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**Abstract**

In nature, breeding opportunities (breeding sites or mates) are often limited. Consequently, breeding populations commonly contain floaters whose non-territoriality severely hinders their breeding chances. Floaters are usually considered as poor competitors incapable of obtaining necessary resources and/or strategically delaying reproduction for better fitness later in life. Both views hint at an underlying quality difference between floaters and breeding individuals. To date, studies examining the potential differences show incoherent results that may be due to species-specific differences in ecology. Telomeres, the protective caps of chromosomes essential for cellular stability, have repeatedly been linked with survival, reproductive success, and different stressors across different species. We measured telomere length (TL) from nestling spotless starlings (*Sturnus unicolor*) close to fledging for two years (2017-18) and followed their later reproductive status (early- or late-breeder, or floater). The association between reproductive status and sex in relation to TL differed between years; in 2017 early-breeder females had shorter early-life TL than early-breeder males or other females while in similar relationship was not seen. Fledgling mass followed the same pattern as TL during both years. Year-specific differences likely stem from environmental conditions; breeding season in 2017 was considerably drier than in 2018 and females might suffer more when food is limited. Longer male TL and higher fledgling mass were associated with early-breeders but as in 2017 early-breeding females had both shorter telomeres and lower fledgling mass, the predictors of female reproductive status are elsewhere. This study highlights the importance of early-life conditions even when studying adult traits.

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### PP-97 Unravelling the Interplay between the Gut Microbiome, Host Genetics and Thermal Physiology in the Great tit (*Parus major*)

Stijn Kouwenberg[1], Charli Davies[1], Kees van Oers[2], Andreas Nord[3], Suvi Ruuskanen[1]

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**Abstract**

Gut microbiomes are important for regulating many physiological functions. In addition to environmental factors, there is evidence that the genetic background of the host contributes to shaping the gut microbiome. Hosts might be selected to better facilitate microbial strains or communities that help them adapt to their local environment, leading to differences in genetic and gut microbiome variation between populations. There is also evidence that the gut microbiome influences thermal physiology in Great tits (*Parus major*), which might help them to adapt to colder environments. The aim of this study is to unravel the interplay between the gut microbiome, host genetics and thermal physiology. Reciprocal transplant and common garden experiments using individuals from different populations can separate the confounding effects of the environment and genetic background. This makes it possible to test their relative contributions to the gut microbiome in relation to thermal physiological adaptation. Here, we present a research plan that incorporates a (1) reciprocal transplant experiment, (2) quantitative genetic reaction norm approach and (3) common garden experiment using the Great tit as a study species. Especially in a time where global warming increases pressure on animals and their microbiomes, it is important to understand how they respond to changing environmental conditions.

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### PP-99 Microclimatic variability affects reproductive performance in hole-nesting birds

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**Abstract**

Climate change significantly impacts a range of important bird behaviours. However, most studies consider uniform climate conditions across breeding sites within a given year, neglecting the potentially important role of intra-site variation of responses to a range of heterogeneous conditions, including microclimates. Microclimates do not align directly with broader climatic trends, as atmospheric conditions are also influenced by local environmental factors, such as vegetation structure and anthropogenic activity. Hole-nesting birds experience microclimatic conditions at the cavity or nest box level, which may influence stages of reproduction (e.g. clutch initiation, brood size, fledgling) and subsequently overall reproductive performance. We use long-term demographic data from three species, blue tit (*Cyanistes caeruleus*), great tit (*Parus major*), and pied flycatcher (*Ficedula hypoleuca*), from four breeding sites across the Netherlands to assess reproductive performance and occupancy patterns at the nest box level. We found temporal and spatial heterogeneity in reproductive performance across species, indicating that localised factors, such as nest box-specific microclimates, may play a significant role in shaping reproductive outcomes. Additionally, we observed varying magnitudes of decline in reproductive performance between stages of reproduction, such as from clutch to brood and from brood to fledgling, within populations, further highlighting the exposure to different environmental stressors per nest box throughout nesting attempts. Therefore, microclimates and individual responses provide insights into the mechanisms driving population and community dynamics. This research has important implications for broadening our understanding and guiding conservation efforts in the face of changing environmental challenges across space and time.

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**PP-101 Disentangling the population abundance, biology and ecology of Alpine and Red-billed Choughs in the Eastern Pyrenees: what have we learnt so far?**

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**Abstract**

Alpine Choughs (*Pyrrhocorax graculus*) are mountain specialists, extremely adapted to mountain ecology in the Palearctic, while Red-billed Choughs (*Pyrrhocorax pyrrhocorax*) are adapted to grasslands, which can be found also in subalpine areas. Both species occur in the Pyrenees, but very little is known about their population size, biology and ecology. In 2021, we started a project at the Cadí Natural Park (E Pyrenees, Barcelona province) with the first aim to conduct a census of the breeding population for both species in the area. During those surveys, we described the nesting locations, population size, and we started to find many knowledge gaps in ecology and biology. The following years, we started to monitor nests with trail cameras, ringing individuals with darvic rings, tracking with GPS devices and observing behaviour of both species, with a particular focus on Alpine Choughs. After the first four years, we have compiled more questions than answers that can be divided in three main groups: 1) population and conservation – finding less pairs than expected in the area, and identifying several threats and pressures of potential relevance, particularly human disturbance, 2) social behaviour – we haven't found evidence of cooperative breeding, but flocking behaviour of breeders and non-breeders, including adults at nesting sites, and 3) seed dispersal – revealing potential interesting trophic relationships with alpine vegetation. This presentation is a short summary of the first findings and challenges working on these species, aiming to inspire future work in other areas.

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**PP-103 Investigating carry-over effects in migration timing and duration of events throughout the non-breeding season in an Afro-Palearctic migrant, the European Bee-eater (Merops apiaster)**

Joana Costa[1,2], Steffen Hahn[3], Afonso Rocha[2], Álvaro Ramírez[4], José Alves[2]

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**Abstract**

Many migratory birds travel long distances between breeding and non-breeding areas. Conditions at distant locations can influence individual performance in subsequent stages of their annual cycle. Thus, understanding these phenological patterns is crucial for identifying drivers of demographic trends. In this study, we explore, for the first time, (1) the variation in migration timing and duration of events between sexes, and (2) the phenological links across the non-breeding period in a long-distance migratory bird, the European Bee-eater (*Merops apiaster*). Between 2015 and 2020 we used geolocators to track bee-eaters between their breeding colonies in Portugal and non-breeding areas, in West Africa. We successfully obtained 31 full annual tracks and 3 incomplete tracks. We used structural equation models to investigate the differences in timing and duration of events between sexes and the phenological links, from breeding departure to its arrival in the following year. Although we did not find any significant differences between sexes in migration timings and duration of migration events, we did find sequential and unidirectional relationships between cascading migratory stages (in which one stage is significantly correlated with the following one): autumn departure date, autumn travel duration, autumn arrival date, time spent at the non-breeding area, spring departure and spring arrival dates. However, spring departure date does not seem to affect spring travel duration, although it does influence spring arrival date. These results suggest that conditions experienced in one stage may indeed affect the next, with the potential to influence individual fitness, breeding success and ultimately, population demography.

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### PP-105 Alpine solar farms – A BACI study on utility-scale photovoltaic projects in the Swiss Alps

Christian Schano[1], Amandine Serrurier[1], Simon McDonald[1,2], Elias Bader[3,4], Marco Barandun[5,6], Manuel Schneider[5], Urs Kormann[1]

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**Abstract**

A rising demand in renewable energy currently thrives the promotion of solar energy to mitigate global climate change. As part of their energy strategy, the Swiss federal government therefore currently provides substantial subsidies for the construction of utility-scale solar farms in the Swiss Alps. However, the ecological implications of solar farms on alpine biodiversity, especially birds, remain unknown. To fill this knowledge gap, we launched a Before-After-Control-Impact (BACI) study to assess the impact of solar farms on birds, bats and grasshoppers using traditional monitoring methods and passive acoustic monitoring. Here, we present the current status of the project, summarising two “before” field seasons from > 25 study sites across an elevational gradient of 1500m. Further, we compare alpine bird communities at sites suitable for alpine solar farms to sites with established, long-term monitoring in the Swiss Alps. Lastly, we present the most frequent species detected. We invite those interested in utility-scale solar farms to meet at our poster to discuss potential pitfalls in analysing and communicating monitoring data from alpine regions, and how to improve data comparability before and after the construction, especially with regards to changing detection probabilities and edge effects.

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### PP-107 How Does the Noise of Uncrewed Aircraft Systems Impact the Behaviour of Birds?

Glen Hancocks ORCID iD, Sam Barrett ORCID iD, Marc Green ORCID iD, Antonio J. Torija Martinez ORCID iD, Amy Leedale ORCID iD, Mike Wood ORCID iD

The University of Salford, Salford, United Kingdom

**Abstract**

Over the last century, aviation technology has advanced rapidly. These advancements have opened airspace to traditionally ground-based operations such as agriculture and commercial or medical deliveries through sophisticated uncrewed aircraft systems (hereafter UAS, also known as drones). However, as the utility and presence of these vehicles increases, so does their potential to disturb wildlife. Previous research has investigated the general impact of UAS on wildlife and has shown that they may negatively impact species, but investigations into potential noise impacts remain limited. This study aimed to understand how UAS noise may impact bird behaviour. Birds, as one of the most well-studied animal taxa with a global distribution, present an ideal case for assessing how UAS noise may disturb wildlife. To achieve this, a comprehensive systematic review was conducted to synthesize current knowledge and identify key knowledge gaps. Following the review, a pilot study on the Isles of Scilly was conducted to assess the acute behavioural response of a breeding colony of herring gulls (*Larus argentatus*) to a large agricultural UAS (XAG P100). This research contributes to our understanding of how UAS impact bird behaviour. Building on these preliminary findings, future work will study both acute and chronic behavioural responses to simulated UAS noise. This will provide evidence of how UAS noise can negatively impact the behaviour of birds, helping to inform future research and providing insights for policymakers on how to regulate flight operations to minimize disturbance.

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### PP-109 Tracking Eurasian Kestrels Across Europe: A Large-Scale Initiative to Understand Farmland Raptor Declines

Sarah Guttenberger[1], Martin Wikelski ORCID iD[2], Timm Wild ORCID iD[2], Ivan Pokrovsky ORCID iD[2], Petra Sumasgutner ORCID iD[1]

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**Abstract**

Understanding the dispersal, recruitment, migratory routes, and mortality hotspots of Eurasian kestrels (*Falco tinnunculus*) is crucial for addressing their population declines. To achieve this, we are launching a large-scale collaborative tracking initiative using ICARUS TinyFox tags, a novel SigFox-based technology that enables high-resolution monitoring of movement and edge-computed sensor data. This project will provide unprecedented insights into the ecological drivers of kestrel population trends and the broader challenges faced by farmland raptors. A pilot study, in which 27 kestrels were tagged, demonstrated the effectiveness of this technology in capturing detailed movement data, revealing diverse migration routes and potential anthropogenic pressures influencing mortality. These findings highlight the urgent need for a broader research effort to understand kestrel ecology at a continental scale. Building on this success, the Max Planck Institute of Animal Behavior is leading a coordinated effort to deploy 2,000 tags across Europe. This initiative will generate a comprehensive dataset to inform conservation strategies for kestrels, which are in decline across multiple regions, including the UK, Benelux, and Fennoscandia. We invite researchers, conservationists, and stakeholders to join this collaborative effort, contributing to a shared data framework that will advance our understanding of kestrel declines and support evidence-based conservation action.

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### PP-111 How colorful is your city? A chromatic analysis of the urban aesthetic environment generated by birds

Liviu Pripon

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**Abstract**

Most cities host diverse bird fauna, shaping human-bird interactions influenced by socio-cultural factors. These factors impact access to nature, reducing its invisibility when positive. One outcome from human-bird interactions is the generation of visual images, forming the basis of aesthetic experience. We define the aesthetic environment as a collective construct emerging from individual aesthetic experiences, shaped by cultural factors. This environment consists of aesthetic landscapes, which can be cumulative (assembled over time) or instantaneous (formed by a single exceptional perception). While landscapes exist at an individual level, the aesthetic environment is non-local. Our study examines the chromatic dimension of this aesthetic environment by analyzing bird imagery in Cluj-Napoca, Romania. We identified three categories of factors shaping bird imagery: bird-related (morphological, ethological, ecological), human-related (cultural, educational, social, financial, behavioral), and urban architectural (habitat availability, accessibility, mobility). A chromatic matrix was constructed based on bird species presence and corrected using these factors. To validate our model, we conducted a questionnaire assessing human encounters with birds and their chromatic impressions, enabling a comparative analysis between deductive and empirical approaches. Results indicate that aesthetic environments vary across urban spaces and time. Moreover, aesthetic experience is conditioned by the extinction of experience, highlighting the need for further research. Given the reciprocal impact of human aesthetic experience on both human life and nature, our approach aims to refine methods for studying aesthetic environments in other European cities.

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### PP-113 Understanding spatial patterns of mass gain at sea using flight kinematics in wild seabirds

Stephanie Harris[1,2], Charles Bishop[3], Sarah Bond[4], Ruth Dunn[5], Lauren Evans[3], Paul Fernandes[6], Tim Guilford[4], Patrick Lewin[4], Oliver Padget[1], Pete Robins[2], Will Schneider[2], James Waggitt[2], Sophie Wilmes[2], Line Cordes[7]

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**Abstract**

Many pelagic seabirds are thought to rely on knowledge of profitable prey patches to inform their foraging decisions, implying that the decision to return to a patch is partly dependent on past foraging success. However, while biologgers have made it relatively straightforward to identify where at sea seabirds forage, determining where they successfully capture prey remains challenging, limiting our ability to assess how seabirds use knowledge of patch profitability in their decision making. Birds predictably adjust their flight kinematics (e.g. wingbeat frequency) with changes in their wing loading, enabling changes in body mass over time to be detectable in changes in flight kinematic variables. Here, we use a large GPS-accelerometer dataset to estimate changes in mass during at-sea foraging trips of Manx shearwaters (*Puffinus puffinus*). By extracting flight kinematic variables from tri-axial accelerometer data, we investigate how shearwaters adjust their flight kinematics with measured changes in body mass between the start and end of their foraging trips. We then use fine-scale changes in kinematics to reconstruct shearwater body mass over the course of their foraging trips, enabling the mapping of mass gain at sea. These results enable us to examine how mass changes at sea are related to birds' decisions of where to forage and the energetic costs they are willing to incur to reach foraging sites of varying profitability.

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### PP-115 Photoperiodic conditions modulate behaviour and physiology in Chiffchaffs (*Phylloscopus collybita*) throughout autumn migration.

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**Abstract**

Photoperiodic changes, in conjunction with endogenous programs, are key regulators of annual cycle events in birds, including migration, moult, and reproduction. Additionally, the photoperiod may provide positional cues during migration, as it changes predictably with date and latitude. The gradual shortening of day length is known to accelerate pre-migratory events in late-hatched individuals, synchronizing the annual cycles of birds hatched at different times. However, little is known about how photoperiod influences the autumn migration itself, particularly over its entire length. Previously, photoperiod was thought not to modulate behavior and physiology during autumn migration in naïve birds, but recent findings challenge this assumption, highlighting the need for further studies. We investigated how photoperiodic changes influence migratory behaviour and physiology in first-year chiffchaffs (*Phylloscopus collybita*), a nocturnal migrant, during the entire period of the autumn migration. Experimental birds caught at the beginning of autumn migration were maintained in controlled laboratory conditions simulating different photoperiodic scenarios: normal migration speed or delayed departure from breeding grounds. Given that this population (Noth-West Russia) has two potential wintering destinations—Southern Europe or equatorial Africa—we simulated photoperiodic conditions for both, resulting in four experimental groups. Noticeable differences in autumn migratory activity and energy reserves were observed among groups, yet all exhibited an extended migratory period beyond the normal schedule. This suggests that i) birds were sensitive to photoperiod throughout autumn migration; ii) in our experimental conditions they may not have received sufficient cues to terminate migration in time. Potential causes behind these results will be discussed.

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### PP-117 Species Distribution Modeling to Support Urban Biodiversity Planning: A Study in Turin and Milan (Italy)

Enrico Caprio ORCID iD[1,2], Giacomo Assandri ORCID iD[3], Riccardo Alba ORCID iD[1,2], Fabio Marcolin[1], Irene Regaiolo[1,2], Dan Chamberlain ORCID iD[1,2]

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**Abstract**

Urban ecosystems can host significant biodiversity, and species distribution models (SDMs) are increasingly used to inform conservation strategies in cities. In this study, we applied Maxent to model the potential distribution of bird species in two major Italian urban areas: Turin and Milan. Presence data were derived from a combination of standardized point counts and citizen science observations. A total of 56 species were modeled in Turin and 52 in Milan. Land-use composition was used as the main set of predictor variables, calculated as the percentage cover of land-use classes within moving windows of 100, 150, and 500 meters around each 10 ×10 m pixel. Presence–absence predictions were obtained by applying species-specific thresholds based on the True Skill Statistic (TSS), ensuring a balanced trade-off between omission and commission errors. All individual species models showed robust performance, with Area Under the Curve (AUC) values exceeding 0.8. The resulting habitat suitability maps were then combined to produce potential species richness maps for each city, providing spatially explicit insights into urban biodiversity patterns. These maps can serve as practical tools to support urban planning and conservation efforts, helping identify biodiversity hotspots and prioritize areas for habitat enhancement or restoration. This study highlights the value of integrating high-resolution environmental data and citizen science in urban SDM applications and offers a replicable framework for data-driven biodiversity management in metropolitan landscapes.

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### PP-119 Feather rachis cross-sectional shape as a function of flight style, wing shape, migration distance, and habitat type

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**Abstract**

The structure of flight feathers in birds plays a key role in flight and adaptation to diverse environments. The rachis determines the flexibility of wing feathers and their behaviour under aerodynamic forces. However, little is known about the relationship between feather shaft cross-sectional shape and flight style, migration distance, or habitat preference. To investigate this, we conducted a phylogenetic comparative study in which we measured the dorso-ventral and lateral thicknesses of the feather shafts in 207 bird species, at both the basal and apical parts of the outer (P8) and inner (P1) primary feathers. The cross-sectional shape was expressed as the ratio of dorso-ventral to lateral thickness. Our preliminary results show that feather shaft thickness and cross-sectional shape differ not only along the longitudinal axis of the feather, but also between P1 and P8. In addition, we found differences between species with different flight styles (soaring, gliding, continuous flapping, and passerine-type) and ecological characteristics. These findings highlight morphological adaptations in the feather shaft that contribute to a deeper understanding of the evolution of bird feathers.

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### PP-121 Time-restricted feeding affected blood glucose and ketones, but not body temperature and mass in house sparrows

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**Abstract**

Time-restricted feeding (TRF) limits food intake to a limited time-period without altering diet quality or quantity and is linked to metabolic benefits and increased lifespan. However, few studies explored TRF's metabolic effects in wild-derived animals under semi-natural conditions. We performed a long-term outdoor experiment on female and male house sparrows (*Passer domesticus*) by comparing birds with all-day food access (control group, $n$ = 42) to those restricted to 8-hour feeding windows (TRF group, $n$ = 41). Blood samples were collected before treatment (T0) and at 60-, 215-, and 398-days post-treatment (T1–T3) to measure blood glucose and ketone body (β-hydroxybutyrate, BHB) levels. Core body temperature and mass were also recorded. We found that blood glucose decreased steadily and significantly over time in the control group but remained stable in the TRF group. BHB levels increased significantly in both groups throughout the experiment. Experimental birds had lower body temperatures only at T3, while females exhibited higher temperatures than males regardless of treatment during breeding (T2). TRF had no effect on body mass. Our results suggest that even mild TRF can influence glucose and BHB levels without affecting body mass or temperature. Ongoing laboratory analyses of oxidative physiology and telomere dynamics will further clarify TRF's broader physiological effects.

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### PP-123 Dispersal behaviour of an Afrotropical forest bird species in response to habitat degradation

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**Abstract**

Predominantly found in tropical regions, species with slow life histories and complex social systems are at increasing risk of decline due to habitat loss and degradation. Dispersal timing is a central component in the formation of groups in cooperatively breeding species, however, it remains unclear whether and to what extent social species can adapt dispersal behaviours to novel environmental selection pressures. Previous work with Placid Greenbuls, *Phyllastrephus placidus,* a cooperative breeding tropical forest bird, demonstrates individuals within disturbed forests have higher baseline corticosterone levels than individuals within near-natural forests, and subordinates disperse from natal groups earlier suggesting that habitat degradation affects sociality. Building on these earlier findings, this study will incorporate experimental methods to determine causal relationships between habitat degradation, physiology and dispersal behaviour. We will track individual movement using radio telemetry and use corticosterone implants to simulate physiological responses to low habitat quality and assess the effects on natal dispersal behaviour, adult aggression and cooperative dynamics. The relationships between habitat quality, physiology and dispersal behaviour will be analysed with structural equation modelling. It is expected that corticosterone-implanted subordinates will have earlier dispersal, as observed in flocks from heavily degraded forests. The study will identify key pathways through which habitat degradation impacts dispersal strategies and improve our understanding of decision making in maintaining group-living and cohesion within cooperative breeders. These insights are applicable across taxa and ecological contexts, particularly with increasing anthropogenic driven environmental changes.

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### PP-125 Insights from a 24-year ringing time series of migratory birds in Nigeria

Crinan Jarrett[1], Barbara Helm ORCID iD[1], Yann Rime[1], Yahkat Barshep[2], Kwanye Bitrus[2], Joy Akpanta Ishong[2], Chima Nwaogu[2,3]

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**Abstract**

Long-term bird ringing time series are rare in the global South. We thus have little insight into how species' phenology and biometrics, such as body reserves, respond to environmental factors, and how they may have changed over time. Here we leverage a 24-year data set from Jos, Nigeria, to primarily investigate body reserves during the pre-breeding migration season of Afro-Palearctic migrants. In West Africa, this phase in the migrants' life cycle is usually preceded by a transition from the dry season to the rainy season, with an accompanying rise in food abundance. We ask whether inter-annual variation in the amount and onset of rain affects migrants' body reserves, which are crucial for crossing the Sahara. We quantified changes in body mass and fat as a function of rainfall and NDVI from the full dry season, and of conditions over two weeks prior to capture. We found that body mass and fat were positively correlated with pre-capture conditions in all species, so that soon after periods of high rainfall and NDVI, birds had more body reserves. The effects of dry season conditions on body reserves were less generalised across species, perhaps due to varying movement strategies. Thus, while some species mainly stay in West Africa for the dry season ("stayers"), others mainly pass through during migration ("movers"). The effects of pre-capture conditions suggest that limitations in fuelling due to poor conditions in West Africa could lead to birds departing later or in poorer condition, and consequently to carry-over costs to breeding.

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### PP-127 Understanding avian space use for offshore wind farm planning: Challenges of multi-source data integration

Sébastien Roques[1], Maud Quéroué[1], Coline Canonne[1,2], Valentin Lauret[1,2], Louis Schroll[1], Victor Cat[1], Nicolas Courbin[1], Aurélien Besnard[1]

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**Abstract**

Large-scale Offshore Wind Farm (OWF) planning requires a thorough understanding of how birds use the marine environment, including feeding grounds and wintering areas for seabirds, as well as offshore migratory pathways of landbirds. However, collecting data in these areas presents significant logistical challenges due to the vastness and inaccessibility of offshore environments. To address this, various monitoring methods are employed, including telemetry, ornithological and weather radars, acoustic monitoring, and aerial and boat-based surveys. Used independently, each of these methods provides complementary but incomplete picture of avian space use. Some methods offer high-resolution data on a small scale, while others provide broader coverage with lower precision. In theory, integrating these diverse data sources through advanced modelling approaches should improve our ability to obtain finer-scale information over a larger area. However, our experience in this field, through the MIGRALION and MIGRATLANE projects on OWF planning in France, highlights the methodological challenges of such an approach. First, data integration does not replace the need for robust and sufficient sampling effort within each dataset associated with the different methodologies used. Effective data collection strategies must then be carefully designed in anticipation of integrated modelling, rather than relying on post hoc combinations of disparate datasets. Furthermore, we show that data from different sources are sometimes difficult to integrate due to fundamental differences in the type of information they provide. Without careful methodological considerations, we may fail to produce reliable predictions of avian space use through data integration, ultimately skewing OWF planning.

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**PP-129 Accounting for observation biases associated with counts of young when estimating fecundity: case study on the arboreal-nesting red kite (*Milvus milvus*)**

Brady Mattsson ORCID iD[1], Nathalie Adenot[1], Peter Spakovszky[2], Jendrik Windt[1], Rahel Sollmann[3]

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**Abstract**

Counting young from a distance is common practice, for example in tree-nesters. These counts can however suffer from over and undercounting, which can lead to biased estimates of fecundity (average number of nestlings per brood). Here, we develop a model that estimates fecundity while accounting for false positives and false negatives in brood counts. We use simulation to investigate bias and precision of the model and parameterize the simulation with empirical data from 26 red kite nests subjected to ground and nest-based counts during 2021 and 2022 in central Europe. In these data, bias in counts was at most 1 in either direction, and undercounting was more common than overcounting. This led to a 5% negative bias in fecundity for ground-only counts. The model produced essentially unbiased estimates (relative bias < 2%) of fecundity across a range of sample sizes. Further, we projected populations 50 years into the future using two approaches to estimating fecundity: 1) corrected for observation biases using our model, and 2) based on raw counts from the ground. We found that ignoring observation bias led to strong negative bias in projected population size for growing populations, but only minor negative bias in declining populations. Accounting for apparently minor biases associated with ground counts is important for ensuring accurate estimates of abundance and population dynamics especially for increasing populations.

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**PP-131 Migratory birds and urban landscapes: comparing habitat associations across the annual cycle**

Jakub Hrouda ORCID iD[1], Petr Procházka[2], Guillermo Fandos Guzman[3], Vojtěch Brlík[1,2]

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**Abstract**

Migratory birds track seasonal changes in availability of resources, but differences in seasonal patterns were observed between urban and natural landscapes. While urban areas may provide scarce nesting opportunities during breeding seasons, cities were also shown to buffer harsh environmental conditions during non-breeding periods due to elevated temperatures, altered vegetation phenology, and potentially more predictable food sources. However, seasonal distribution patterns of migratory birds in urbanized areas remain largely unknown, preventing the assessment of how human-altered landscapes impact these highly mobile, yet rapidly declining, species. Using eBird Status and Trends data, we analyzed how migratory bird abundances vary seasonally in relation to urbanization. To test how urbanization (quantified by the Global Human Modification index) contributes to variations in bird abundances across both breeding and non-breeding seasons, we applied Generalized Additive Models. Specifically, we tested whether birds use urban areas more during breeding season linked to the availability of nesting sites, or whether urban environments provide benefits only during non-breeding season likely through elevated temperatures and more stable availability of food resources. Moreover, we assessed how different breeding latitude impacts the seasonal preferences of urbanized areas. Preliminary results suggest that some species show higher abundances in urbanized areas during non-breeding period supporting the role of cities as buffers of resource scarcity, while others rely on urban areas primarily during breeding season. Our findings will provide insights into how urban environments influence migratory birds with the potential to inform conservation strategies in urbanized landscapes.

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**PP-133 Bird-ectoparasites across Europe**

Freya Coursey ORCID iD, Adèle Mennerat ORCID iD

University of Bergen, Bergen, Norway

**Abstract**

Parasites are ubiquitous and play a crucial role in the ecology and evolution of birds. However, these host-parasite interactions are increasingly influenced by global changes such as climate change and urbanisation, with potential consequences for bird conservation. Despite their importance, the extent to which host-parasite interactions are changing, and the mechanisms driving these changes, remain poorly understood. My PhD project explores how global changes may affect these host-parasite interactions, using breeding Paridae (e.g. blue tits, great tits) and their nest-dwelling ectoparasites as a model system. To examine how nest-dwelling parasites may be affected by climate and urbanisation, I will combine a systematic review of existing literature with an international collaboration to collect new data on parasite communities across Europe. While this project is in its early stages, my poster will describe the methodologies, hypotheses, and perhaps some preliminary results.

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**PP-135 Natural selection in the early life of long-lived species : insights from two albatrosses' populations in the French Southern and Antarctic Territories**

Pauline Richard, Karine Delord, Timothée Bonnet

Centre d'Études Biologiques de Chizé, Villiers-en-Bois, France

**Abstract**

Natural selection corresponds to differences in the ability of individuals to survive and reproduce - also known as fitness - among phenotypes. In rapidly changing environments, understanding the nature and intensity of natural selection is crucial to comprehend the mechanisms of evolution and what drives changes among populations' traits and demography. However, studying natural selection in long-lived species is a particularly difficult task, due to the amount of time and data required to encompass the different parameters of fitness within a population. Here, we aim to understand natural selection in two long-lived species: the Wandering albatross *(Diomeda exulans)* and the Black-Browed albatross *(Thalassarche [m.] melanophris)*. Both species have been monitored continuously since the 1960's in the French Southern and Antarctic Territories, on Crozet and Kerguelen Islands. A thorough monitoring of reproduction events gives us a good estimate of reproductive outcomes for couples each season, as well as an opportunity to acquire biometric data from fledglings before they depart to spend several years at sea. Furthermore, the philopatry of both species facilitates the measure of survival by monitoring which individuals return to the colony. The quality of the collected data allows us to understand the fitness of such long-lived species through episodes of selection. We use Generalized Linear Models to infer direct and indirect selection on biometric traits. I will present initial results on natural selection in the early life of albatrosses, from fledgling to their first return to the colony.

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# Roundtable discussion: Advancing open, reliable, and transparent science - Insights from SORTEE

18:00 - 19:00 Tuesday, 19th August, 2025

LR5

Conveners: Giulia Masoero and Matthieu Paquet

This round table discussion will explore strategies for improving reliability and transparency in ornithology (and beyond). Drawing inspiration from SORTEE's mission (the Society for Open, Reliable, and Transparent Ecology and Evolutionary biology, www.sortee.org), we will engage participants in a dialogue about the challenges and opportunities associated with implementing these practices in avian research. Participants will share experiences, challenges, and solutions in implementing open science principles, fostering a collaborative environment for researchers at all career stages.

# Wednesday 20th August

# Plenary lecture - Mylene Mariette: Avian developmental programming by sound in a changing world

09:00 - 10:00 Wednesday, 20th August, 2025

PL5

Chair: Andreas Nord

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**Plenary 4 Avian developmental programming by sound, in a changing world**

Mylene Mariette ORCID iD

Doñana Biological Station EBD-CSIC, Seville, Spain. Deakin University, Geelong, Australia

**Abstract**

From contact and alarm calls to beautifully elaborated songs, birds are intrinsically vocal. And this acoustic communication starts even before birth. In this talk, I will present the fascinating ways in which prenatal soundscapes affect avian development, in both adaptive and maladaptive ways, and their implications in a changing world. Early studies have shown that avian embryos can learn external sounds (e.g. mother calls), cue on sibling calls and vibrations to synchronise hatching, and produce vocalisations to solicit incubation from the parents. Recently, my work demonstrated that, beyond these immediate effects, prenatal sound can also inform embryos of upcoming environmental conditions postnatally, and affect a wide range of offspring traits, including until adulthood. Notably, in the desert-adapted Australian zebra finch, parents emits peculiar “heat-calls” when incubating in the heat, which prepares offspring development for high temperatures, by triggering a suite of behavioural, morphological, physiological, and even cellular, changes in offspring. These changes then lead to higher reproductive success in adulthood. This suggests that developmental programming by heat-calls is an adaptive strategy that may be especially beneficial in the face of climate change. Nonetheless, sensitivity to external sounds can also make avian embryos vulnerable to another major anthropogenic stressor, noise pollution. Last year, we revealed that when only offspring are exposed (but not their parents), noise soundwaves alone are capable of interfering with developmental processes, with life-long fitness consequences. Overall these findings suggest that considering acoustic developmental programming may bring a better understanding of avian susceptibility to global change.

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# Oral session 6: Migration 2

10:30 - 12:00 Wednesday, 20th August, 2025

MALT

Chair: Ivan Maggini

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10:30 - 10:45

**Oral 6-1 Extreme flight altitude changes between night and day in migratory birds**

Sissel Sjöberg ORCID iD

Lund University, Lund, Sweden

**Abstract**

Some species of migratory birds have been shown to exhibit a diel cycle in flight altitudes, flying several kilometers higher during day than night, when performing migratory flights covering both night and day. But why are birds behaving like this? One hypothesis proposed to explain this behaviour is that the birds face additional heating by solar radiation during daytime and hence must climb to very high, and thus also very cold, altitudes to avoid overheating during daytime flights. We have shown that the heat balance of the flying birds is indeed affected by solar radiation, but if this is the cause of the diel cycles in flight altitude is still unclear. Overall, the observed behaviour is a remarkable performance, and it opens for a number of questions related to migratory behaviour in birds. How do diurnal migrants perform their travels? How do juvenile birds react the first time they fly into daytime? And why is the behaviour important to understand bird migration ecology?

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10:45 - 11:00

**Oral 6-2 Predicting the future of African-Eurasian bird migration under climate change: a mechanistic modelling approach**

Etienne Henry ORCID iD[1], Marius Somveille ORCID iD[2], Inês Catry ORCID iD[3], Ana Rodrigues ORCID iD[1]

[1]CEFE - Centre d'Ecologie Fonctionnelle et Evolutive, Montpellier, France. [2]School of Environmental Sciences at the University of East Anglia, East Anglia, United Kingdom. [3]CE3C - Centre for Ecology, Evolution and Environmental Changes, University of Lisbon, Lisbon, Portugal

**Abstract**

The African-Eurasian flyway involves billions of birds migrating twice a year between their Eurasian breeding grounds and their non-breeding areas in Africa. Empirical evidence indicates that this ecological system is changing: intercontinental migratory species are declining faster than resident or short-distance migrants; some European breeding populations are shortening their migratory distances or even becoming sedentary; and shifts in migratory routes have been observed for multiple species. While previous studies invoked climatic changes as an explanation, they focused on correlative approaches and on individual species. A mechanistic understanding of how climate changes may affect the overall migratory system remains lacking. In this study, we used a macro-ecological migration model to investigate the effect of past and future climate changes on the spatiotemporal dynamics of migration across the African-Eurasian flyway. Our mechanistic model integrates energy availability and costs under competition to simulate the optimal redistribution of individuals between breeding and wintering areas across the entire migratory system. Our model's result indicate that climate changes of the magnitude observed in the past five decades affect the spatiotemporal distribution of migratory birds. Specifically, the model predicts a decline in average migratory distances among European-breeding birds that is consistent with the observed empirical trends. This suggests that the recent climatic changes in Africa and Eurasia can explain, at least partially, the ongoing changes in the African-Eurasian flyway, which are expected to accelerate in future climate scenarios. Our findings provide valuable insights into the future of migratory systems and the broader ecological consequences of global change.

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11:00 - 11:15

**Oral 6-3 From multi-sensor geolocation to annual energy budgets in songbirds: a multi-species perspective**

Martins Briedis ORCID iD[1,2], Peter Adamik[3], Arnaud Barras[1], Raphael Nussbaumer[1], Ance Priedniece[2], Petr Prochazka[4], Viesturs Vigants[2], Steffen Hahn[2]

[1]Swiss Ornithological Institute, Sempach, Switzerland. [2]University of Latvia, Riga, Latvia. [3]Palacky University, Olomouc, Czech Republic. [4]Czech Academy of Sciences, Institute of Vertebrate Biology, Brno, Czech Republic

**Abstract**

For small-bodies species, light and multi-sensor geolocation has been a staple in migration research since more than a decade but thus far it has predominantly been used to study spatiotemporal movement patterns or flight performance. However, multi-sensor tracking that includes accelerometery holds the potential to open a new avenue that could facilitate a life cycle approach to study energy expenditure in free-ranging songbirds. Tri-axial accelerometer logging has been successfully used as a proxy to quantify mechanical energy use in large-bodied species based on overall dynamic body acceleration. Here, we develop a method to estimate year-round energy expenditure in small songbirds incorporating allometric scaling of BMR, thermoregulation, and mechanical energy costs estimated via partial dynamic body acceleration (z-axis). We explore how energy budgets across the annual cycle differ for songbirds of various migration strategies, distances, and destinations. Our results highlight consistent differences in energy allocation throughout the annual cycle between short- and long-distance migratory species. Overall, long-distance migrants showed higher peaks and lower lulls in annual energy expenditure with strikingly lower intraspecific variation in total energy expenditure compared to short-distance migrants. We revealed pronounced trade-offs between energy investment in migratory flights and thermoregulation during the non-breeding period. Across all species, spring migration was the most energetically demanding part of the annual cycle potentially highlight this as an energetically limiting phase in the life history of migratory birds. Combining an annual perspective on energy expenditure with behavioural and environmental data can open new frontiers in migratory bird research under global change.

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11:15 - 11:30

**Oral 6-4 Post-migratory non-breeding movements in small migratory birds: facultative behavior shaped by environmental conditions and flight efficiency**

Vojtěch Brlík ORCID iD[1], Jelany Duali ORCID iD[2], Petr Procházka ORCID iD[3], Quinn M. R. Webber ORCID iD[2], D. Ryan Norris ORCID iD[2]

[1]Department of Ecology, Charles University, Prague, Czech Republic. [2]Department of Integrative Biology, University of Guelph, Guelph, Canada. [3]Institute of Vertebrate Biology, Czech Academy of Sciences, Brno, Czech Republic

**Abstract**

With the miniaturization of tracking devices, post-migratory non-breeding movements – relocations between distinct sites during the ‘stationary’ non-breeding period – have become more widely documented in migratory birds. The increase in available data provides an opportunity to examine the prevalence of non-breeding movements within and across species, as well as the underlying factors driving them. Using tracking data collated from 1,964 individuals across 74 passerine and near-passerine species, we investigated the frequency of post-migratory non-breeding movements in small migratory birds and examined the influence of migration timing, vegetation characteristics, and life-history traits on this behavior. We identified substantial variation in the occurrence of non-breeding movements within and between species: 30% (n = 598) of individuals and 35% (n = 26) of species tracked showed evidence of non-breeding movements. Preliminary results suggest that birds in areas with lower vegetation greenness (i.e., primary productivity) were more likely to relocate, though the effect size was small. Across species, non-breeding movements occurred more frequently in species with a high hand-wing index, suggesting that greater flight capability facilitated relocations. Our findings provide new insights into this behavioral phenomenon, highlighting how migratory birds respond to environmental conditions during a poorly understood phase of their annual cycle, with implications for predicting their resilience to environmental change.

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11:30 - 11:45

**Oral 6-5 How did the falcon cross the ocean? Analyzing how Eleonora's falcons *Falco eleonorae* use seasonal winds and insular stepping-stones to avoid drowning in the Indian Ocean.**

Meixu CHEN ORCID iD[1], Laura Gangoso ORCID iD[2], Wouter Vansteelant ORCID iD[1,3]

[1]BirdEyes - University of Groningen, Leeuwarden, Netherlands. [2]Doñana Biological Station (EBD-CSIC), Seville, Spain. [3]IBED - University of Amsterdam, Amsterdam, Netherlands

**Abstract**

Wind conditions play a major role in determining how birds overcome ecological barriers on their long-distance migrations. In many cases birds minimize flights over barriers in opposing winds, while crossing the same barriers directly in supportive winds. Nevertheless, even in supportive conditions, barrier-crossings likely involve a number of risk-mitigating behaviors. We aimed to clarify how Eleonora's falcon (*Falco eleonorae*) mitigate the risk of crossing the Indian Ocean to and from Madagascar in opposing autumn winds and supportive spring winds. Using GPS-tracking data from 19 individuals over a decade (2012-2022), we asked how seasonal wind support affected the falcons' energy expenditure (air speeds and distances) and their propensity to use isolated islands as stop-overs. Wind support allowed the falcons to conserve energy by flying at lower air speeds the ocean in spring. However, wind-assisted spring crossings still took 2.3 times more flight hours, and an overall greater energetic effort from the falcons. Concomitantly, islands were most used during spring crossings (57.9% individuals in spring vs 21.1% in autumn), and use of islands significantly increased with weaker wind support in spring. We conclude that isolated islands provide emergency stop-over opportunities for Eleonora's falcons during their protracted spring ocean crossings. These findings underline the complex interplay of landscape and atmospheric conditions in shaping the migratory routes and flight behaviour of terrestrial birds. While our study was limited to successful adult migrants tracked with GPS-loggers, it remains to be determined how falcons learn such intricate ocean-crossing tactics.

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11:45 - 12:00

**Oral 6-6 Exploring intraspecific distribution patterns: insights from tracking data**

Michiel Boom ORCID iD

Sovon Dutch Centre for Field Ornithology, Nijmegen, Netherlands

**Abstract**

For the effective conservation of migratory birds, it is crucial to understand which populations use which areas throughout the annual cycle. Observational data and structured surveys provide valuable insights into species occurrence but often suffer from spatial biases, particularly in remote or inaccessible regions. Additionally, distinguishing between populations of the same species is often impossible, especially when they co-occur at shared stopover or wintering sites. High-resolution tracking data offers a powerful tool to overcome these limitations by providing detailed occurrence information across entire migratory ranges, including poorly surveyed areas. Moreover, it allows for the identification of individuals from different populations throughout the year, offering new opportunities to study intraspecific variation. However, commonly used methods for studying distribution patterns, such as species distribution models (SDMs), were originally designed for observational occurrence data, making the integration of tracking data challenging. In this presentation, we discuss key considerations for incorporating tracking data into SDMs and explore the potential benefits of modelling co-occurring migratory populations through case studies (shorebirds and geese). We highlight how these new opportunities tracking data provide can help understand distribution patterns of migratory birds, with a focus on species traveling to remote areas.

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# Oral session 7: Life histories and development 2

10:30 - 12:00 Wednesday, 20th August, 2025

LR2

Chair: Joshua Tabh

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10:30 - 10:45

**Oral 7-1 Fitness of metabolic phenotypes in resident songbirds**

Elana Rae Engert ORCID iD, Fredrik Andreasson ORCID iD, Andreas Nord ORCID iD, Jan-Åke Nilsson ORCID iD

Lund University, Lund, Sweden

**Abstract**

Throughout the annual cycle, small, resident passerines must go through energy-demanding life phases that change with the seasons such as breeding in the spring and surviving cold temperatures in the winter. How individuals will allocate energy between self-maintenance and capacity for work may directly or indirectly affect survival and reproductive success, and therefore fitness, of individuals. However, the stochasticity of environmental conditions and resource abundance can change the energy required and available for different activities both in the short and long term. Selection may act independently or correlatively on minimum and maximum metabolic rates, which could maintain variation in metabolic syndromes. We aimed to uncover the relationships between minimum and maximum metabolic rates in blue tits and the fitness of metabolic phenotypes. We measured the basal metabolic rate (BMR), maximum cold-induced metabolic rate (summit metabolic rate, $M_{sum}$) and maximum exercise-induced metabolic rate (MMR) in blue tits wintering in southern Sweden. We then documented their apparent survival and reproductive success the following spring. We found that metabolic rates are positively correlated and align with predictions of the performance hypothesis.

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10:45 - 11:00

**Oral 7-2 Understanding the variation in lifetime reproductive success in Northern lapwings (*Vanellus vanellus*) using a multievent model**

Louis Hunninck ORCID iD, Simon Hohl

Swiss Ornithological Institute, Sempach, Switzerland

**Abstract**

The northern lapwing, an iconic, ground-nesting wader, has seen a strong population decline in past decades in central Europe, mostly due to intensification of agriculture. In Switzerland, the population decreased with more than 90% in the 20st century to a minimum of 83 pairs in 2005, likely due to low breeding productivity. This was linked to, among other, loss of chicks and eggs due to increased mammalian predation. After intensive management action, the Swiss population since increased, counting 200 breeding pairs in 2024. However, we observe a large variation in productivity of lapwings. Improving our understanding of individual breeding success is essential to improve conservation actions. Here, we studied the lifetime reproductive success (LRS) and nest site fidelity (NSF) of lapwings in an intensively monitored population in an agricultural area in central Switzerland. Most chicks and many adults were colour ringed from 2009 to 2022, allowing for individual identification, and to determine fledgling survival. LRS was analysed using a capture-recapture multievent model, incorporating uncertainty in the breeding state assessment. We explore how nest success, colony density, fencing, weather, and NSF affects lapwing LRS. Additionally, we investigate what determines NSF in lapwings, as some individuals nest within meters of previous nest sites, but large variation exists. While research shows that the lapwing population in Switzerland is currently dependent on intensive conservation measures, particularly fencing, it is crucial to understand the drivers of individual productivity to improve conservation measures and thereby contribute to the successful recovery of the species in Switzerland.

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11:00 - 11:15

**Oral 7-3 Phenotypic plasticity and heritability of laying dates in a long-lived bird, the Alpine swift**

Carla Dreon ORCID iD[1,2], Giulia Masoero ORCID iD[1], Michela Natalina Dumas ORCID iD[3], Pierre Bize ORCID iD[1]

[1]Swiss Ornithological Institute, Sempach, Switzerland. [2]La Rochelle Université, La Rochelle, France. [3]University of Ottawa, Ottawa, Canada

**Abstract**

Birds adjust their laying dates to optimize reproductive success in response to environmental changes. By laying eggs when conditions are optimal, parents can maximize the growth and survival of their offspring, and thus their fitness. This adjustment can occur through phenotypic plasticity, which allows fine-tuning of reproductive timing to favorable conditions, and/or through microevolution in response to selection. Understanding the genetic architecture of this trait is crucial, as it must be heritable for evolutionary responses to occur. In this study, we investigated variation in laying dates in response to temperature using a 25-year dataset comprising over 2,800 records from 611 female Alpine swifts (*Tachymarptis melba*), a migratory insectivorous bird breeding in Switzerland. We applied a sliding window approach to identify the period when temperature most influenced early laying (10th percentile) at the population level. The most relevant window extended from the birds' arrival (28 March) to the earliest clutches (22 May). Within this period, laying dates advanced by ~four days per 1°C increase in average temperature. Follow-up analyses using random slope models indicated that individuals responded similarly to temperature fluctuations, while a quantitative genetic model based on a social pedigree revealed that the trait is heritable. These findings deepen our understanding of how wild populations adjust to environmental changes through phenotypic plasticity and heritability. By highlighting the interplay between these mechanisms in shaping reproductive timing, this study provides insight into wild populations' potential to respond to changing environmental conditions.

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11:15 - 11:30

**Oral 7-4 What feathers can tell about the life of arctic skuas over 50 years ago and now**

Elina Mäntylä ORCID iD[1], Tapio Eeva ORCID iD[1], Pilar Gómez-Ramírez ORCID iD[2], Toni Laaksonen ORCID iD[1], Kari Mäntylä[3], Jukka Nuotio[3], Kimmo Nuotio[3], Matti Sillanpää[3], Jyrki Torniainen ORCID iD[4]

[1]University of Turku, Turku, Finland. [2]University of Murcia, Murcia, Spain. [3]Pori Ornithological Society, Pori, Finland. [4]University of Jyväskylä, Jyväskylä, Finland

**Abstract**

Arctic skua (*Stercorarius parasiticus*) has a circumpolar breeding distribution by the northern seas, and most of the individuals spend the non-breeding season in the southern hemisphere. In Finland, the monogamous arctic skuas breed on rocky, small islands by the coastline, using the same island every year. They spend the non-breeding season in southern Atlantic. We have a collection of feather samples from arctic skuas breeding in western Finland (n=171), 144 from 1967-1973 (136 adults and 8 nestlings) and 26 more recent, from 2011-2023 (23 adults and 3 nestlings). The feathers of the complete post-breeding moult show the conditions in southern Atlantic, while feathers from nestlings show the condition in the Baltic Sea. With the analysis of multi-isotopic ($\delta^{2}$H, $\delta^{13}$C, $\delta^{15}$N, $\delta^{32}$S) profile of the feathers, we can place the non-breeding regions of skuas that have lived over 50 years apart. For few of the more recent birds, we have also geolocation data to confirm the location from the isotope data. Preliminary results suggest that majority of the skuas have used the Benguela region and Patagonian shelf, also 50 years ago. The isotope results also indicate that the non-breeding region fidelity of this species is very high. Preliminary analyses of inorganic elements show a decrease during the 50 years (e.g. 61 % for mercury, 38 % for lead and 58 % for iron). These analyses show the environmental changes of the southern Atlantic and Baltic Sea during 50 years. Overall, this study shows the potential of scientific importance of archived samples.

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11:30 - 11:45

**Oral 7-5 Paying the cost of reproduction: environmental variability shapes reproductive senescence in albatrosses**

Bertille Mohring ORCID iD[1], Denis Réale ORCID iD[2], Alastair Wilson ORCID iD[3], Jonathan Potts ORCID iD[4], Henri Weimerskirch ORCID iD[5], Richard Phillips ORCID iD[6], Christophe Barbraud ORCID iD[5], Ashley Bennison ORCID iD[6], Karine Delord ORCID iD[5], Andrew Wood[6], Samantha Patrick[1]

[1]University of Liverpool, Liverpool, United Kingdom. [2]Université du Québec à Montréal, Québec, Canada. [3]University of Exeter, Cornwall, United Kingdom. [4]University of Sheffield, Sheffield, United Kingdom. [5]Centre d'Etudes Biologiques de Chizé, Villiers-en-Bois, France. [6]British Antarctic Survey, Cambridge, United Kingdom

**Abstract**

Allocating resources to reproduction can result in fitness costs paid later in life through a reduction of future reproduction (reproductive senescence) or survival (actuarial senescence). How early and strongly senescence occurs can reflect how organisms resolve life-history trade-offs, and may be driven by environmental conditions. However, how this translates into intraspecific variation in senescence has been overlooked. Here, we compared reproductive senescence within and across two albatross species differing in environmental sensitivity. We predicted that black-browed albatrosses *Thalassarche melanophris* breeding under less predictable environmental conditions would display slower life histories, mirrored in later and slower reproductive senescence. In contrast, we predicted that reproductive senescence patterns would not markedly differ between populations of wandering albatrosses *Diomedea exulans*, a species thought to be less sensitive to environmental fluctuations. As predicted, black-browed albatrosses displayed later and slower reproductive senescence under less predictable environmental conditions. Intriguingly, we found a trade-off between how early or strongly senescence occurred when comparing two populations of wandering albatrosses differing in environmental conditions. Further investigation highlighted that reproductive senescence arose from cumulated costs of reproduction in black-browed albatrosses, with individuals senescing early and strongly having the highest lifetime reproductive output. This was not visible in wandering albatrosses for which costs of reproduction may be lower or buffered by biennial breeding. However, we provided evidence for among-individual variation in senescence patterns that may reflect among-individual variation in resource acquisition and/or reproductive costs. These results support the idea that environmental conditions shape reproductive senescence within and across populations and species.

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11:45 - 12:00

**Oral 7-6 Epigenetic potential for DNA methylation and dispersal propensity in pied flycatchers**

Blanca Jimeno[1,2], Marianthi Tangili[3], David Canal[4], Carlos Camacho[5], Jaime Potti[5], Julio Dominguez[6], Jesús T García[6], Jesús Martínez-Padilla[2], Mark Ravinet[1]

[1]University of Oslo, Oslo, Norway. [2]Pyrenean Institute of Ecology, Jaca, Spain. [3]University of Groningen, Groningen, Netherlands. [4]Museo Nacional de Ciencias Naturales, Madrid, Spain. [5]Estación Biológica de Doñana, Sevilla, Spain. [6]Instituto de Investigación en Recursos Cinegéticos, Ciudad Real, Spain

**Abstract**

Dispersal is the movement from the native habitat to another - either temporarily or for reproduction - and a highly relevant life history trait determining fitness prospects, genetic structure and species distributions. Although not all phenotypes are equally likely to disperse, the mechanistic underpinnings driving variation in dispersal propensity remain poorly understood. Moving into new environments requires phenotypic plasticity that may be achieved via epigenetic processes, occurring in specific genomic regions (e.g. DNA methylation on CpG sites). Thus, genomes differ in their capacity to be modified epigenetically, and this “Epigenetic Potential” may represent the range of phenotypic plasticity attainable by individuals and a key requirement of successful settlement. We tested the association between epigenetic potential (number of CpG sites throughout the genome) and dispersal propensity in a long-term study population of Pied flycatchers (*Ficedula hypoleuca*). We compared epigenetic potential in a) individuals dispersing between habitat patches vs. those staying in one patch; b) Immigrants vs. residents; (spatial approach) and c) first vs. later generations (temporal approach). We found a significant, positive association between epigenetic potential and dispersal propensity in a) and c) but not b), the latter possibly reflecting our limited capacity to tell apart immigrants and individuals from natural nests. Our results point to epigenetic potential playing a role in dispersal propensity, suggesting that epigenetically-driven phenotypic plasticity facilitates bird dispersal.

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# Oral session 8: Ecological physiology 1

10:30 - 12:00 Wednesday, 20th August, 2025

LR3

Chair: Elisa Thoral

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10:30 - 10:45

**Oral 8-1 Multidecadal study identifies ecophysiological tipping points for Arctic seabirds facing environmental change**

David Grémillet ORCID iD[1,2], Françoise Amélineau ORCID iD[3], Ann Harding[4], Jérôme Fort ORCID iD[5]

[1]CEFE-CNRS, Montpellier, France. [2]UCT, Cape Town, South Africa. [3]ENS, Rennes, France. [4]Auk Ecological Consulting, Cordova, USA. [5]LIENSS-CNRS, La Rochelle, France

**Abstract**

The Arctic is warming nearly four times faster than the rest of the planet. Such rapid and drastic change and associated environmental disruptions, have severe consequences for panarctic ecosystem functioning, polar biodiversity and the livelihoods of indigenous communities. Seabirds are acknowledged ecological indicators of environmental change, and it is essential to identify ecophysiological tipping points which may challenge their resilience, and function as warning systems for ecosystem shifts. Between 2005 and 2024, we studied little auks at Ukaleqarteq in East Greenland. During breeding seasons, we assessed adult diet, body condition, foraging effort, annual survival, and reproductive performance. Mercury contamination was also measured in adults, eggs and chicks. Across the study period, climate change induced ocean warming and sea-ice loss, as well as shifts in zooplankton communities upon which little auks feed. Adult birds responded via dietary and behavioural plasticity, maintaining fitness (survival, body condition and reproduction) in most years. Little auks therefore seemed to buffer Arctic change, but recent years allowed us to identify two major tipping points. First, climate-related mercury load diminished the aerobic diving capacity of little auks and their resistance to overheating. Mercury also impacted little auk reproductive performance. Second, chick growth was compromised by climate-induced summer storms, with strong winds preventing adults from commuting between foraging areas and the nest to feed their offspring. Little auks are the most abundant Arctic seabird and key ecosystem engineers; ecophysiological tipping points will have profound impacts on their fitness, their population dynamics and the functioning of the marine Arctic.

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10:45 - 11:00

**Oral 8-2 Legs are primary heat exchangers in nest-bound White storks**

Julían Cabello-Vergel ORCID iD, José A. Masero ORCID iD, Auxiliadora Villegas ORCID iD, Jorge S. Gutiérrez ORCID iD

Universidad de Extremadura, Badajoz, Spain

**Abstract**

Endotherms must manage heat fluxes under changing environmental conditions to maintain safe core body temperatures. An important mechanism for energy management is peripheral heterothermy. Despite growing evidence that birds' bare body parts such as legs and bills can serve as effective thermal windows (i.e. areas of controlled heat loss), the function and importance of such body regions likely differ across species and ecological contexts. This might be particularly important for birds breeding in exposed locations (such as open nests) that promote rapid heat gain and loss. Combining thermal imaging with weather data we assess the thermoregulatory role of various body parts (eye region, bill, gular skin, and legs) in White storks (*Ciconia ciconia*) breeding in Southwestern Iberia. In doing so, we also test whether adults and nestlings differ in their capacity to modulate surface temperature ($T_{surf}$) through these regions across a wide range of environmental temperatures ($T_{air}$ = 15 – 38 ºC). Our analyses showed that White storks finely tuned $T_{surf}$ of all the regions tested in response to $T_{air}$, with nestlings showing an overall poorer capacity to modulate $T_{surf}$ under colder conditions ($T_{air}$ < 20 ºC). Notably, only the legs served as effective thermal windows in adult storks, with dry heat loss through these appendages

representing up to 70% of basal metabolic rate. Thus, passive heat exchange through the legs can significantly contribute to alleviate heat stress in nest-bound White storks. Yet, further work is needed to better understand the ontogeny of thermal windows in the face of climate change.

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11:00 - 11:15

**Oral 8-3 The country hen and the city hen: telomere length dynamics as mediator between oxidative stress and behavioural modulation in a bird model species**

Matteo Schiavinato ORCID iD[1], Aaron Mariano D'Costa[1], Javier Pineda Pampliega[2], Shivani Ronanki[1], David Spurgeon[3], Nico van den van den Brink[1]

[1]Wageningen University, Wageningen, Netherlands. [2]Universidad Complutense Madrid, Madrid, Spain. [3]UK Centre for Ecology & Hydrology, Wallingford, United Kingdom

**Abstract**

Telomeres are the non-coding end regions of linear chromosomes, which normally shorten with each cell division. However, reactive oxygen species (ROS), such as those generated by urban pollution, can accelerate this process. The 'selective adoption hypothesis' suggests that individuals with shorter telomeres may be more or less likely to adopt specific behaviors, such as increased impulsivity. Thus, investigating the effects of pollution on telomere dynamics could provide insights into broader physiological and behavioral processes. To assess the role of telomere length as a mediator between environmental stressors and behavioral modulation, we experimentally induced oxidative stress in young chickens (Gallus gallus) using Paraquat, a pro-oxidant agent. Our aims were to determine (i) whether oxidative stress affects telomeres in vivo and (ii) whether reduced telomere length is associated with cognitive and personality changes. A second group of chickens was exposed to a telomerase inhibitor to disentangle the effects on behavior from oxidative stress or direct telomere attrition. As expected, Paraquat, but not the telomerase inhibitor, significantly increased oxidative stress and accelerated telomere shortening in red blood cells. Surprisingly, both treatments resulted in longer telomeres in the brain compared to controls, likely due to the activation of repair mechanisms. Furthermore, telomere length, but not oxidative stress, was positively associated with increased movement in an open-field test, though no effects on memory performance were observed. These findings suggest that oxidative stress has influenced telomere dynamics in vivo and that behavioral effects on personality could be mediated by brain-specific telomere regulation.

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11:15 - 11:30

**Oral 8-4 Do basal and summit metabolic rates always go hand in hand?**

Cesare Pacioni ORCID iD[1], Andrey Bushuev ORCID iD[2], Marina Sentís ORCID iD[1], Anvar Kerimov ORCID iD[2], Elena Ivankina ORCID iD[3], Luc Lens ORCID iD[4], Diederik Strubbe ORCID iD[1,5]

[1]Center for Research on Ecology, Cognition and Behavior of Birds (ECoBird), Ghent, Belgium. [2]Department of Vertebrate Zoology, Faculty of Biology, Moscow, Russian Federation. [3]S.N. Skadovsky Zvenigorod Biological Station, Moscow, Russian Federation. [4]Center for Research on Ecology, Cognition and Behavior of Birds (ECoBird), Ghent, Russian Federation. [5]Research Institute for Nature and Forest (INBO), Brussels, Belgium

**Abstract**

Understanding the potential limits placed on organisms by their ecophysiology is crucial for predicting their responses to varying environmental conditions. A main hypothesis for explaining avian thermoregulatory mechanisms is the aerobic capacity model, which posits a positive correlation between basal (basal metabolic rate [BMR]) and summit ($M_{sum}$) metabolism. Most evidence for this hypothesis, however, comes from interspecific comparisons, and the ecophysiological underpinnings of avian thermoregulatory capacities hence remain controversial. Indeed, studies have traditionally relied on between-species comparisons, although, recently, there has been a growing recognition of the importance of intraspecific variation in ecophysiological responses. Therefore, here, we focused on great tits (*Parus major*), measuring BMR and $M_{sum}$ during winter in two populations from two different climates: maritime-temperate (Gontrode, Belgium) and continental (Zvenigorod, Russia). We tested for the presence of intraspecific geographical variation in metabolic rates and assessed the predictions following the aerobic capacity model. We found that birds from the maritime-temperate climate (Gontrode) showed higher BMR, whereas conversely, great tits from Zvenigorod showed higher levels of $M_{sum}$. Within each population,

our data did not fully support the aerobic capacity model's predictions. We argued that the decoupling of BMR and $M_{sum}$ observed may be caused by different selective forces acting on these metabolic rates, with birds from the continental-climate Zvenigorod population facing the need to conserve energy for surviving long winter nights (by keeping their BMR at low levels) while simultaneously being able to generate more heat (i.e., a high $M_{sum}$) to withstand cold spells.

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11:30 - 11:45

**Oral 8-5 Effects of elevated yolk testosterone levels on malaria susceptibility, aging, growth, and survival in a wild passerine**

Jaime Muriel ORCID iD[1], Toni Laaksonen ORCID iD[2], Suvi Ruuskanen ORCID iD[3], Karen C. Tse[2], Margot Turc[4], Antoine Stier ORCID iD[5]

[1]University of Cordoba, Cordoba, Spain. [2]University of Turku, Turku, Finland. [3]University of Jyväskylä, Jyväskylä, Finland. [4]Université Claude Bernard Lyon 1, Lyon, France. [5]Institut Pluridisciplinaire Hubert Curien, Strasbourg, France

**Abstract**

In the context of global change, emerging infectious diseases are becoming increasingly difficult to prevent or control. In birds, malaria parasites are responsible for wildlife population declines in many species worldwide. Despite experiencing similar risk exposure, there is marked inter-individual variation in susceptibility to malaria. Since hormone-mediated maternal effects can function as mechanisms of phenotypic plasticity, facilitating offspring adaptation to novel environments, in this study, we explored the dose-dependent response to maternal yolk hormones by experimentally injecting two different testosterone (T) doses into the egg yolks of wild great tits. High prenatal T levels may provide short-term benefits but may also incur long-term costs, including accelerated telomere shortening and immunosuppression, both of which could increase susceptibility to malaria. Our preliminary results show that high prenatal testosterone concentrations increased susceptibility to malaria infections in male juveniles but not in females, likely due to sex and dose-dependent effects of prenatal T on immunity. We found no effects of T treatment on body size or condition of nestlings, but nestlings exposed to the higher T dose exhibited increased breathing rates. Nestling survival to fledging was positively influenced by prenatal T, while we found no evidence of an effect on hatching success or post-fledging survival. With respect to the medium- to long-term costs of prenatal androgens, testosterone surprisingly increased telomere length in early life without modifying postnatal telomere dynamics. Future studies should carefully consider a range of concentrations, as the balance of costs and benefits of prenatal hormones may be dose-dependent.

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11:45 - 12:00

**Oral 8-6 Effects of early-life ambient temperature on thermal physiology and cellular ageing: an experimental approach in wild great tits.**

Julie Fleitz[1], Clémence Furic[1], Charli Davies[2], Jenna Palttala[2], Suvi Russkanen[2], Sophie Reichert[1]

[1]University of Turku, Turku, Finland. [2]University of Jyväskylä, Jyväskylä, Finland

**Abstract**

Current global changes are characterized by an increase in average ambient temperatures and the occurrence of extreme weather events, such as heatwaves and cold snaps. These abrupt temperature changes can present significant challenges, particularly for avian species, by altering survival prospects and inducing sublethal effects. For example, thermoregulatory capacities and cellular aging are likely to be affected. However, these factors are rarely considered in wild populations. We hypothesized that altered thermal physiological responses and accelerated aging could be a cost of exposure to higher ambient temperatures, especially during early life, when thermoregulatory capacities are not yet fully developed. To test this, we examined the short- and long-term effects of early-life thermal conditions on thermal physiology, as well as the potential role of aging markers as biomarkers of fitness, using wild great tits (Parus major) as the study system. Developing individuals in the wild were experimentally exposed to increasing or decreasing nest box temperatures by approximately 2°C during postnatal growth. These individuals were then reared in outdoor aviaries until late winter, during which we measured various metabolic, thermal physiology, dehydration, and aging markers. This unique dataset contributes to our

understanding of the long-lasting effects of early-life thermal conditions and the underlying mechanisms of developmental thermoregulatory plasticity.

# Oral session 9: Behavioural ecology 2

10:30 - 12:00 Wednesday, 20th August, 2025

LR4

Chair: Zsofía Toth

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10:30 - 10:45

**Oral 9-1 Food availability affects parental anti-predator behaviour in red kites**

Martin U. Grüebler ORCID iD[1], Samuel Sieder[1,2], Patrick Scherler ORCID iD[1], Matthias Tschumi ORCID iD[1], Tobias Mühlemann[1,3], Stephanie Witczak ORCID iD[1,4]

[1]Swiss Ornithological Institute, Sempach, Switzerland. [2]University of Natural Resources and Life Sciences, Vienna, Austria. [3]ZHAW Life Sciences und Facility Management, Wädenswil, Switzerland. [4]Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Zürich, Switzerland

**Abstract**

Parental investment theory proposes two non-mutually exclusive hypotheses to explain variation in anti-predator behaviour in relation to the age of offspring: the “reproductive value of offspring” hypothesis and the “harm-to-offspring” hypothesis. The relative contribution of the two factors underlying the hypotheses, reproductive value and harm, may change depending on environmental conditions such as food availability. To test the relative importance of the two hypotheses under different food conditions, we conducted a supplementary feeding experiment in red kite (*Milvus milvus*) breeding pairs and used a live eagle owl (*Bubo bubo*) as decoy nest predator to trigger anti-predator behaviour in 371 predator exposure trials. We used capture probability and time-to-capture in mist nets mounted next to the decoy predator as proxy for mobbing intensity. Under natural food conditions we found a nearly constant mobbing intensity throughout the entire nestling period. However, under food-enhanced conditions mobbing intensity was reduced in parents with young nestlings and increased in parents with old nestlings. These results suggest greater importance of the “reproductive value of offspring” hypothesis in situations of favourable food availability. The results suggest that parental anti-predator investment is shaped by both, offspring vulnerability and offspring reproductive value with changing contributions in relation to offspring age. Thus, parental predator responses are dynamically adjusted to the current environmental conditions affecting vulnerability and reproductive values of offspring as well as parental predation risks.

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10:45 - 11:00

**Oral 9-2 Breaking rank: How group composition changes affect dominance in tree sparrows**

Attila Fulop ORCID iD[1,2,3], Péter Imre Fábián[1,4], Bianka Kocsis[1], Gabriella Kőmüves[5], Dóra Lukács[1], Gergő Oláh[1], Zoltán Barta ORCID iD[1]

[1]HUN-REN-UD Behavioural Ecology Research Group, Department of Evolutionary Zoology, University of Debrecen,, Debrecen, Hungary. [2]Evolutionary Ecology Group, Hungarian Department of Biology and Ecology, Babeş-Bolyai University, Cluj-Napoca, Romania. [3]STAR-UBB Institute of Advanced Studies in Science and Technology, Babeş-Bolyai University, Cluj-Napoca, Romania. [4]The Mina and Everard Goodman Faculty of Life Sciences, Bar Ilan University, Ramat Gan, Israel. [5]Behavioral Ecology Group, Department of Systematic Zoology and Ecology, ELTE Eötvös Loránd University, Budapest, Hungary

**Abstract**

The phenotypic composition of groups is an important factor in determining group functioning, for instance, through individual access to resources via the structure of the group's social dominance hierarchy. However, social groups are not permanent; their membership and composition change regularly (e.g., during fission-fusion events). These changes in group composition can affect the dominance structure of the group and, at an individual level, influence an individual's status (i.e., rank) and correlates of dominance. These processes are still poorly understood. We investigated the dominance structure in groups of tree sparrows (Passer montanus) and the relationship between dominance status and individual phenotypic traits (i.e., sex, bib size, and exploratory personality). Initially, we formed two groups of tree sparrows with random composition. Midway through the study, we mixed individuals from the two original groups to form two new groups. As a result, half of the individuals in each initial group were

replaced by new ones. Our findings show that, regardless of group composition, all groups exhibited a linear dominance hierarchy. In the initial groups, males had a higher dominance status than females. However, after re-mixing, males that were assigned to a new group had a lower status than they had in their initial group. Neither bib size nor exploratory personality proved to be reliable indicators of dominance status. Our results suggest that the costs of group (composition) change may be sex-dependent, with males incurring greater costs in terms of dominance status loss than females.

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11:00 - 11:15

**Oral 9-3 Super Size Me: how body size shapes king penguin dive performance**

Maëlle Oberlin ORCID iD[1], Yves Handrich ORCID iD[1], Charles-André Bost ORCID iD[2]

[1]Université de Strasbourg, CNRS, IPHC UMR 7178, Strasbourg, France. [2]Centre d'Etudes Biologiques de Chizé, CNRS, UMR 7372, Villiers en Bois, France

**Abstract**

During the breeding season, king penguins of the Crozet archipelago mainly target a predictable food source (myctophid fish) that is concentrated within the southern Polar Front (PF), at shallower depth than near their colonies. Climate change models predict shifts of the PF that would double the required travel distance for birds by 2100, with potentially dire consequences for the Crozet population. One way to buffer such predicted population decline could be through changes in foraging behaviour. For example, birds could target myctophid fish at greater depth but closer to the colony, rather than travel to the PF and forage at shallower depth. A prerequisite for such a scenario, however, is a sufficiently large dive capacity. In general, larger air-breathing vertebrates can dive for longer and deeper than smaller species, and this holds also true within species. However, little is known about the intraspecific variability in body size and underwater performance of divers. Here, we investigated the effect of body size on the dive performance of 34 king penguins from the Crozet Islands. We found that the effect of body size on dive performance became most apparent at greatest depth. Yet, it was not the generally better performance of the larger individuals that was most striking, but rather the limited performance of the smaller birds. These findings provide important insights into the ecological and physiological consequences of body size variation in king penguins, with implications for their potential responses to environmental change.

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11:15 - 11:30

**Oral 9-4 Individual, ecological, and demographic drivers of helping in a facultative cooperative breeder**

Jennifer Morinay ORCID iD, Ben Hatchwell ORCID iD

School of Biosciences, EEB, University of Sheffield, Sheffield, United Kingdom

**Abstract**

The evolution of sociality represents one of the major evolutionary transitions in the history of life, enabling the development of complex behaviours like cooperation. While the consequences of sociality for individuals' fitness are well understood, proximate drivers of cooperation remain contentious. We used 28 years of data from long-tailed tits—a facultative cooperative breeder—to study the ecological, demographic and individual drivers of cooperation. In long-tailed tits, failed breeders may help neighbours to provision their nestlings. We gathered decisions to help or not from 1434 failed breeders and extracted individual data (sex, immigration status) and 11 ecological and demographic features in the vicinity of their failed nest relating to predation pressure, population density, availability of kin and nests to help, and timing of breeding. We varied the scale at which these features were measured around failed nests (100m-1000m) to identify the most likely scale at which they act. Males and residents were more likely to help than females and immigrants, and both sexes were more likely to help when they had first order kin nearby (within 100m), especially residents. Among males, those that decided to help had experienced a lower predation pressure in their surroundings (from 450m) than non-helpers, presumably because predation reduces the availability of recipient nests. Among females, helpers bred in neighbourhoods (~150m radius) where the onset of breeding was early compared to those that did not help. Our findings highlight the interplay of multiple ecological, demographic and individual factors, offering new insights into the drivers of sociality.

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11:30 - 11:45

**Oral 9-5 Once a specialist always a specialist? Multiple techniques determine consistency of individual specialisation across traits.**

Thomas Bodey[1], Danielle Thompson[1], Beth Scott[1], Ana Payo-Payo[2], Alastair Baylis[3]

[1]University of Aberdeen, Aberdeen, United Kingdom. [2]Universidad Complutense, Madrid, Spain. [3]South Atlantic Environmental Research Institute, Stanley, Falkland Islands (Malvinas)

**Abstract**

Individual variation is central to determining how adaptable populations are to environmental change. Thus, apparently generalist species are often comprised of specialist individuals, but this individual specialisation is typically examined across only single functional or behavioural traits. Simultaneous consideration of multiple traits can reveal more nuanced mechanisms of divergence among individuals. We combined biologging (GPS and TDR) data from breeding Falkland Island shags *Leucocarbo atriceps albiventer* with stable isotope data to identify the extent of specialisation across both foraging movements and diet from 104 individuals at seven colonies. Levels of individual specialisation varied across colonies and across multiple movement metrics and dietary niche widths, as did the extent of individual consistency across multiple traits. By combining multiple techniques to determine the consistency of individual specialisation across traits, we gain deeper insights into the extent of behavioural syndromes for specialisation within a generalist species.

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11:45 - 12:00

**Oral 9-6 Who goes there? Using bioacoustic machine learning methods to investigate social recognition and context in long-tailed tit calls.**

Alexandra Jebb de Calais ORCID iD[1], Adam Stanton ORCID iD[1], Mickael Jacquier ORCID iD[1], Tom Lewis ORCID iD[2], Ben Hatchwell ORCID iD[1]

[1]University of Sheffield, Sheffield, United Kingdom. [2]Longleat, Warminster, United Kingdom

**Abstract**

Social species have diverse and often complex organisation, with individuals belonging to different hierarchical levels simultaneously. Consequently, the signals individuals use to communicate may encode many different kinds of social information, such as their regional origin, group membership, kinship and individual identity. Moreover, other contextual stimuli may add complexity to the information signals convey. Analysis of the information that phenotypic signals encode about social group membership within a hierarchy can therefore be extremely challenging. Recent developments in bioacoustics allow application of machine learning methods to questions about social recognition, facilitating analysis of vocal signals at greater resolution than permitted previously. Here, we apply these approaches to vocalisations collected from a well-studied population of long-tailed tits *Aegithalos caudatus*. Long-tailed tits are an excellent test species for categorization of the social information encoded by vocal signals because their seasonal fission-fusion society creates group membership at a range of social levels. We use a large, curated dataset on long-tailed tit vocalisations to, first, investigate the most suitable methodological approach to this task by varying sample sizes and dataset structures. We show, second, through a series of observational and experimental approaches how variation within calls can be attributed to individual and family identity, and also to context. Finally, we investigate how vocalisation complexity influences the classification accuracy by applying our method to a species with a more complex song, the great tit *Parus major*. We conclude that signals in social species can encode layers of information that may require sophisticated analytical tools to distinguish.

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# Oral session 10: Population ecology 1

10:30 - 12:00 Wednesday, 20th August, 2025

LR5

Chair: Alex Sutton

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10:30 - 10:45

**Oral 10-1 Intraspecific variation in demographic responses to environmental changes: insights from a large-scale study of four seabird populations**

Camille Schatz ORCID iD[1], Karine Delord ORCID iD[1], Dominique Joubert[1], Samuel Peroteau ORCID iD[1], Ruijiao Sun ORCID iD[2], Christophe Barbraud ORCID iD[1]

[1]Centre d'Etudes Biologiques de Chizé, UMR 7372 CNRS-La Rochelle Université, Villiers-en-bois, France. [2]Marine Science Institute, University of California Santa Barbara, Santa Barbara, California, USA

**Abstract**

Seabirds are one of the most threatened groups of birds, especially albatrosses which suffer additional mortality due to bycatch in fisheries, disease and introduced predators, all contributing to population declines. Successful conservation programs require estimations of demographic parameters, which are possible through the study of long-time series of capture–recapture data. However, the demography of several albatross species and populations remains poorly known. Here, we estimated multiple demographics parameters (survival probability, return probability, breeding probability and breeding success probability) for four populations of two closely related species of albatrosses: Sooty Albatrosses (*Phoebetria fusca*) and Light-Mantled Sooty Albatrosses (*Phoebetria palpebrata*) from two different biomes (subtropical and subantarctic) and monitored from 1966 to 2021. We also investigated the impact of fisheries and environmental covariates on these demographic parameters over time. Using multievent mark–recapture models to account for quasi-biennial breeding and for dealing with non-breeding individuals and state uncertainty, we showed negative effects of fishing effort on survival and breeding success, positive effects of wind velocity on breeding success, negative effects of warm sea surface temperature anomalies, and positive effects of sea ice concentration. We demonstrated that edge populations were more sensitive to oceanographic changes. Only northern populations' reproductive success was influenced by the speed of meridional winds, and a large-scale climate index affected western and eastern South Indian Ocean populations in opposite ways. This highlights our limited understanding of life-history trait variation and suggests that local environmental conditions and large-scale climate patterns may drive ecological diversity across species' ranges.

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10:45 - 11:00

**Oral 10-2 Adult survival, productivity, and European songbird population dynamics**

Inari Nousiainen ORCID iD[1], Laura Bosco[1], Petteri Lehikoinen[1], Rob Robinson[2], Markus Piha[3], Aleksi Lehikoinen[1]

[1]LUOMUS - Finnish Museum of Natural History, Helsinki, Finland. [2]British Trust for Ornithology, Norfolk, United Kingdom. [3]LUKE - Natural Resources Institute Finland, Helsinki, Finland

**Abstract**

Biodiversity is decreasing at an alarming rate, and there is an urgent need to understand the demographic drivers behind population declines. Therefore, it is important to study the different stages of a species' life cycle, including adult survival and productivity. It is still poorly understood whether adult survival or productivity has a stronger role in population dynamics, and how the role of adult survival and productivity varies spatially in relation to species' traits. I used bird ringing data from the European Constant Effort Sites (EuroCES) project from the years 2000–2021, with 1.2 million captures of 33 songbird species from ten European countries. I investigated the role of productivity and adult survival in annual population dynamics and how it was affected by spatio-climatic gradient (measured as average breeding season temperature per country), migratory strategy (long- vs. short-distance and resident birds), and breeding habitat (forest vs. other habitats) by using linear mixed effect models. My results suggests that adult survival is a more important driver of annual population dynamics than productivity in European

songbirds. The importance of adult survival and productivity varied spatially, both having a weaker role in warmer regions. The role of adult survival was even stronger for long-distance migrants compared to short-distance migrants or resident birds. I will discuss these patterns in relation to the observed long-term trends in adult survival and productivity in European songbirds.

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11:00 - 11:15

**Oral 10-3 Mesoscale eddies provide foraging opportunities for penguins across the Southern Ocean**

Joshua Wilson ORCID iD[1,2], Phil Trathan ORCID iD[2], Hugh Venables ORCID iD[2], Alistair Baylis[3], Charles-André Bost ORCID iD[4], Louise Emmerson ORCID iD[5], Kimberley Goetz[6], Jefferson Hinke ORCID iD[7], Catharine Horswill ORCID iD[8], Aymeric Houstin ORCID iD[9], Akiko Kato ORCID iD[4], Nobuo Kokubun ORCID iD[10], Gerald Kooyman[11], Małgorzata Korczak-Abshire ORCID iD[12], Sara Labrousse ORCID iD[13], Celine le Bohec ORCID iD[14], Andrew Lowther ORCID iD[15], Phil Lyver ORCID iD[16], Ana Laura Machado-Gaye ORCID iD[17], Azwianewi Makhado ORCID iD[18], Silvia Olmastroni ORCID iD[19], Pierre Pistorius ORCID iD[20], Roland Proud ORCID iD[21], Klemens Pütz ORCID iD[22], Norman Ratcliffe ORCID iD[2], Yan Ropert-Coudert ORCID iD[4], Peter Ryan ORCID iD[23], Mercedes Santos[24], Richard Sherley ORCID iD[25], Alvaro Soutullo ORCID iD[17], Akinori Takahashi ORCID iD[10], Barbara Wienecke ORCID iD[5], Daniel Zitterbart ORCID iD[9], Ryan Reisinger ORCID iD[1]

[1]University of Southampton, Southampton, United Kingdom. [2]British Antarctic Survey, Cambridge, United Kingdom. [3]South Atlantic Environmental Research Institute, Stanley, Falkland Islands (Malvinas). [4]Centre for Biological Studies of Chizé, Villiers-en-Bois, France. [5]Australian Antarctic Division, Hobart, Australia. [6]National Oceanic and Atmospheric Administration, Seattle, USA. [7]National Oceanic and Atmospheric Administration, San Diego, USA. [8]Zoological Society of London, London, United Kingdom. [9]Woods Hole Oceanographic Institute, Falmouth, USA. [10]National Institute of Polar Research, Tachikawa, Japan. [11]University of California, San Diego, USA. [12]Polish Academy of Sciences, Warsaw, Poland. [13]Sorbonne Université, Paris, France. [14]Scientific Center of Monaco, Monaco, Monaco. [15]Norweigan Polar Institute, Tromsø, Norway. [16]Landcare Research, Lincoln, New Zealand. [17]Universidad de la República, Montevideo, Uruguay. [18]Department of Forestry, Fisheries and the Environmental Affairs, Cape Town, South Africa. [19]Università degli Studi di Siena, Siena, Italy. [20]Nelson Mandela University, Gqeberha, South Africa. [21]University of St Andrews, St Andrews, United Kingdom. [22]Antarctic Research Trust, Bremen, Germany. [23]University of Cape Town, Cape Town, South Africa. [24]Instituto Antártico Argentino, Villa Lynch, Argentina. [25]University of Exeter, Penryn, United Kingdom

**Abstract**

Mesoscale eddies are rotating vortices of water that perturb the local physical, chemical, and biological environment. In the Southern Ocean, penguins inhabit regions of intense eddy activity, which can improve local foraging opportunities. Climate change is predicted to intensify Southern Ocean eddies, and winners and losers could arise among penguin species depending on whether they exploit these oceanographic features. To better understand the relationships between penguins and eddies, we collated tracking data for five species (Emperor, Chinstrap, Adélie, King, and Macaroni), totalling 3189 individuals from 60 different colonies. First, data were subset to allow comparisons between different colonies and breeding stages. We then fit Hidden Markov Models to tracks to identify Area-Restricted-Search behaviour and used Generalised Additive Mixed Models to relate this behaviour to local eddy dynamics. Following this, we profiled the local environment for every colony to assess whether statistical results could be supported by the literature. We found evidence of each species exploiting eddies as foraging habitat. Generally, colonies that could access the eddy-rich Antarctic Circumpolar Current and other frontal systems exploited eddies most frequently. Breeding stages when penguins were constrained to a central place but could engage in trips spanning several days also demonstrated greater preference for eddies. The mechanisms through which eddies provided foraging opportunities varied, influenced often by local bathymetry or sea-ice dynamics. These findings suggest that penguins are unlikely to be negatively impacted by predicted changes to eddy fields as they navigate other threats arising from environmental change.

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11:15 - 11:30

**Oral 10-4 Short-term responses of the montane bird community to an extreme wildfire in northwestern Iberia**

Fernando García-Fernández ORCID iD, María Vidal ORCID iD, Jesús Domínguez ORCID iD

Department of Zoology, Genetics and Physical Anthropology, University of Santiago de Compostela, Santiago de Compostea, Spain

**Abstract**

Fire is a key ecological driver in Mediterranean-type climate (MTC) ecosystems, shaping biodiversity through selective pressure on life-history traits and promoting functional differentiation. Bird communities in MTC regions are generally resilient to disturbance, and fire rarely causes drastic shifts in species composition. However, the interaction between climate change, rural abandonment, and fire suppression policies has significantly altered natural fire regimes, increasing the risk of extreme wildfires. This shift is particularly evident in Mediterranean mountain landscapes, where land abandonment has led to greater vegetation continuity and homogeneity, exacerbating fire severity. We assessed how spatial and severity attributes of an extreme wildfire influenced short-term bird responses across community, population, and functional levels in a Mediterranean mountainous landscape of NW Spain. One year post-fire, we conducted 215 point counts (10 min each) in burned and unburned control zones. Preliminary results indicate that burned areas favoured granivores, insectivores, and habitat generalists, as well as overall bird abundance. Open-habitat species also thrived within the burned area, highlighting the role of post-fire habitat heterogeneity in promoting certain species and functional groups. Conversely, fire severity had a consistently negative impact across all community and functional metrics considered and adversely affected 40% of the modelled species, particularly shrub-dependent taxa. These findings highlight the need to consider fire severity and spatial heterogeneity when predicting fire impacts on bird communities. However, long-term monitoring is needed as the magnitude and direction of the observed responses will likely shift with vegetation recovery and post-fire succession.

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11:30 - 11:45

**Oral 10-5 A first assessment on the demographic impact of the recent Highly Pathogenic Avian Influenza panzootic: general insights from the Dutch peregrine falcon population**

Jaume A. Badia-Boher ORCID iD[1], Marc Kéry[1], Martin Mollet[2], Peter van Geneijgen[2], Michael Schaub[1], Henk van der Jeugd[3]

[1]Swiss Ornithological Institute, Sempach, Switzerland. [2]Werkgroep Roofvogels Nederland, Wapse, Netherlands. [3]Nederlands Instituut voor Ecologie (NIOO-KNAW) Nederlands Instituut voor Ecologie, Wageningen, Netherlands

**Abstract**

The ongoing Highly Pathogenic Avian Influenza (HPAI-H5N1) panzootic is the most severe panzootic ever recorded. Since its emergence in late 2020, the virus has triggered widespread outbreaks resulting in unprecedented mortality in many bird and mammal species, including some of conservation concern. Despite these alarming trends, demographic models have rarely been applied to assess the population-level effects of HPAI, limiting our understanding of its implications for population dynamics and conservation. In this study, we employed an Integrated Population Model (IPM) to analyze the long-term population dynamics of peregrine falcons in the Netherlands, incorporating data from the panzootic years. By integrating breeding pair counts, breeding surveys, and mark-resighting data, we estimated age-structured survival rates, productivity, and stage-specific population dynamics while accounting for temporal variation. Our results reveal a sharp decline in adult survival probabilities and breeding pair numbers in 2022 and 2023, coinciding with major HPAI outbreaks. Survival declines of such magnitude are of large concern given the important role of adult survival for population viability. In contrast, juvenile survival and productivity remained relatively stable during the panzootic. Population projections indicate an estimated recovery time of approximately 10 years to reach pre-panzootic breeding pair numbers. However, outbreaks in future years may jeopardize this recovery. Further demographic research is urgently needed to determine whether similar declines in adult survival are occurring in other species, as such trends could signal a shift in the demographic effects of HPAI, posing a threat to the conservation of long-lived species.

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11:45 - 12:00

**Oral 10-6 Decrypting the most critical stage in Black-tailed godwit population dynamics**

Marie Stessens[1,2], Theunis Piersma[1,2,3], Rienk W. Fokkema[1,2], Jos C. E. W. Hooijmeijer[1,2], Egbert van der Velde[1,2], Eldar Rakhimberdiev[2,4]

[1]University of Groningen, Groningen, Netherlands. [2]BirdEyes, Centre for Global Ecological Change, Leeuwarden, Netherlands. [3]NIOZ Royal Netherlands Institute for Sea Research, Texel, Netherlands. [4]University of Amsterdam (IBED), Amsterdam, Netherlands

**Abstract**

Designing efficient conservation measures requires detailed knowledge on the population dynamics of a species. Ideally, conservation actions target life stages that are influential and manageable, implicating that small changes in the vital rates during these stages have a maximal effect on population growth rates. One of the groups of birds in need of conservation are waders. The reasons for wader population declines are often found during the stage of reproduction. Unfortunately, obtaining detailed insight into waders full reproductive process is challenging, as they have a tendency to renest and their precocial chicks are inconspicuous. By applying misidentification-aware capture-recapture models to demographic data of a declining wader species, the Black-tailed godwit (*Limosa limosa limosa*), we compared the relative importance of increasing the survival during 1) the nesting stage, 2) the 30-day long flightless phase of chicks (pre-fledging) and 3) the remaining time in their first calendar year (post-fledging), for achieving a stable population. Specifically, our decade-long study on the reproductive success of Dutch Black-tailed godwits showed that the population growth rate was most sensitive to changes in pre-fledging survival. Management actions focused on increasing other phases such as nest or post-fledging survival will thus only impact growth rates minimally, while small changes in pre-fledging survival are expected to generate the fastest population increases. Our results demonstrate that it is possible to identify very specific life phases on which to focus conservation efforts in order to maximize their efficiency.

# Plenary lecture - Davide Dominoni: Navigating the urban jungle - From individuals to population processes of city birds

13:30 - 14:30 Wednesday, 20th August, 2025

PL5

Chair: Barbara Helm

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**Plenary 5** **Navigating the Urban Jungle: From Individuals to Population Processes of City Birds**

Davide Dominoni ORCID iD

University of Glasgow, Glasgow, United Kingdom

**Abstract**

Cities are natural laboratories where we can study how animals colonise novel environments, cope with changes in habitat characteristics, and ultimately adapt to urban life. However, cities are also often associated with reduced biodiversity, individual health and reproductive output. Understanding why this is the case, and what we can do about it, is an urgent matter of urban ecology and more in general of conservation biology. In my talk I will present findings from a 35-km gradient system in Glasgow, Scotland, which we use to study the urban ecology of blue and great tits. I will discuss urban drivers of changes in life-history traits, the consequences of such changes for reproductive and survival, and the impact that these may have on population dynamics.

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# Poster pitches 2

14:30 - 15:00 Wednesday, 20th August, 2025

PL5

Chair: Koley Freeman

14:30 - 14:32

**PP-2 Disappearing barn owl (*Tyto alba*) nesting sites in the Carpathian Basin: The number of available barn owl nesting sites has been halved in the past decades**

Zoltán Schneider ORCID iD[1,2], Ákos Klein[2], Balázs Móczár[3,2], Miklós Laczi ORCID iD[4,5,2]

[1]Doctoral School of Biology and Sport Biology, Faculty of Sciences, University of Pécs, Pécs, Hungary. [2]The Barn Owl Foundation, Orosztony, Hungary. [3]Veszprém County Group of BirdfLife Hungary, Balatonkenese, Hungary. [4]HUN-REN–ELTE–MTM Integrative Ecology Research Group, ELTE Eötvös Loránd University, Budapest, Hungary. [5]Behavioural Ecology Group, Department of Systematic Zoology and Ecology, ELTE Eötvös Loránd University, Budapest, Hungary

**Abstract**

In Central Europe, churches represent one of the most important breeding sites for barn owls (Tyto alba). However, due to church renovations and tower closures, owls are increasingly being forced out of such nesting sites. An additional factor that potentially have a negative impact on nesting site availability is the placement of internet transmitter stations in church towers. In 2024, we examined 92 churches in which the continuous presence of the species had previously confirmed, and there have not been active conservation in the last 7-25 years (depending on the location). 46% of these buildings remained available to barn owls. In 22% of the surveyed buildings, we found at least some trace of the species' presence, and in 16%, we also found breeding. There was no association between closure (accessibility as nesting site) and building renovations, or the presence of internet transmitter stations. Importantly, in buildings remained open, the species' presence did not associate with the presence of internet transmitter stations. Furthermore, we revealed that the unproper building closure and maintenance poses serious risks for owls, allowing entry but not exit, thus functioning as traps. This highly overlooked risk factor could even lead to mass mortality of barn owls, hence this should be taken into account in species protection plans. The churches are still important resting and breeding sites for the species in Hungary. However, the accessibility of these nesting sites has enormously decreased due to closures. This emphasizes the need for active conservation efforts.

14:32 - 14:34

**PP-4 Using Multi-Sensor Geolocators to Unravel the Migratory Strategies of Short-Distance, Intra-European Migratory Birds.**

Paul Doniol-Valcroze ORCID iD[1], Pierrick Bocher[2], Yannig Coulomb[1], Sophie de Grissac[1], Rose Delacroix[2], Fanny Rey[3], Frédéric Jiguet[1]

[1]CESCO, MNHN, CNRS, Sorbonne Université, Paris, France. [2]Laboratory Littoral Environnement et Sociétés UMR LIENSs 7266 CNRS-La Rochelle University, La Rochelle, France. [3]Laboratory Littoral Environnement et Sociétés UMR LIENSs 7266 CNRS-La Rochelle University, Paris, France

**Abstract**

Passerine migration research has recently benefited from considerable technological advances, including the ongoing miniaturization of loggers, enabling the tracking of increasingly smaller species. Additionally, the use of multi-sensor loggers has significantly improved our ability to refine stopover detection and location, as well as to describe previously unknown migratory behaviors. To date, most tracking studies using these cutting-edge methods have focused on long-distance, transcontinental migratory species, revealing fascinating details about their migratory strategies (e.g., astonishing flight distances, altitudes, or durations). However, much less is known about the relatively less spectacular migratory strategies of short-distance (e.g., intracontinental) migrants,

possibly due to the limitations of previously used twilight-based tracking approaches. This research imbalance toward long-distance migrants hampers both fundamental and conservation-related aspects of migration research. In this study, we focus on intra-European short-distance migrants—namely, the Meadow Pipit, the Eurasian Reed Bunting, and the Bluethroat—providing a detailed analysis of their previously unknown migratory strategies using multi-sensor loggers. We also contrast the characteristics and constraints of these short-distance migratory strategies with those of related long-distance transcontinental migrants. This study is among the first to focus on intra-European migrants, opening up new perspectives for the study of previously overlooked migratory strategies. Furthermore, it demonstrates the effectiveness of multi-sensor tracking approaches in investigating short-distance migratory behaviors that were previously technically challenging to study.

14:34 - 14:36

**PP-6 High throughput measures of mitochondrial function in avian blood cells: use of a plate reader as an alternative to the Oroboros instrument**

Cloé Hadjadji[1], Molly Ohse[1], Antoine Stier[2], Pierre Bize[1]

[1]Swiss Ornithological Institute, Sempach, Switzerland. [2]University of Strasbourg, CNRS, Strasbourg, France

**Abstract**

As mitochondria power almost all biological processes, there is growing interest in measuring mitochondrial function to gain new insights into the source of individual variations in performance and fitness. The discovery of functional mitochondria in avian red blood cells (RBCs) has made birds an ideal model species for such studies. Currently, the golden standard approach in cell physiology is to measure avian RBC mitochondrial respiration, and thereby function, using a high-resolution respirometer instrument (Oroboros). However, one of the main limitations of this approach is that measurements are limited to a maximum of two individuals per series of measurements and per instrument. In this study, we present an alternative approach where avian RBC mitochondrial respiration is quantified using a plate-based analysis and the phosphorescent oxygen sensing probe MitoXpress™. We demonstrate that both approaches provide quantitatively similar results. Thus, by enabling the measurement of mitochondrial respiration of a larger number of individuals on the same plate during shorter measurement series, this high-throughput approach opens new doors to answer ecological and evolutionary questions for which large sample sizes are a prerequisite, such as testing for natural selection and the heritability of mitochondrial function.

14:36 - 14:38

**PP-8 Does nest location matter in the city? Reproductive consequences of substrate choice in the European blackbird (*Turdus merula*)**

Noémi Pallás, Iván Alejandro González Andazola, Judit Szabados, Bianka Kocsis, Zoltán Németh ORCID iD

University of Debrecen, Debrecen, Hungary

**Abstract**

Urbanization is rapidly transforming natural landscapes, imposing challenges and opportunities for wildlife. Birds, particularly open-cup nesters, must adapt to changes in habitat structure, resource availability, and landscape of predation risk. While some species thrive in cities, the effects of urbanization on their nesting behavior and reproductive success remain unclear. Our long-term study investigates the timing and use of nesting sites by European blackbirds (*Turdus merula*), a widely urbanized species, across urban and forested habitats and evaluates the associated fitness consequences. Over seven breeding seasons (2018-2024), we monitored nests in four study areas in Debrecen, Hungary, each representing different levels of urbanization. We analyzed the use of three main nesting substrates – deciduous plants, evergreen plants, and anthropogenic structures – and assessed their influence on breeding timing and reproductive success. We hypothesized that blackbirds would initiate egg-laying on evergreen vegetation due to its year-round concealment, enabling earlier breeding. Furthermore, we predicted that reproductive success would vary depending on nest substrate, with anthropogenic sites exhibiting lower reproductive success due to their increased exposure. Our findings revealed that while blackbirds indeed began breeding earlier on evergreens, contrary to our expectations, nests on anthropogenic structures had lower predation and abandonment rates and higher breeding success than those on vegetation, likely due to the so-called ‘human shield effect’. These results provide insight into the adaptive responses of blackbirds to urbanization, shedding light on trade-offs associated with different nesting substrates. Understanding these dynamics is crucial for conservation strategies to mitigate the impacts of habitat modification on avian

populations.

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14:38 - 14:40

**PP-10 Environmental Drivers of Spring Bird Arrivals: The Role of Weather and Food Availability Uncovered by a Long-Term Study**

Jakub Zając ORCID iD[1,2], Julia Barczyk ORCID iD[1], Marta Cholewa ORCID iD[1], Dorota Czeszczewik ORCID iD[3], Grzegorz Hebda ORCID iD[4], Fränzi Korner-Nievergelt ORCID iD[5], Marta Maziarz ORCID iD[6], Cezary Mitrus ORCID iD[7], Patryk Rowiński ORCID iD[8], Grzegorz Neubauer ORCID iD[6]

[1]University of Wrocław, Wrocław, Poland. [2]The Polish Society for the Protection of Birds (OTOP), Warsaw, Poland. [3]University of Siedlce, Siedlce, Poland. [4]University of Opole, Opole, Poland. [5]Swiss Ornithological Institute, Sepmach, Switzerland. [6]Polish Academy of Sciences, Warsaw, Poland. [7]Wroclaw University of Environmental and Life Sciences, Wrocław, Poland. [8]Warsaw University of Life Sciences, Warsaw, Poland

**Abstract**

Seasonal patterns in the Northern Hemisphere are becoming increasingly disrupted by ongoing climate change. Earlier and warmer springs advance the phenology of vegetation and leaf-eating insects, i.e. caterpillars. For migratory birds, this creates potentially favourable conditions for advancing their spring arrival, as weather conditions and food resources essential for breeding become available sooner. We analysed 50 years of observations of bird arrivals in the Białowieża Forest, Poland, to investigate the relationship between migration timing, weather conditions, and food availability. Most species have advanced their arrival dates, but the extent of the change varies depending on life-history and ecological traits, such as breeding strategy, wintering range, and habitat preference. Our results indicate that the interaction between weather conditions and food availability plays a crucial role in the advancement of migration timing. The "warm and early spring effect" leads to earlier arrivals and was more visible in years of caterpillar outbreaks, which occur periodically, and much weaker in years with low caterpillar abundance. This suggests that migratory birds adjust their arrival not only in response to weather conditions but also based on cues related to expected food availability at breeding grounds. These findings highlight the complex effects of climate change on migratory patterns and the importance of considering multiple environmental factors when predicting future changes in bird migration.

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14:40 - 14:42

**PP-12 Apps to use bird telemetry data for real-time monitoring**

Lara Gross, Steffen Oppel ORCID iD, Valentijn van Bergen, Ginny Chan, Benedetta Catitti, Florian Orgeret, Stephanie Witczak, Ursin Beeli, Patrick Scherler, Martin Grüebler ORCID iD

Schweizerische Vogelwarte, Sempach, Switzerland

**Abstract**

Technical progress is constantly improving the way we study wildlife. For the last 3 decades devices to track the movements of animals have become smaller and more powerful. In addition to unprecedented insights into animal movements, new analytic approaches can also extract demographic information from such tracking data. To facilitate real-time monitoring of demographic parameters like mortality and breeding success, we developed two ShinyApps that allow users to assess the status of tracked birds in real time. Both apps require that telemetry data are stored in a Movebank project. The user enters their Movebank credentials to retrieve the real-time tracking data, and some additional parameters to customize the app to different species' movement behaviours. The first app (https://vogelwarte.shinyapps.io/BirdCheck/) facilitates easy inspection of the most recent locations of a tracked animal, including a map and other sensors that indicate whether an individual is alive or not. The second app (https://vogelwarte.shinyapps.io/NestFind/) is useful for monitoring birds during the breeding season because it determines the most likely nest location for each bird. This analysis is based on a user-specified time window and movement radius and calculates the number of repeated visits to each location. This app also allows downloading of nest locations for offline navigation devices and therefore reduces the search effort for field staff. We demonstrate the utility of these apps for a large telemetry project with >450 individual red kites (*Milvus milvus*) tracked with GPS-GSM transmitters.

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14:42 - 14:44

**PP-14 How personal knowledge of local atmospheric dynamics in naive Andean Condors guides optimal movement strategies**

Anna Schneider ORCID iD[1], Hannah Williams[1,2]

[1]University of Constance, Constance, Germany. [2]Max-Planck Institute of Animal Behavior, Constance, Germany

**Abstract**

Movement within an animal's home range is primarily influenced by body size and energy availability. This becomes evident in the wide-ranging, obligate soaring Andean Condor (*Vultur gryphus*), capable of covering hundreds of kilometers per day. As the world's heaviest soaring birds, condors rely on their ability to leverage thermal energy, optimizing space-use and minimizing energy expenditure. Despite being classified as vulnerable, little is known about how flight experience and habitat knowledge affect movement performance. This study therefore investigates how condors adjust their movement patterns to minimize flight costs and how these patterns change with experience gained in unfamiliar terrain, potentially revealing a learning curve in spatial behavior. We collected high-frequency movement and performance data from bio-loggers on condors released from captivity within a closed mountain range. This unique pseudo-controlled experiment allowed separation of flight experience from local knowledge to quantify the effect of habitat familiarity on performance and space use. We predict that flight performance will improve with experience and time spent in the habitat, as previous studies have shown that soaring performance increases with a condor's age. We also expect condors to revisit known beneficial roosting and foraging sites, as well as areas where thermals frequently occur, given that past research has demonstrated that condors select distinct sites for specific activities based on local habitat properties. Our findings support condor conservation efforts by identifying key areas naturally frequented. Additionally, we aim to optimize reintroduction strategies by selecting suitable release sites and thereby mitigating risks for young or inexperienced individuals.

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14:44 - 14:46

**PP-16 Increasing the accessibility of critical research and conservation information using Birds of the World, a global platform for avian life history synthesis**

Yoav Perlman ORCID iD, Shawn Billerman ORCID iD, Guy Kirwan ORCID iD, Nicholas Sly ORCID iD

Cornell Lab of Ornithology, Ithaca, USA

**Abstract**

Sharing life-history knowledge is essential for ornithologists as we collaborate on solutions to the multi-faceted biodiversity crisis. However, species information is scattered and often incomplete. Increased cooperation among stakeholders is vital to ensure broad accessibility of species knowledge for use in conservation. *Birds of the World* (BOW) presents a dynamic, global platform for synthesizing vast ornithological knowledge. Launched in 2020, BOW combines previous projects HBW, *Neotropical Birds*, and Birds of North America, and is now the largest, most comprehensive reference featuring complete life histories of every bird. Working with a global network of 35 partner organizations and more than 2200 contributors who are passionate about sharing their expertise on this central platform has been key to maximizing this tool's usefulness and keeping it up-to-date. Since launch, this network has powered updates to 2707 species accounts (24% of the world's species) with new life history information. BOW now offers free access across the Global South, and all accounts have been translated into Spanish (with more languages in development), greatly expanding access to this content. This expansion of both reach and content, including more material from regional and non-English-language sources, has already yielded new insights in research and conservation. We are committed to continuing to grow a diverse team of contributors. By showcasing avian expertise by those who know the birds best, we hope that transformative insights for global bird research and conservation can be unlocked.

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14:46 - 14:48

**PP-18 Foraging Habitat Selection of the Eurasian Goshawk in Forest Landscape**

Jaan Grosberg[1], Ülo Väli ORCID iD[1,2], Paweł Mirski ORCID iD[1,2]

[1]Estonian University of Life Sciences, Tartu, Estonia. [2]University of Białystok, Białystok, Poland

**Abstract**

The Eurasian Goshawk (Astur gentilis) is an avian predator benefitting from heterogeneous forest structure. We used GPS-tracking to identify key ecological factors shaping the foraging habitat selection of Goshawks in forests and thereby evaluated the potential of the species to indicate high conservation-value forests. We tracked 27 Goshawks for up to six years in a 5,300 km2 study area in Estonia (north-eastern Europe) and used Resource Selection Function approach with Generalized Linear Mixed Models to detect seasonal and sex-specific variations in habitat selection. Goshawks exhibited distinct preferences for mature, structurally complex high conservation-value forests with abundant lying deadwood, and proximity to water bodies. Females were favoring older, denser forests closer to edges, while males demonstrated greater flexibility, utilizing a broader range of forest types. Seasonal variations were also observed, with coniferous forests becoming more critical for females during defoliated periods, while males showed a stronger preference for deciduous forests year-round. By elucidating the habitat preferences of the Goshawk, an indicator species, our study highlights the importance of maintaining diverse forests. Our findings also inform potential conservation strategies for preserving high-value forest habitats.

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14:48 - 14:50

**PP-20 How reliable are point counts in estimating true abundance? A field evaluation of three forest bird species**

Julia Barczyk[1], Marc Kéry[2], Jaume Badia-Boher[2], Ricardo Carrizo Vergara[2], Marta Cholewa[1], Grzegorz Neubauer[3,1]

[1]University of Wrocław, Wrocław, Poland. [2]Swiss Ornithological Institute, Sempach, Switzerland. [3]Ornithological Station Museum and Institute of Zoology, Polish Academy of Sciences, Gdańsk, Poland

**Abstract**

Abundance is a fundamental piece of information in ecology, but obtaining reliable estimates of population size is far from trivial. This is true for most birds: they are difficult to count and observed numbers will typically be lower than true abundance due to imperfect detection. To obtain more precise estimates, methodology for assessing bird abundance has been improved for decades resulting in several field protocols proposed for passerines only, like the territory mapping method with multiple surveys per season. Modern abundance assessment methods tend to be less field-intensive, as they are based on fewer repeated visits and the use of statistical models that correct observed numbers for imperfect detection. In this study, we aimed to verify how well abundance estimates from generalized *N*-mixture and distance sampling models applied to point counts results agree with “true abundance”. To achieve this, we performed repeated point counts on seven study plots in the Białowieża Forest (Poland) over four years. At the same time, we conducted exhaustive search for nests and territories of the three target bird species (Wood Warbler, Nuthatch, and Marsh Tit) to obtain per-plot “true abundances”. Our results provide valuable insights for estimating abundance and highlight the most effective approach for obtaining precise estimates.

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14:50 - 14:52

**PP-22 Warm and cool temperatures decrease early-life telomere length in wild pied flycatchers**

Clémence Furic[1], Coline Marciau[2], Bin-Yan Hsu[3], Nina Cossin-Sevrin[1], Julie Fleitz[1], Sophie Reichert[1], Suvi Ruuskanen[1], Antoine Stier[4]

[1]Department of Biology, University of Turku, Finland. [2]Institute for Marine and Antarctic Studies, University of Tasmania, Australia. [3]Department of Life Science, Tunghai University, Taiwan. [4]Department of Ecology, Physiology and Ethology, Strasbourg University, France

**Abstract**

Climate change represents one major challenge for avian species. It is characterized by an increase in average ambient temperature, but also in occurrence of extreme weather events, such as heat waves and cold snaps. These abrupt temperature changes can modify the immediate and long-term survival prospects of nestling birds when their thermoregulatory capacities are still not fully developed. While immediate nestling survival can easily be measured, long-term survival is more challenging to evaluate. Yet, early-life telomere length has been suggested as a potential biomarker of fitness prospects. To evaluate the potential impact of changes in early-life temperature, we thus experimentally increased (*ca.* +2°C) and decreased (*ca.* -1.5°C) nestbox temperatures in wild pied flycatchers (*Ficedula hypoleuca*) during nestling postnatal growth, and measured nestling telomere length before fledging. Shorter telomeres were observed in individuals exposed both to an experimental heating or cooling during growth. Our results suggests that long-term survival prospects or long-term performance of individuals exposed to abrupt changes in early-life temperature may be decreased.

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14:52 - 14:54

**PP-24 Mitochondrial function and the Lansing effect**

Winnie Boner[1], Edward Ivimey-Cook[1], Cara Cochrane[1], Sophie DuPont[2,3], Pat Monaghan[1]

[1]University of Glasgow, Glasgow, United Kingdom. [2]CEFE, Montpellier University, Montpellier, France. [3]Centro de Investigacao Em Biodiversidade e Recursos Geneticos, Porto, Portugal

**Abstract**

Understanding why and how the ageing process occurs has long been an intense area of research across many scientific disciplines. However, such studies have mainly focused on somatic cell deterioration and mechanisms surrounding within-individual ageing. As a result, the potential for intergenerational transfer of ageing between parents and offspring has largely been neglected. There is empirical evidence of a negative relationship between the age of parents and lifespan of the offspring in many species (including the zebra finch), referred to as the Lansing effect. We are examining the mechanisms by which advanced maternal age gives rise to shorter-lived offspring, whether this is affected by the degree of stress exposure offspring experience in early life, and whether effects are manifest via higher baseline frailty or faster age-related deterioration. This poster will present preliminary data on various components of mitochondrial function in the offspring from young (1yr) and old (3.5+yrs) mothers in the zebra finch relatively early in their lives.

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14:56 - 14:58

**PP-28 Grit as a source of mate-feeding and territory advertisement in a colonial raptor**

Alejandro Corregidor-Castro ORCID iD[1,2], Mickael Jacquier ORCID iD[3], Alessandro Berlusconi ORCID iD[4], Florane Evrard[1], Jacopo G. Cecere ORCID iD[5], Michelangelo Morganti ORCID iD[6,2], Andrea Pilastro ORCID iD[1,2], Diego Rubolini ORCID iD[4], Jennifer Morinay ORCID iD[3]

[1]Dipartimento di Biologia, University of Padua, Padova, Italy. [2]National Biodiversity Future Centre, Palermo, Italy. [3]School of Biosciences, EEB, University of Sheffield, Sheffield, United Kingdom. [4]Dipartimento di Scienze e Politiche Ambientali, University of Milan, Milan, Italy. [5]Area Avifauna Migratrice, Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), Ozzano dell'Emilia, Italy. [6]Consiglio Nazionale delle Ricerche – Istituto di Ricerca sulle Acque (CNR-IRSA), Brugherio, Italy

**Abstract**

Mate feeding, the behaviour whereby a breeder provides food to its partner, is a sexually selected trait observed across various animal taxa. In monogamous birds with biparental care, this behavior may also serve as a signal of male quality and future parental investment. While mate feeding and its evolution are well-studied, the provision of resources other than typical food items, such as calcareous stones in geophagous species, remains unexplored. Here, we report a novel behaviour in lesser kestrels (*Falco naumanni*): breeders deposit small grit atop nest boxes, which females consume. We studied this behaviour in a large nest box breeding population of lesser kestrels in Matera, southern Italy, over four years, combining classic breeding monitoring, video recordings and experimental presentations of different types of grit. Females consumed grit more frequently than males, and nest boxes with

grit were usually occupied by breeders (82%). Grit deposition on occupied boxes was higher in densely populated sub-colonies than is less dense sub-colonies (31% and 22% of nest boxes with grit respectively), suggesting a role of grit deposition in territory advertisement. This was supported by the predominant placement of grit atop nest boxes (82%) rather than nearby. Additionally, grit deposition tended to correlate with prey delivery during courtship and the pre-laying phase. Our findings reveal a previously undocumented behaviour, highlighting the potential dual function of grit as both a nutritional resource and a signal in sexual selection and territory retention. This study enhances our understanding of mate provisioning and resource use in geophagous birds.

# Symposium 5: Adapting to the world ahead - How the developmental environment shapes adult phenotype for the better or worse

15:30 - 17:00 Wednesday, 20th August, 2025

MALT

Conveners: Elin Persson, Joshua K. R. Tabh, and Elisa Thoral

Over the past century, amassing evidence has shown us that many traits, from mating tactics, plumage colouration, bill size, migratory strategy, and physiology, are also shaped by plastic responses to the environment during development. Such responses, from short- to long-term, adaptive to non-adaptive, are increasingly identified in response to both anthropogenic and non-anthropogenic shifts in the developmental environment. Understanding these plastic responses, their mechanisms, manifestations, and functional consequences, is likely to help illuminate the future paths of avian form, function, and selection. This symposium aims to explore the manifold ways in which: (1) the developmental environment shifts avian phenotypes, and (2) how these shifts may influence the performance and/or fitness of individuals.

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15:35 - 16:00

**S5 Keynote Bad beginnings and untimely ends: early life conditions and why they matter.**

Pat Monaghan

University of Glasgow, Glasgw, United Kingdom

**Abstract**

Conditions during development can profoundly influence offspring phenotypes, and evolution has shaped many aspects of reproductive behaviour to provide offspring with optimal developmental conditions. However, developmental conditions do not simply permit development; they can potentially shape it in ways that better tailor the resulting individual to prevailing conditions. To influence phenotypes in such adaptive ways, the future environment has to be reasonably predictable, and this information signalled either directly or indirectly to the developing organism. Retaining the developing embryo inside the mother can buffer offspring from potentially damaging effects of pre-natal environmental harshness, and post-natal parental care also contribute. Interestingly, birds are the only vertebrate class in which there are no viviparous species, and the reasons for this are not entirely clear, but parental care is nonetheless intense. Early life conditions in birds do have substantial and lasting effects that can be both positive and negative, and can operate both pre and post hatching. That birds are egg laying provides many opportunities for experimentally teasing apart effects at different life stages, and for identifying the fitness consequences. In this talk I will present data from some of the experiments that we have been carrying out in this field, where we have manipulated early life conditions in various ways. I will use these to illustrate some potential pitfalls and to emphasise that observed fitness outcomes are mostly a compromise due to costs and benefits varying across life stages. I will also suggest some key areas where further research is needed.

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16:00 - 16:15

**S5-1 Urban Stressors on Avian Immune Defenses: Impact of pollution on Viral challenge via Poly I:C in blue tit *(Cyanistes caeruleus*) nestlings**

Shivani Ronanki

Wageningen, Wageningen, Netherlands

**Abstract**

Urbanization alters landscapes, increases emissions, and disrupts habitats, affecting biodiversity, particularly birds adapted to city life. Chemical exposure in urban areas via ozone, metals, nitrogen oxides, and PMs induces oxidative stress, disrupting cellular balance.The innate and acquired immune systems, regulated by antioxidant defenses, are susceptible to oxidative stress. While studies often report baseline immune impacts in urban birds, fewer employ standard approaches like immune challenges. Given rising avian influenza rates, understanding how pollutants affect birds' ability to mount anti-viral responses is crucial. To address this, a field experiment was conducted on blue tit (*Cyanistes caeruleus*) nestlings in polluted and clean sites in the Netherlands. Four chicks per nest were selected, with two receiving a Poly I:C injection, and two a saline as control. After 48 hours, blood and immune organs were collected and parameters, including Hemolysis(natural antibodies), haptoglobin(acute phaseprotein), immune cell counts, and gene expression of TLR3, RIG-1, IL-6, COX-2 & IRF-7 were quantified. Our results show that nestlings in polluted site had lower hemolysis scores but higher baseline haptoglobin. Following Poly I:C challenge, nestlings in clean sites mounted a stronger immune response, with higher haptoglobin and immune cell counts. Additionally, differential gene expression was observed with TLR3 upregulation in Poly I:C-treated nestlings across both sites, IRF-7 upregulation and COX-2 downregulation in polluted-site nestlings. These results suggest that exposure to chronic pollution alters immune system in birds, causing higher baseline inflammation,  but weaker immune defenses if they encounter a potential infection.

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16:15 - 16:30

**S5-2 Are bigger eggs better? Short- and long-term effects of egg size in a precocial bird.**

Oscar Vedder ORCID iD

Institute of Avian Research, Wilhelmshaven, Germany

**Abstract**

In birds, the size of the egg represents one of the most fundamental forms of maternal investment per individual offspring, which can vary considerably within and among mothers of the same species. Yet, because of the difficulty of manipulating egg size non-invasively, still little is known on the causal effects of egg size on offspring performance. In this study in Japanese quail, I combine a multitude of approaches (within subject centring, quantitative genetic variance partitioning, and divergent selection for egg size) with monitoring of offspring performance over their complete lifespan, for multiple cohorts. These analyses show that there are clear advantages of developing in a larger egg, but that these advantages dissipate with age after hatching. Overall, my research represents one of the most comprehensive studies towards the effect of intraspecific variation in egg size on performance over the complete life course of a bird species.

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16:30 - 16:45

**S5-3 Adapting to invaded habitat: how do bird phenotypic responses to plant invasions affect the expression of reproductive traits?**

Emilia Grzędzicka ORCID iD

Institute of Systematics and Evolution of Animals of the Polish Academy of Sciences, Kraków, Poland

**Abstract**

Many reproductive traits of birds, like required nesting stratum, length of breeding season stages, and migratory strategy, can be shaped by responses to the environment directed at the best nest-site selection. The environment has experienced significant impacts of alien plants in recent decades, with an increased frequency and extent of their invasions. Birds are among the organisms most impacted by plant invasions, the effects of which are particularly conspicuous during the breeding season. Birds assess the suitability of large, invasive hogweeds *Heracleum* sp. when selecting nesting sites early in spring when the developing invaders, reaching full sizes in summer, do not yet differ substantially in form from the rest of the vegetation. This may impact the possibilities of expressing traits, and shift bird community composition towards species with filtered traits, which may be reflected in diversity measures. It turned out that the presence of *Heracleum* was associated with lower bird taxonomic and phylogenetic diversity in south-eastern Poland. Functional richness (based on species' reproductive traits) was lower at sites with these invaders. The species detected at invaded sites were characterised by traits associated with rapid breeding, such as small clutches, short incubation periods, short fledging periods, and long migration. Bird communities at sites with hogweeds became less diverse and composed of random species sharing similar reproductive traits, and tended to exhibit a common trait syndrome. These patterns provide insights into the mechanisms of how invasive plants may lead to the loss of some traits and species in bird communities.

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16:45 - 17:00

**S5-4 Growing up in the heat: effects of post-hatch temperature changes on physiology and morphology in a wild bird**

Elin Persson ORCID iD, Jan-Åke Nilsson ORCID iD, Andreas Nord ORCID iD

Department of Biology, Lund University, Lund, Sweden

**Abstract**

Global temperatures have increased because of climate change and are predicted to continue to rise in the future. Laboratory studies in birds suggest that changes in temperature during development can affect offspring metabolism and growth. In the wild, resources invested in thermoregulation must be balanced against demands from other competing pressures, such as somatic maturation, repair, and plumage development. This complexity can hardly be addressed in a laboratory environment. Therefore, we investigated the consequences of the thermal environment in early post-hatching life in wild blue tit nestlings, by simulating heatwave conditions during the first week of life when the chicks lack competent thermoregulatory ability. At the end of the heatwave period, we found negative effects of heating on body temperature in the heated compared to unheated control nestlings, which were compensated for by a lower metabolic heat production. Despite the physiological compensation, heated nestlings suffered lower body mass. When we measured the birds again shortly before fledging, after more than one week in naturally occurring temperatures, no physiological effects of the previous heatwave simulation remained, and body mass was indistinguishable from the control treatment. Thus, physiological and morphological consequences of heat exposure appear flexible in the short term. This study brings new insights into how developmental priming and plasticity allow birds to cope with warmer temperatures, if phenotypic effects are long-lasting and under which circumstances such responses are adaptive or maladaptive.

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# Symposium 6: Two decades in review - Advances in Integrated Population Models and applications to bird population dynamics studies

15:30 - 17:00 Wednesday, 20th August, 2025

LR2

Conveners: Ellen C. Martin, Jaume A. Badia-Boher, and Matthieu Paquet

Twenty years after the seminal paper on Integrated Population Models by Pannagiotis Besbeas, this modelling approach has revolutionized the study of bird demographics. Where once demographic parameters were estimated independently from single data sources, IPMs now provide a more precise framework by integrating shared information across multiple datasets. Avian datasets have been central to the advancement of IPM methodological developments, which has allowed our field to progress substantially in several directions, from the understanding of individual and population heterogeneity and population dynamics drivers to the generation of evidence-based knowledge to guide conservation action. In this symposium, we want to highlight the methodological advancements in IPM development and its application to bird ecology and conservation in the last two decades, while also exploring promising future directions.

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15:35 - 16:00

**S6 Keynote Advances and challenges with the use of Integrated Population Models**

Matthieu Paquet ORCID iD

Theoretical and Experimental Ecology Station (SETE), CNRS, Moulis, France

**Abstract**

By flexibly combining several data sources that contain information on e.g. demographic parameters, populations sizes, individual locations, and environmental covariates, Integrated Population Models (IPMs) have allowed several major advances in our understanding of population dynamics. For example to estimate some demographic parameters more precisely, to estimate parameters that are not estimable when datasets are analyzed independently (e.g. emigration/immigration, “true” survival, species interactions), or to estimate the contribution of demographic parameters (and to some extent population size and other covariates) to past and potential future variation in population growth. With an increase in IPMs complexity and versatility also comes new challenges. For example with an increase in the amount and type of data may come issues with computation times, or model fit. With an increase in the number of parameters may come issues with biased parameters, or parameters not being identifiable at all. These potential issues may be particularly hard to detect and address, but hopefully ongoing developmental advances can provide efficient and accessible tools to address them and move our understanding of birds demographics even beyond.

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16:00 - 16:15

**S6-1 Reinforcement is not enough to establish a viable population of an endangered long-distance migratory passerine**

Susanne Arbeiter ORCID iD[1], Žymantas Morkvėnas ORCID iD[2], Jaume A. Badia-Boher ORCID iD[3], Steffen Oppel ORCID iD[3]

[1]University of Greifswald, Partner in the Greifswald Mire Center, Greifswald, Germany. [2]Baltic Environmental Forum, Vilnius, Lithuania. [3]Swiss Ornithological Institute, Sempach, Switzerland

**Abstract**

The Aquatic Warbler (*Acrocephalus paludicola*) is one of the most threatened passerines in Europe. It breeds in mesotrophic sedge fen mires in Central Europe and winters in sub-Saharan Africa. Its population strongly declined due to habitat loss caused by large-scale peatland drainage and agricultural intensification. Although conservation measures have stopped the decline in the core breeding area, peripheral populations continue to decline. The westernmost population in Germany and northwestern Poland (Pomeranian population) is currently threatened with extinction. An ambitious reinforcement project is under way to restore depleted populations by translocations of juveniles.

In our study we used an integrated population model (IPM) to understand the demographic parameters that contributed to the past decline of the Pomeranian population of Aquatic Warblers. We then projected future population trajectories to assess the reinforcement effort needed to establish a stable population and whether additional conservation measures such as habitat restoration and improvements in survival are required for population persistence. Our results indicate that the prevention of second broods by mowing during the breeding season has contributed to the past decline. Reinforcement alone will be insufficient to restore a viable population of the Aquatic Warbler in Pomerania, unless productivity is enhanced by allowing second broods, the amount of available habitat is increased, and conservation measures along the whole flyway are taken to increase annual survival. The IPM approach facilitates the easy integration of information gathered during the reinforcement project, such as return rates of released juveniles, to update and refine future population projections.

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16:15 - 16:30

**S6-2 Accounting for interspecific interactions in bird population dynamics using multispecies integrated population models**

Maud Quéroué ORCID iD[1], Pierre-Yves Henry ORCID iD[2,3], Frédéric Barraquand ORCID iD[4], Olivier Gimenez ORCID iD[1]

[1]Centre d'Ecologie Fonctionnelle et Evolutive (CEFE), Université Montpellier, CNRS, EPHE, IRD, Montpellier, France. [2]Mécanismes adaptatifs et Evolution (MECADEV UMR 7179), Muséum National d'Histoire Naturelle, CNRS, Brunoy, France. [3]Centre de Recherches sur la Biologie des Populations d'Oiseaux (CRBPO), Centre d'Ecologie et des Sciences de la Conservation (CESCO UMR 7204), Muséum National d'Histoire Naturelle, CNRS, Sorbonne Universités, Paris, France. [4]Institute of Mathematics of Bordeaux, University of Bordeaux and CNRS, Talence, France

**Abstract**

Understanding how interspecific interactions influence the demographic parameters of species is challenging due to the complex dynamics of interacting species. Indeed, species interact with each other through various interspecific interactions (e.g., competition, predation), but also with conspecific individuals and their environment (e.g., climatic conditions, habitat). Integrated Population Models (IPMs) provide a framework that combines data at the individual scale (e.g., capture-recapture) and at the population scale (e.g., counts) into a single analysis. This approach allows for the estimation of demographic parameters and population sizes while propagating all sources of uncertainty. Extending IPMs to a multispecies scale enables the analysis of how the estimated population size of one species affects the demographic parameters of another, while simultaneously accounting for other factors such as environmental covariates. Here, we implemented a multispecies IPM with a case study on great and blue tits, two bird species that compete for food resources and nesting cavities. We integrated capture-recapture data from the French Constant Effort Site bird banding scheme and population counts from the French Breeding Bird Survey over the period 2001–2019. We estimated species-specific demographic parameters

and quantified fluctuations in population sizes for both species while simultaneously assessing explicit relationships between the population size of one species and its effect on demographic parameters of the other species (e.g., survival, breeding success). Through this case study, we aim to assess both the strengths and limitations of this methodology and identify potential improvements to enhance our understanding of the factors shaping avian population dynamics.

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16:30 - 16:45

**S6-3 Modelling the country-wide impact of disease emergence on a common avian reservoir host**

Tjomme van Mastrigt ORCID iD[1,2,3], Eelke Jongejans ORCID iD[4], Ruud Foppen ORCID iD[5], Henk van der Jeugd ORCID iD[1,2]

[1]Dutch Centre for Avian Migration and Demography, Netherlands Institute of Ecology (NIOO-KNAW), Wageningen, Netherlands. [2]Department of Animal Ecology, Netherlands Institute of Ecology (NIOO-KNAW), Wageningen, Netherlands. [3]Wildlife Ecology and Conservation Group, Wageningen University & Research (WUR), Wageningen, Netherlands. [4]Radboud Institute for Biological and Environmental Sciences, Radboud University, Nijmegen, Netherlands. [5]Sovon Dutch Centre for Field Ornithology, Nijmegen, Netherlands

**Abstract**

Wild birds are important hosts for various emerging pathogens that can impact host population dynamics. Naive host populations may particularly be at risk. Population impacts can include declines in abundance due to disease-induced mortality or negative effects on reproduction. Common blackbirds (*Turdus merula*) are a key reservoir host of the emerging, mosquito-borne Usutu virus (USUV). In the Netherlands, blackbirds have experienced mass-mortality during USUV outbreaks in the summers of 2016-2018. Yet, the true impacts of USUV emergence on blackbird population size, dynamics and underlying vital rates have not been assessed. By constructing a country-wide integrated population model (IPM) using 29 years of census data, nest records and capture-recapture data, we quantify spatial and temporal variation in stage-specific survival probabilities, productivity rates and abundances to assess the demographic impacts of USUV emergence on Common blackbirds in the Netherlands. We show that during three consecutive USUV outbreak years, adult survival probabilities and population growth rates were considerably reduced, resulting in steep population decline (24.0%). Using a transient life table response experiment, we show that annual variability in survival probabilities of adults and juveniles contributed most to population growth rate variability. Following the USUV outbreaks, the blackbird population showed some signs of recovery, although densities were estimated 17.1% lower than before USUV emerged. We outline several avenues and challenges for the use of IPMs in the context of emerging infectious disease in wild birds.

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16:45 - 17:00

**S6-4 Climate change and the world's rarest albatross: Impacts on demographic trends of the Amsterdam Albatross**

Lise Viollat ORCID iD, Karine Delord ORCID iD, Christophe Barbraud ORCID iD

CEBC, Villiers-en-Bois, France

**Abstract**

As long-lived species with extensive foraging ranges, seabirds are particularly vulnerable to climate variability, which can significantly affect prey availability, breeding success and overall population dynamics. Small populations are particularly vulnerable to environmental fluctuations, as even small shifts in climate variables can lead to significant changes in demographic parameters and overall population growth rates. One of the seabird species of greatest concern is the endangered Amsterdam Albatross (*Diomedea amsterdamensis*), one of the rarest bird species, consisting of a single population on the plateau of Amsterdam Island (SE Indian Ocean). The population has increased in recent decades, from 5 pairs when discovered in the early 1980s to 82 pairs recorded in 2024, but remains fragile. Understanding the relationship between climate variables and demographic parameters is crucial for predicting the long-term viability of this albatross population under ongoing global climate change. Our study aims to quantify the impact of climate variability on the demographic trends of the Amsterdam albatross population, providing insights into how this species may adapt to, or be threatened by, future environmental changes. Using an integrated population model with 41 years of capture-recapture and count data,

together with population viability analysis, we will assess the effect of large-scale climatic variables on demographic parameters and population growth rates. We hypothesise that the observed increase in this population is not related to changes in climatic conditions. However, future climatic changes may have a significant impact on juvenile survival and recruitment rates of this population.

# Symposium 7: Filling the knowledge gaps on small landbird migration in poorly known migratory systems using individual tracking

15:30 - 17:00 Wednesday, 20th August, 2025

LR3

Conveners: Yann Rime and Tianhao Zhao

Global avian migration research and conservation efforts depend on gathering comprehensive knowledge of migration patterns worldwide. Recent advancements in technology have enabled more detailed studies of migratory landbirds, especially smaller species. Despite this progress, a pronounced geographical bias exists. While migration patterns in Western Europe and North America are well-documented, fundamental information on landbird migration from regions such as Eastern Europe, Asia, the Southern Hemisphere, and tropical areas remains scarce. This geographical imbalance limits researchers' ability to develop comprehensive migration theories and understand the evolutionary aspects of avian migration. Equally important, it hampers conservation efforts. In poorly-studied regions, many endangered species exhibit cryptic migration behaviours, making it difficult to identify threats and design effective conservation strategies. Individual tracking, particularly using multi-sensor geolocators, offers a key method for studying small migratory species. However, the adoption of these technologies in under-researched areas is limited, restricting further research and conservation efforts. To address these gaps, fostering international collaboration is essential. This symposium will synthesize recent research on poorly studied migratory systems to reveal the knowledge gap. The goal for this symposium is to identify research priorities, promote knowledge exchange, and support collaboration to improve the understanding and protection of migratory species worldwide.

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15:35 - 16:00

**S7 Keynote Review talk: why do we need to study bird migration more comprehensively worldwide?**

Yann Rime ORCID iD[1], Tianhao Zhao[2]

[1]Swiss Ornithological Institute, Sempach, Switzerland. [2]University of Groningen, Groningen, Netherlands

**Abstract**

Landbird migration research is progressing fast, with new techniques being developed in the field of individual tracking. However, these advances are mostly used for studying birds breeding in Europe and North America. Accounting for other migratory systems is necessary to consolidate or challenge general migration theories, to understand the evolutionary aspects of avian migration in a comprehensive way and to support conservation efforts globally. How different and urgent are conservation challenges between flyways? What is the extent of intra-tropical movements, and what regulates the seasonality of tropical migratory species? How do migrants adapt to the geographical barriers like the Qinghai-Tibet Plateau in Asia or the Andes Mountain in South America? These missing puzzle pieces from under-researched flyways are essential for understanding avian migration on a global scale. This introductory talk aims at reviewing the main open questions and how answering them will improve our understanding of bird migration globally, with examples of recent findings and ongoing research in this still emerging field. Furthermore, we will discuss how recent technical advances, particularly miniaturized tags, can help filling research gap in the next years; and a way forward to make these techniques available outside of institutions based in high-income countries. We shall also highlight the importance for knowledge exchange across continents from European ornithologists' perspective, paving the way for the invited speakers of the symposium, working on migratory flyways in Asia, Africa and South America.

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16:00 - 16:15

**S7-1 From Siberia to the tropics: landbird migration along the Asian flyways**

Wieland Heim ORCID iD

University of Oldenburg, Oldenburg, Germany

**Abstract**

New tracking technologies have revolutionized bird migration research and led to an ever-increasing number of publications on the ecological, behavioural and physiological aspects of migration, and its conservation implications. This is especially true for the huge number of (mostly small) landbirds, which have only recently become available for tracking studies due to miniaturization of tracking devices. The Central Asian and East Asian flyways have been the least studied flyways, despite being the most speciose among the world's flyways. A recent explosion in the number of studies tracking the migration of small landbirds has greatly increased our knowledge of stopover and wintering ecology, and migratory routes linking northeast Eurasia and the Asian tropics. The Asian flyways also support the highest number of threatened species among flyways. Here I review the existing literature in combination with ongoing own studies to describe overall migration patterns and address important knowledge gaps including (1) migration strategies of little-known species, (2) birds' ecological requirements and habitat use during the non-breeding season, and (3) threats affecting species in different parts of their annual cycle.

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16:15 - 16:30

**S7-2 Intra-African Bird Migration: Understanding the spatio-temporal patterns**

Soladoye Iwajomo ORCID iD[1,2], Mikkel Willemoes ORCID iD[3], Ulf Ottosson ORCID iD[4], Roine Strandberg[3], Shiiwua Manu ORCID iD[5,4], Kasper Thorup ORCID iD[6]

[1]Department of Zoology, Faculty of Science, University of Lagos, Lagos, Nigeria. [2]TETFUND Centre for Excellence in Biodiversity Conservation and Ecosystem Management, University of Lagos, Lagos, Nigeria. [3]Department of Biology, Lund University, Lund, Sweden. [4]A.P. Leventis Ornithological Research Institute, Jos, Nigeria. [5]Department of Zoology, University of Jos, Jos, Nigeria. [6]Center for Macroecology, Evolution and Climate, Globe Institute, University of Copenhagen, Copenhagen, Denmark

**Abstract**

Many Afrotropical birds migrate seasonally within the continent, yet individual movements remain poorly understood. Using satellite telemetry data, we tracked the annual migration of two intra-African migrants, the African Cuckoo (*Cuculus gularis*) and Black Coucal (*Centropus grillii*), breeding in the savanna zone of sub-Saharan Africa. After breeding in central Nigeria, African Cuckoos migrated annually to forested sites in Cameroon (n=2) and the Central African Republic (n=1). They covered an average of 748 km in 66 days post-breeding and 744 km in 27 days during return migration, with considerable individual variation and greater stopover use post-breeding. Stopover habitats ranged from savannah scrub to sub-montane forests, with the two general stopover areas in Central Africa having similar woodland vegetation at different altitudes. We found evidence of nocturnal and directional migration with flight speeds of 2.3–10.0 m/s over distances that can exceed 100 km. Birds departed breeding sites as vegetation greenness declined and arrived at non-breeding sites just before greenness peaked. Return migration coincided with the lowest greenness at breeding sites, which then increased. The Black Coucal (n=1) migrated 225 km in 30 days post-breeding and returned 184 km in just 2 days, with nocturnal movements and no gain in vegetation greenness. African Cuckoos displayed flexible migration routes but consistent final stopover use, indicating site fidelity. Proper understanding of the intra-African bird migratory system requires more tracking studies especially in the face of rapid habitat transformations and climatic uncertainties. This can be potential beneficial for Palaearctic migrants wintering in sub-Saharan Africa.

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16:30 - 16:45

**S7-3 Global patterns of migratory connectivity in barn swallows**

Susan Ellen McKinlay ORCID iD[1], Jouke Altenburg[2], Yury Anisimov[3], Emi Arai[4], Javier Balbontín Arenas[5], Juan I. Areta[6], Juan Arizaga[7], Marc Bastardot[8], Vojtěch Brlík[9], Jocelyn Champagnon[10], Cosme López Calderón[11], Renato Casagrandi[12], Alessandra Costanzo[1], Paul Dufour[13], Olivier Duriez[14], Facundo Gandoy[15], Masaru Hasegawa[16], Wieland Heim[17], Barbara Helm[13], Frédéric Jiguet[18], Hakan Karaardıç[19], Kevin Kardynal[20], Petr Klvaňa[21], Felix Liechti[13], Yu Liu[22,23], Ivan Maggini[24], Christoph Meier[13], Piotr Matyjasiak[25], Mattia Pancerasa[12], Andrea Romano[1], Rebecca Safran[26], Chiara Scandolara[1], Ichiro Tayasu[4], Li Tian[23], Sheela Turbek[26], Henk van der Jeugd[27], Irene Vertua[1], David Winkler[28], Yang Wu[23], Zhengwang Zhang[23], Martins Briedis ORCID iD[13,29], Diego Rubolini ORCID iD[1], Roberto Ambrosini ORCID iD[1]

[1]Dipartimento di Scienze e Politiche Ambientali, Università degli Studi di Milano, Via Celoria 26, Milano, Italy. [2]Birdlife Netherlands, PO BOX 925, 3700 AX, Zeist, Netherlands. [3]Ulaanbaatar, Ulaanbaatar, Mongolia. [4]Fundamental Research Department, Research Institute for Humanity and Nature, 457-4 Motoyama, Kamigamo, Kita-ku, Kyoto, Japan. [5]Department of Zoology, Faculty of Biology, Green Building, Avenue Reina Mercedes, E-41012, Seville, Spain. [6]Laboratorio de Ecología, Comportamiento y Sonidos Naturales (ECOSON), IBIGEO-CONICET, Rosario de Lerma - Salta, Argentina. [7]Department of Ornithology, Aranzadi Sciences Society, Zorroagagaina 11, 20014, Donostia, Spain. [8]Lausanne, Lausanne, Switzerland. [9]Department of Ecology, Charles University, Viničná 7, Prague, Czech Republic. [10]Institut de Recherche de la Tour du Valat, Le Sambuc, Arles, France. [11]Department of Anatomy, Cellular Biology and Zoology, University of Extremadura,, Badajoz, Spain. [12]Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico Di Milano, Via Ponzio 34/5, 20131, Milano, Italy. [13]Swiss Ornithological Institute, Department of Bird Migration, Seerose 1, 6204, Sempach, Switzerland. [14]CEFE, Univ Montpellier, CNRS, EPHE-PSL University, IRD, Montpellier, France. [15]Instituto de Ecología Regional, Universidad Nacional de Tucumán (UNT) - Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET),, Tucumán, Argentina. [16]Department of Environmental Science, Ishikawa Prefectural University, 1-308 Suematsu, Nonoichi-city, Ishikawa Prefecture, 921-8836, Japan. [17]Institute of Biology and Environmental Sciences, University of Oldenburg, Oldenburg, Germany. [18]Conservation des Espèces Restauration et Suivi des Populations-MNHN, Paris 75005, France. [19]Department of Math and Science Education, Education Faculty, Alanya Alaaddin Keykubat University, 07400,, Alanya, Turkey. [20]Environment and Climate Change Canada, Saskatoon, Saskatchewan, Canada. [21]Bird Ringing Centre, National Museum, Prague, Hornoměcholupská 34, 102 00, Prague, Czech Republic. [22]State Key Laboratory of Environmental Criteria and Risk Assessment, Chinese Research Academy of Environmental Sciences,, Beijing, 100107, China. [23]Key Laboratory for Biodiversity Sciences and Ecological Engineering, Ministry of Education, College of Life Sciences, Beijing Normal University,, Beijing 100875, China. [24]Konrad-Lorenz Institute of Ethology, University of Veterinary Medicine, Savoyenstrasse 1a, 1160 Vienna, Austria. [25]Institute of Biological Sciences, Cardinal Stefan Wyszyński University in Warsaw, 01-938 Warsaw, Poland. [26]Department of Ecology and Evolutionary Biology, University of Colorado, Boulder, Colorado 80309, USA. [27]Dutch Centre for Avian Migration and Demography, NIOO – KNAW, Wageningen, Netherlands. [28]Department of Ecology and Evolutionary Biology, Museum of Vertebrates and Laboratory of Ornithology, Cornell University, Corson Hall,, Ithaca, NY 14853, USA. [29]Institute of Biology, Faculty of Medicine and Life Sciences, University of Latvia, Riga 1004, Latvia

**Abstract**

Migratory connectivity defines the degree of mixing of individuals from multiple breeding populations in their non-breeding areas. It can vary across populations and may depend on multiple factors including migration distance and the availability of suitable land in non-breeding areas. Migratory spread — the average distance between individuals from the same breeding population in non-breeding areas — has been proposed as a measure of migratory connectivity. It has been hypothesised that migratory spread increases with migration distance due to increasing effects of random deviations from genetically predetermined routes, as well as with greater availability of suitable habitats. To test these hypotheses, we analysed a global dataset of nearly 300 geolocator-tracked barn swallows (*Hirundo rustica*) from 12 populations, spanning from Argentina to eastern China. To our knowledge, this study is the first to examine migratory connectivity patterns within a single passerine species on a global scale. Barn swallows show broad variation in migratory behaviour, with some populations travelling short distances and others migrating long distances. Such variability was well captured by our global dataset, with migration distances ranging from 2559 to 8474 km and migratory spread from 675 to 2189 km across populations. Migratory spread increased significantly with greater availability of land masses in non-breeding areas but was unrelated to migration distance. Our results suggest that geography, rather than migration distance, drives intraspecific patterns of

migratory spread. Historical and biogeographical factors, such as landmass distribution, likely shaped current connectivity patterns in this migratory species.

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16:45 - 17:00

**S7-4 Advances in studying Neotropical austral migrants**

Maggie MacPherson

Trent University, Peterborough, Canada. Western Illinois University, Macomb, USA

**Abstract**

The *Tyrannus* (a genus of suboscine in the most diverse bird family: *Tyrannidae*) is exceptional for studying the evolution of migration because it comprises Nearctic, Neotropical, and Intratropical migrants and several partially migratory species. Using this Neotropical genus, I have tested several hypotheses explaining the evolution of migration through measuring and tracking individual birds. In a phylogenetically constrained study, I found that migratory *Tyrannus* are morphologically distinct with longer and pointier wings (following expectations of aerodynamic theory). By tracking two long-distance migratory *Tyrannus* using geolocators, I discovered that *Tyrannus* track with high rainfall across their annual cycles. Annual long-distance migrations of a Nearctic and austral migrant that both track with rainfall patterns regardless of hemisphere speaks to the evolution of migration in this tropical genus where seasons are largely driven by rainfall. When comparing austral migratory to sedentary subspecies, I found evidence of a dietary shift from fruit to invertebrates during their single annual moult. While a trophic niche shift is common in temperate migratory birds during hyperphagic fueling in preparation for migration, the switch to protein-rich foods for moult highlights the importance of moult especially in suboscines that only moult once per year. Recently, we have found flashier plumage patches in migratory compared to sedentary *Tyrannus* with migrants having higher carotenoid concentrations in crown and belly patches. While carotenoid-based signals often reflect evidence of sexual selection, in monochromatic taxa such as many Neotropical austral migrants, these signals may be more agonistic and reflect increased interspecific conflict.

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# Symposium 8: Effects of Artificial Light at Night (ALAN) on birds' behaviour, fitness and physiology

15:30 - 17:00 Wednesday, 20th August, 2025

LR4

Conveners: Rachel Reid and Anne-Caroline Heintz

This symposium aims to explore the effects of artificial light at night (ALAN) on bird species, with a focus on how ALAN influences their behaviour, fitness and physiology. As artificial lighting becomes increasingly prevalent across the globe, understanding its impact on avian life is crucial for both conservation efforts and urban planning. While studies on ALAN have been increasing in recent years, much of the research on birds has centred around reporting attractive or repulsive effects and activity shifts related to ALAN. However, there remains limited research on how ALAN influences critical life-history traits that could ultimately have profound consequences on birds' health and fitness. By bringing together researchers from diverse fields, this symposium will provide an opportunity for sharing research, fostering collaboration, and discussing the challenges posed by ALAN on bird populations.

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15:35 - 16:00

**S8 Keynote Artificial light at night: a global disruptor on avian behaviour, physiology, and fitness**

Jenny Ouyang

University of Nevada Reno, Reno, USA

**Abstract**

Artificial lighting has transformed the global nighttime environment, which has widespread consequences for humans and wildlife, including impacts on health and well-being. In this introduction and review for the symposium, I will summarize the current state of knowledge about how the widespread and growing use of artificial light at night affects avian behaviour, physiology and fitness. I will focus on past and recent works that highlight impacts on behaviour, including locomotion and cognition; physiology, including neuroendocrine, circadian, microbiome function; and fitness, including reproduction and survival. I will conclude with a discussion of the knowledge gaps that exist within these topics and possible future research questions. The causes and consequences of a multiscale disruption of night will need mitigation strategies that come from collaborative efforts of researchers, urban planners, and policy makers.

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16:00 - 16:15

**S8-1 The effects of artificial light at night on the behaviour of Atlantic puffin fledglings**

Gary Burness[1], Taylor Brown[1], Sabina Wilhelm[2], Aaron Slepkov[1], Kaitlyn Baker[1], Gabriela Mastromonaco[3]

[1]Trent University, Peterborough, Canada. [2]Environment and Climate Change Canada, St. John's, Canada. [3]Toronto Zoo, Peterborough, Canada

**Abstract**

When leaving their nests for the first time fledgling seabirds of many species become stranded in coastal communities. These first flights occur at night, and fledglings are thought to be attracted to and disoriented by the presence of artificial light. In Newfoundland, Atlantic puffin fledglings (*Fratercula arctica*) become stranded each summer in towns near their colonies. To test the role of artificial light at night we performed a series of behavioural experiments. First, we illuminated beaches near breeding colonies and tested whether more individuals would become stranded on beaches when lights were on. Second, we measured short-range phototaxis by placing fledglings in a Y-maze and measuring their response to different types of light, and we quantified activity in an open field test. Confirming the importance of artificial light at night, far more fledglings were found stranded when

beaches were artificially lit than when dark, and fledglings preferred light over darkness in the Y-maze. Captive fledglings showed no preference for different spectra. Fledglings were more active in darkness and when exposed to high pressure sodium light bulbs (such as used in streetlights) than when exposed to LED bulbs. Our results suggest the most effective mitigation strategy to reduce strandings is a reduction in coastal lighting near Atlantic puffin colonies.

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16:15 - 16:30

**S8-2 Artificial light at night affects nesting site selection and breeding parameters of a cosmopolitan nocturnal bird of prey**

Anne-Caroline Heintz[1,2], Alexandre Roulin[2], Pierre Bize[1,2], Bettina Almasi[1]

[1]Swiss Ornithological Institute, Sempach, Switzerland. [2]University of Lausanne, Lausanne, Switzerland

**Abstract**

Artificial light at night (ALAN) is rapidly increasing worldwide, leading to the widespread alteration of nocturnal landscapes. Light pollution has documented effects on a variety of taxa, with birds being the most studied group. However, the impacts of ALAN on nocturnal bird species, particularly birds of prey, remain largely underexplored. Here, we investigated the effects of ALAN on nesting site selection and reproductive traits of the barn owl (*Tyto alba*), a nocturnal raptor. Using satellite-derived light pollution data, we assessed the relationship between light exposure in the home ranges of barn owl nesting sites and several key ecological factors, including site occupancy and breeding success. Our results indicate that higher levels of ALAN are associated with a decreased probability of nesting site occupancy. Additionally, we found that exposure to light pollution affects multiple breeding parameters, including clutch size, nestling growth, and parasite infestation rates. These findings highlight the potential ecological consequences of light pollution for nocturnal bird species, and underscore the need for further research to understand the broader impacts of ALAN on nocturnal wildlife. Given the global increase in ALAN, our study calls attention to the importance of considering light pollution as a key factor in conservation and habitat management strategies for nocturnal species.

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16:30 - 16:45

**S8-3 Light pollution-induced mortality of seabirds**

Airam Rodríguez ORCID iD

Museo Nacional de Ciencias Naturales CSIC, Madrid, Spain

**Abstract**

Artificial light at night causes high mortality of seabirds, one of the most threatened groups of birds globally. Burrow-nesting seabird fledglings are attracted to artificial lights and forced to land when they first fly from their nests to the ocean at night. Once on the ground, seabirds are vulnerable to fatal injuries, vehicle collisions, or predation. Seabirds have been found dazzled by lights all over the world, mainly on oceanic islands, but also on the mainland. At least 72 species of seabirds are grounded by light pollution, with Procellariiformes being the most affected seabird group. Rescue programs offer the most immediate and widely used mitigation measure to reduce light-induced mortality and save thousands of birds each year. These programs also provide useful information for the management of rare and elusive species. However, rescue programs are palliative actions as they rescue birds already landed. Therefore, further research is essential to find less damaging lights to reduce attraction and minimize seabird mortality. I will review the current state of knowledge on seabird attraction to light to identify information gaps and propose measures to address the problem. I will focus on what we have learned after more than three decades of seabird rescue on different islands around the world, and what we need to know to mitigate this emerging source of mortality.

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16:45 - 17:00

**S8-4 Partial night lighting mitigates the effects of artificial light at night on glucose and telomere loss in a songbird.**

Rachel Reid ORCID iD[1], Neal Dawson[1], Eleanor Duncan[1], Robert Gillespie[1], Christopher Mitchell[2], Claire Branston[1,3], Pablo Capilla-Lasheras[1,4,5], Jelle Boonekamp[1], Davide Dominoni[1]

[1]University of Glasgow, Glasgow, United Kingdom. [2]University of Exeter, Penryn, United Kingdom. [3]University of the West of Scotland, Glasgow, United Kingdom. [4]Swiss Ornithological Institute, Sempach, Switzerland. [5]Donana Biological Station, Sevilla, Spain

**Abstract**

Urban environments present a range of novel stressors for wildlife including artificial light at night (ALAN), which can disrupt circadian rhythms and induce behavioural and physiological changes. However, the broader health consequences of ALAN remain poorly understood. There is a pressing need for more longitudinal studies to investigate the impacts of ALAN over time, as well as exploring strategies to mitigate the negative impacts of ALAN. In this study, we exposed captive adult zebra finches to either full light at night, partial light at night, or a control condition over four months. We assessed multiple health biomarkers, including glucose concentration, oxidative damage, antioxidant defence, and telomere length at the start and end of the experiment. Our results show that full light at night disrupted the circadian pattern of glucose and accelerated telomere attrition, while these effects were not present under partial light exposure. These findings suggest that a partial light at night strategy could mitigate some of the negative health consequences of ALAN for wildlife.

# Poster session 2 (even IDs)

17:00 - 19:00 Wednesday, 20th August, 2025

PJ/Powis

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**PP-2 Disappearing barn owl (*Tyto alba*) nesting sites in the Carpathian Basin: The number of available barn owl nesting sites has been halved in the past decades**

Zoltán Schneider ORCID iD[1,2], Ákos Klein[2], Balázs Móczár[3,2], Miklós Laczi ORCID iD[4,5,2]

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**Abstract**

In Central Europe, churches represent one of the most important breeding sites for barn owls (Tyto alba). However, due to church renovations and tower closures, owls are increasingly being forced out of such nesting sites. An additional factor that potentially have a negative impact on nesting site availability is the placement of internet transmitter stations in church towers. In 2024, we examined 92 churches in which the continuous presence of the species had previously confirmed, and there have not been active conservation in the last 7-25 years (depending on the location). 46% of these buildings remained available to barn owls. In 22% of the surveyed buildings, we found at least some trace of the species' presence, and in 16%, we also found breeding. There was no association between closure (accessibility as nesting site) and building renovations, or the presence of internet transmitter stations. Importantly, in buildings remained open, the species' presence did not associate with the presence of internet transmitter stations. Furthermore, we revealed that the unproper building closure and maintenance poses serious risks for owls, allowing entry but not exit, thus functioning as traps. This highly overlooked risk factor could even lead to mass mortality of barn owls, hence this should be taken into account in species protection plans. The churches are still important resting and breeding sites for the species in Hungary. However, the accessibility of these nesting sites has enormously decreased due to closures. This emphasizes the need for active conservation efforts.

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**PP-4 Using Multi-Sensor Geolocators to Unravel the Migratory Strategies of Short-Distance, Intra-European Migratory Birds.**

Paul Doniol-Valcroze ORCID iD[1], Pierrick Bocher[2], Yannig Coulomb[1], Sophie de Grissac[1], Rose Delacroix[2], Fanny Rey[3], Frédéric Jiguet[1]

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**Abstract**

Passerine migration research has recently benefited from considerable technological advances, including the ongoing miniaturization of loggers, enabling the tracking of increasingly smaller species. Additionally, the use of multi-sensor loggers has significantly improved our ability to refine stopover detection and location, as well as to describe previously unknown migratory behaviors. To date, most tracking studies using these cutting-edge methods have focused on long-distance, transcontinental migratory species, revealing fascinating details about their migratory strategies (e.g., astonishing flight distances, altitudes, or durations). However, much less is known about the relatively less spectacular migratory strategies of short-distance (e.g., intracontinental) migrants, possibly due to the limitations of previously used twilight-based tracking approaches. This research imbalance toward long-distance migrants hampers both fundamental and conservation-related aspects of migration research. In this study, we focus on intra-European short-distance migrants—namely, the Meadow Pipit, the Eurasian Reed

Bunting, and the Bluethroat—providing a detailed analysis of their previously unknown migratory strategies using multi-sensor loggers. We also contrast the characteristics and constraints of these short-distance migratory strategies with those of related long-distance transcontinental migrants. This study is among the first to focus on intra-European migrants, opening up new perspectives for the study of previously overlooked migratory strategies. Furthermore, it demonstrates the effectiveness of multi-sensor tracking approaches in investigating short-distance migratory behaviors that were previously technically challenging to study.

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**PP-6 High throughput measures of mitochondrial function in avian blood cells: use of a plate reader as an alternative to the Oroboros instrument**

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**Abstract**

As mitochondria power almost all biological processes, there is growing interest in measuring mitochondrial function to gain new insights into the source of individual variations in performance and fitness. The discovery of functional mitochondria in avian red blood cells (RBCs) has made birds an ideal model species for such studies. Currently, the golden standard approach in cell physiology is to measure avian RBC mitochondrial respiration, and thereby function, using a high-resolution respirometer instrument (Oroboros). However, one of the main limitations of this approach is that measurements are limited to a maximum of two individuals per series of measurements and per instrument. In this study, we present an alternative approach where avian RBC mitochondrial respiration is quantified using a plate-based analysis and the phosphorescent oxygen sensing probe MitoXpress™. We demonstrate that both approaches provide quantitatively similar results. Thus, by enabling the measurement of mitochondrial respiration of a larger number of individuals on the same plate during shorter measurement series, this high-throughput approach opens new doors to answer ecological and evolutionary questions for which large sample sizes are a prerequisite, such as testing for natural selection and the heritability of mitochondrial function.

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**PP-8 Does nest location matter in the city? Reproductive consequences of substrate choice in the European blackbird (*Turdus merula*)**

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**Abstract**

Urbanization is rapidly transforming natural landscapes, imposing challenges and opportunities for wildlife. Birds, particularly open-cup nesters, must adapt to changes in habitat structure, resource availability, and landscape of predation risk. While some species thrive in cities, the effects of urbanization on their nesting behavior and reproductive success remain unclear. Our long-term study investigates the timing and use of nesting sites by European blackbirds (*Turdus merula*), a widely urbanized species, across urban and forested habitats and evaluates the associated fitness consequences. Over seven breeding seasons (2018-2024), we monitored nests in four study areas in Debrecen, Hungary, each representing different levels of urbanization. We analyzed the use of three main nesting substrates – deciduous plants, evergreen plants, and anthropogenic structures – and assessed their influence on breeding timing and reproductive success. We hypothesized that blackbirds would initiate egg-laying on evergreen vegetation due to its year-round concealment, enabling earlier breeding. Furthermore, we predicted that reproductive success would vary depending on nest substrate, with anthropogenic sites exhibiting lower reproductive success due to their increased exposure. Our findings revealed that while blackbirds indeed began breeding earlier on evergreens, contrary to our expectations, nests on anthropogenic structures had lower predation and abandonment rates and higher breeding success than those on vegetation, likely due to the so-called 'human shield effect'. These results provide insight into the adaptive responses of blackbirds to urbanization, shedding light on trade-offs associated with different nesting substrates. Understanding these dynamics is crucial for conservation strategies to mitigate the impacts of habitat modification on avian populations.

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### PP-10 Environmental Drivers of Spring Bird Arrivals: The Role of Weather and Food Availability Uncovered by a Long-Term Study

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**Abstract**

Seasonal patterns in the Northern Hemisphere are becoming increasingly disrupted by ongoing climate change. Earlier and warmer springs advance the phenology of vegetation and leaf-eating insects, i.e. caterpillars. For migratory birds, this creates potentially favourable conditions for advancing their spring arrival, as weather conditions and food resources essential for breeding become available sooner. We analysed 50 years of observations of bird arrivals in the Białowieża Forest, Poland, to investigate the relationship between migration timing, weather conditions, and food availability. Most species have advanced their arrival dates, but the extent of the change varies depending on life-history and ecological traits, such as breeding strategy, wintering range, and habitat preference. Our results indicate that the interaction between weather conditions and food availability plays a crucial role in the advancement of migration timing. The "warm and early spring effect" leads to earlier arrivals and was more visible in years of caterpillar outbreaks, which occur periodically, and much weaker in years with low caterpillar abundance. This suggests that migratory birds adjust their arrival not only in response to weather conditions but also based on cues related to expected food availability at breeding grounds. These findings highlight the complex effects of climate change on migratory patterns and the importance of considering multiple environmental factors when predicting future changes in bird migration.

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### PP-28 Grit as a source of mate-feeding and territory advertisement in a colonial raptor

Alejandro Corregidor-Castro ORCID iD[1,2], Mickael Jacquier ORCID iD[3], Alessandro Berlusconi ORCID iD[4], Florane Evrard[1], Jacopo G. Cecere ORCID iD[5], Michelangelo Morganti ORCID iD[6,2], Andrea Pilastro ORCID iD[1,2], Diego Rubolini ORCID iD[4], Jennifer Morinay ORCID iD[3]

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**Abstract**

Mate feeding, the behaviour whereby a breeder provides food to its partner, is a sexually selected trait observed across various animal taxa. In monogamous birds with biparental care, this behavior may also serve as a signal of male quality and future parental investment. While mate feeding and its evolution are well-studied, the provision of resources other than typical food items, such as calcareous stones in geophagous species, remains unexplored. Here, we report a novel behaviour in lesser kestrels (*Falco naumanni*): breeders deposit small grit atop nest boxes, which females consume. We studied this behaviour in a large nest box breeding population of lesser kestrels in Matera, southern Italy, over four years, combining classic breeding monitoring, video recordings and experimental presentations of different types of grit. Females consumed grit more frequently than males, and nest boxes with grit were usually occupied by breeders (82%). Grit deposition on occupied boxes was higher in densely populated sub-colonies than is less dense sub-colonies (31% and 22% of nest boxes with grit respectively), suggesting a role of grit deposition in territory advertisement. This was supported by the predominant placement of grit atop nest boxes (82%) rather than nearby. Additionally, grit deposition tended to correlate with prey delivery during courtship and the pre-laying phase. Our findings reveal a previously undocumented behaviour, highlighting the potential dual function of grit as both a nutritional resource and a signal in sexual selection and territory retention. This study enhances our understanding of mate provisioning and resource use in geophagous birds.

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### PP-12 Apps to use bird telemetry data for real-time monitoring

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**Abstract**

Technical progress is constantly improving the way we study wildlife. For the last 3 decades devices to track the movements of animals have become smaller and more powerful. In addition to unprecedented insights into animal movements, new analytic approaches can also extract demographic information from such tracking data. To facilitate real-time monitoring of demographic parameters like mortality and breeding success, we developed two ShinyApps that allow users to assess the status of tracked birds in real time. Both apps require that telemetry data are stored in a Movebank project. The user enters their Movebank credentials to retrieve the real-time tracking data, and some additional parameters to customize the app to different species' movement behaviours. The first app (https://vogelwarte.shinyapps.io/BirdCheck/) facilitates easy inspection of the most recent locations of a tracked animal, including a map and other sensors that indicate whether an individual is alive or not. The second app (https://vogelwarte.shinyapps.io/NestFind/) is useful for monitoring birds during the breeding season because it determines the most likely nest location for each bird. This analysis is based on a user-specified time window and movement radius and calculates the number of repeated visits to each location. This app also allows downloading of nest locations for offline navigation devices and therefore reduces the search effort for field staff. We demonstrate the utility of these apps for a large telemetry project with >450 individual red kites (*Milvus milvus*) tracked with GPS-GSM transmitters.

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### PP-14 How personal knowledge of local atmospheric dynamics in naive Andean Condors guides optimal movement strategies

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**Abstract**

Movement within an animal's home range is primarily influenced by body size and energy availability. This becomes evident in the wide-ranging, obligate soaring Andean Condor (*Vultur gryphus*), capable of covering hundreds of kilometers per day. As the world's heaviest soaring birds, condors rely on their ability to leverage thermal energy, optimizing space-use and minimizing energy expenditure. Despite being classified as vulnerable, little is known about how flight experience and habitat knowledge affect movement performance. This study therefore investigates how condors adjust their movement patterns to minimize flight costs and how these patterns change with experience gained in unfamiliar terrain, potentially revealing a learning curve in spatial behavior. We collected high-frequency movement and performance data from bio-loggers on condors released from captivity within a closed mountain range. This unique pseudo-controlled experiment allowed separation of flight experience from local knowledge to quantify the effect of habitat familiarity on performance and space use. We predict that flight performance will improve with experience and time spent in the habitat, as previous studies have shown that soaring performance increases with a condor's age. We also expect condors to revisit known beneficial roosting and foraging sites, as well as areas where thermals frequently occur, given that past research has demonstrated that condors select distinct sites for specific activities based on local habitat properties. Our findings support condor conservation efforts by identifying key areas naturally frequented. Additionally, we aim to optimize reintroduction strategies by selecting suitable release sites and thereby mitigating risks for young or inexperienced individuals.

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**PP-16 Increasing the accessibility of critical research and conservation information using Birds of the World, a global platform for avian life history synthesis**

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**Abstract**

Sharing life-history knowledge is essential for ornithologists as we collaborate on solutions to the multi-faceted biodiversity crisis. However, species information is scattered and often incomplete. Increased cooperation among stakeholders is vital to ensure broad accessibility of species knowledge for use in conservation. *Birds of the World* (BOW) presents a dynamic, global platform for synthesizing vast ornithological knowledge. Launched in 2020, BOW combines previous projects HBW, *Neotropical Birds*, and Birds of North America, and is now the largest, most comprehensive reference featuring complete life histories of every bird. Working with a global network of 35 partner organizations and more than 2200 contributors who are passionate about sharing their expertise on this central platform has been key to maximizing this tool's usefulness and keeping it up-to-date. Since launch, this network has powered updates to 2707 species accounts (24% of the world's species) with new life history information. BOW now offers free access across the Global South, and all accounts have been translated into Spanish (with more languages in development), greatly expanding access to this content. This expansion of both reach and content, including more material from regional and non-English-language sources, has already yielded new insights in research and conservation. We are committed to continuing to grow a diverse team of contributors. By showcasing avian expertise by those who know the birds best, we hope that transformative insights for global bird research and conservation can be unlocked.

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**PP-18 Foraging Habitat Selection of the Eurasian Goshawk in Forest Landscape**

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**Abstract**

The Eurasian Goshawk (Astur gentilis) is an avian predator benefitting from heterogeneous forest structure. We used GPS-tracking to identify key ecological factors shaping the foraging habitat selection of Goshawks in forests and thereby evaluated the potential of the species to indicate high conservation-value forests.

We tracked 27 Goshawks for up to six years in a 5,300 km2 study area in Estonia (north-eastern Europe) and used Resource Selection Function approach with Generalized Linear Mixed Models to detect seasonal and sex-specific variations in habitat selection.

Goshawks exhibited distinct preferences for mature, structurally complex high conservation-value forests with abundant lying deadwood, and proximity to water bodies. Females were favoring older, denser forests closer to edges, while males demonstrated greater flexibility, utilizing a broader range of forest types. Seasonal variations were also observed, with coniferous forests becoming more critical for females during defoliated periods, while males showed a stronger preference for deciduous forests year-round.

By elucidating the habitat preferences of the Goshawk, an indicator species, our study highlights the importance of maintaining diverse forests. Our findings also inform potential conservation strategies for preserving high-value forest habitats.

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**PP-20 How reliable are point counts in estimating true abundance? A field evaluation of three forest bird species**

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**Abstract**

Abundance is a fundamental piece of information in ecology, but obtaining reliable estimates of population size is far from trivial. This is true for most birds: they are difficult to count and observed numbers will typically be lower than true abundance due to imperfect detection. To obtain more precise estimates, methodology for assessing bird abundance has been improved for decades resulting in several field protocols proposed for passerines only, like the territory mapping method with multiple surveys per season. Modern abundance assessment methods tend to be less field-intensive, as they are based on fewer repeated visits and the use of statistical models that correct observed numbers for imperfect detection. In this study, we aimed to verify how well abundance estimates from generalized *N*-mixture and distance sampling models applied to point counts results agree with “true abundance”. To achieve this, we performed repeated point counts on seven study plots in the Białowieża Forest (Poland) over four years. At the same time, we conducted exhaustive search for nests and territories of the three target bird species (Wood Warbler, Nuthatch, and Marsh Tit) to obtain per-plot “true abundances”. Our results provide valuable insights for estimating abundance and highlight the most effective approach for obtaining precise estimates.

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**PP-22 Warm and cool temperatures decrease early-life telomere length in wild pied flycatchers**

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**Abstract**

Climate change represents one major challenge for avian species. It is characterized by an increase in average ambient temperature, but also in occurrence of extreme weather events, such as heat waves and cold snaps. These abrupt temperature changes can modify the immediate and long-term survival prospects of nestling birds when their thermoregulatory capacities are still not fully developed. While immediate nestling survival can easily be measured, long-term survival is more challenging to evaluate. Yet, early-life telomere length has been suggested as a potential biomarker of fitness prospects. To evaluate the potential impact of changes in early-life temperature, we thus experimentally increased (*ca.* +2°C) and decreased (*ca.* -1.5°C) nestbox temperatures in wild pied flycatchers (*Ficedula hypoleuca*) during nestling postnatal growth, and measured nestling telomere length before fledging. Shorter telomeres were observed in individuals exposed both to an experimental heating or cooling during growth. Our results suggests that long-term survival prospects or long-term performance of individuals exposed to abrupt changes in early-life temperature may be decreased.

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**PP-24 Mitochondrial function and the Lansing effect**

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**Abstract**

Understanding why and how the ageing process occurs has long been an intense area of research across many scientific disciplines. However, such studies have mainly focused on somatic cell deterioration and mechanisms surrounding within-individual ageing. As a result, the potential for intergenerational transfer of ageing between

parents and offspring has largely been neglected. There is empirical evidence of a negative relationship between the age of parents and lifespan of the offspring in many species (including the zebra finch), referred to as the Lansing effect. We are examining the mechanisms by which advanced maternal age gives rise to shorter-lived offspring, whether this is affected by the degree of stress exposure offspring experience in early life, and whether effects are manifest via higher baseline frailty or faster age-related deterioration. This poster will present preliminary data on various components of mitochondrial function in the offspring from young (1yr) and old (3.5+yrs) mothers in the zebra finch relatively early in their lives.

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**PP-30 Magnetic cues and refuelling in thrush nightingales (*Luscinia luscinia*): a 25-year-old hypothesis revisited**

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**Abstract**

Naïve migratory birds may have an innate system of reference points for orientation during migration. Studies in thrush nightingales (*Luscinia luscinia*) indicated that first-time migrants placed in an artificially generated magnetic field of northern Egypt (experimental group), i.e. in front of a major ecological barrier (the Sahara Desert) accumulated more fat than those exposed to the magnetic conditions of their capture site in Sweden (control group). Despite similar daily food portions, young nightingales from experimental group, perhaps being aware of their geographic position, prepared for a difficult flight by accumulating fat, even though excess fuel reduced their maneuverability and made predator avoidance difficult, especially when fuel loads were >30%. In a more recent study northern wheatears (*Oenanthe oenanthe*) exposed to a magnetic field simulating the Europe-to-Africa route accumulated less fat than their counterparts in northwestern Germany. The birds remaining in Germany appeared to recognize the mismatch between their current location and the expected route, leading to active fueling. We replicated the experiment with thrush nightingales and found that in the magnetic field of the Curonian Spit their mass increased, while the birds exposed to in the magnetic field of northern Egypt displayed no increase. These results align more closely with the results obtained earlier in northern wheatears than with the original thrush nightingale study. The conflicting results in a single species show how difficult it is to disentangle how magnetic cues affect refueling. The birds themselves don't always seem to know how to interpret different signals correctly.

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**PP-32 Using Machine Learning Approaches to Predict the Effect of Urbaniztion on Avian Biodiversity**

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**Abstract**

Urbanization deeply transforms natural ecosystems, posing significant threats to avian biodiversity. This study explores the impact of urban environmental factors on bird species in Souk Ahras, Algeria. Using the point count method, we surveyed breeding birds across urban, peri-urban, and rural sites. In addition to assessing bird species occurrences, we collected environmental variables, including tree cover, green space extent, noise levels, and human activity. To analyze the data, we employed Extreme Gradient Boosting (XGBoost) and artificial neural networks (ANN) to predict bird species occurrence based on urbanization-related variables. Both models provided feature importance rankings, identifying key environmental predictors of avian biodiversity. The results indicate that large trees and green spaces are the strongest determinants of bird species richness. Urban areas with well-preserved mature trees and expansive green spaces supported greater bird diversity, emphasizing the crucial role of green infrastructure in sustaining urban biodiversity. These findings underscore the importance of biodiversity-conscious urban planning and advocate for the preservation and expansion of green spaces to mitigate the negative effects of urbanization on bird populations. By integrating machine learning into ecological research, this study demonstrates the potential of data-driven approaches to forecast biodiversity trends and guide sustainable urban development. Our research contributes to urban ecology and offers practical insights for policymakers and urban planners seeking to balance development with biodiversity conservation.

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**PP-34 A novel application of buccal swabbing for dietary DNA metabarcoding: insights from two Procellariiform species.**

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**Abstract**

Seabirds are often considered sentinels of ocean health and investigating seabird diet is essential to further our understanding of marine trophic webs. However, determining the diet of wide-ranging, pelagic species is challenging and there are a series of limitations associated with current techniques. In this study, we investigated the novel application of buccal swabbing and DNA metabarcoding to determine the diet of Manx Shearwaters *Puffinus puffinus* and Northern Fulmars *Fulmarus glacialis* during different stages of the breeding season. We detected 17 fish taxa, with prey DNA successfully amplified in 62.1% of Manx Shearwater samples and 46.7% of Fulmar samples. For both species, prey DNA amplification was more successful in chick samples than in adult samples. This study presents the first species-level dietary data for breeding Manx Shearwaters and identifies five additional fish taxa not previously documented as prey of Fulmars. European Sprat *Sprattus sprattus* was the primary prey item for Manx Shearwaters, while Atlantic Herring *Clupea harengus* and Anglerfish *Lophius piscatorius* were the most frequently consumed prey taxa by Fulmars. Overall, we have shown that buccal swabbing for DNA-based dietary analysis is a minimally invasive and effective method for assessing seabird diets.

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**PP-36 Assessing the ecological consequences of crude oil spills on bird communities in an Afrotropical landscape**

Iniunam Iniunam ORCID iD, Talatu Tende, Adams Chaskda

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**Abstract**

Oil spills present a significant challenge to global environmental sustainability, potentially impacting biodiversity and ecosystem functioning. In the Niger Delta, where crude oil production plays an important role in both local and national economies, oil spills have the potential to impact habitats and threaten local biodiversity negatively. This study aims to improve our understanding of the impact of crude oil spills on bird communities in the Niger Delta region, with a particular focus on species richness, diversity, and functional traits. We found that bird species richness and diversity were significantly lower at impacted sites compared to reference areas. Furthermore, our findings revealed a clear distinction in bird community structure, with generalist species prevailing in spill-affected areas, while specialist species exhibited lower abundance. Our findings also indicate a significant reduction in functional diversity, as indicated by functional richness and Rao's entropy, in spill- impacted habitats. This suggests a loss of critical ecological functions such as pollination, seed dispersal, and pest control. Our study highlights the cascading effects of oil spills on ecosystem services provided by birds, which are vital for human well-being. This research fills a critical gap in understanding the ecological consequences of oil spills on avian communities within the oil-rich Niger Delta area in tropical Africa. The findings underscore the urgent need for effective conservation strategies and policy measures to mitigate the environmental impacts of oil spills and protect biodiversity in the Niger Delta.

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**PP-38 Effectiveness and perspective of artificial breeding sites for the Common Tern Sterna Hirundo in the Netherlands**

Margriet van der Zwan-Krijn

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**Abstract**

The Common Tern is the most abundant tern species in the Netherlands, yet its breeding population has been declining since the 1990s. This decline is primarily due to habitat loss along the North Sea coast, the Wadden Sea and the Zeeland Delta, driven by predation and increased recreational activities. Common Terns have therefore increasingly sought refuge inland, nesting on roofs of buildings. However, these urban colonies create human-wildlife conflicts with residents, prompting the construction of artificial breeding islands as an alternative. The effectiveness of such measures, however, remains uncertain. To address this, we mapped inland breeding locations in the province of Fryslân and monitored population trends and breeding success of Common Terns on an artificial breeding island over five years. Although the first results seemed promising, the colony proved vulnerable to competition, bird flu and inadequate site management. Additionally, we tracked roof-nesting terns with GPS transmitters, revealing a home range larger than previously documented, including frequent visits to salt-water habitat. This may offer prospects for expanding the search for suitable artificial breeding sites. However, as recent data suggest that Common tern chicks mainly eat freshwater fish, it raises questions about the relationship between breeding sites and foraging range.

Our findings suggest that artificial breeding sites can be a viable conservation measure, but their long-term success depends on collaboration with stakeholders and a deeper understanding of their documented home-range.

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**PP-40 Recovery of Coded Wire Tags to Evaluate Impacts of a wintering Great Cormorant (*Phalacrocorax carbo*) population on Juvenile Salmon (*Salmo salar*)**

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**Abstract**

Salmon (*Salmo salar*) populations in the northwestern Iberian Peninsula hold significant biogeographical interest, as they are situated at the southernmost limit of their European distribution. This biogeographical relevance, along with their economic and cultural importance, underscores the need to thoroughly understand the factors influencing their current status. One potential determining factor is early-stage mortality caused by piscivorous predators, including the Great Cormorant (*Phalacrocorax carbo*).Since the early 20th century, population enhancement of salmonids has been a key management strategy in many European rivers. In the autumns of 2020 and 2021, a total of 33,814 and 18,746 juvenile salmon, respectively, were released into the Ulla River (Galicia, NW Spain). All individuals were tagged with magnetic microtags (CWT, Coded Wire Tag, Northwest Marine Technology). Microtag recoveries from pellets and gastric remains were used to assess predation by the wintering Great Cormorant population during the winters of 2020–21 and 2021–22. The estimated mean number of juveniles consumed by the local Great Cormorant population was 12,034 (95% CI: 6,271–21,209) in the winter of 2020–21 and 9,109 (95% CI: 4,686–17,202) in the winter of 2021–22. These figures represent 35.5% (95% CI: 18.5–62.7) and 57.5% (95% CI: 29.9–109.6) of the juveniles released in 2020 and 2021, respectively. These findings highlight the impact of the local wintering population of Great Cormorant on translocated juvenile salmon populations, inducing changes in the translocation strategy to minimise the bird's impact.

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### PP-42 Human food sources shape daily, altitudinal movements of an alpine corvid species

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**Abstract**

Alpine ecosystems are characterized by extreme environmental conditions that pose significant challenges to animal survival. Some species mitigate these challenges through altitudinal movements, seeking milder conditions and richer resources at lower elevations. While the ecological drivers of these movements have been widely studied, the influence of anthropogenic factors remains poorly understood. Addressing this knowledge gap is crucial in the context of increasing human-induced environmental changes, such as the provision of supplemental food sources, and their impacts on animal movement. Here, we examine the altitudinal movements of the yellow-billed chough (*Pyrrhocorax graculus*), a corvid species known to frequently forage on human food sources. During winter, yellow-billed choughs descend to lower elevations searching for food. Contrary to many other species, yellow-billed choughs return daily to their roost sites located 1500m higher in elevation which renders them an ideal study species to examine altitudinal movements. Using GPS tracking and behavioural observations, we demonstrate that the space use at low elevations overlapped significantly with urban areas where they exploited human-provided food. Moreover, individuals exhibited strong site fidelity, consistently revisiting specific urban locations and following similar routes back to higher elevations. Our findings highlight the profound influence of human activity on the altitudinal movements of yellow-billed choughs. Long-term research is needed to understand how changes in human behaviour and environmental conditions in alpine regions will affect these movement patterns over time.

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### PP-44 The Ely valley: an important site for wintering Green Sandpiper *Tringa ochropus*

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**Abstract**

Green Sandpipers winter in small numbers in the UK. Establishing a robust wintering population estimate for the species is difficult because they occupy a variety of habitats and are thinly spread across the country. Here we describe a survey method for Green Sandpiper, using the River Ely in Glamorgan as a case study. A series of coordinated counts undertaken by a team of local volunteers across several sections of the river during the core winter period (November to March) revealed that the River Ely regularly held at least 7-15 wintering Green Sandpipers. The survey method was designed to avoid double counting these highly mobile birds, such that each month produced a "safe" minimum count and a possible maximum count of birds present at the river. The value of researching suitable habitat for the species is demostrated by the presence of Green Sandpipers during the study at sites along the river where they had not previously been recorded. Variation in the monthly counts and the spatial behaviour of the birds are explored and the potential threats to species' continued precence on the Ely are discussed. The River Ely in Glamorgan has, for many years, attracted wintering Green Sandpipers and the results of this study demostrate that they are present there in nationally significant numbers, regurarly exceeding 1% of the species' current wintering population estimate.

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**PP-46 Does long-tailed tit preen oil contain a signature of kinship?**

Joey Baxter ORCID iD, Ben Hatchwell ORCID iD

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**Abstract**

The ability to discriminate between kin and non-kin is advantageous, both to avoid inbreeding and to enhance indirect fitness by cooperating with relatives. The redirected system of helping in cooperatively breeding long-tailed tits (*Aegithalos caudatus*) means that, prior to helping, individuals interact with both close relatives and unrelated conspecifics. Therefore, accurate kin recognition mechanisms are likely required when making decisions about who to help. While the role of olfaction in kin recognition is well-documented in many taxa, it has only recently gained attention in birds. Olfactory kin recognition has now been evidenced in several avian species, but not yet in any cooperative breeders, despite the potential kin-selected fitness benefits available in these social systems. For olfactory kin recognition to be possible, individuals must produce and detect an olfactory signal that correlates with relatedness. We test whether preen oil, the primary source of avian odour, contains such a signal by comparing its composition among over 250 long-tailed tits. We also examine the effects of individuality, season, and age on preen oil composition. We conclude by evaluating the extent to which olfactory cues can provide reliable information about relatedness in this system.

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**PP-48 The effect of research activities on nest predation in the Eurasian Reed Warbler**

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**Abstract**

During studies of avian breeding biology, ecology and population dynamics, researchers have to breach nesting territories, which can potentially lead to various disturbances resulting in altered relationships in the predator-prey system. It is usually assumed that human disturbance reduces nest success in birds. However, recent studies have revealed that in most passerines there is no significant effect of human presence on nesting success. Moreover, some research even suggests that birds may benefit from researcher disturbance near nests. Here, we examine the effect of research activities on nest predation in a small reed-nesting passerine, the Eurasian Reed Warbler, studied during two consecutive breeding seasons. The study plot consisted of two adjacent parts (subplots) differing in the frequency of visits. In the second breeding season subplots were inverted (high-pressure subplot became a low-pressure subplot) to minimise the effect of external factors on the studied parameters. We observed some variability in predation rates between two breeding seasons, but the differences were not statistically significant. We also did not find significant differences in nest survival probabilities between subplots differing in human pressure neither at the egg nor at the nestling stage. We conclude that the researcher presence does not affect nest predation rates in the study population of Eurasian Reed Warblers.

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**PP-50 Understanding the mechanistic link from the predictable physical environment to diving seabird distribution via their marine prey**

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**Abstract**

Due to the acceleration in deployment of offshore renewables and climate warming there are increasing, often cumulative, pressures on marine environments. Seabed sediments provide habitat for predictable prey concentrations for marine top predators, and so changes to these habitats have impacts on the wider marine ecosystem. Both offshore renewables and climate change have the potential to alter seabed sediment composition and stability, but the implications of these changes have barely been considered. Whilst many studies measure the ocean's physical environment in relation to predator behaviour and productivity, the link between seabed, habitat, and prey and the role this plays is overlooked. To make the relationship explicit from seabed habitat to

prey to predator, we concurrently measured fine scale substrate and topography, the distribution, community, size of prey fish, and distribution of diving seabirds. Path analysis in a habitat selection model framework links these components together, allowing us to quantify the ecologically relevant mechanistic link from habitat to predator via their prey. Preliminary results show that sediment type and size can play a role in prey concentrations and that catchability of prey may be more important than visibility in driving seabird distribution. This new evidence base will allow better prediction of the consequences of a changing physical environment on marine top predators and help deliver conservation advice on protecting seabed and seabirds with more ecological certainty. This will aid efficient regional strategic planning and environmental improvement plans.

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**PP-52 Shifting Seasons: Long-Term Insights into Climate Change Effects on Bird Phenology from Ringing Data**

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**Abstract**

Understanding how animal communities respond to environmental change is crucial for predicting biodiversity trends. Birds, particularly migratory species and those experiencing large-scale declines, are sensitive to shifting climatic conditions. Environmental stressors have been linked to earlier migration timing, which can alter species abundance and disrupt ecological interactions. Long-term population monitoring provides essential insights into species' capacity to adapt to climate change, offering a predictive framework for assessing future viability. We analyse a 25-year bird ringing dataset from Spurn Bird Observatory located at a notable migratory bird hotspot. We show that climate factors, especially temperature, are significantly changing and consequently impact migrant bird arrival times. We also show that different species' abundances change over time, making a weak but notable association between these trends with climate change. However, when species are analysed in isolation, it is clear there are other factors to explain this variation – such as epidemiological drivers, in the cases of Trichomoniasis for Greenfinches, and Usutu virus for Blackbirds. We control for catching effort in our analyses, as it directly correlates with abundance and diversity of species caught, evidencing the importance of year-round standardised ringing coverage at UK biodiversity hotspots. Therefore, we suggest caution when using ringing data to make ecological interpretations. While citizen science ringing data has limitations that restrict its use for elucidating mechanisms of species-level patterns, it remains a vital tool for informing conservation. Our study highlights the value of sustained ecological datasets in tracking these dynamics and informing conservation strategies across taxa for landscape-level management.

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**PP-54 Climbing performance of migrating Great snipes, *Gallinago media***

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**Abstract**

Migratory birds perform extraordinary flights on their way to their wintering grounds, dealing with high energetic cost. Not only do birds cover long distances in their migratory flights, they also constantly shift their flight altitude. Apart from constant small-scale shifts in altitude, it has recently been shown that birds perform large climbs and sinks in a diel altitude cycle. This diel altitude cycling has been judged a suboptimal behaviour following time- or energy minimization strategies. The argument for suboptimality assumes that this behaviour would largely add up onto an already high cost of flight. However, to what extent, and at what rate birds climb and sink, has never been described in detail, rendering predictions on the cost of the behaviour into mere guesses. We aimed to describe the climbing- and sinking behaviour of migratory Great snipes and discuss whether their diel altitude cycle could represent an additional cost to their migration. Making use of multisensor data, we quantify altitude variability and compare climb- and sink rates from non-stop migratory flights lasting up to 4 days. Our results show that in general, Great Snipes climb- and sink at slow rates. However, the fastest climb rates we observed are substantially higher than theoretical predictions. Especially long nighttime climbs have high average climb rates while the fastest sinks were performed in the day. We found a diminishingly low cost of shifting altitudes and conclude that the selection pressures driving the emergence of diel altitude cycles is likely lower than previously thought.

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### PP-56 Endocrine disrupting chemicals in waterways and the impact on the survival and breeding success of Hirundines

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**Abstract**

UK waterways have reached critical levels of pollution with an almost ubiquitous presence of persistent, bioaccumulative, and toxic contaminants from agricultural runoff, industrial discharge and sewage overflows. Many of these chemicals are known endocrine disruptors (EDCs) which alter or inhibit the normal function of the hormonal system or cause cellular damage, leading to reduced fitness and reproductive success. Despite the negative impact of these chemicals on aquatic habitats, many polluted aquatic areas are recognised as profitable food sources for insectivorous songbirds, in particular wastewater treatment plants (WWTPs). WWTPs are hotspots for aquatic macroinvertebrates, with high densities of these nutritionally valuable prey items available even when numbers fall elsewhere. However, WWTPs also serve as the endpoint for EDCs in wastewater from various sources, and incomplete removal of EDCs during water treatment means that even treated effluent carries EDCs outside of WWTPs. As insect numbers fall elsewhere, WWTPs may become more attractive as foraging sites, forming a potential ecological trap where EDCs bioaccumulate from wastewater to aquatic macroinvertebrates and into insectivorous birds. This study will establish whether there is a significant bioaccumulation pathway from WWTP effluent to insectivorous birds using sand martins (*Riparia riparia*) as a model species, and advanced non-targeted mass spectrometry to identify particular pollutants of concern. Following this we will investigate links between EDC load and reproductive fitness and behaviour in sand martins breeding and foraging near WWTPs.

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### PP-58 Scope for waterfowl to speed up migration to a warming Arctic

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**Abstract**

Earlier onset of spring is one of the key ecological effects of climate change. Many migratory birds have been speeding up their spring migration to mitigate negative consequences of arriving late at the breeding grounds relative to spring phenology. We examine how much scope there currently is for herbivorous birds to migrate faster. Combining multi-year GPS tracking and body mass data from a range of large-bodied Arctic-breeding waterfowl, we quantify fuelling before departure and en route. While substantial reductions in the total fuelling time (or increases in fuelling rate) are required to speed up migration, individuals are variable in their fuelling time and they appear to have considerable scope to migrate faster. Still, under the current rates of Arctic warming, this variability may enable them to mediate only a few more decades of spring advance by migrating faster.

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**PP-60 Measuring exposure to mercury pollution and its health and fitness consequences in wild adult European Dippers (*Cinclus cinclus*)**

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**Abstract**

Chemical pollutants, due to their persistence and toxicity, present significant threats to wildlife. Among these, mercury, in particular methylmercury, poses a high risk due to its bioavailability and tendency to biomagnify within aquatic ecosystems. Mercury exposure has been linked to oxidative stress, a physiological imbalance in which reactive oxygen species production exceeds the body's capacity to neutralize them. This imbalance can cause cellular damage, potentially affecting vital life-history traits such as growth, reproduction, and survival. The European dipper (*Cinclus cinclus*), a riverine bird, is highly vulnerable to methylmercury exposure due to its high trophic position and diet of aquatic invertebrates. Inhabiting rivers that traverse a wide habitat gradient, this bird enables a robust investigation into the effects of varying mercury exposure. For my master project, I will leverage an extensive long-term dataset to achieve three key objectives: 1) measuring mercury concentrations in feathers and blood to evaluate their correlation and relevance in quantifying exposure to mercury over different time windows, 2) examining the relationship between mercury burden and adult health markers, such as oxidative status and body condition, and 3) evaluating how adult mercury levels and health influence reproductive success through a cross-fostering experiment. By integrating ecotoxicology with physiological ecology, this project will provide valuable insights into the sublethal effects of mercury contamination, contributing to a deeper understanding of pollutant-induced stress in freshwater ecosystems.

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**PP-62 Multiscale 3D imaging of avian eggshell using X-ray and electron tomography, and atomic force microscopy, reveals shell nanostructure and shell membrane attachment mechanism**

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**Abstract**

Eggshell formation in the avian oviduct occurs on a soft fibrous membrane at the egg surface that provides a substratum for eggshell mineral deposition. These dissimilar material layers apparently evolved a structural attachment to each other as a successful strategy essential for avian embryonic development, growth, and hatching of the chick. To understand how organic membrane fibres attach to shell mineral, 3D multiscale imaging including X-ray and electron tomography coupled with deep learning-based segmentation was used to investigate the organic-inorganic interface of the domestic chicken egg. With structural observations spanning across the nano- and microscales, we used 3D thickness and directionality mapping from X-ray tomography to quantitatively determine fibre features across large tomographic volumes. In the shell, using conventional, anhydrous and cryogenic sample preparation methods for electron microscopy, high lability of calcium carbonate mineral was established. Using atomic force and electron microscopy, a gradient of nanostructure across the shell thickness was identified that contributes to the shell's mechanical properties. At the shell-membrane interface, whole fibres embed into mineral across the microscale, while fine mineral projections (nanogranules / nanospikes) insert into fibre surfaces at the nanoscale. This reciprocal attachment considerably increases the organic-inorganic interface surface area. The multiscale anchorage between the soft membrane and the hard shell occurring at two different length scales provides a secure attachment mechanism for eggshell integrity across two dissimilar materials, and may play a role in facilitating Ca supply for embryonic skeletal development. This work provides a morphological basis for understanding eggshell and eggshell membrane structure-function relationships.

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**PP-64 The search for the holy grail: one black rotor blade did not reduce bird mortality in windfarm Eemshaven in the Netherlands**

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**Abstract**

Following the positive results of painting one blade black to reduce collision rates among birds on the Norwegian island of Smøla, a follow-up study was set up in windfarm Eemshaven in the Netherlands starting in 2021. Here, a much broader set of species is present, and collision rates among birds are known to be relatively high.

The study consisted of 14 turbines in a BACI setup (Before-After-Control-Impact). After one year of Before monitoring, during which all turbines had regular white blades, half of the turbines received one black blade. The After monitoring lasted two years, until the end of 2024. In total 436 collision victims of birds were found. The most frequently recorded species groups were songbirds and gulls, followed by waders. Unfortunately, no statistically significant effect of the black blade on the number of collision victims was found. This result holds for all bird species together, as well as for all individual species groups. Interestingly, for diurnal birds and large gull species we did find a positive effect of the black blade, although this was not statistically significant. A possible explanation for the rather disappointing results of this study, is that the single black blade might not contrast enough with the (busy) industrial background in the Eemshaven area. Another explanation is that due to the relatively small sample size in the study at Smøla, the positive effect of the black blade might have been overestimated.

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**PP-66 Apparent survival and turnover in Estonia's Golden Eagle (*Aquila chrysaetos*) population: A comparison of various marking methods**

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**Abstract**

Survival and turnover rates are key factors in determining population dynamics, particularly for long-lived species. In this study, we analyze these characteristics and their dynamics in a widespread raptor species, the Golden Eagle (*Aquila chrysaetos*), over a 20-year period. The data was collected using three different marking methods: (1) genetic sampling and analysis of non-invasively collected adult feathers, (2) identification of coloured leg rings captured by trail cameras, and (3) genetic analysis of relatedness between juveniles and adults. All of these methods produced similar results for both apparent survival and turnover rates, with males exhibiting an average survival rate between 0.83 and 0.87 and a turnover rate between 0.05 and 0.11 across all methods. Similarly, females had a survival rate ranging from 0.81 to 0.88 and an average turnover rate between 0.06 and 0.12. These results align with previously published studies on the apparent survival and turnover of the Golden Eagle in other countries and regions. Our study showed that although each marking method has its own specific challenges, they provide comparable results and complement one another.

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### PP-68 Reconciling cocoa agriculture and bird conservation in West Africa through research and action

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**Abstract**

Cocoa agriculture has caused extensive deforestation in West Africa. In Côte d'Ivoire, the leading producer worldwide, cocoa is grown in intensified plantations with sparse shade cover and low tree diversity. Such plantations are of limited value to bird communities and tend to suffer more from pest burdens and climatic extremes. Ivorian farmers are thus showing increasing interest in restoring and diversifying their plantations. Here, we showcase a multidisciplinary collaborative project, which combines research, capacity development and on-the-ground action to mitigate the effects of cocoa agriculture on birds and local communities. Specifically, we investigated aspects of cocoa management that could be adjusted to improve the value of plantations for birds. We found that shade tree density, richness and community composition had a strong influence on different aspects of bird communities. We identified the shade tree species that are most beneficial to birds, whilst also giving farmers alternative income sources. In collaboration with a local cocoa cooperative, we implemented a programme where shade tree saplings of these desirable species are raised and distributed to local farmers. Such actions are an example of the much-needed measures that can mitigate the effects of cocoa agriculture on biodiversity, whilst benefitting local communities in West Africa.

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### PP-70 Sex-specific patterns of activity in a nocturnal bird of prey: the influence of the environment during the non-breeding season

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**Abstract**

Barn owls (*Tyto alba*) in temperate regions face significant environmental challenges, including temperature fluctuations and seasonal variations in prey availability. Adapting their behaviour to meet energy demands, particularly during the non-breeding period, is crucial for survival. In this study, we investigated the activity patterns and foraging behaviour of barn owls using accelerometer data and GPS tracking, focusing on the influence of weather conditions, habitat composition, and prey availability. Our findings reveal that barn owls exhibit peak activity during dusk and dawn, aligning with the primary activity periods of their prey. Adverse weather conditions, such as low temperatures, strong winds, and rainfall, strongly reduce their activity levels, likely due to increased energy expenditure and decreased prey detectability. Activity patterns were also closely linked to habitat-specific prey availability, with owls demonstrating behavioural flexibility by adapting their foraging strategies. For instance, reduced active flight time in areas with greater perching opportunities and higher prey availability suggests a shift from aerial hunting to perching, possibly to conserve energy. Conversely, barn owls employed more active hunting strategies in areas with abundant, mobile prey species. These adaptations highlight the owls' ability to optimize energy allocation in response to environmental constraints. Efficient energy management during the non-breeding period is critical for survival, as reduced foraging success can lead to increased mortality rates. These findings enhance understanding of the ecological factors influencing barn owl populations in temperate regions and their adaptive strategies for survival in fluctuating environments.

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### PP-72 Improving the spatial coordination of agri-environmental schemes for bird conservation

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**Abstract**

Agricultural productivity and biodiversity conservation often compete for the same land. Improving the spatial coordination of agri-environmental schemes in agricultural landscapes can help minimize these trade-offs. Mobile species like birds and their insect prey depend on key habitats for nesting, food provisioning and shelters. However, habitats not only need to be generally available in landscapes but also need to be of sufficient quality and linked to ensure habitat connectivity. Here we describe a new methodological approach how to investigate trade-offs and synergies between productivity and bird conservation in a case study in Grisons, Switzerland. Scenarios of farmers adoption of agri-environmental schemes were used to project future agricultural land use on parcel level resolution as different spatial configurations. The expected impact of farmers' adoption decision on bird species was then calculated by matching the spatial-explicit land use with the distribution of key regional grassland bird species (Fieldlark, Whinchat, Hoopoe, Corn crake…) using high-resolution spatially-explicit maps. This combination of land-use and potential distribution, together with a spatial evaluation of habitat connectivity was used to assess the suitability of each scenario for promoting the key bird species. The presented approach can be used to inform planning of regional agricultural landscapes and design of agri-environmental schemes with the aim to maximize synergies between production and conservation. As next steps, similar analyses will be conducted including other key species (groups). Information about the optimal locations of agri-environmental schemes promoting biodiversity helps to maximize ecological networks and minimize the area needed to contribute to safeguarding biodiversity.

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### PP-74 Overlapping characteristics of tree-cavities used by nesting birds are due to preference, not resource limitations

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**Abstract**

Many forest bird species depend on pre-existing tree cavities for nesting. In human-transformed forests cavity-bearing trees are often removed, reducing the availability of potential nest-sites. Consequently, breeding birds can suffer interspecific competition for nesting sites, with subordinates being killed or evicted by dominant species. In managed or modified forests, competing bird species can be forced to use a limited range of tree cavities, and an overlap in nest-cavity characteristics has been suggested as an effect of reduced resource availability and/or diversity. We test this assumption using data collected in 1987–2015 in primeval conditions of the Białowieża Forest (Poland), where diverse tree cavities are superabundant, birds have unlimited choice of preferable nesting sites, and where conflicts over cavities are rarely recorded. Our presentation focuses on the type, location and dimensions of 2,108 natural tree-cavities that were used for breeding by six non-excavating bird species: *Parus major*, *Cyanistes caeruleus*, *Poecile palustris*, *Ficedula albicolla*, *F. hypoleuca and Sitta europaea*. The results reveal that the greatest interspecific overlap in characteristics was found between nest-cavities used by closely-related *F. albicolla* vs. *F. hypoleuca*, *P. major* vs. *C. caeruleus*, or *C. caeruleus* vs. *P. palustris*. We argue that the large overlap in tree-cavity types, locations and dimensions reflects nest-site preferences of individual bird species that respond to similar selective forces, rather than resource limitations and interspecific competition for nest-sites. We discuss the effects of the selective forces and highlight the implications of limited nest-site availability in human-modified habitats.

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### PP-76 A global analysis of raptor mortality causes in the Anthropocene: the role of life-history traits and the Human Footprint

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**Abstract**

Raptors are vital components of ecosystems due to their high trophic position, and are considered as important biodiversity indicators and flagship species for conservation measures. Currently, half of all raptor species experience population declines and nearly 20% are threatened with extinction. Raptors face widespread mortality from human persecution (shooting, poisoning, trapping) and unintentional anthropogenic mortality (e.g. electrocution at powerlines, collisions with vehicles, windows). Identifying the key drivers associated with major sources of raptor mortality will help in setting effective policies and conservation actions. To address this, we conducted a global review of literature, identifying 250 sources reporting 81,806 counts of raptor mortality from 76 species. The most commonly reported mortality cause was 'unknown' (30%), followed by persecution (21%) and natural causes (20%). We used Bayesian Multivariate Regression methods to model the association of indirect and direct anthropogenic mortality rates with body mass, life-history traits (migratory behaviour, primary lifestyle, habitat preference) and the Human Footprint Index (HFI), a proxy for the extent of human transformation of the landscape. Our results indicate that larger species and those occurring in open habitats (grasslands, rock and shrublands) were prone to higher rates of persecution, while sedentary species suffered higher indirect mortality rates. Additionally, both persecution and unintentional anthropogenic mortality rates were positively associated with HFI. Conservation measures attempting to reduce raptor mortality will need to be species-specific, considering their diverse life-history strategies and ecological traits and must target reduction of both direct and indirect anthropogenic mortality.

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### PP-78 Upscaling species-habitat relationships: fine-scaled habitat suitability predicts landscape-level breeding density

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**Abstract**

Modelling species-habitat relationships is key to understanding species ecology and designing effective conservation measures. The hierarchical nature of habitat selection by animals has been proposed over 40 years ago (Johnson 1980); even if largely accepted since then, it has rarely been tested in practice so far. Here, we focused on nine common bird species in intensive apple orchards to test whether models built on habitat use at fine scale (314 $m^2$) can be upscaled to predict the overall breeding population density observed at the transect scale (~6 ha). To do so, we compared transect models with/without upscaled predictions using three evaluation statistics (AICc, coefficient of determination $R^2$, and root-mean-square error RMSE). In all species, the inclusion of upscaled predictions increased at least one model statistic; in five species, all the three statistics were improved, meaning that transect-level patterns of breeding densities strongly correlate with individual patterns of (within-territory) habitat use. Such a good upscaling performance confirms that species distributions may be the outcome of habitat selection processes acting at different scales and on different levels of organisation (individuals *vs* population), consistently with Johnson's theory. Moreover, we found a relatively high degree of cross-scale consistency in habitat effects, which might facilitate the design of conservation measures and their effectiveness. With this work, we aim to repropose this relatively old concept as central to current ornithological research: multi-level habitat selection studies can benefit from modern data and tools and foster key advancements in applied ecology and conservation.

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### PP-80 Magnetic maps in seabirds? Investigating geomagnetic cues for navigation

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**Abstract**

Seabirds are remarkable navigators, capable of long-distance migrations, exhibiting philopatry and successfully returning to home even after experimental displacement. However, the specific cues they use for navigation remain debated, particularly regarding the role of geomagnetic information. Conflicting findings have left uncertainty about whether seabirds rely on the Earth's magnetic field as part of their navigational strategy. This study aims to explore the use of magnetic cues in the Manx shearwater (*Puffinus puffinus*), a migratory, pelagic seabird of the Procellariiformes order. Using a long-term GPS-tracking dataset, we are investigating the accuracy of initial flights of shearwaters as they return to their colony following foraging trips, sometimes over hundreds of kilometres. By using a new data fusion tool, MagGeo, we will examine whether increased magnetic disturbance caused by solar storms correlates with shearwater navigational error, apparent as angular deviations from the homeward direction during homing flights. The findings from this study will contribute to our understanding of whether shearwaters use magnetic cues as part of their navigational map sense.

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### PP-82 Occurrence of *Campylobacter* spp. in seabirds

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**Abstract**

Wild birds are known carriers of *Campylobacter* spp., responsible for campylobacteriosis, a common zoonosis in the EU. These bacteria typically inhabit the intestinal tract of birds. Birds that feed opportunistically and live near people are assumed to have higher *Campylobacter* incidence, as they may ingest the bacteria from the environment. To investigate this, we surveyed four seabird groups during the breeding season. We tested for the presence of *C. jejuni and C. coli* which are mostly responsible for campylobacteriosis, and *C. lari*, which is common in marine habitat but can also affect people. From 2021 to 2024, cloacal swabs were collected from three gull species (n = 1639), one tern (n = 85), one shag (n = 67), and two shearwater species (n = 349) across various breeding colonies of Croatia. Overall occurrence of these *Campylobacter* species in seabirds was 10.93 %, with *C. jejuni* being the most common (7.01 %). The highest prevalence of *Campylobacter* spp. was found in gulls (13.58 %), followed by terns (11.76 %) and shags (4.48 %). All shearwaters tested negative for the presence of these three *Campylobacter* species. Gulls, known for their opportunistic feeding in urban areas and landfills, had higher bacterial prevalence. Terns, from inland colonies near settlements and agricultural lands show higher occurrence than terns breeding at sea. Shags, primarily marine birds, have limited contact with people, contributing to their lower *Campylobacter* prevalence. Shearwaters, strictly marine and avoiding contact with humans, had no *Campylobacter* presence, aligning with their behavior.

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### PP-84 Bird mortality and scavenger activity at a site with high bird-glass collision rates: a case study from the University of Białystok campus, Poland

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**Abstract**

Bird-glass collisions are a significant source of bird mortality worldwide, yet accurately estimating strike rates is challenging due to the lack of evidence from many collisions. Scavengers often remove bird carcasses before detection, leading to underestimation of collision rates. From 2019 to 2023, we investigated bird mortality and

scavenger dynamics at a high collision site on the University of Białystok campus, Poland. We recorded 263 dead birds from 38 species, with *Parus major* (16.3%), *Coccothraustes coccothraustes* (16.0%), and *Turdus philomelos* (14.8%) being the most frequent victims. Collision rates were higher in summer (1.9 collisions/survey) and autumn (1.0) compared to winter (0.3) and spring (0.4). Citizen science data revealed differences in bird community structures between carcass surveys and general surveys, indicating selectivity. Camera traps showed scavenger activity and carcass removal times ranging from 1.2 to 209.1 hours. Approximately 50%, 66.7%, and 76.7% of removals occurred within 24, 48, and 72 hours, respectively, suggesting that 1.0, 2.0, and 3.3 birds were likely missed due to scavenger activity. Six scavenger species were identified, with *Martes foina* (43.3%), *Buteo buteo* (23.3%), and *Pica pica* (10.0%) being the most common. Scavenger activity varied, with birds active mostly at dawn and dusk, and mammals at night. We recommend simultaneous bird-glass collision monitoring and carcass removal trials to accurately determine local bird mortality and avoid underestimation.

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### PP-86 Evaluating the effectiveness of BirdShades ultraviolet-reflective film in reducing bird-glass collision rates: a case study from the University of Białystok campus, Poland

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**Abstract**

Bird-glass collisions pose a significant conservation challenge worldwide, leading to high bird mortality rates. Birds often mistake reflections of the environment in glass surfaces as extensions of their habitat, causing collisions. This issue raises social and economic concerns, prompting the development of technologies to reduce bird collisions and mortality rates. Moreover, property owners often express aesthetic concerns about visible decals on windows, creating pressure for invisible collision-reducing technologies. It is crucial to test the effectiveness of these measures under natural conditions, considering local factors influencing bird-glass collisions and free-living birds. Using Before-After Control-Impact analysis, we evaluated the effectiveness of BirdShades ultraviolet-reflective film installed on a 330 square meter highly reflective (35%) glass surface at the University of Białystok campus, Poland. The BirdShades product features vertical stripes of ultraviolet-disrupting patterns, invisible to humans but visible to birds in the UV spectrum. We found a statistically significant reduction in bird-glass collision rates compared to control windows. Additionally, we observed effects of month (more carcasses during fall migration), temperature (more carcasses on warmer days), habitat (more carcasses in closed and more vegetated habitats), and the total reflective glass area at monitored sites (positive relationship) on bird-glass collision risk. Our study provides evidence that the BirdShades product effectively reduces bird-glass collisions under natural conditions. As the film is invisible to the human eye, it offers a promising alternative to other visible collision-reducing technologies.

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### PP-88 Using passive acoustic monitoring and indicator bird species to evaluate the effectiveness of restoration initiatives

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**Abstract**

European populations of long-distance migratory landbirds are declining faster than those of short-distance migrants or resident species. These long-distance migrants are particularly vulnerable as they face multiple threats and require good quality habitats at their breeding sites, along their migratory flyways, and in their non-breeding grounds in Sub-Saharan Africa. Many species of migratory landbirds concentrate in the Sahel region, where the combined effects of anthropogenic pressures and climate change are primary causes of land degradation, threatening biodiversity (including resident and migratory birds), and the livelihood of local communities, calling for urgent restoration efforts. Numerous restoration initiatives exist in the Sahel, with great potential to benefit biodiversity, including resident and migratory birds. However, their effectiveness in restoring biodiversity is rarely evaluated. Here We propose a framework to assess restoration success using passive acoustic monitoring (PAM) and birds as bioindicators. Leveraging recent advances in AI technologies, PAM offers a cost-effective opportunity

to monitor biodiversity recovery over large spatial and temporal scales, making birds ideal indicators of habitat restoration. Using a case study from habitat restoration through livestock grazing exclusion in Burkina Faso, this presentation demonstrates how PAM can evaluate restoration outcomes. By monitoring bird communities, we can assess biodiversity recovery, providing critical insights into the effectiveness of restoration initiatives. This approach not only contributes to the conservation of migratory landbirds but also supports broader efforts to restore degraded ecosystems in the Sahel.

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**PP-90 Adaptiveness of breeding habitat selection in a changing landscape: a successful case of a novel habitat use associated to nest placement flexibility by an early-successional bird species**

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**Abstract**

Agriculture and forestry activities have generated structurally different open-habitats available to early-successional bird species, in which individuals are often confronted with ecological novelties in regard to their species' evolutionary past. In a farmland-forest landscape in Belgium, the spread of Christmas tree plantations within farmland offers novel breeding opportunities for some of these species, along with grassland and clear-cut patches in forests. The European Stonechat (*Saxicola rubicola*) has experienced an important population increase in our study area during the last decades and currently breeds in these three contrasted habitat types. We tested if habitat selection is adaptive in this changing landscape by comparing the attractiveness and breeding quality of clear-cut patches, Christmas tree plantations and grassland. As we noted that stonechats breeding in Christmas tree plantations exhibit higher individual flexibility in nest placement then their conspecifics established in grassland and in clear-cut patches, we then also studied how building off-ground nests in Christmas trees affects the breeding performances of this typical ground-nesting species. Stonechats preferentially settle in clear-cut patches than in grassland and Christmas tree plantations, although they face some difficulties to provide their offspring with food in the preferred habitat in the late breeding season. All in all, however, our results indicate similar fitness for the breeders in the three habitat types. Breeding attempts in off-ground nests built in Christmas trees do not induce any fitness loss in comparison to traditional on-ground nests. Our study thus documents a successful use of a novel environment facilitated by behavioural flexibility of individuals.

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**PP-92 Optimizing BirdNET for local ecosystems, fine-tuning for ecoacoustic monitoring**

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**Abstract**

Passive Acoustic Monitoring (PAM) is a valuable tool for biodiversity assessment, yet the accuracy of automated species identification models like BirdNET varies across environments. This study evaluates BirdNET's performance in detecting 13 bird species in Bahía de Cádiz at two sites—INM and TAR—100 km apart. A custom validation tool enabled manual BirdNET-base verification of four common species (Actitis hypoleucos, Larus michahellis, Falco tinnunculus, Arenaria interpres). Initial results showed higher performance in TAR (F1-score: 48%) than INM (1%). To improve detection, BirdNET was fine-tuned using four datasets with bird vocalizations: Xeno-Canto data, site-specific training (TAR and INM), and a mixed dataset. The base model on those segments achieved 0.37 accuracy (macro F1: 0.06, weighted F1: 0.51) in TAR and 0.32 (macro F1: 0.07, weighted F1: 0.39) in INM. The best model for TAR used TAR-specific data (accuracy: 0.53, macro F1: 0.31, weighted F1: 0.54), while INM performed best with a mixed dataset (accuracy: 0.40, macro F1: 0.19, weighted F1: 0.41). Adaptive confidence thresholds were tested, but a fixed 0.1 threshold performed best. Training with Xeno-Canto slightly improved TAR's macro F1 (0.18) but was ineffective for INM, highlighting the need for domain-specific data. Future work will integrate more local environmental sounds to enhance model robustness and reduce false positives, improving ecoacoustic monitoring in complex habitats.

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### PP-94 Migration of common shelduck *Tadorna tadorna* in relation to offshore wind farms

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**Abstract**

The global extinction risk for migratory species is increasing, with climate change being implicated as a major driver, so mitigating the impacts of climate change is essential. Offshore wind farms (OWFs) have great potential to achieve this, but placing OWFs in flyways can negatively affect migratory species. Here we present new data on the migrations of common shelduck (Tadorna tadorna) in northwest Europe in relation to OWFs. Between 2019 – 2023, 57 common shelduck were GPS tracked on migration from UK breeding sites to moulting sites, providing high resolution data on routes, timings, and flight metrics. To complement this, stable isotope analysis of hundreds of feathers have allowed us to establish the connectivity of common shelduck between moulting and non-breeding sites. Together these data demonstrate complex and variable migratory strategies. The GPS data indicate that sea crossings take 3 - 29 hours, with flight speeds between 18 – 90+ km/h. Routes taken suggest that the majority of the UK breeding population interact with OWFs on migration. The stable isotope analysis demonstrates that individuals routinely migrate over sea areas throughout their annual cycle, and there can be within-individual annual variation in these movements. Individuals from single non-breeding locations moult at a variety of sites, meaning a portion of most protected populations may be at risk of OWF interaction. This research provides a case study for how an integrated sampling method can be used to understand the migratory cycle of a data deficient species.

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### PP-96 RFID deployment at natural passerine nest burrows: design, data accuracy, and effects on bird behaviour

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**Abstract**

Tracking technologies, such as Radio Frequency Identification (RFID), enable continuous monitoring of bird behaviours compared to traditional monitoring methods. RFID is most often used to study birds' breeding behaviours in artificial nest boxes, thereby limiting studies to box-using species. To assess the feasibility of equipping natural nests, we installed equipment at the burrow nests of spotted pardalotes (*Pardalotus punctatus*) - a passerine with biparental care. In contrast to nest-box studies, where equipment can be placed prior to nesting, we placed equipment after birds commenced breeding as the birds had to first choose the nest site and commence burrow and nest construction. Natural breeding sites present challenges, such as environmental factors (e.g., rain/dust) adding to existing limitations of RFID technology and potentially affecting data reliability. Our study aims to develop a field-proof RFID system for burrow-nesting passerines and evaluate the method's accuracy and effects on bird behaviour. Our custom system balanced concealment and effectiveness against field constraints and technological limitations. Nine treatment and 11 control nests were monitored with cameras, and treatment nests were RFID equipped. We quantified equipment placement effect on birds' behaviours by measuring the time to return to nests after placement and comparing behaviours documented from videos across groups. To assess accuracy, we compare video and RFID data. This study provides a comprehensive method, from field data collection to behaviour extraction, offering the potential to continuously monitor breeding behaviours of any burrow/cavity nesting birds at natural nests.

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**PP-98 The sequence of barn swallows waking up at the roost.**

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**Abstract**

The analysed material was collected during bird ringing on the ponds of a fishing farm in central Poland (52°00'41''N, 19°05'48''E) between 1975 and 1980. It numbered 61,256 barn swallows. The age of individuals in the first calendar year was determined according to the 4-level, original scale, based on the convexity and colour of the gape and the initial exchange of remiges and rectrices. It was checked based on the time analysis of recaptured ringed birds. The material was analysed using generalised linear methods.

In the evening, barn swallows gather at the roost, flying over it and in its vicinity. Then, the birds suddenly fall into the reed. This way of falling into roosts causes the birds to catch themselves in a manner close to random. The morning dispersal of birds from the roost takes much longer, even up to 2.5 hours after sunrise, in the case of the youngest individuals. At that time, the mist nets are already visible, making it more challenging to catch them. Assuming that the visibility of the mist nets increases during sunrise, it is possible to reconstruct the order in which birds of subsequent age and sex groups fly out of the roost. Adult males take flight first, then adult females, and birds from age classes 4 to 1 are the last. The connections mentioned above change for barn swallows in different age and sex categories among years, depending on the weather conditions and food availability.

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**PP-100 Climate change affects the timing of spring migration of the Dunnock Prunella modularis on the southern Baltic coast**

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**Abstract**

Climate in Europe has been changing rapidly since the 20th century, and migratory birds are adapting to these changes. In particular, temperature changes have affected many aspects of avian life. Dunnock is a medium-distance migrant, with the northern European breeding populations wintering around the Mediterranean Sea. In spring, they migrate from the Mediterranean region, through C Europe via the southern Baltic coast, to their breeding grounds in the Fennoscandia and NE Europe. We analyzed the effect of temperatures at their wintering grounds in SW Europe and along tmigration routes in C Europe on the Annual Anomaly (AA) and the dates of percentiles (10%, 50%, 90%) of spring passage of Dunnock at the Hel ringing station (N Poland, Baltic Sea coast) during 1965-2023. The start of migration shifted on average earlier by 3.7 days, but the end shifted later by 7.1 days, so the duration of spring passage through Hel has extended by 10,8 days over these 59 years. During this period, early starts and late ends of spring migration of Dunnocks were associated with warm temperatures in March and April on the wintering grounds in SW Europe and along their migration routes in central Europe. These temperatures in March and April increased over 1965-2023. Thus, we conclude that the long-term shifts in the timing of the spring migration of Dunnock on the Baltic coast can be attributed to the climate change, in particular to the influence of rising temperatures in spring.

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**PP-102 Impact of extreme climatic events on an urban nesting insectivorous bird, the Alpine swift**

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**Abstract**

Extreme climatic events (ECEs) are changing in frequency and intensity due to climate change, posing significant challenges to wildlife. Understanding their impact on species' reproductive success is critical for conservation efforts. This study aims to assess how ECEs influence Alpine Swifts (*Tachymarptis melba*) reproduction and nestling development. Alpine swifts are highly aerial insectivorous birds, and the amount of flying insects strongly drops on cold and rainy days. Furthermore, they are cavity breeders and often colonise urban environments by breeding under roofs that can get particularly warm during hot days. First, we defined ECEs as days when the temperature extremes either exceed the 90th percentile or fall below the 10th percentile during critical life stages

of Alpine swift nestlings (incubation and growth). During the past 30 years, the number of cold days during incubation and growth has decreased, whereas the number of hot days has increased. We then analysed long-term data (1999–2024) on Alpine Swift reproductive success and nestling growth. We found an effect of ECE, where the number of hot days during incubation was linked to reduced hatching and fledging success and reduced body mass and wing growth. During nestling growth, the number of cold days reduces wing growth. This study highlights the importance of understanding microclimatic variability within urban breeding sites to mitigate the impacts of ECEs on avian populations and underscores the need for long-term monitoring to assess responses to climate change.

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**PP-104 AVISEN: AVIan SENescence database to understand senescence in birds**

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**Abstract**

Senescence is the biological process of progressive damage accumulation and physiological dysfunction, leading to a gradual deterioration of organismal health and a decrease of survival prospects. Studies focusing on model organisms have provided molecular insights into the processes of senescence within species, while analyses on broader taxonomic scales using wild-living organisms have shown that senescence patterns can be highly variable. Of special interest in this context are birds, because of their long lifespan and slower senescence compared with size-matched mammals, despite several physiological and cellular avian traits (e.g., high blood glucose levels, metabolic rates and body temperatures), which were expected to contribute to senescence. This phenomenon is known as the 'bird paradox'. Making use of increasing empirical data on senescence in wild birds, we compiled the AVIan SENescence (AVISEN) database. This extensive literature review yielded longitudinal and cross-sectional data about age-specific reproduction, survival and phenotype. AVISEN currently contains 923 species-specific datasets of 101 bird species and 142 populations, derived from 199 scientific publications covering most of the global biogeographic regions. AVISEN includes 659 reproductive, 73 survival and 191 phenotypic life tables. Preliminary analyses indicate evidence of senescence in 54% of reproductive and 46% of phenotypic datasets. We present preliminary results on the influence of ecological traits on senescence in birds.

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**PP-106 Olfactory camouflage and communication in birds**

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**Abstract**

The uropygial gland of birds produces an odoriferous secretion (preen oil) that can differ seasonally and between the sexes. These differences are hypothesized to function in olfactory camouflage (olfactory crypsis hypothesis) and/or intraspecific olfactory communication, particularly during breeding (sex semiochemical hypothesis). We conducted a systematic review of such changes in preen oil chemical composition, finding seasonal differences in 95% of species (57/60 species in 35 studies) and sex differences in 47% of species (28/59 species in 46 studies). We then conducted phylogenetic comparative analyses using data from 59 bird species to evaluate evidence for both the olfactory crypsis and sex semiochemical hypotheses. Seasonal differences were more likely in the incubating than non-incubating sex in ground-nesting species, but were equally likely regardless of incubation strategy in non-ground-nesting species. This result supports the olfactory crypsis hypothesis, if ground nesters are more vulnerable to olfactorily searching predators than non-ground nesters. Sex differences were more likely in species with uniparental than biparental incubation and during breeding than non-breeding, consistent with both the olfactory crypsis and sex semiochemical hypotheses.

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**PP-108 A tale of two amino acids: habitat-dependent effects of methionine and leucine on nestling growth and physiology**

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**Abstract**

Nestling growth and immune development in birds are closely linked to habitat quality, particularly food availability and nutrient composition. Urban environments often provide suboptimal diets, potentially deficient in essential amino acids, which may constrain nestling development. In this study, we experimentally supplemented Great Tit (Parus major) nestlings with methionine, leucine, or water (control) from day 4 to day 7 post-hatching to assess the effects on growth performance and immune function across urban and forest habitats. We measured body mass, tarsus length, and wing length as growth indicators and evaluated immune function using hemagglutination and lysis assays. Leucine supplementation significantly enhanced body mass gain in forest nestlings, particularly in smaller individuals, suggesting increased protein synthesis efficiency, but also resulted in reduced tarsus growth and lower agglutination scores, indicating a potential growth-immunity trade-off. Methionine had no measurable effect on growth but significantly enhanced lysis activity, reflecting improved innate immune function. Urban nestlings exhibited limited responses to supplementation, suggesting broader nutritional constraints beyond individual amino acids. Habitat and initial body mass significantly influenced wing growth, with urban nestlings developing shorter wings. These findings highlight the complex, condition-dependent effects of amino acid availability on nestling development, emphasizing the need to consider habitat-specific nutritional limitations when assessing avian developmental plasticity in urban environments.

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**PP-110 Acute but not chronic infections trigger terminal investment.**

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**Abstract**

Life-history theory predicts a trade-off between immune defence and reproduction. Individuals undergoing an infection during breeding may trade-off their current reproductive effort against fighting the infection. Alternatively, with the expectancy of reduced survival probabilities due to the infection, they may increase investment into current reproduction ; a strategy known as the terminal investment hypothesis. However, little is known about which types of infection may trigger terminal investment. Here, we compared the reproductive investment of females with acute vs. chronic infections. Great reed warblers were screened for chronic haemosporidian infections, female jackdaws were injected with lipopolysaccharide (LPS) to simulate an acute bacterial infection. We found no difference in nestling condition (body mass, Hp1, haemoglobin concentration) between great reed warbler nests with infected and uninfected mothers. Jackdaw nestlings with LPS-injected mothers showed larger body mass increases than controls over the first 5 days after the injections, but showed no difference in immunocompetence before fledging. These results suggest that a less virulent infection can have no observable effect on an individual's reproductive effort in a single breeding season. In contrast, the increases in growth experienced by the nestlings of LPS-injected jackdaw mothers suggests that the (simulated) acute infection triggered a terminal investment behaviour.

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### PP-112 Who needs a SatNav? Shearwaters learn optimal routes for circumnavigating at-sea obstacles

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[1]Oxford University, Oxford, United Kingdom. [2]University of Liverpool, Liverpool, United Kingdom

**Abstract**

Shearwaters don't routinely fly over land during their foraging movements, as being on land presents a significant predation risk when you're built for life at sea. This means that when returning home from sites beyond a landmass, they cannot adopt the beeline (straight line) home that they are impressively able to calculate and instead must circumnavigate around the obstacle before them. The islands within the foraging areas of these birds vary in size, and in some cases, adopting the longer route around an island could result in a costly detour. Therefore, we would expect birds to learn the geometries of these islands, so that they are able to correctly anticipate the shorter route and avoid any unnecessary movement costs. Furthermore, if this is learned associatively, we might expect that these route preferences are more reinforced when the difference between circumnavigation routes, and cost of 'getting it wrong', is greater, as there is stronger a reinforcement in the energetic efficiency. Here, using a large dataset of free-ranging tracking data, we look for evidence of this learning. We find that birds are more likely to adopt the shorter route when circumnavigating these at-sea obstacles, and that the likelihood of adopting this shorter route is predicted by increasing differences in route lengths between circumnavigation options. We then discuss the learning mechanisms that could underpin this finding, as well as alternative theories from the field of animal navigation.

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### PP-114 Control of first-time migration in a small pelagic seabird

Oliver Padget[1], Stephanie Harris[1,2], Katrina Siddiqi-Davies[3], Patrick Lewin[3], Joe Wynn[1], Sarah Bond[3], Lewis Lancaster-Reeves[3], Tim Guilford[3]

[1]University of Liverpool, Liverpool, United Kingdom. [2]University of Bangor, Bangor, United Kingdom. [3]University of Oxford, Oxford, United Kingdom

**Abstract**

The movements of first-time migrating animals have the potential to reveal much about migratory navigation mechanisms which have evolved to facilitate these great natural movements. One example is the often-cited failure of first-time migrants to correct for passive translocation during migration, implying reliance on an inherited 'clock and compass' to control migratory movement. Here we investigated the control of first-time migration in fledgling Manx shearwaters (a small pelagic seabird) which, after fledging, migrate independently from their parents from the UK to the coastal waters of southern Argentina. Using GPS-GSM devices equipped with magnetometers, we were able to determine the preferred migratory direction for these naïve seabirds and examine whether they attempted to maintain this course in the face of crosswinds by comparing their heading (which way they were facing) and their track. We conclude that inherited instructions for global-scale navigation are probably augmented by innate or rapidly learnt local control mechanisms (e.g. wind-drift anticipation & compensation; social cues) that help shearwaters maintain an appropriate course in the face of crosswinds and perhaps even unanticipated storms. These findings may explain how a simple 'clock and compass' mechanism can be so widespread given how vulnerable its basic theoretical incarnation is to unavoidable environmental perturbations.

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### PP-116 50 years of fattening and migration: long-term insights into pre-departure fuelling and migratory timing in dark-bellied brent geese

Jan Geisler ORCID iD[1,2], Bart A. Nolet ORCID iD[1,2], Eldar Rakhimberdiev ORCID iD[2]

[1]Department of Animal Ecology, Netherlands Institute of Ecology, Wageningen, Netherlands. [2]Department of Theoretical and Computational Ecology, Institute for Biodiversity and Ecosystems Dynamics, University of Amsterdam, Amsterdam, Netherlands

**Abstract**

Before migrating to their Arctic breeding grounds, dark-bellied brent geese (*Branta bernicla bernicla*) acquire essential energy reserves in the Wadden Sea. This pre-departure fuelling not only determines the body condition

at departure, and, by extension, the success of migration, but also impacts reproduction. Additionally, precise timing is crucial to avoid a phenological mismatch by aligning hatching with the short peak of protein-rich food. While migration timing is theoretically comparable for individuals (they all breed in the tundra of northern Siberia), the necessity for sufficient body condition may vary by role: juveniles focus mainly on growth, while adults prioritize reproduction. Females lay and incubate eggs and carry the necessary energy to do so, while males defend their mates and nests. Yet, brent geese face ongoing environmental changes, including a warming climate advancing the onset of spring at breeding sites. To better understand their trade-off between timing and body condition, and eventually their adaptive capacity, we investigate 1) how fuelling speeds differ by age and sex, 2) whether these differences are confined to the fuelling period or persist throughout the year, and 3) to what extent fuelling rates, departure conditions and spring migration timing have changed over the past 50 years. For this, we present analyses of two long-term datasets (1970-2024). We calculate the Scaled Mass Index and derive fuelling rates and departure conditions of brent geese caught in the Netherlands, and estimate peak spring departure dates from daily counts of migrating brent geese in the Wadden Sea.

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### PP-120 Weather during egg laying affects time to hatching in blue tits and great tits across Europe

Adele Mennerat[1], Lisa Hansen Simonsen[2], Anne Charmantier[3], Niels Dingemanse[4], Bart Kempenaers[5]

[1]University of Bergen, Bergen, Norway. [2]Norce Research, Bergen, Norway. [3]CEFE, Montpellier, France. [4]Ludwig Maximilans Universität München, Munich, Germany. [5]Max Planck Institute for Biological Intelligence, Seewiesen, Germany

**Abstract**

Breeding tits are selected for phenological synchrony with arboreal caterpillars. Failing to match the timing of reproduction with peak food abundance results in reduced offspring survival and greater foraging effort from parents. Clutch initiation date, marking the starting point of the breeding sequence, has advanced in the past decades as a result of increasing mean spring temperatures. There is evidence, however, that the extent of this plasticity may not be sufficient in the absence of microevolutionary responses for tits to keep tracking the advancing phenology of their prey under sustained climate change. Most of the evidence comes from studies taking clutch initiation date as the main phenological indicator, as it marks the start of the breeding sequence. Yet hatching date, which appears to be a better predictor of reproductive success, has advanced in some populations to a greater extent than egg-laying date. This indicates that tits may further adjust their phenology after egg laying has started. Here we present results from a broad-scale study of another phenological indicator, namely the time from clutch completion to hatching. Using data obtained via SPI-birds encompassing eight European sites and spanning 11 years, we find that warmer weather during egg laying is followed by shorter time from clutch completion to hatching. This relationship is consistent across study sites and for both study species. This additional flexibility past the egg-laying stage may buffer some of the phenological mismatch predicted by considering clutch initiation date only.

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### PP-122 Evaluating the effect of hemp cultivation on bird communities: A step toward sustainable agricultural practices?

Alfonso Marzal ORCID iD[1,2], Luis Royano ORCID iD[3], María Pérez-Rey ORCID iD[4]

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**Abstract**

In recent decades, the European Union has experienced significant degradation of natural areas and a decline in animal populations, as reported by the European Environment Agency and species conservation assessments. This deterioration is driven by intensive agriculture, urbanization, and climate change, threatening ecosystem integrity. Addressing this crisis requires adopting sustainable, integrative agricultural practices that balance economic gains with biodiversity conservation. This study examines the relationship between industrial hemp (*Cannabis sativa* L.) cultivation and bird diversity and abundance to assess its potential as a wildlife-friendly crop. Biweekly dawn surveys were conducted from May to August in a hemp plot in Losar de la Vera (Cáceres, Spain), comparing bird communities over time. Preliminary results reveal that from the start of cultivation to peak growth,

the total number of bird species tripled, average population size increased sixfold, and individuals per species grew twentyfold. Additionally, the Margalef diversity index rose significantly from 2.415 to 4.008. These findings suggest that hemp cultivation positively influences bird biodiversity, likely by providing food resources, shelter, or nesting sites within the crop area. Overall, initial evidence indicates that hemp farming in Extremadura can contribute to biodiversity conservation efforts while supporting sustainable agriculture. Such practices align with the EU's 2030 Biodiversity Strategy and policies under the European Green Deal, highlighting the potential for integrating ecological benefits into modern agricultural systems to promote resilient ecosystems and preserve wildlife.

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**PP-126 A Global Systematic Review of Roadkill of Avifauna: Towards a New Research Agenda**

Mabel Narh, Krisztian Katona

Hungarian University of Agriculture and Life Sciences, Gödöllő, Hungary

**Abstract**

While roads provide essential services to humans, they also contribute to the decline of bird populations due to road-related accidents. The impact of roadkill on birds has received increasing scientific attention, yet a comprehensive understanding of its effects across different bird families remains limited. This study conducted a systematic review to examine (i) the geographical distribution of research on bird roadkill, (ii) the bird families most affected, (iii) the factors influencing their vulnerability, and (iv) the proposed mitigation measures. A review of 20 studies published between 2005 and 2023, selected from 175 articles, revealed that most research was conducted in Europe and South America, followed by North America, the Middle East, Africa, and Australia. The Tytonidae family exhibited the highest roadkill incidence, followed by Strigidae, Accipitridae, and Corvidae, while families such as Furnariidae, Passeridae, and Icteridae recorded the lowest. Traffic volume and vehicle speed were identified as the primary causes of bird fatalities. Commonly recommended mitigation strategies included installing road signs to alert drivers, regulating traffic speed, and managing roadside vegetation, though implementation of these measures remains limited.

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**PP-128 Radar insights into the migration of raptors and storks across the Strait of Gibraltar.**

Gonzalo M. Arroyo[1], Javier Vidao[2], Alba Márquez-Rodríguez[1], Laura Rollan[1], Mike Bierman[2], Andrés De la Cruz[1]

[1]University of Cádiz, Puero Real, Spain. [2]DeTect, Florida, USA

**Abstract**

The study of soaring bird migration across ecological barriers, such as the Strait of Gibraltar, is crucial for understanding the impacts of such obstacles. Radar technology offers valuable insights into these movements, providing precise measurements of individual flight altitude, ground speed, and direction. This study utilises a 3D Bird Radar to track the migration of 6 species of raptors and storks (Black Kite, White Stork, Short Toed Eagle, Booted Eagle, Honey buzzard and Egyptian Vulture). Sixty trajectories of individuals from these species initiating the crossing of the Strait from the northern coast were recorded during September 2024, all of which were species-verified through ground truthing by a visual observer to identify the species. Preliminary findings indicate significant variability in flight altitudes, with European Honey Buzzards generally reaching greater altitudes than the other species, while the flight speed at the start of the crossing was similar across species. These findings highlight the potential of radar for studying the flight dynamics and intensity of raptor and stork migration during migration between Europe and Africa across the Strait of Gibraltar.

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**PP-130 Integrating existing ecological knowledge with data-driven exploration for habitat modelling with remote sensing data**

Rachel Kuzmich ORCID iD[1], Ross Hill ORCID iD[2], Shelley Hinsley[3], Paul Bellamy ORCID iD[4], Richard Broughton ORCID iD[3], Ailidh Barnes ORCID iD[5], Markus Melin ORCID iD[6], Paul Treitz ORCID iD[1]

[1]Queen's University, Kingston, Canada. [2]Bournemouth University, Poole, United Kingdom. [3]UK Centre for Ecology and Hydrology, Wallingford, United Kingdom. [4]The Royal Society for the Protection of Birds (RSPB) Centre for Conservation Science, Sandy, United Kingdom. [5]British Trust for Ornithology, Thetford, United Kingdom. [6]Natural Resources Institute Finland, Joensuu, Finland

**Abstract**

Remote sensing data that captures spectral and structural information can be used to characterize and model bird habitat. This study evaluates the ability of airborne laser scanning (ALS) structural metrics and Landsat satellite spectral metrics, separately and together using object-level fusion, to model Eurasian Blue Tit (*Cyanistes caeruleus*), Common Chaffinch (*Fringilla coelebs*), Common Chiffchaff (*Phylloscopus collybita*) and Willow Warbler (*Phylloscopus trochilus*) occurrence at two study sites in Cambridgeshire, United Kingdom. Bird data were collected annually between 2000 and 2017, and remote sensing data were acquired in 2000, 2005, 2012/13, and 2015. Metrics were extracted using circular plots with a 15-metre radius at presence locations. Landsat metrics were sampled using an area-weighted mean, and ALS metrics were extracted from the terrain normalized point clouds. Species distribution models (SDMs) were developed using Random Forests. Landsat models performed best for woodland generalists, Blue Tit and Chaffinch, with tasselled cap transformation (TCT) brightness, greenness, and wetness as top variables. Object-level fusion was most accurate for Chiffchaff and Willow Warbler, a mature woodland and early successional woodland specialist, respectively. Top variables for Chiffchaff were ALS mean and maximum height and Landsat TCT brightness. For Willow Warbler, top variables were ALS maximum and standard deviation of heights and Landsat TCT wetness. Our results highlight the importance of integrating ecological knowledge with data-driven exploration to improve modeling, particularly for variable selection. While TCT variables are widely used in remote sensing, they are relatively uncommon in habitat studies. A combined approach may improve variable selection for habitat modeling.

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**PP-132 Sex dimorphism at early age – nestling male and female Great Tits differ in size and immune function**

Sofia Ventura[1], Tiancheng Liu[1], Juli Broggi[2], Jan-Åke Nilsson[1], Arne Hegemann[1]

[1]Department of Biology, Lund university, Lund, Sweden. [2]Departamento de Ecología Evolutiva, Museo Nacional de Ciencias Naturales-CSIC, Madrid, Spain

**Abstract**

Birds can show patterns of sexual size dimorphism as early as in the nestling stage. This raises the question of how the sexes might reconcile the energetic and nutritional needs of a faster growth rate with resource allocation to other important life functions, such as the development of an innate immune function. Innate immunity protects the body against disease-mediated mortality. A basis for innate immunity is present already at hatching but needs to undergo substantial development throughout the nestling stage. This process may compete for resource allocation with other important life functions, such as growth, potentially affecting nestlings in a sex-specific way. However, little is known about how sex might shape life-history strategy early into the bird life cycle. In this two-year study, we molecularly determined the sex of Great tit (*Parus major*) nestlings. We measured morphometrics (mass, wing and tarsus) and carried out innate immunity assays (HLHA assay, Bacteria Killing Assay, and Haptoglobin assay) to compare the relative allocation of resources to growth and immunity in both sexes. We also carried out a brood size manipulation experiment to simulate resource limitation in the nest. We found that male nestlings grow faster than their female siblings. However, we also found some indication that males mounted a better immune defense than females albeit their faster growth rate. Thus, males manage to invest more heavily in both growth rate and immune defence probably depending on males being dominant to females in the competition for parental feeding, resulting in higher resource acquisition.

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**PP-134 How an Anthropogenic Diet affects the Innate Immunity of Yellow-Legged Gull and White Stork Nestlings**

Miriam Kott[1], Marta Acácio[2], Inês Catry Catry[3], Aldina Franco[4], Joana Marcelino[5], Carole Leray[6], Marion Vittecoq[6], Karen D. McCoy[2], Arne Hegemann[1]

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**Abstract**

Many opportunistic birds take advantage of landfills and urban areas for foraging, both for themselves and their nestlings. While this food resource is often reliable, predictable and abundant, an anthropogenic diet is also associated with an increased intake of plastic debris and other harmful substances. Still, little is known about the effects of an anthropogenic diet on the physiology and fitness of these birds. Here, we investigated the impact of an anthropogenic diet on the development of the innate immunity in nestlings of Yellow-Legged Gulls (*Larus michahellus*) and White Storks (*Ciconia ciconia*) from France, Spain and Portugal. Using GPS data of adults, we calculated an index of individual landfill use to determine the degree to which individuals bring anthropogenic resources to their nestlings. We measured the innate immunity of the nestlings (bacteria killing capacity, complement activity and natural antibody titres, haptoglobin concentrations) and tested for correlation between immune parameters and diet. Moreover, we looked for trade-offs in growth dependent on the different immune values and diets.Since anthropogenic resources have lower nutritional value and higher pollutant levels compared to marine prey, we hypothesize a compromised innate immune system in nestlings with higher landfill use index and a diminished capacity to fight off acute pathogen infections. Our study will help to further understand the impact of an anthropogenic diet on the health, development and fitness of opportunistic birds living under increasing anthropogenic pressure.

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### PP-136 Vocal individuality of male Western Capercaillie *Tetrao urogallus* calls - an ambisonic bio-acoustic approach

olga jordi ORCID iD[1], xavier puig ORCID iD[2], angelo farina ORCID iD[3], santi mañosa ORCID iD[4]

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**Abstract**

Capsule: Male Western Capercaillies Tetrao urogallus use their vocalizations during the breeding season for territorial and reproductive purposes, and these have genetically predefined characteristics that confer each bird with a unique and distinguishable vocal signature. Aims: To investigate whether call components allow discrimination between different individual Western Capercaillie males. Methods: We used ambisonic technology, capable of recording in closed forests and at long ranges, to record and analyse the calls of 12 male Western Capercaillies during the courtship season on seven lek areas of the Alt Pirineu Natural Parc, in north-east Spain. We measured call variables relative to the fundamental frequency and the duration of the song components. A supervised cluster analysis evaluated the power of call characteristics for inter-individual discrimination and correct classification of vocalizations to each individual. Results: All measured characteristics of vocalizations showed significant differences between males. Supervised cluster analysis showed that audio recordings were identifiable to individual males. Conclusion: Calls of male Western Capercaillies could be individually identified and differentiated from each other through their bioacoustic characteristics. This may have applications in improving the monitoring and management of the species, allowing for the future development of non- invasive bioacoustic tools for the identification of individual males.

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### PP-138 Using Indicator Species with Umbrella Potential to Assess Restoration in Western Africa

Francesca Fehlberg[1], Gabriel Marcacci[2], Joseph Afrifa[3], Matthew Ashpole[4], Hannah Wauchope[1]

[1]University of Edinburgh, Edinburgh, United Kingdom. [2]Swiss Ornithological Institute, Sempach, Switzerland. [3]Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. [4]Tree Aid, Bristol, United Kingdom

**Abstract**

Ecological restoration projects increasingly prioritise vegetation structure and carbon metrics yet often overlook biodiversity outcomes. To address this gap, we assess the value of birds not only as indicators of habitat quality but also as umbrella species, whose presence may signal broader community recovery. This study focuses on Ghana's savannahs, where restoration initiatives are expanding but biodiversity monitoring still remains limited. Standardised point counts were conducted in March 2025 and will be repeated in October 2025 to capture

seasonal variation. Surveys were carried out in three distinct habitat types (open, woodland, and riparian systems) within Mole National Park, used as reference baselines representing intact grassland, Guinea savannah woodland, and gallery forest, respectively. These habitats mirror those targeted by active restoration efforts in Atebubu, Yendi, and Bongo. We applied a Bayesian latent factor multi-species occupancy model to estimate species-specific habitat associations while accounting for detection probability and species correlations. Candidate indicator species were identified for each habitat type and evaluated for their umbrella potential by analysing correlations between their occupancy and that of co-occurring species. This framework contributes to the development of scalable, cost-effective biodiversity monitoring tools that can support long-term restoration planning. As part of a broader methodology that will incorporate passive acoustic monitoring and AI-based species recognition, this approach offers a robust means of evaluating ecological recovery across spatial and temporal scales. Ultimately, identifying birds that reflect habitat condition and community structure enables more cost-effective, evidence-based conservation strategies for West Africa's rapidly changing savannah landscapes.

# Roundtable discussion: Genoscaping European bird taxa

18:00 - 19:00 Wednesday, 20th August, 2025

LR5

Conveners: Joseph Wynn, Rose Thorogood, and Barbara Helm

Understanding the spatial distribution of genetic variation (‘genoscaping’) is increasingly seen as a powerful tool in both the conservation of avian diversity as well as in answering fundamental questions of bird biology. Whilst this approach has been extensively applied in North America, genoscapes have been constructed for only a handful of European species. Here we wish to discuss a proposal to genoscape a substantial number of Europe’s landbirds. Specifically, we wish to discuss which species would be most useful to include, what uses people would have for continental-scale genomic data, and whether anyone might be interested in contributing to such a project. More generally, we seek to promote the integration of genetic information into the study of European ornithology and form the connections that might make this possible. No experience with genomic data is necessary to join the discussion!

# Thursday 21st August

# Excursion 1 : South Stack RSPB Reserve

08:00 - 18:00 Thursday, 21st August, 2025

Reichel

South Stack Reserve is located at the far west of the island of Anglesey, where views of Ireland can be obtained on a clear day. South Stack is home to a large seabird colony and some seabirds will remain in the reserve, including the iconic chough around the rocky sea cliffs. The area is also a good place for cetaceans and has a café, meaning that you can walk as much or as little as you wish. https://www.rspb.org.uk/days-out/reserves/south-stack

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# Excursion 2: Snowdon

08:00 - 18:00 Thursday, 21st August, 2025

Reichel

The city of Bangor lies between the sea and the mountains. Snowdon, is the highest mountain in Wales, and is located about eight miles south of Bangor and whilst those feeling energetic can climb the mountain themselves, those feeling less energetic can climb on board the Snowdon Mountain Railway and travel to the summit in style. However you ascend the mountain, you are bound to have fantastic views of north Wales, provided it is not foggy! Please note the costs of travelling on the train are additional, and you must pay on the day. https://snowdonrailway.co.uk/

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# Excursion 3: Conwy RSPB Reserve

08:00 - 18:00 Thursday, 21st August, 2025

Reichel

The RSPB reserve at Conwy is a haven for birds, yet a decade or so ago, this reserve was an industrial wasteland. It has since been transformed and is now home to a variety of ducks, geese, herons, egrets, and many waders. There is also a café on site so you can enjoy a warm drink between spells in the hides on the reserve. Meanwhile, the reserve is located very close to the town of Conwy so you can walk around the town as part of your day around Conwy. Please note that the costs of entering this reserve are additional, and you must pay on the day. https://www.rspb.org.uk/days-out/reserves/conwy

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# Excursion 4: Great Orme, Llandudno

08:00 - 18:00 Thursday, 21st August, 2025

Reichel

A circular walk around the Great Orme, which is a limestone headland close to the town of Llandudno, is 9 kilometres in length. Starting and finishing close to the pier, this walk will follow a small road right around the Great Orme which offers fantastic views of the sea. The area is good for birds such as chough and peregrine falcons, as well as Atlantic grey seals and semi-wild goats, so this walk will provide lots of wildlife experiences. https://www.conwy.gov.uk/en/Resident/Leisure-sport-and-health/Coast-and-Countryside/Assets/documents/Discover-the-Great-Orme.pdf

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# Excursion 5: Chester Castle

08:00 - 18:00 Thursday, 21st August, 2025

Reichel

Chester Castle stands prominently over the River Dee in the city of Chester, in western England. This medieval castle, built between 1788 and 1813, represents just one of many impressive castles along the north Wales coast and is well worth a visit. Meanwhile, the small town of Chester is a very popular tourist destination and therefore has a range of shops and cafes in which to spend some time Please note that the costs of entering the castle are additional, and you must pay on the day.

# EOU Fledglings event

18:30 - 20:00 Thursday, 21st August, 2025

MALT

Convener: Zsófia Tóth

We the “Fledglings” are an open community of early career researchers. This session aims to give a chance for early career researchers and students to ask questions that in most labs are not a part of curriculum. We will start with an up to 60-minute session on tips and advice for networking followed by up to additional 60 minutes of a discussion on various topics. How to maintain work-life balance? How to avoid burnout? How to stay motivated? How to find a job outside of academia, and/or whatever anyone of the attendees would like to discuss. If you would like to stay tuned and receive news about fledgling activities and conferences join the Facebook group called “EOU fledglings”.

# Friday 22nd August

# Plenary lecture - Rose Thorogood: Why do birds do what they do? How ‘information ecology’ helps understand behavioural responses to environmental change

09:00 - 10:00 Friday, 22nd August, 2025

PL5

Chair: Peter L. Pap

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**Plenary 6 'Why do birds do what they do? How ‘information ecology’ helps understand behavioural responses to environmental change**

Rose Thorogood ORCID iD

University of Helsinki, Helsinki, Finland

**Abstract**

Explaining why animals behave in different ways lies at the heart of behavioural ecology. Birds have provided many answers since the field’s inception 50 years ago, but with a rapidly changing world, behavioural responses have become even more important to understand if we are to better predict the outcomes of our intentional or inadvertent modifications to the natural world. In this talk I will describe how we have been using an ‘Information ecology’ framework to better understand how individuals living in social communities respond to environmental change. This approach provides us with explicit pathways to consider how individuals acquire information from direct and indirect observation of their world, integrate this information with what they expect based on prior experience, and update responses to match environmental conditions accordingly. I’ll provide examples from our field experiments with coevolving enemies as well as conservation actions with threatened species to highlight how behavioural responses are not always the ‘best’ decisions, even if they are optimal given the information available. In birds, as in our own experience, information use can be manipulated.

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# Symposium 9: Avian shape in a warming world - Unravelling the impact of temperature on bird morphology

10:30 - 12:00 Friday, 22nd August, 2025

MALT

Conveners: Giulia Masoero and Alejandro Corregidor-Castro

Global climate has experienced significant warming in recent decades, with an increased frequency and magnitude of temperature extremes. During the same period, mounting evidence suggests that endotherms, particularly birds, have progressively decreased in size and increased the relative length of their appendages in association with increasing temperatures. These observed size and shape shifts have been understood as a temporal extension to Bergmann's and Allen's rules, which state that animals living in warmer environments tend to have smaller body size and relatively longer appendages. Consequently, these changes have been interpreted as the result of stronger selection for phenotypes that facilitate efficient passive heat dissipation. However, recent experimental studies challenge this perspective, suggesting that size reduction may not provide significant thermoregulatory advantages. Thus, while empirical support for a widespread morphological response to increasing temperatures in birds appears overwhelming, the underlying mechanisms responsible for these rapid changes are less clear. This symposium aims to present the various hypotheses behind these changes (i.e. adaptive plasticity vs selection) and showcase the latest evidence to address these knowledge gaps.

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10:35 - 11:00

**S9 Keynote Form follows function? Possible mechanisms underlying changing avian morphology in a warming world.**

Ryan Shipley ORCID iD[1], Giulia Masoero[2], Alejandro Corregidor-Castro[3]

[1]Swiss Federal Institute of Forest, Snow, and Landscape Research WSL, Birmensdorf, Switzerland. [2]Swiss Ornithological Institute, Sempach, Switzerland. [3]University of Padua, Padua, Italy

**Abstract**

Birds worldwide are diminishing in size—a pattern widely attributed to climate change, though the underlying mechanisms remain unclear. While thermoregulatory explanations based on Bergmann's and Allen's rules are frequently invoked, mounting evidence indicates that modest size reductions may yield minimal physiological advantages. More likely, these size shifts stem from multiple interacting ecological processes, though direct evidence remains sparse. This review examines three critical drivers of climate-linked body size reduction that are primarily inferred from observational studies of adult birds: (1) developmental temperature effects, whereby warmer conditions during early life stages constrain growth and diminish adult size; (2) nutritional constraints, particularly when warming creates phenological mismatches or sustained resource scarcity during development; and (3) differential survival patterns, where smaller individuals increasingly persist due to milder winters or altered post-fledging conditions. These mechanisms often operate concurrently or vary according to context, species, and developmental stage—complicating broad generalizations. Experimental research directly testing these pathways remains remarkably limited in scope and taxonomic breadth, predominantly focusing on temperate passerines with measurements largely restricted to adult specimens. We contend that progress requires integrative methodologies combining longitudinal observational data with strategic experimental manipulations across ecological gradients and life stages. Determining whether observed size changes result from developmental plasticity or demographic selection is crucial for forecasting avian responses to continued warming and for understanding potential cascading effects on ecological networks and ecosystem functions.

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11:00 - 11:15

**S9-1 Joel, Carl, Adam, and the appeal to antiquity: Does old wisdom really help us explain why the shape of extant birds is changing?**

Joshua Tabh ORCID iD, Andreas Nord ORCID iD

Lund University, Lund, Sweden

**Abstract**

In 1993, Adam Urbanek defined the Lilliput Effect as a temporary dwarfing of species or their groupings across mass extinction events. While the cause of this dwarfing was not clear, observations from ancient animals suggested that erosion of nutritive conditions required for growth was likely. Today, scientists across the globe agree that we are in the middle of a sixth great mass extinction, and, as predicted by the Lilliput Effect, average body sizes of many vertebrates, including birds, is decreasing. But despite evidence that biomass of common avian food species (e.g. insects) has also diminished, dominant scientific narratives generally assert that warming climates are instead driving size declines, specifically, by favouring smaller, less heat-retaining morphologies (an extension of Bergmann's Rule). By combining thermophysiological theory with long-term data from >200 North American bird species, we questioned whether predictions of the Lilliput effect and/or Bergmann's Rule are sufficient to explain observed shifts in avian size. Our results provide weak evidence that the fitness of large species and individuals is declining as our climate warms, consistent with Bergmann's Rule. However, these declines are largely insufficient to explain morphological shifts, which appear better explained by phenotypic plasticity in most species. Further still, we find that shifts in body size distributions (rather than means) are more consistent with resource shortages than thermoregulatory pressure. Together, our results indicate that assuming a sole, climatic underpinning to morphological shifts may yet be naive. Further studies considering the broader ecological context of shapeshifting species are needed.

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11:15 - 11:30

**S9-2 Shape-shifting in relative wing length of juvenile shorebirds: no evidence of developmental temperatures driving morphological changes**

Sara Ryding

Deakin University, Melbourne, Australia

**Abstract**

Morphological responses concurrent with climate change are increasingly identified in birds, often through decreasing body size and increasing appendage size. Such changes could have thermoregulatory implications, through the improved surface area to body ratio they provide. Due to the role of bird wings in thermoregulation, wing length relative to body mass may be changing as another form of shape-shifting, where increased relative wing length may facilitate increased heat loss as climates warm. We investigated changes in relative wing length on a dataset of nearly 20 000 juvenile shorebirds from 11 species over the past 4 decades, to determine changes in morphology and whether these are linked to developmental temperatures. Overall, across species, we found that relative wing length increased across the 43-year study period in populations migrating to tropical northern Australia but not in those migrating to temperate southern Australia. Furthermore, we found that changes in relative wing length were not driven by immediate responses to high temperature at the breeding ground during juvenile growth. These results may suggest that relative wing length increases occur in shorebirds occupying already warm climates, where they might potentially be more thermally challenged under further warming, but that such changes are not occurring through plastic mechanisms during development.

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11:30 - 11:45

**S9-3 Spatial trends in morphology do not predict individual species responses to climatic warming in Australian birds.**

Matthew Symonds ORCID iD, Isaac Sims, Sara Ryding ORCID iD, Alex McQueen ORCID iD

Deakin University, Melbourne, Australia

**Abstract**

Allen's and Bergmann's rules describe geographical trends towards larger appendage size and smaller body size in warmer climates. A key prediction from these spatial trends in morphology is that they can be extrapolated across time to predict responses to climate change. Appendage size and body size have, accordingly increased and decreased concomitant with climatic warming across many species. However, there is great variation in these responses across species. It is not known whether some species might simply be more prone to climate-induced morphological adaptation. If so, we would predict that species that adhere most strongly to Allen's and Bergmann's rules spatially, should also be the species that ones that show the strongest temporal responses to climate change. We tested this prediction using data on body size (wing length) and bill surface area from 2014 museum skins of 17 species of Australian birds. Overall, changes in body size across their latitudinal range matched Bergmann's rule, but there no significant change in body size through time. Conversely, over all species relative bill surface area has increased through time, as predicted by an Allen's rule response to climatic warming, but there was no significant spatial trend in bill surface area. When considering the species individually, we found no association between the size of their morphological gradients across latitude with those over time. I shall discuss the possible reasons for this disconnect between thermoregulatory adaptation across space and time, and the implications for our interpretation of evolutionary adaptations to climatic warming in birds.

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11:45 - 12:00

**S9-4 Antagonistic effect of temperature on nestling development and selection for body size and shape**

Alejandro Corregidor-Castro ORCID iD[1,2], Andrea Romano ORCID iD[3], Michael Butler-Margalef ORCID iD[4], Jacopo G. Cecere ORCID iD[5], Jennifer Morinay ORCID iD[5,6], Michelangelo Morganti ORCID iD[2,7], Diego Rubolini ORCID iD[3,7], Andrea Pilastro ORCID iD[1,2]

[1]Università di Padova, Padova, Italy. [2]National Biodiversity Future Centre, Palermo, Italy. [3]Università degli Studi di Milano, Milano, Italy. [4]University of Girona, Girona, Spain. [5]Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), Ozzano Emilia, Italy. [6]University of Sheffield, Sheffield, United Kingdom. [7]Istituto di Ricerca sulle Acque (CNR-IRSA), Brugherio, Italy

**Abstract**

Temporal decreases in body size and elongation of appendages represent commonly documented morphological responses of avian species to contemporary climate warming. These morphological changes are consistent with Bergmann's and Allen's ecogeographical rules and are generally interpreted as evolving due to a selective advantage in dry heat dissipation. Yet, direct evidence from wild species is lacking, and laboratory studies failed to find significant improved non-evaporative thermoregulatory benefits associated with body size or relative appendage length. We tested whether body shrinking and shape-shifting during development provide a selective advantage in lesser kestrel (*Falco naumanni*) nestlings using a nest cooling experiment. Nestling body size near fledging was negatively predicted by maximum nest temperature, but nestlings developing in warmer nests grew relatively longer bills. Contrary to the dry heat dissipation hypothesis, nestlings that were smaller at hatching and grew slower experienced reduced pre-fledging survival, irrespective of nest cooling, whereas relative bill length did not confer any significant survival advantage. Collectively, our findings suggest that temperature-driven developmental plasticity and selection may act antagonistically on nestlings' morphology at fledging. These findings align with previous evidence that failed to detect any change in the direction and strength of selection on adult body size associated with warming temperatures. Our findings suggest that the nearly universal body-shrinking response observed in avian species facing climate warming is likely a result of non-adaptive, temperature-driven developmental plasticity, rather than an outcome of natural selection favouring body shapes more efficient at dry heat dissipation.

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# Symposium 10: The impact of climate change on high-elevation birds

10:30 - 12:00 Friday, 22nd August, 2025

LR2

Conveners: Francesca Roseo and Maria Delgado

High-elevation birds are highly sensitive to the direct and indirect impacts of climate change and to those of anthropogenic activities, which can exacerbate the effects of global warming on alpine species and mountain ecosystems. Mountain birds, adapted to cope and thrive under harsh conditions, respond to climate and environment alterations in different ways, for instance by shifting their distributions upwards. Within this context, it is important to understand the complexity of the effects of climate change and human activities, such as winter sports, and their possible interactions on mountain birds. The identification of climate refugia for high-elevation species and main sources of anthropogenic threats is therefore of paramount importance for conservation. The symposium will provide an overview of climate change impacts on high-elevation species, explore methods to identify climate refugia combining past and future scenarios, and discuss possible ways to deal with the impacts of anthropogenic activities on these and other key areas for the conservation of high-elevation species.

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10:35 - 11:00

**S10 Keynote Climate change and mountain birds**

James Pearce-Higgins ORCID iD

British Trust for Ornithology, Thetford, United Kingdom

**Abstract**

Mountains are colder than lower elevations, but in some cases have warmed at a greater rate. Snowfall has generally declined at lower elevations but shown more variable patterns higher up. These climatic changes have had direct impacts on mountain birds through altered phenology, breeding success and survival. Indirect biotic impacts of climate change are widespread, with reduced availability of key prey items and altered predation rates, particularly of ground-nesting species. Climate change impacts on individual populations combine to drive elevational distribution shifts. Although there is widespread evidence for upward shifts in the distribution of mountain birds, the magnitude of these shifts varies between studies, which are reviewed globally. Looking forward, the interaction of elevational shifts, the shape of mountains and elevational distribution of habitats will play a major role in determining climate change vulnerability. Climate vulnerability may be exacerbated by a range of ecological and life-history traits. Given these vulnerabilities, options to conserve mountain birds in a changing climate are reviewed, including the expansion of protected area networks and proactive conservation management, as well as the potential to translocate range-restricted and sedentary species. The talk concludes with an assessment of the uncertain future facing European mountain birds. There is an urgent need to expand avian population monitoring in remote mountain environments to improve our understanding of ongoing climate change impacts and to evaluate the effectiveness of conservation efforts in a changing climate.

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11:00 - 11:15

**S10-1 Breeding seasonality in Andean Charadriiformes reveals the dual importance of rain: favoring food availability for chicks but limiting nesting on impermeable substrates**

Guillaume Dillenseger ORCID iD[1], Andreas Rimoldi[1], Virginia Mosconi[2], Carla Llerena-Quiroz[3], Mauricio Ugarte[2,3], Renato Condori Ayquipa[3], Kateřina Kubelková[1], Vojtěch Kubelka[1]

[1]University of South Bohemia, České Budějovice, Czech Republic. [2]Universidad Nacional de Río Cuarto, Córdoba, Argentina. [3]Universidad Nacional de San Agustín de Arequipa, Arequipa, Peru

**Abstract**

The Andean Altiplano in South America represents a remarkable mountain ecosystem with unique wildlife. However, knowledge of breeding ecology for birds inhabiting it is scarce, relying mostly on anectodes, while drivers of breeding phenology remain unexplored. Here, we combined records of naturalistic databases, literature and our own observations to provide an account on timing of 11 species of ground-nesting Charadriiformes breeding above 3000 m in Peru, Bolivia, Chile and Argentina. We observed a clear annual seasonality , with most individuals initiating breeding between July and December. Birds started breeding earlier when closer to the Equator, but later with increasing elevation. Climatic variations during chick care and incubation periods best explained breeding timing, when performing model selection. This result suggested that local birds use environmental information to predict favourable conditions to incubate and rear their chicks. Increased rainfalls and temperature were associated with advanced breeding start, while number of rainy days was associated with delayed initiation. Our field observations provided additional evidence that within the same locations, rainfalls could influence differently shorebird species. Species nesting on impermeable soils interrupted courtship activities with increasing rains to possibly avoid risk of clutch flooding, while species nesting in vegetation were not negatively affected by rain. These observations were supported by citizen-science data. Our study provided the first comprehensive exploration on breeding phenology of Andean shorebirds. It suggested more complex patterns than previously published, highlighting that local nesting environment could affect phenology of tropical ground-nesting birds.

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11:15 - 11:30

**S10-2 Identifying climate refugia for the sensitive high-elevation specialist Montifringilla nivalis based on past and current patterns of occurrence**

Maria Mar Delgado[1], Chiara Bettega[2], Rafa Benjumea[1], Juan Carlos del Moral[3], Blas Molina[3], Virginia Escandell[3], Santiago Delgado[3], Mattia Brambilla[2], Francesca Roseo[2], Federica Rosetto[1], Davide Scridel[4]

[1]Biodiversity Research Institute (CSIC/UO/PA), Mieres, Spain. [2]Milan University, Milan, Italy. [3]Sociedad Ornitiological Española SEO BirdLife, Madrid, Spain. [4]University of Trieste, Trieste, Italy

**Abstract**

In the face of accelerating climate change, it is crucial to identify habitat and climatic conditions that could define climate refugia for conservation purposes, especially for species highly threatened by climate warming. This study aims to identify the environmental characteristics that determine climatic refugia, focusing on the White-winged snowfinch (*Montifringilla nivalis nivalis*; hereafter, snowfinch) as a target species. The snowfinch is a mountain specialist passerine, whose traits make it particularly vulnerable to climate change, making it an ideal model for investigating the broader consequences of climate change on biodiversity. We utilized a long-term historical dataset, collected during the breeding period from 1980, of snowfinches in the Cantabrian Mountains. We employed favorability models based on landscape and climate characteristics to classify the favorability of each historical breeding area. We surveyed again these areas in 2024 to determine whether snowfinches had maintained their presence or become absent over time. By comparing the environmental characteristics of the areas where snowfinches are still present with those where they are now absent, we identified key factors that may determine areas with suitable conditions for snowfinch persistence under climate change, potentially serving as climate refugia. The results of this study are expected to significantly enhance our understanding of the ecological factors driving displacement in a mountain specialist bird species due to climate change, with broader consequences for conservation strategies aimed at preserving biodiversity in the face of ongoing environmental change.

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11:30 - 11:45

**S10-3 Challenges for Alpine bird conservation in the face of climate change**

Raphaël Arlettaz ORCID iD[1], Ian Ausprey[2]

[1]University of Bern, Bern, Switzerland. [2]Texas A&M University, College Station, USA

**Abstract**

Mountain biodiversity is greatly affected by the rapid degradation of the World climate system, whose intensity is far more acute at high latitude and high elevation than in any other region of the World. Climatic shifts and the increased variation of weather circumstances directly impact many species of the alpine flora and fauna that have evolved specific adaptations to cope with the adverse environmental conditions that characterize mountain ranges. Furthermore, new anthropogenic pressures have emerged, which indirectly impact mountain biodiversity, such as land-use changes, the sprawl of outdoor leisure activities and the installation of new infrastructure, notably for “green” electricity production. The latter is sold as a nature-friendly solution for overtaking the current energy crisis although it often represents a novel threat to biodiversity, in particular to the Alpine avifauna (wind turbines and photovoltaic parks). Over the past two decades, our research group has investigated the conservation ecology of several emblematic species typically inhabiting high-elevation habitats of the European Alps (whinchat, black grouse, bearded vulture, golden eagle, snowfinch, ring ouzel, wallcreeper, etc.). More recently, we have launched new research projects in these fragile ecosystems (e.g. habitat at glacier forefront), some with a bird conservation focus (rock ptarmigan, rock partridge). I will present an overview of the research carried out so far, focusing on our concrete, evidence-based management recommendations for the preservation of that unique bird community, and describe the objectives of our new research.

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11:45 - 12:00

**S10-4 Impact of winter sports on alpine birds and climate refugia**

Francesca Roseo ORCID iD[1], Claudio Celada[2], Mattia Brambilla ORCID iD[1]

[1]Milan University, Department of Environmental Science and Policy, Milan, Italy. [2]Lipu/BirdLife Italia, Parma, Italy

**Abstract**

Mountain ecosystems are profoundly impacted by climate change and human impacts. Alpine species are moving upwards to track their ecological niche. Climate refugia are areas expected to maintain suitable conditions for biodiversity even under climate change and play a key role in conservation under a warming climate. Evidence suggests that winter sports pose a major threat to alpine bird conservation and climate refugia.

We first performed a review on the impact of downhill skiing on birds. 48 documents assessed direct/indirect impacts of infrastructures and pistes. Most of the studies were carried out in the Alpine region, and Galliformes was the most investigated order. Only few papers explored the direct impacts of ski infrastructures and winter sports.

We then evaluated the spatial extent currently occupied by ski resorts and pistes along the Alps, modelled their future distributions and assessed the overlap with climate refugia under current and future conditions. Downhill ski-pistes occupy c. 500,00 ha and considering also the surroundings the current overlap with climate refugia reaches 11%. The future ski-piste distribution is predicted to shift upwards (on average, from c. 1800 up to 2375 m), and the overlap between suitable areas for ski-pistes and climate refugia will increase substantially.

The results obtained through the review and the modelling approach reveal that ski-resorts have an impact on birds. By moving upwards, ski-resorts will exacerbate the overlap with climate refugia and further threaten alpine biodiversity. Understanding these impacts is key to increase the sustainability of winter sports and protect mountain biodiversity.

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# Symposium 11: The Motus wildlife tracking system - A chance for avian research in Europe

10:30 - 12:00 Friday, 22nd August, 2025

LR3

Conveners: Lucy Mitchell and Thiemo Karwinkel

While large birds such as storks, birds of prey or waterfowl can be tracked using satellite or cellular-based GPS transmitters, most bird species are too small and too light to be able to carry such high-resolution devices. Radio transmitters, on the other hand, have become so small that very light animals, such as the smallest European songbirds (and even bats and insects) can be outfitted with them. They can then be tracked, either by following the animal manually with an antenna or using a network of stationary receivers. The Motus wildlife tracking system uses the latter approach by standardising the equipment and data acquisition process (open access!), creating a mutual research community across countries and institutions. While the system is already widespread in North America, the European community is currently accelerating in growth, comprising mainly songbird and bat migration researchers. This symposium introduces the European perspective from the technical basics towards its application in research and clarifies whether the system might be the right approach to the researchers in the audience.

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10:35 - 11:00

**S11 Keynote The Motus Wildlife Tracking System – from Technical Basics and Research Applications to Future Perspectives in Europe**

Lucy Mitchell ORCID iD[1], Thiemo Karwinkel ORCID iD[2]

[1]University of Ghent, Genth, Belgium. [2]Carl von Ossietzky Universität Oldenburg, Oldenburg, Germany

**Abstract**

While large birds such as storks, birds of prey, or waterfowl can be tracked using satellite- or cellular-based GPS transmitters, most bird species are too small and light to carry such high-resolution devices. Radio transmitters, on the other hand, have become so small that even very light animals, such as the smallest European songbirds, bats, and even insects, can be outfitted with them. These animals can then be tracked either manually, using a handheld antenna, or via a network of stationary receivers. The Motus Wildlife Tracking System (short: *Motus*) uses the latter approach by standardising the equipment and data acquisition process (*open access!*). In doing so, it fosters a collaborative research community across countries and institutions, while simultaneously providing the benefit of the network effect. While the system is already widespread in North America, the European community is currently growing rapidly, comprising mainly researchers focusing on songbird and bat migration. This review talk, which opens the symposium, introduces the Motus system—starting from the technical basics and research applications, and moving towards future perspectives in Europe. It also aims to clarify whether the system might be suitable for addressing the research questions of the audience and to foster collaboration.

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11:00 - 11:15

**S11-1 Investigating desert stopover strategies using automated radiotelemetry**

Ivan Maggini ORCID iD[1], Armando A. Aispuro ORCID iD[1], Marc Illa Llobet ORCID iD[2]

[1]University of Veterinary Medicine Vienna, Wien, Austria. [2]Institut Catalá d'Ornitologia, Barcelona, Spain

**Abstract**

The crossing of the Sahara Desert represents a major challenge for migratory songbirds traveling between Africa and Europe during their pre-breeding movements. Small oases along the route attract good numbers of migrants, but the extent to which they are used depends on the species' habitat preference. Species from dry habitats are able to use these sites for prolonged stopovers with refueling, while mesic-adapted species tend to make short stopovers with no refueling. The description of these strategies has traditionally been based on mark-recapture studies, which are not highly reliable when the proportion of recaptures is low. During spring 2019, we deployed Motus nanotags on four related warbler species at a small oasis in Southern Morocco: Saharan Olivaceous (*Iduna pallida reiseri*), Western Olivaceous (*Iduna opaca*), Melodious (*Hippolais polyglotta*) and Common Reed Warbler (*Acrocephalus scirpaceus*). Stopover duration was generally only one day in the mesic Melodious and Reed Warblers, while it spanned several days in the two *Iduna* species. We used variations in signal strength to assess foraging behaviour, to explore whether birds are more active during times of the day when temperatures are lower. The patterns did not differ between species, showing that even if stopovers are short, birds may opportunistically forage when they have an opportunity. Departures were generally shortly after sunset. This study shows the potential of radiotelemetry to explore stopover in small desert oases, which due to their isolation offer the possibility of tracking birds throughout the duration of their stay.

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11:15 - 11:30

**S11-2 Towards year-round Motus tracking of seabirds to improve understanding of offshore wind impacts: a feasibility study**

Tom Evans[1], Stacey Adlard[1], Sophie Bennett[2], Niall Burton[3], Nigel Butcher[4], Adam Butler[5], Ana Couto[5], Laura Curtis-Moss[1], Francis Daunt[6], Liz Humphreys[2], Esther Jones[5], Anna Lowden[7], Elizabeth Masden[8], Mark Newell[6], Emma Witcutt[1]

[1]The Royal Society for the Protection of Birds (RSPB), Edinburgh, United Kingdom. [2]British Trust for Ornithology (BTO), Stirling, United Kingdom. [3]British Trust for Ornithology (BTO), Thetford, United Kingdom. [4]The Royal Society for the Protection of Birds (RSPB), Sandy, Bedfordshire, United Kingdom. [5]Biomathematics and Statistics Scotland (BioSS), Edinburgh, United Kingdom. [6]UK Centre for Ecology & Hydrology (UKCEH), Edinburgh, United Kingdom. [7]Scottish Government - Marine Directorate, Aberdeen, United Kingdom. [8]Environmental Research Institute - University of the Highlands and Islands, Thurso, United Kingdom

**Abstract**

We will present our work investigating the feasibility for long-term Motus tracking of individual seabirds via leg-mounted tags. Our study focusses on Black-legged Kittiwake (*Rissa tridactyla*), a medium bodied seabird. This technology promises to provide new understanding on population and movement ecology. We are using the recently developed 2.4 GHz (Blu series) tags from Cellular Tracking Technologies, which allows sufficient miniaturisation for leg-mounting for Kittiwake. The technology has the potential to address knowledge gaps relevant to offshore wind, both in understanding the frequency of interactions with offshore structures (via deployment of offshore receivers) and of key demographic information relevant to understanding population level impacts. The system can be used for automated presence/absence detection at seabird colonies, which can be used for capture-mark-recapture studies, including of survival rates. Long-term Motus leg-mounted tags have the potential to provide new insights into metapopulation processes by investigating dispersal rates which are currently not possible without unrealistically high levels of colour ringing and resighting effort. This study is at the feasibilty stage, with us following through a series of off- and on-bird system trials. We will present our progress so far and discuss the potential wider applications of this method for studying seabird populations.

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11:30 - 11:45

**S11-3 Motus tracking to unravel physiological mechanisms of migratory decisions**

Arne Hegemann ORCID iD

Lund University, Lund, Sweden

**Abstract**

Motus, an automated international telemetry network to register movements of birds (and bats), is mainly known for mapping the progress and timing of migratory movement or stopover durations. As such, most studies using Motus focus on patterns and phenology of migration and migratory decisions. However, the system also has great potential to help unravelling the mechanisms of migratory decisions if tagging of birds is combined with physiological measurements. In this talk, I will review existing studies that used the Motus system together with physiological measurements (e.g. hormones, immune function, oxidative stress) to gain insights in how migratory decisions may be regulated. For example, studies combining physiological measurements with tracking using the Motus system have significantly contributed to our understanding of how infections influence departure decisions. Other studies have shown that the oxidative status influences the stopover duration and condition-dependent departure decisions, and that corticosterone predicts departure probability and departure time within the night. By summarising the knowledge gained from such studies, I will demonstrate the great potential that the Motus system offers for researchers who want to go beyond describing patterns, and are interested in underlying mechanisms. I will also highlight current knowledge gaps and propose how experimental and correlational studies within the collaborative efforts of the Motus system can boost our understanding of why birds migrate the way they do.

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11:45 - 12:00

**S11-4 The Motus Wildlife Tracking Network Reaches Critical Mass: From Humble Beginnings to Global Impact (and Your Role in Its Future)**

David La Puma ORCID iD

Cellular Tracking Technologies, Rio Grande, USA

**Abstract**

The Motus Wildlife Tracking System has evolved from a visionary grassroots collaboration into what is rapidly becoming the most impactful global sensor network for wildlife research. At its core, Motus leverages digitally-coded radio transmitters and a decentralized array of receiving stations to track small flying animals across hemispheres. Its early success was made possible by the SensorGnome—an affordable, DIY receiver platform that allowed for mass deployment and broad accessibility. In 2019 Cellular Tracking Technologies (CTT) joined the Motus effort, at the request of the Northeast Motus Collaboration, during their initial grant-funded expansion. In response to the challenges of scaling a DIY platform, CTT developed the SensorStation—a commercial-grade receiver with reliable, standardized performance and near real-time data transmission capabilities. This innovation not only accelerated Motus growth, but also enhanced the reliability, consistency, and scientific value of the data. Since that first shipment, over 4,000 SensorStations have been deployed worldwide. As Motus enters a new phase of global relevance, Europe stands at a critical juncture. With growing interest and existing pilot efforts, the potential to build a truly continent-wide network is within reach. This talk will outline the trajectory of Motus' exponential growth, share lessons learned from successful deployments, and conclude with a call to action: to think big about Motus in Europe. Drawing on insights from regional coordinators, we'll explore what's working, what stands in the way, and how we can collectively unlock the full potential of this revolutionary wildlife tracking system.

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# Symposium 12: The importance of vagrancy in ecology and evolution

10:30 - 12:00 Friday, 22nd August, 2025

LR4

Conveners: Paul Dufour and Alexander C. Lees

Vagrancy, the occurrence of individuals outside their normal geographic range of their species, offers a unique lens through which to study the importance of rare events on ecological and evolutionary processes. Indeed, this phenomenon can lead to significant, often unpredictable consequences, such as the disruption of ecosystem stability, the formation of new migration routes, speciation and the emergence of new reproductive behaviours. Besides, vagrancy can offer insights into movement ecology, as studying abnormal movements helps uncover the neuro-physiological bases and heritability of animal navigation. With recent advances in tracking technologies and data collection, the study of vagrancy is becoming increasingly feasible and is gaining increasing attention.

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10:35 - 11:00

**S12 Keynote Vagrancy is an important eco-evolutionary process**

Alexander Lees ORCID iD[1], Paul Dufour[2]

[1]Manchester Metropolitan University, Manchester, United Kingdom. [2]Swiss Ornithological Institute, Sempach, Switzerland

**Abstract**

Vagrancy is the phenomenon of extralimital occurrence of individuals of species outside their normal geographic ranges. Such occurrences are well catalogued but often historically regarded as trivial. This understanding that has been strongly challenged in recent years by a growing body of evidence that extralimital occurrences can have important roles in eco-evolutionary processes.

Species geographic ranges are not fixed in space and time and vagrancy events may lead to colonisation of new geographic areas as breeding or non-breeding habitats. Vagrants may thus promote the evolution of new migration routes, which may be encoded genetically, or culturally - provided that the novel route is transferred to offspring. This facilitation of rapid range expansions is likely to be an increasingly important process underpinning species responses to rapid climate change and land use change.

Vagrancy also fosters the evolution of new species after the colonization of new regions, in the absence of such passive or active dispersal events, oceanic islands would be very depauperate. Vagrancy may also be a disruptive force for speciation if regular vagrancy leads to occasional geneflow to disjunct populations. Avian vagrancy may also facilitate the dispersal of other non-avians via endozoochoric and epizoochoric means again leading to eco-evolutionary processes even if the avian vector dies relatively quickly. This may involve the dispersal of pathogens or parasites through passive transport by vagrants with important socioecological implications. Increased academic interest in this phenomenon will likely unlock new insights into large-scale eco-evolutionary dynamics.

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11:00 - 11:15

**S12-1 Using stable isotope analysis to determine the natal origin of vagrants**

Lucinda Zawadzki ORCID iD[1], Phil Taylor[2], Tim Guilford ORCID iD[1]

[1]University of Oxford, Oxford, United Kingdom. [2]Acadia University, Wolfville, Canada

**Abstract**

A number of theories have been proposed that attempt to explain why vagrancy occurs. However, the majority of studies on vagrancy employ indirect techniques that are unable to resolve information on individual vagrants, particularly their natal origin, leaving major gaps in our understanding of this behaviour. Here, we examine the use of stable isotope analysis as a method to determine the natal origin of vagrant passerines in North America, by analysing ratios of stable-hydrogen isotopes (deuterium; d2H) in tail feathers of 15 species of vagrants captured in Nova Scotia. We found that assignments of natal origin were possible for all individuals using this method, though some species were assigned relatively broad areas within their breeding range due to limitations of the deuterium isoscape. Assignment maps further revealed patterns in origin across species, with 75% of individuals predicted to originate from an edge of their species' range. These findings demonstrate that stable isotope analysis is an effective method to study vagrancy directly, and suggests an intriguing link between exploratory behaviour and vagrancy. Information revealed through stable isotope analysis may be paramount to refining existing vagrant theories, and exploring questions about how and why vagrancy occurs. We call for more studies using stable isotope analysis to study vagrancy, and propose the addition of multiple isotopes to decrease ambiguity of natal assignments.

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11:04 - 12:00

**S12-2 Whole-genome resequencing reveals the origin of a rapidly emerging 'reverse' songbird migration**

Joe Wynn ORCID iD

University of Liverpool, Liverpool, United Kingdom

**Abstract**

Understanding how and why animal migration is changing is key to anticipating the ways in which animals will (or won't) respond to increasingly rapid environmental change. Tracing the very early origins of changes in migratory behaviour is inherently challenging – given the necessarily small numbers of individuals involved – though in principle modern genomic methods might allow recently-emerging migratory routes to be tracked back to their geographic origins. One of the most remarkable changes in migratory behaviour ever observed is that of the yellow-browed warbler (*Phylloscopus inornatus*). Breeding across Siberia and typically migrating south to winter in south/south-east Asia, increasing numbers of yellow-browed warblers have started migrating in a 'reverse' north-western migratory direction and end up in northern Europe; 7,000km away from their nearest historic wintering area. Using low resolution whole-genome resequencing, we here trace the European yellow-browed warbler to a single geographic origin in western Siberia. We further use ringing data to infer the most likely route taken by yellow-browed warblers across Europe, which when back-extrapolated intersects the genetically-inferred origin. We propose that the observed change in trajectory is broadly consistent with migratory route reversal, and propose that a) observation of similar behavioural changes in other species and b) determining the precise ancestral migratory behaviour of the yellow-browed warbler will be key to determining the mechanistic underpinning of this and similar phenomena.

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11:15 - 11:30

**S12-3 Long-distance relatives: genetic structure and diversity of eastern imperial eagle populations across Eurasia**

Ádám Tisza[1], Krisztián Szabó[1], Márton Horváth[2], Szilvia Pásztory-Kovács[1]

[1]Department of Zoology, University of Veterinary Medicine Budapest, Budapest, Hungary. [2]Department of Species Conservation, Hungarian Ornithological and Nature Conservation Society, Budapest, Hungary

**Abstract**

The eastern imperial eagle is a long-lived raptor species with a wide distribution that follows the forest-steppe belt in Eurasia. Russia and Kazakhstan possess the largest populations, which are migratory, while the western populations are mostly sedentary and geographically non-contiguous. We analyzed feather samples of 204 individuals collected from nine geographical populations across its distribution range (Western and Eastern Carpathian Basin, Northern Macedonia, Thrace, Anatolia, South Caucasus, Crimea-Ukraine, Volga-Ural, Altai) including three migrating and all western non-migrating populations, then examined their genetic structure and diversity using 15 microsatellite markers. Our results suggest a population structure with four distinct clades: 1. Carpathian Basin, 2. Northern Macedonia, 3. Thrace-Anatolia and 4. the unit of eastern populations. Despite of the geographic proximity, the three western clades showed a higher degree of differentiation than expected and all three of them were the most similar with the eastern clade. This pattern could be explained by bottleneck effects in the 20th century and fragmentation of the western population or a colonization scenario with eastern origin and different founder effects. The low recent migration rate detected serves as genetic proof for strong philopatric behavior, which supposedly limits gene flow. This and the western non-migrating behavior increase the risk of inbreeding, which we did not detect for now. Our research raises awareness for the monitoring of isolated eastern imperial eagle populations, especially for the Northern Macedonian population comprising of a low number of breeding pairs, and for the potential genetic consequences of non-continuous distribution paired with non-migrating behavior.

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11:30 - 11:45

**S12-4 Comparing different genetic encoding mechanisms of a novel migratory route in the Eurasian blackcap**

Georg Langebrake ORCID iD[1], Joe Wynn ORCID iD[2], Miriam Liedvogel ORCID iD[1]

[1]Institute of Avian Research, Wilhelmshaven, Germany. [2]University of Liverpool, Liverpool, United Kingdom

**Abstract**

In the last century, the Eurasian blackcap has developed a novel migratory route, with some birds migrating from their breeding grounds in central Europe in a north-westerly direction to winter in Great Britain. The blackcap is already known for a migratory divide between south-west and south-east migrants and it has been shown that this directional choice is heritable. Using whole genome sequencing, we compare different ways of encoding migratory direction in the genes including different types of route reversals.

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# Plenary lecture - Suvi Ruuskanen: Invisible friends - Microbiome, physiology and fitness in a changing world

13:00 - 14:00 Friday, 22nd August, 2025

PL5

Chair: Jan-Åke Nilsson

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**Plenary 7** **Invisible friends: Microbiome, physiology and fitness in a changing world**

Suvi Ruuskanen ORCID iD

University of Jyväskylä, Jyväskylä, Finland

**Abstract**

All organisms carry microbes, and biomedical research clearly shows that gut microbiome is strongly linked to health and sickness. In eco-evolutionary research, a current key challenge is to understand how microbiome variation contributes to host phenotypic variation and fitness, and especially how the microbiome may help the host to respond to rapid environmental variation. In this talk I summarize our recent experimental and longitudinal studies in avian species, mostly wild passerine bird populations, that aim to understand the role of gut microbiome in phenotypic variation and adaptations. In particular, I discuss how gut microbiome is shaped by environmental variation, the causal effects of (environmentally-induced) gut microbiome variation on host physiology (e.g. metabolism, thermal physiology, immune function) and ultimately, the links between gut microbiome variation and host fitness. I also explore the role of gut microbiome as a driver for developmental plasticity in responding to environmental changes. Finally, I discuss the challenges and future directions in the avian eco-evo host-microbiome research.

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# Oral session 11: Anthropogenic effects 2

14:00 - 15:00 Friday, 22nd August, 2025

MALT

Chair: Zsofía Toth

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14:00 - 14:15

**Oral 11-1 Feathers for Land: Bird Monitoring Drives Conservation and Social Engagement Beyond Cities**

María Viota ORCID iD[1,2], Óscar Prada[1]

[1]Grupo Local SEO-Castro, Sociedad Española de Ornitología/BirdLife, Castro-Urdiales, Spain. [2]University of the Basque Country, Leioa, Spain

**Abstract**

Effective bird conservation relies not only on habitat protection but also on active community involvement. This approach is particularly promising in urban and peri-urban areas, where economic and population dynamics from urban centers exert significant influence. The Montaña Oriental Costera of Cantabria (North Spain) is an Important Bird and Biodiversity Area (IBA n. 422, BirdLife International) hosting critical breeding populations including the endangered Egyptian vulture (*Neophron percnopterus*) and a maritime breeding colony of the griffon vulture (*Gyps fulvus*). It is influenced by the urban metabolism of a nearby large city and lacks protection under the Natura 2000 Network nor the regional level. These dynamics add complexity and pose significant threats to its ecological importance and uniqueness. To address these conservation challenges, the Spanish Society of Ornithology/BirdLife International has successfully implemented a bottom-up conservation model based on voluntary land stewardship agreements. Partnerships have promoted traditional land-use practices that enhance biodiversity, ecosystem resilience and the sustainability of its natural and cultural values as well as efforts raising awareness and the urgent need for legal protection. A key component of this initiative is the integration of scientific bird monitoring, including GPS tracking and population censuses, to inform conservation strategies and foster community engagement. By bridging the gap between research, management, and society, this model demonstrates that voluntary agreements and collaborative governance can effectively mitigate habitat loss, promote sustainable land use, and contribute to long-term conservation success. Its scalability suggests potential applicability in other peri-urban contexts facing similar challenges.

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14:15 - 14:30

**Oral 11-2 No skiers, no problems? Preserved alpine grassland along ski-pistes may provide foraging habitats for a climate-threatened species during the breeding period, offering mitigation opportunities.**

Chiara Bettega ORCID iD[1,2], Pietro Luciani[2,3], Francesca Roseo[1,4], Paolo Pedrini[2], Stefano Leonardi[3], Mattia Brambilla[1,5]

[1]Dipartimento di Scienze e Politiche Ambientali Università Degli Studi Milano, Milan, Italy. [2]Biologia Della Conservazione, Museo Delle Scienze di Trento, Trento, Italy. [3]Dipartimento di Scienze Chimiche, Della Vita e Della Sostenibilità Ambientale, Università di Parma, Parma, Italy. [4]Lipu/BirdLife Italia, Parma, Italy. [5]CRC Ge.S.Di.Mont, Università Degli Studi di Milano, Edolo, Italy

**Abstract**

Winter sports are one of the main sources of income in many mountain regions and the ski industry has expanded globally in recent decades. For many mountain species, ski-pistes and the associated habitat alterations are a major issue. Moreover, ski-pistes are predicted to shrink towards higher elevations, further impacting on alpine species already threatened by climate change. By assessing the drivers of habitat selection during the critical period of nestling rearing we investigated the impacts of ski-pistes in the Dolomites on the foraging behaviour of the white-winged snowfinch *Montifringilla nivalis*, an iconic alpine bird highly threatened by climate change. Snowfinches prefer to forage on snow patches and short grass on medium slope, frequently found on and around ski-pistes. We also observed a marked effect of the temperature-solar radiation interaction, with

snowfinches foraging in sunlit areas when ambient temperature is low, while under higher temperatures they prefer shady zones, probably because of specific physiological/thermoregulatory requirements. The abundance of some key prey groups was affected by pistes and human structures. Foraging snowfinches are associated with environmental characteristics that also occur on ski-pistes. Therefore, the impact of the latter could be mitigated by adequate management aimed at maintaining short-sward alpine grassland and residual snow patches. In one hand, conservation measures and policies should prevent, or at least limit, the future construction of new ski-pistes in alpine sites with high conservation value. In the other hand, proper management could help reduce the ecological footprint of current and future ski resorts on alpine ecosystems.

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14:30 - 14:45

**Oral 11-3 Light Pollution alters wild biological clocks: four years of evidence on clock gene expression and behaviour in a migrant bird**

Sayuri Diaz Palma[1], Ewa Ocłoń ORCID iD[2], Juliette Champenois[1], Lars Gustafsson ORCID iD[3], Joanna Sudyka ORCID iD[1]

[1]Jagiellonian University, Krakow, Poland. [2]University of Agriculture in Krakow, Krakow, Poland. [3]Uppsala University, Krakow, Sweden

**Abstract**

Life on Earth has evolved under predictable light-dark cycles via the circadian rhythms that govern individual performance. The rapid expansion of artificial light at night (ALAN) disrupts circadian rhythms, driving severe repercussions for avian species by misregulating their physiology and shifting their activity timing. Evidence on the molecular mechanisms regulating circadian clocks and resulting behavioural responses to ALAN is the missing link to uncovering the broader ecological consequences of light pollution. In this study, we experimentally introduced ALAN in nest boxes of the collared flycatcher (*F. albicollis*), a long-range migrant bird breeding in Gotland, Sweden. We exposed nestlings to ALAN from two days post-hatching until fledging and recorded breeding data. We collected blood samples at the experiment's start and shortly before fledging including "Day" and "Night" samples. We quantified the expression of four key circadian genes (*Clock, Bmal1, Per2,* and *Cry1*) in the samples gathered across four breeding seasons. ALAN consistently altered circadian gene expression in nestlings, particularly at night. Specifically, negative clock regulators (*Per2* and *Cry1*) showed higher expression in ALAN-exposed group compared to dark controls. These shifts were reflected in disrupted nocturnal behaviour, ALAN-exposed nestlings begging for food more frequently and for longer at night compared to dark controls. These effects were extended to parents, who prolonged daily activity in ALAN-exposed broods, starting to feed earlier and ending later. This study highlights the impact of light pollution in natural populations, for the first time in long-distance migrants, which are exposed to ALAN in real-life during their nightly displacements.

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14:45 - 15:00

**Oral 11-4 City life or country life? Behavioural, physiological and molecular responses of common kestrels to urbanisation.**

Gianluca Damiani ORCID iD[1,2], Giacomo Dell'Omo ORCID iD[2], David Costantini ORCID iD[1]

[1]Department of Ecological and Biological Sciences, University of Tuscia, Viterbo, Italy. [2]Ornis italica, Roma, Italy

**Abstract**

Urbanization is one of the fastest-growing anthropogenic land cover transformations worldwide. Birds of prey, as apex predators, are particularly sensitive to the novel selective pressures of urban habitats, including altered food availability, nesting opportunities, and exposure to pollutants. The common kestrel (*Falco tinnunculus*) is an excellent model species to study effects of urban habitat on wildlife, owing to its widespread distribution, generalist diet, and occurrence across urban, rural, and natural environments. In this multi-year research conducted in Rome (Italy), we examined how kestrels respond to urban environments using key biological metrics such as reproduction, movement ecology, feeding ecology, immunology, stress physiology, transcriptomics, and genomics. Our findings indicate that urban kestrels lay eggs earlier than those in rural or natural habitats, without significant differences in reproductive success. GPS tracking and diet analysis reveal distinct habitat use and prey composition. Additionally, urban kestrels exhibit different levels of oxidative stress and immune markers compared

to non-urban individuals, along with variations in genes related to metabolism. These differences likely reflect trade-offs associated with city life. Unlike other European cities, Rome's urban landscape does not seem detrimental to common kestrels, possibly due to its extensive green areas and suitable nesting sites. This research enhances our understanding of how raptors cope with anthropogenic habitat changes, offering insights for conservation and urban wildlife management.

# Oral session 12: Climate change

14:00 - 15:00 Friday, 22nd August, 2025

LR2

Chair: Joshua Tabh

14:00 - 14:15

**Oral 12-1 Protected areas under pressure: conserving bird diversity in the warming Italian Alps**

Riccardo Alba, Dan Chamberlain

University of Turin, Turin, Italy

**Abstract**

Mountains are global biodiversity hotspots but are increasingly vulnerable to climate change. In the European Alps, rising temperatures and land-use changes have caused shifts in vegetation, impacting bird communities, particularly alpine specialists. Protected areas (PAs) are critical for buffering climate effects and safeguarding cold-adapted species, but their effectiveness in a warming world remains unclear. This study assessed shifts in bird assemblages across the elevational gradient in the Italian Alps over 13 years, using the Community Temperature Index (CTI) as a measure of community thermal tolerance. By comparing shifts inside and outside PAs, we identified key species and elevation bands driving CTI changes and modeled species-specific elevational shifts. Results revealed a critical divergence: CTI remained stable outside PAs but increased sharply within PAs, reflecting a 1.19 °C rise in mean annual temperature in the study area. Initially, PAs supported colder-adapted communities, but these differences diminished over time, reducing benefits for high-elevation species. The most marked changes occurred near the treeline, a key zone for sensitive species. CTI increases were driven by treeline and alpine grassland species which are most vulnerable to vegetation encroachment. Our findings suggest that PAs facilitate upward shifts but are insufficient to prevent declines in high-elevation species under rapid warming. Adaptive conservation strategies are urgently needed, including measures to counteract vegetation shifts, maintain habitat heterogeneity, and support elevational connectivity. Continuous CTI monitoring is essential to detect ecological disruptions and refine priorities, ensuring resilience in mountain biodiversity under climate change. These insights provide critical guidance for conservation globally.

14:15 - 14:30

**Oral 12-2 Coastal winds are stronger in a warming arctic and impact seabird behavior and fitness**

Tristan MARTIN ORCID iD, David Grémillet ORCID iD

CEFE, Montpellier, France

**Abstract**

The Arctic is warming nearly four times faster than the rest of the planet. This unprecedented warming is profoundly altering environmental conditions, ecosystem functioning, and the livelihoods of Arctic peoples. Coastal areas, which are crucial for biodiversity and human activities, are at the forefront of these changes. Using an interdisciplinary approach, we demonstrated that (1) climate change is affecting wind conditions in Arctic coastal regions during summer. Since 1979, average summer wind speeds and their variability have increased along much of the Arctic coastline, resulting in a rise in strong wind events. (2) These large-scale changes in wind dynamics influence the movements and fitness of seabirds, with broader impacts on panarctic socio-ecosystems. Specifically, we used a long-term study of little auks (*Alle alle*), the most abundant arctic seabird species and ecological indicator of Arctic coastal ecosystems. We showed that during strong wind events, little auks are trapped at sea and significantly reduced the duration and frequency of their visits to the colony. These behavioral changes negatively impact their fitness as inferred from chick growth rates and adult body condition toward the end of the linear chick-growth phase. Overall, strong wind events disrupt the delicate balance between parental investment and self-maintenance in this long-lived species. Over time, such pressures may drive shifts in life-history traits, potentially affecting population dynamics. As little auks are key ecosystem engineers in a warming Arctic, such eco-evolutionary processes could have far-ranging consequences, notably by reshaping socio-ecosystems and altering their stability across Arctic coastal environments.

14:30 - 14:45

**Oral 12-3 The impacts of climate change on the spatial distribution of tits and chickadees (Paridae)**

Dieter Thomas Tietze ORCID iD[1], Celine Emmel[2], Jens Oldeland[3]

[1]Universität Hamburg, Hamburg, Germany. [2]Universität Mainz, Mainz, Germany. [3]Institute for Globally Distributed Open Research and Education (IGDORE), Hamburg, Germany

**Abstract**

Climate change, primarily driven by human activities, has been observed since the mid-20th century, leading to various impacts on bird distributions, including poleward and upward range shifts. High-elevation species are particularly vulnerable, as their habitat is spatially limited and warming-induced range shifts may result in habitat loss due to the lack of suitable higher elevations. Tits and chickadees (Paridae) represent a well-studied passerine family with a wide ecological range, occurring from lowland forests to alpine environments across the Holarctic (e.g., Rocky Mountains, Himalayas and Qinghai-Tibetan Plateau), as well as tropical regions in Africa and Asia. Using state-of-the-art climate-niche modeling, we analyzed the potential future distribution of 55 parid species under past, current and projected climatic conditions, incorporating global climate models and four shared socio-economic pathways. We quantified latitudinal range shifts and examined changes in species' range sizes. While we expected general poleward shifts and range contractions, we found species-specific deviations, also among montane species, where upward shifts may lead to increased range fragmentation or even local extinctions due to the lack of available habitat. Understanding how climate change affects changes in range size plus latitudinal and elevational shifts in distribution is crucial for identifying potential climate refugia and conservation priorities, especially for high-elevation species.

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14:45 - 15:00

**Oral 12-4 Birds on the move: understanding bird responses to changing mountain environments.**

Joséphine Couet ORCID iD[1], Emma-Liina Marjakangas ORCID iD[2,3], Andrea Santangeli ORCID iD[4,5], Aleksi Lehikoinen ORCID iD[1]

[1]University of Helsinki, Helsinki, Finland. [2]ection for Ecoinformatics and Biodiversity, Department of Biology, Aarhus University, Aarhus, Denmark. [3]Center for Ecological Dynamics in a Novel Biosphere (ECONOVO), Department of Biology, Aarhus, Denmark. [4]Animal Demography and EsporlesEcology Unit, Institute for Mediterranean Studies (IMEDEA), CSIC-UIB, 07190,, Esporles, Spain. [5]FitzPatrick Institute of African Ornithology, University of Cape Town, Cape Town, South Africa

**Abstract**

Climate change is driving species towards higher elevations, yet the extent and mechanisms of these shifts across entire mountain ranges remain insufficiently understood. While local elevational shifts are well documented, the role of abiotic factors such as solar radiation and land cover in shaping these dynamics has received less attention. In our study, we adopted a novel cross-scale community approach to quantify the impact of solar radiation on the mean elevation and elevational shifts of bird species across European mountain ranges of the Alps, Pyrenees, Scandinavia and UK over an 18-year period. On average, species moved uphill by 0.5 m/year across Europe, with the fastest shifts in Scandinavia and the Alps, while no significant change occurred in the UK or Pyrenees. Birds inhabited higher elevations in areas receiving more solar radiation, though the rate of elevational shifts was similar across solar radiation levels. Habitat also played a key role, with species occurring at higher elevations in forested habitats across Europe, the Alps, and the UK. However, shifts over time were more pronounced in open habitats, suggesting birds in these landscapes respond more strongly to warming temperatures. The combination of solar radiation and land cover effects underscores the complexity of bird elevational responses to climate and habitat change. Identifying areas with accelerated shifts is essential for developing targeted conservation strategies that account for both topographic and habitat influences.

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# Oral session 13: Conservation 2

14:00 - 15:00 Friday, 22nd August, 2025

LR3

Chair: Alex Sutton

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14:00 - 14:15

**Oral 13-1 Can riparian habitats buffer populations of the Spotted Flycatcher, a declining, Afro-Palearctic migrant?**

Catrin Eden ORCID iD[1], Richard Broughton[2], Bart Donato[3], Chris Hewson[4], Caroline Isaksson[5], Stuart Sharp[1]

[1]Lancaster University, Lancaster, United Kingdom. [2]UK Centre for Ecology & Hydrology, Wallingford, United Kingdom. [3]Natural England, Kendal, United Kingdom. [4]British Trust for Ornithology, Lund, Sweden. [5]Department of Biology, Lund University, Lund, Sweden

**Abstract**

Cross-system fluxes of aquatic insects rich in highly unsaturated fatty acids (HUFAs), specifically eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), may subsidise insectivorous vertebrates suffering due to terrestrial insect declines. The benefits of high HUFA diets have previously been demonstrated for riparian insectivores, but understanding the potential for aquatic insects to benefit generalist species remains unmeasured in the wild. Using the spotted flycatcher (*Muscicapa striata*), a habitat-generalist, insectivorous bird, as a model, we tested how blood plasma HUFA concentrations were related to the body condition of 14 adults and 84 chicks in the wild. We measured how variation in HUFAs was related to river proximity, to test whether higher HUFA concentrations were related to aquatic insect availability. We also tested how these relationships may extend to population dynamics by monitoring flying insect availability throughout two breeding seasons and assessing whether this predicted reproductive success. EPA was positively correlated with body condition in chicks and adults, and was also correlated with river proximity. Breeding success was positively correlated with aquatic insect availability, suggesting that access to high HUFA diets could extend to the population level. Our results demonstrate the potential for aquatic subsidies to buffer populations of terrestrial insectivores, highlighting how the maintenance or creation of high-quality freshwater habitats may be promoted in a conservation context for non-aquatic species.

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14:15 - 14:30

**Oral 13-2 Designing Effective Agricultural Exclusion Periods for Farmland Breeding Waders: A Wide-scale Analysis of the Timing of Nesting in the UK**

Leah Gray ORCID iD[1], David Douglas[2], Lucy Mason[2], Allan Perkins[2], Max Wright[3], Andrew Hoodless[3], Mark Wilson[4], Thomas Bodey[1]

[1]University of Aberdeen, Aberdeen, United Kingdom. [2]RSPB, Edinburgh, United Kingdom. [3]GWCT, Aberdeenshire, United Kingdom. [4]BTO, Thetford, United Kingdom

**Abstract**

Agricultural exclusions during the breeding season are a common component of agri-environment schemes, designed to minimize disturbance to breeding birds and to prevent nest destruction. When designed correctly, these types of exclusions can be highly effective and easily applied at scale. However, to provide benefits to breeding birds, exclusion periods must align with the peak breeding season of the target species. This study compiled nesting data for Northern Lapwing (*Vanellus vanellus*), Eurasian Oystercatcher (*Haematopus ostralegus*), and Eurasian Curlew (*Numenius arquata*) from across the UK to assess the timing of the breeding season and to determine effective exclusion dates for wader-targeted initiatives. Multiple schemes, including Scotland's Agri-Environment Climate Scheme, apply standard fixed exclusion periods, however, this analysis shows the timing of the nesting season shifts significantly with latitude. Also, as is well documented, different wader species do not follow the same breeding schedules. This means currently offered exclusion

periods are out-of-phase at northern latitudes in the UK, and entirely unsuitable for later-nesting species including Oystercatcher and Curlew. To increase the effectiveness of future schemes, this analysis proposes an evidence-based framework that recommends effective exclusion timelines based upon (1) the type of agricultural activity (mowing or grazing), (2) the target wader species (late or early nesting), and (3) the latitude of the site. By tailoring exclusion periods to species-specific nesting timelines and adjusting for geographic variation, these recommendations provide a relatively straightforward but impactful method to prevent disturbance and significantly improve wader breeding outcomes.

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14:30 - 14:45

**Oral 13-3 How do methods of woodland creation affect bird communities and abundance, supporting early successional species or more rapid convergence with mature woodland?**

Paul Bellamy ORCID iD[1], Matt Guy ORCID iD[2], Sam Hughes ORCID iD[2]

[1]RSPB Centre for Conservation Science, Sandy, United Kingdom. [2]Forest Research, Farnham, United Kingdom

**Abstract**

New woodland creation is most often achieved in the UK by planting evenly spaced trees to aid establishment and rapidly establish canopy cover. Natural colonisation is an alternative method that is used much less frequently but is thought to provide a more natural woodland structure that is beneficial for wildlife. We compared abundance of birds in the breeding season in paired woodlands created by planting (PL) or natural colonisation (NC) alongside reference values from the adjacent pre-existing woodland (EW). The study woods ranged in age from 5-120 years since creation allowing inference of development of woodland bird communities over time. Birds were recorded by mapping all species along with activity for the whole site during three visits in the breeding season April-June. Woodland structure was measured using Airborne Laser Scanning and tree species composition from sample quadrats. The bird communities of NC & PL were more varied between sites that EW with both differing from EW. NC was characterised by more shrub nesting and migrant species and EW by more hole nesting species with PL intermediate. Differences were largely reflected differences in structure and tree species composition. Accumulation of woodland specialists with woodland age was marginally faster on PL than NC after 40 years but with a high degree of variation in both creation types. The NC sites had small but significantly larger number of scare and declining species of conservation concern than PL, the identity of species contributing to this varied with geographic and landscape context.

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14:45 - 15:00

**Oral 13-4 Climate and land use explain mid-elevation declines in Switzerland's open-land birds**

Tyler Hallman ORCID iD[1], Jérôme Guélat[2], Nicolas Strebel[2], John Kilbride[3], Eliane Meier[4], Thomas Sattler[2]

[1]Bangor University, Bangor, United Kingdom. [2]Swiss Ornithological Institute, Sempach, Switzerland. [3]Renoster, Bellingham, USA. [4]agroscope, Bern, Switzerland

**Abstract**

Ongoing declines in European and North American birds have been particularly pronounced for species in open habitats. Agricultural intensification, land abandonment, forest expansion, and changing climate contribute to declines through altered habitat suitability. Understanding the patterns and drivers of such declines is important to conservation efforts moving forward. Here, we investigated the environmental drivers of change in diversity of open-land avian communities over two decades in Switzerland. We used estimates of species abundance from territory mapping surveys conducted for two Swiss Breeding Bird Atlases (1990s and 2010s). We restricted survey locations to km squares that were surveyed in both atlas periods and contained over 40% open-land cover. Metrics of diversity were calculated for the full communities and open-land communities (included only species for which at least 50% of the total observations were in open-land habitats). Over the 20-year period, diversity of the full communities and open-land communities increased above 1500 m. In open-land communities, however, diversity declined between 1000 and 1500 m. While variables for climate and land cover were included in the AIC top model, early season NDVI and seasonal scope of NDVI were the strongest predictors of observed changes in open-land diversity.

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# Oral session 14: Population ecology 2

14:00 - 15:00 Friday, 22nd August, 2025

LR4

Chair: Sara Ryding

14:00 - 14:15

**Oral 14-1 Field-monitoring of Highly-Pathogenic Avian Influenza Outbreak in a Sub-Antarctic island of Crozet archipelago.**

Aude Noiret[1], Romain Fischer[2], Lucile Hateau[2], Bastien Bauger[1], Paolo Parsy[3], Camille DePasquale[2], Jérémy Tornos[2], Mathilde Lejeune[2], Elsa Marçon[1], Guillaume Lespagnol[2], Tao Joly[4], Lucia Llorente[4], Timothée Bonnet[3], Julien Collet[3], Karine Delord[3], Blaise Raymond[3], David Renault[5], Sara Boucheron[2], Gaël Bardon[6], Marina Oget[2], Tristan Bralet[2], Béatrice Grasland[7], François-Xavier Briand[7], Christophe Guinet[3], Francesco Bonadonna[2], Charles-André Bost[3], Christophe Barbraud[3], Céline Lebohec[2,6], Antoine Stier[1,8], Thierry Boulinier[2]

[1]IPHC, Strasbourg, France. [2]CEFE, Montpellier, France. [3]CEBC, Villiers-en-Bois, France. [4]Direction de l'Environnement TAAF, Saint-Paul, Réunion. [5]ECOBIO, Rennes, France. [6]Centre scientifique de Monaco, Monaco, Monaco. [7]Ploufragan-Plouzané-Niort Laboratory, Anses, Ploufragan, France. [8]University of Turku, Turku, Finland

**Abstract**

Highly pathogenic avian influenza (HPAI) has been circulating around the globe in recent years, impacting wildlife. In the sub-Antarctic region, HPAI initially reached South Georgia in 2023 causing mortality in seabird and marine mammal populations. Since then, the risk for the disease to spread to other sub-Antarctic and Antarctic pristine environments hosting endemic species has been increasing. In October 2024, the first mortality events of elephant seals were reported in Crozet archipelago (French Southern Territories). The risk for human health and of accentuating HPAI spreading across wild populations motivated the shutdown of scientific activities, except for the purpose of following the dynamics and impact of the HPAI outbreak. Despite the low manpower, the field conditions and the biosecurity regulations, we followed the spatial and temporal early stages of HPAI dissemination throughout the island, reporting on-land mortalities, changes in alive individuals' densities and reproductive success, as well as clinical expression of HPAI in seabirds and mammals, while sampling carcasses to detect and sequence the virus. The virus originated from the same clade as the one found in South Georgia and while the clinical expression of HPAI was mostly observed in king penguins throughout the outbreak, on-land mortality impacted marine mammals, wandering albatrosses, brown skuas, king and other penguin species at different rates, locations, time-scales and life-stages. Studying the whole impact of such epizootic event on wild populations remains a priority in the long term, as well as its spreading to other sub-Antarctic and Antarctic regions.

14:15 - 14:30

**Oral 14-2 Identifying the demographic pathways linking environmental covariates to population dynamics in a polygynous avian migrant**

Ellen Martin ORCID iD[1,2], Thomas Riecke[3], Pierre-Alain Ravussin[4], Daniel Arrigo[5], Michael Schaub[2]

[1]Université de Neuchâtel, Neuchâtel, Switzerland. [2]Swiss Ornithological Institute, Sempach, Switzerland. [3]University of Montana, Missoula, USA. [4]3. Rue du Theu 12, CH-1446, Baulmes, Switzerland. [5]4. Hofmattenstrasse 12, CH-2560, Nidau, Switzerland

**Abstract**

Understanding and predicting the effects of climate change on populations requires linking first environmental conditions to demographic rates and second demographic rates to population-level consequences, but often this complete demographic pathway is not studied. Tracking demographic rates and population sizes through time can allow us to identify likely drivers of temporal variation in demographic rates and link changes in demographic rates to changes in population growth. Integrated population models (IPMs) incorporate demographic data into a single analytical framework, allowing for the inclusion of environmental covariates to test hypotheses considering how

the environment influences demographic rates, and consequently, to which demographic rates population growth rate is most sensitive. In birds, there is strong evidence that environmental conditions impact population growth, and that long-distance migrant avian species with short phenological windows are at greatest risk of population decline due to changing environmental conditions. We built a Bayesian IPM with over 40 years of mark-recapture, fecundity, and nest box occupancy data and incorporated environmental covariates hypothesized to be driving the changes in 2 populations of a fast-lived long-distance migrant, the European pied flycatcher. We identified the demographic pathways through which environmental covariates were acting. While several environmental covariates impacted fecundity and survival, only precipitation acting via apparent juvenile and adult survival contributed to variation in population growth rate. Linking environmental covariates to demographic rates does not sufficiently explain or predict population-level consequences, and that decomposing variation along the complete demographic pathway is a necessary step to appropriately identify how covariates influence population dynamics.

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14:30 - 14:45

**Oral 14-3 Large-Scale Spatial Variation in Survival and Recruitment in a Long-Lived Species, the White Stork**

Matia Haïm Muller ORCID iD, Fabian Ketwaroo, Michael Schaub

Swiss Ornithological Institute, Sempach, Switzerland

**Abstract**

Survival and recruitment are key demographic parameters that shape population dynamics. Although crucial for identifying drivers of local population trends and informing region-specific conservation strategies, the spatial variability of these processes remains largely unexplored. The white stork (Ciconia ciconia) population in Germany, with its extensive ringing data, provides an ideal opportunity to investigate spatial differences in survival and recruitment, as contrasting population trends between western Germany (positive) and eastern Germany (slightly negative) suggest spatial variation in these parameters. Using federal states (Bundesländer) as spatial units and data from 2000 to 2023, we applied capture-recapture-recovery models incorporating spatial autocorrelation to estimate age-dependent survival, recruitment, and emigration across our study area. Our results reveal higher survival probabilities in western Germany, consistent with the more positive population trend observed in this region. Additionally, recruitment occurred at younger ages in the west, with a substantial portion of individuals recruiting as early as 2 years old, compared to later recruitment (ages 3–4) in eastern Germany. These findings highlight significant large-scale differences in demographic processes within a single species, providing valuable insights into how population dynamics vary across spatial gradients.

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14:45 - 15:00

**Oral 14-4 Long-distance dispersal is asymmetrical with respect to age, sex and breeding latitude in a long-lived monogamous bird**

EHJ (Lisenka) de Vries ORCID iD[1,2,3], Michiel P. Boom ORCID iD[1,2,3,4], Bart A. Nolet ORCID iD[1,3], Eelke Jongejans ORCID iD[1,5], Henk P. van der Jeugd ORCID iD[1,2]

[1]Department of Animal Ecology, NIOO-KNAW, Wageningen, Netherlands. [2]Dutch Centre for Avian Migration and Demography, Wageningen, Netherlands. [3]Department of Theoretical and Computational Ecology, Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, Amsterdam, Netherlands. [4]Sovon Dutch Centre for Field Ornithology, Nijmegen, Netherlands. [5]Department of Ecology, Radboud Institute for Biological and Environmental Sciences, Radboud University, Nijmegen, Netherlands

**Abstract**

Although relatively rare, long-distance dispersal significantly impacts population persistence by facilitating range expansion, range shifts and genetic exchange. We constructed a Bayesian multistate joint live encounter – dead recovery model to quantify long-distance dispersal between the Barents Sea, Baltic Sea and North Sea subpopulations of the Russia/Germany & Netherlands flyway of barnacle goose (*Branta leucopsis*), using long-term mark-recapture data of 22,413 individuals ringed between 1995-2023. Long-distance dispersal was strongly age-, sex- and directionally biased. Natal dispersal predominantly occurred northwards, with 23.9% of juvenile males and 8.6% of juvenile females estimated to transition annually from the North Sea to the Barents Sea

subpopulation. Breeding dispersal in the same direction was minimal, estimated at 0.49% and 0.21% for adult males and females respectively, and was not always distinguishable from temporary (moult-) migrations. These model results were validated with data on timing of breeding or moult from 14 dispersing individuals. Dispersal was northwards in all cases and timing of breeding or moult of dispersers more closely resembled the timing of the new subpopulation, although dispersing females moulted on average 6.4 days earlier than the mean of their new subpopulation. Our results confirm strong male-biased natal dispersal in monogamous waterbirds. This unidirectional long-distance dispersal is expected to result from the unique flyway structure, were subpopulations with large differences in numbers mix during wintering. Additionally, we showed that plasticity in timing of breeding and moult may be greater in males than in females, which could be an additional explanation for the male-biased northward dispersal observed here.

# Oral session 15: Molecular ecology and structural biology

14:00 - 15:00 Friday, 22nd August, 2025

LR5

Chair: Attila Fülöp

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14:00 - 14:15

**Oral 15-1 Large-scale molecular identification reveals habitat imprinting behaviour of the white-tailed eagle**

Ida Penttinen ORCID iD, Carina Nebel ORCID iD, Toni Laaksonen ORCID iD

University Of Turku, Turku, Finland

**Abstract**

Breeding habitat selection is a crucial process with profound consequences for individual fitness. For species with high site fidelity these consequences can be lifelong. Habitat imprinting means that stimuli experienced in the natal environment causes preference for similar stimuli when searching for breeding sites. This behaviour can reduce the costs of habitat selection or increase success in the chosen breeding habitat. Finnish white-tailed eagle population has been monitored since 1973. Since 2003, the monitoring routine has included collection of feather samples. We have extracted DNA from over 2800 adult feathers and over 1700 nestling feathers and genotyped them with 13 microsatellite markers. By searching for identical genotypes between nestling and adult genotypes we have been able to find out the natal nests of 398 breeding individuals. This unique dataset allows us to compare the habitats in the natal and breeding territories of identified white-tailed eagle individuals. Our results show that the natal and breeding sites are similar, and the similarity is not affected by the natal dispersal distance. We also show that the similarity between natal sites and chosen breeding sites is greater, than similarity between natal sites and other available nesting sites known to be suitable for eagles. Further analysis will show whether choosing a natal-like breeding habitat increases breeding success of white-tailed eagles. These results provide essential information of habitat selection behaviour of the white-tailed eagle and help to understand the patterns of range expansion in the growing population.

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14:15 - 14:30

**Oral 15-2 Tracing the geographic origins of behavioural variation using genomics**

Malin V. Klumpp[1,2,3], William J. Smith ORCID iD[2,3,4], Bengt Hansson ORCID iD[1], Beatriz Portinha ORCID iD[3,5], Rose Thorogood ORCID iD[2,3]

[1]Department of Biology, Lund University, Lund, Sweden. [2]HiLIFE – Helsinki Institute of Life Science, University of Helsinki, Helsinki, Finland. [3]Research Program in Organismal and Evolutionary Biology, Faculty of Environmental and Biological Sciences, University of Helsinki, Helsinki, Finland. [4]Department of Biology, University of Oxford, Oxford, United Kingdom. [5]cE3c – Centre for Ecology, Evolution and Environmental Changes & CHANGE – Global Change and Sustainability Institute, Campo Grande, Universidade de Lisboa, Lisboa, Portugal

**Abstract**

Consistent behavioural differences among individuals can have significant ecological and evolutionary consequences, yet their origins and persistence within species remain key questions in animal behaviour research. In newly established populations at expanding range margins, behavioural variation may result from natural selection and spatial sorting, with behavioural types that promote dispersal being more common. While such behaviours are expected to decline as populations age, ongoing immigration may sustain variation at the range edge. However, this dynamic remains largely unexplored, likely due to the difficulty of inferring immigration in the wild. Here we combine genome-wide sequencing data with behavioural assays to examine whether individual

behavioural variation in a range-front population of Common Reed Warblers (*Acrocephalus scirpaceus*) relates to differences in genetic ancestry. Over the past century, reed warblers have expanded into Finland, where they exhibit higher aggression and explorative behaviour than individuals breeding in the range core. However, it is unclear whether this reflects the persistence of dispersal-enhancing traits from founders or continued immigration to the range front. We find evidence for genomic admixture from the range core in 18.4 % of range-front individuals, and demographic modelling suggests continued gene flow into the range edge. However, while some behavioural traits associate with increased relative fitness, further work is needed to confirm if behavioural variation in the Finnish population is shaped by recent immigration. Overall, this study provides insights into how intraspecific behavioural diversity is shaped by individuals' geographic backgrounds, increasingly relevant as anthropogenic influences drive animal redistributions worldwide.

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14:30 - 14:45

**Oral 15-3 Effects of highly pathogenic avian influenza on the behavior and survival of breeding Black-headed gulls in Sweden**

Alessia Ostolani ORCID iD, Mariëlle van Toor, Jonas Waldenström

Linnaeus University, Kalmar, Sweden

**Abstract**

Highly pathogenic avian influenza (HPAI) has emerged as a significant threat to wild bird populations, especially the spread of the H5N1 2.3.4.4b lineage since 2021, which has led to unprecedented mortality in seabirds. Among the most affected species in Europe, the Black-headed gull (*Chroicocephalus ridibundus*) experienced mass mortality during the 2023 breeding season. While direct mortality is well documented, the sub-lethal effects of HPAI on behavior, survival, and migration remain poorly understood. In this study, we monitored six Black-headed gull colonies in Sweden, combining field observations, GPS tracking, and virological analyses to assess the epidemiological and behavioral impacts of HPAI. Five of the six colonies experienced outbreaks, leading to severe mortality, widespread nest abandonment, and altered adult movement patterns. Virus sequencing confirmed the outbreak was caused by HPAI-H5N1 clade 2.3.4.4b, and serological analyses the following year indicated widespread antibody presence in surviving individuals. GPS data revealed that, following the outbreak onset, adults from affected colonies traveled shorter daily distances compared to those from the unaffected colony. Additionally, tagged individuals from infected sites exhibited an earlier migration onset, likely due to nest failure following high chick mortality. Our findings highlight that HPAI not only causes direct mortality but also significantly alters movement behavior, potentially affecting survival and reproductive success. These results emphasize the need to integrate epidemiological monitoring with behavioral studies to better assess the broader impacts of HPAI outbreaks on wild bird populations.

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14:45 - 15:00

**Oral 15-4 Avian eggshell geometry, and pore architecture and distribution, observed by multiscale 3D X-ray computed tomography combined with a mathematical model using spherical harmonics**

Shumeng Jia[1], Marc D. McKee[2,3], Natalie Reznikov[1,2,3]

[1]Department of Bioengineering, McGill University, Montreal, Canada. [2]Faculty of Dental Medicine and Oral Health Sciences, McGill University, Montreal, Canada. [3]Department of Anatomy and Cell Biology, McGill University, Montreal, Canada

**Abstract**

Avian eggshells exhibit a wide range of shapes and sizes, adapted to different reproductive strategies. Beyond providing protection, the shell is a porous structure that helps regulate gas and water vapour exchange, which are essential for embryonic development. Egg geometry, described by parameters like volume and surface area, is insightful for applications in biomechanics, poultry research and biomimetic design. Existing quantification methods commonly relying on 2D measurements and formulas that incorporate speculative constants are prone to computational bias, as they assume perfect symmetry along the egg's longitudinal axis. To overcome these limitations, fully analyzable 3D volumetric images of eggs were collected using X-ray computed tomography. This approach allowed precise quantification of length, width, surface area, inner volume, and shell volume with

micrometer accuracy. Key shape attributes like elongation and pointedness were derived from these measurements. To refine shape characterization, a mathematical model was applied to capture the 3D geometry of eggs by combining multiple spherical harmonics to represent asymmetric features. A program was developed to define egg regions based on extent of curvature, enabling precise description of shape variation across the equatorial region. With high-resolution scans, we measured the density, shape, and volume of individual pore spaces (perforate and imperforate). By correlating measurements across 11 species, we found that pointed eggs had fewer pores in the most curved part of their equatorial region than less-pointed eggs. This study provides a quantitative framework for analyzing eggshell structure, expanding opportunities for research in evolutionary biology and in explaining adaptive traits.

# Oral session 16: Anthropogenic effects 3

15:30 - 17:00 Friday, 22nd August, 2025

MALT

Chair: Kevin Matson

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15:30 - 15:45

**Oral 16-1 What can feral pigeons tell us about multiscale spatial patterns of Psittacosis in urban environments?**

Valentin Adrian Kiss ORCID iD[1], Bram Vanden Broecke ORCID iD[2], Wendt Müller ORCID iD[1]

[1]University of Antwerp, Department of Biology, Behavioural Ecology & Ecophysiology, Antwerp, Belgium. [2]University of Ghent, Faculty of Sciences, Centre for Research on Ecology, Cognition and Behaviour of Birds, Ghent, Belgium

**Abstract**

Cities must be recognized as unique habitats that attract large populations of synanthropic bird species, such as feral pigeons (*Columba livia*), which thrive due to abundant anthropogenic food resources and fewer predators. However, these advantages come at a cost—high-density populations provide an ideal environment for diseases to proliferate. Studying disease ecology in urban environments is hence important, but most previous studies focus on either large-scale (country-level) or intermediate-scale (city-level) variation. This approach ignores that cities are dynamic and heterogeneous landscapes, with conditions varying substantially between neighborhoods. In this study, we therefore investigated fine-scale spatial variation in Psittacosis prevalence across different locations in Antwerp city (Belgium) using *Chlamydia psittaci*, a generalist multihost bacterium with a mild pathogenicity, as a model. We collected disease prevalence data from >500 pigeons across 47 different locations. Our findings reveal a significant spatial heterogeneity in prevalence rates (range: 6% to 80%) across Antwerp's urban landscape. When comparing our results with our comprehensive literature review of *C. psittaci* prevalence in pigeon populations worldwide, it appeared that the variation within Antwerp city is as large as the observed variation among cities. Currently, we are investigating whether this variation is linked to factors such as pigeon population density, host contact rates, pollution, or the degree of urbanization. Understanding these fine-scale patterns is essential for understanding disease dynamics in urban birds and ultimately for assessing potential health risks for both humans and wildlife.

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15:45 - 16:00

**Oral 16-2 Socio-economic status and non-native species drive bird ecosystem service provision in urban areas**

Fabio Marcolin ORCID iD[1,2,3], Stefano Mammola ORCID iD[4,5,6], Riccardo Alba ORCID iD[1,4], Pedro Segurado ORCID iD[2], Luís Reino ORCID iD[3,7,8], Dan Chamberlain ORCID iD[1,4]

[1]Department of Life Sciences and System Biology, University of Turin, Turin, Italy. [2]Forest Research Centre, Associate Laboratory TERRA, School of Agriculture, University of Lisbon, Lisbon, Portugal. [3]CIBIO/InBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, School of Agriculture, University of Lisbon, Lisbon, Portugal. [4]NBFC, National Biodiversity Future Center, Palermo, Italy. [5]Molecular Ecology Group, Water Research Institute, National Research Council, Pallanza, Italy. [6]Finnish Museum of Natural History, University of Helsinki, Helsinki, Finland. [7]CIBIO/InBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, University of Porto, Vairão, Portugal. [8]BIOPOLIS Program in Genomics, Biodiversity and Land Planning, CIBIO, Vairão, Portugal

**Abstract**

Urban areas of higher socio-economic status generally have greater taxonomic diversity than poorer areas, reflecting environmental injustice. This disparity may lead to lower-income areas experiencing reduced cultural (e.g., aesthetic value of birds) and regulating (e.g., pest control by insectivorous birds) ecosystem services.

Additionally, cities are hotspots for non-native species introductions, which can alter community functional space and ecosystem services. However, the link between socio-economic status and the services provided by both native and non-native urban birds remains underexplored. We examined how functional diversity related to cultural and regulating ecosystem services varies along the socio-economic gradient of functional urban areas (FUAs) in Spain and Portugal. Using national bird atlases, we assessed species richness and functional dispersion of traits linked to these services. Generalized linear mixed models were applied to analyse their relationship with median household income, while also evaluating the moderating effect of non-native species presence. We found that cultural and regulating ecosystem services declined with socio-economic status, while species richness increased. However, invaded communities exhibited greater species richness and cultural ecosystem services than non-invaded ones. Our findings suggest a negative relationship between socio-economic status and ecosystem service provision, with non-native species significantly influencing this dynamic. These results emphasize the need for urban planning strategies that address both socio-economic and ecological inequalities, alongside non-native species management.

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16:00 - 16:15

**Oral 16-3 Bird Responses to Avian Influenza and Developments at Sea (BRAIDS), a multi-partner collaborative study in Scotland**

Claudia Tapia-Harris ORCID iD[1], Aly McCluskie[1], Adam Butler[2], Charlotte Regan[3], Chris Thaxter[4], Daniel Johnston[5], Emily Burton[6], Emma Cunningham[7], Esther Jones[2], Francis Daunt[3], Ian Cleasby[8], Jana Jeglinski[9], Jason Matthiopoulos[10], Jude Lane[11], Kate Searle[3], Katherine Whyte[2], Kirsty Franklin[1], Liz Humphreys[5], Lucy Wright[11], Maria Bogdanova[3], Niall Burton[4], Nigel Butcher[11], Phil Bouchet[2], Philipp Boersch-Supan[4], Sarah Burthe[3], Sophie Bennett[5]

[1]Royal Society for the Protection of Birds (RSPB), Edinburgh, United Kingdom. [2]Bioinformatics and Statistics Scotland, Edinburgh, United Kingdom. [3]UK Centre for Ecology & Hydrology, Edinburgh, United Kingdom. [4]British Trust for Ornithology, Thetford, United Kingdom. [5]British Trust for Ornithology, Stirling, United Kingdom. [6]Scottish Seabird Centre, North Berwick, United Kingdom. [7]University of Edinburgh, Edinburgh, United Kingdom. [8]Royal Society for the Protection of Birds (RSPB), Inverness, United Kingdom. [9]Aarhus University, Aarhus, Denmark. [10]University of Glasgow, Glasgow, United Kingdom. [11]Royal Society for the Protection of Birds (RSPB), Sandy, United Kingdom

**Abstract**

Seabird populations are currently facing multiple challenges, including the H5N1 Highly Pathogenic Avian Influenza (HPAI) outbreak and the rapid expansion of offshore wind developments (OWDs). With Scotland aiming to decarbonise and achieve net zero emissions by 2045, OWDs will play a crucial role in meeting this target. This, coupled with the fact that the effects of HPAI are still poorly understood, led the Scottish Government to commission BRAIDS, Bird Responses to Avian Influenza and Developments at Sea. BRAIDS brings together ecologists, statisticians, epidemiologists, developers, and Government to understand the effects of OWDs on Northern Gannet *Morus bassanus*, Black-legged Kittiwake *Rissa tridactyla*, Razorbill *Alca torda*, and Common Guillemot *Uria aalge* across the east coast of Scotland, framed within the broader context of population change due to the recent HPAI outbreak. BRAIDS will use historical and current seabird tracking data, as well as cutting-edge modelling techniques and epidemiological studies to identify changes in at-sea distribution and foraging ranges arising because of the outbreak, alongside any reactive behaviour to the presence of windfarms. By generating and integrating up-to-date scientific evidence, the project aims to produce outputs directly relevant to national marine impact assessments. As BRAIDS is still in its early stages, we will outline the project's aims and methods and show preliminary analysis of seabird flight behaviour and foraging ranges. The focus will be on emphasising how BRAIDS bridges the critical evidence gap between scientific research and practical applications, addressing the challenge of mitigating climate change without further impacting vulnerable seabird populations.

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16:15 - 16:30

**Oral 16-4 Common Starling (*Sturnus vulgaris*) – as a species for citizen science and fundamental research**

Oskars Keišs ORCID iD

Institute of Biology, Faculty of Medicine and Life Sciences, University of Latvia, Rīga, Latvia

**Abstract**

The Common Starling (*Sturnus vulgaris*) is a species seen by the general public on its everyday life. Phenological observations of starling arrival in spring date back to 19th century in Europe. In Latvia, setting up nest-boxes for starlings has been popular since 20th century. This makes the Common Starling almost ideal species for citizen–science projects, involving individuals and schools. Common Starling in Latvia has been one of the top species ringed between 1925 and 1940 – about 20000 ringed, and majority of them were ringed by schoolteachers. Until 2024, more than 80 000 Common Starlings have been ringed in Latvia, and about 1000 recoveries are yielded. During public data gathering on spring arrival dates, Common Starling has been the most frequent species to be reported due to its synanthropic lifestyle and recognition by the general public. Common Starling has also been selected as one of the nest-box monitoring species by Latvian Ornithological Society in 1980ties (Čauns 1987). It is also selected as "Bird of the year" in 2025 by the Latvian Ornithological Society to raise public awareness of the citizen-science contribution to fundamental Science project carried out by the Institute of Biology: From migrants to residents – shifting behaviour in migratory birds to withstand global change (lzp-2023/1-0233).

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16:30 - 16:45

**Oral 16-5 Invasive fruit flies erode fruit reward and avian fruit dispersal in Europe**

Urs G. Kormann ORCID iD[1], Adrian Weidmann[1,2], Martin Gossner ORCID iD[3], Irene Bühlmann ORCID iD[3], Mike Werfeli ORCID iD[4], Jana Collatz ORCID iD[2]

[1]Swiss Ornithological Institute, Sempach, Switzerland. [2]Agroscope, Zurich, Switzerland. [3]Swiss Federal Research Institute WSL, Birmensdorf, Switzerland. [4]Remote Sensing Laboratories, University Zurich, Zurich, Switzerland

**Abstract**

Interactions between frugivorous birds and fruit-bearing plants are crucial for ecosystem persistence. Two-thirds of European songbird species consume fruit, and over 70% of woody plant species in Europe depend on birds for seed dispersal. Research from island ecosystems shows that invasive vertebrates can disrupt frugivore-fruit interactions. However, the potential effects of invasive species on frugivore-fruit interactions remain unclear in continental systems, particularly for invasive invertebrates. We experimentally investigate how the spotted wing drosophila (Drosophila suzukii), a rapidly spreading invasive fruit fly, affects the nutritional reward of wild fruits, and fruit choice and removal in four common wild shrub species. First, we found that fruit infestation caused a rapid reduction of up to 80% in fruit sugar content in three shrub species. Second, fruit choice experiments over two years revealed that songbirds, the main disperser group, avoided experimentally infested fruits. Overall, reductions in the nutritional reward aligned with a 60% decrease in avian, and 40% in overall fruit removal. Our results provide the first experimental evidence of the spotted wing drosophila's dual impact on fruit-frugivore systems. This invasive fly reduced the temporal and quantitative availability of fruit rewards for frugivores during late summer and autumn, a period when many frugivores rely on wild fruits to build reserves. Fruit infestation reduced fruit removal, the first important step of seed dispersal, suggesting that the spotted wing drosophila may jeopardize seed dispersal services. Our results highlight the disruptive role of invasive species on critical ecosystem functions, emphasizing the need to curb ongoing invasions.

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16:45 - 17:00

**Oral 16-6 High-density urban environments reduce infection prevalence and genetic diversity of vector-borne parasites in synanthropic Italian sparrows (*Passer italiae*)**

Luca Ilahiane[1], Mattia Brambilla[1], Joan Ferrer Obiol[1], Samuele Ramellini[1], Susan E. McKinlay[1], Irene Vertua[1], Corrado Alessandrini[1], Enrico Caprio[2,3], Fabio Marcolin[3], Riccardo Alba[2,3], Alessandro Sacchetti[4], Linda Colligiani[4], Iacopo Corsi[4], Gabriele Raiser[4], Mauro Del Sere[4], Alessandro Montemaggiori[5], Fulvio Fraticelli[5], Giuseppe Landucci[5], Emiliano De Santis[5], Rosario Balestrieri[6], Daniela Campobello[7], Mario Lo Valvo[7], Marie Claire Gatt[8], Benjamin Metzger[8], Elisa Fesce[9], Nicola Ferrari[9], Roberto Ambrosini[1,2], Dan E. Chamberlain[2,3], Gentile F. Ficetola[1,2], Andrea Galimberti[2,10], Luca Gianfranceschi[2,11], Carlo Polidori[1,2], Diego Rubolini[1,2], Martina Ferraguti[12,13]

[1]Dipartimento di Scienze e Politiche Ambientali, Università degli Studi di Milano, Milan, Italy. [2]National Biodiversity Future Center (NBFC), Palermo, Italy. [3]Department of Life Sciences and Systems Biology, Università degli Studi di Torino, Turin, Italy. [4]COT - Centro Ornitologico Toscano, Livorno, Italy. [5]SROPU - Stazione Romana Osservazione e Protezione Uccelli, Rome, Italy. [6]Stazione Zoologica “Anton Dohrn” – CRIMAC, Calabria Marine Centre, Department of Integrative Marine Ecology, Amendolara (CS), Italy. [7]Department of Biological, Chemical and Pharmaceutical Sciences and Technologies, University of Palermo, Palermo, Italy. [8]Independent Researcher, Gżira, Malta. [9]Department of Veterinary Medicine and Animal Science, Wildlife Health Lab, Università degli Studi di Milano, Lodi, Italy. [10]Department of Biotechnology and Biosciences, University of Milano-Bicocca, Milan, Italy. [11]Dipartimento di Bioscienze, Università degli Studi di Milano, Milan, Italy. [12]Department of Conservation Biology and Global Change, Estación Biológica de Doñana (EBD), CSIC, Seville, Spain. [13]Consorcio de Investigación Biomédica en Red de Epidemiología y Salud Pública (CIBERESP), Madrid, Spain

**Abstract**

Birds in urban environments may benefit from high resource availability, scarcity of predators, increased nesting opportunities, and warmer microclimates during harsh weather. Conversely, drawbacks of urban life, such as low-quality diets, pollution, and exposure to heat islands may lead to high physiological stress. It has been suggested that infectious diseases are more frequent among urban-dwellers, potentially linked to simplified ecological networks, nutritional deficiencies and increasing stress levels. Nevertheless, evidence is inconsistent across urban areas and pathogens. We investigated infection prevalence of vector-borne avian malaria (haemosporidian parasites) in relation to urbanization. We did so by molecular screening nearly 400 Italian sparrows (*Passer italiae*), a highly synanthropic species, from seven large cities, scattered between Northern Italy and Malta, and nearby rural areas. Results revealed that infection prevalence was consistently and significantly lower in urban than rural areas (21.6% vs. 67.5%), as was the case for parasite diversity (7 vs. 12 lineages). Across all 37 sampling sites, we found a strong negative effect of human population density on infection probability. Given that haemosporidian vectors (blood-sucking Diptera) feed on both humans and sparrows, low prevalence in dense urban areas may be driven by a dilution effect mediated by high availability of non-competent human hosts (infection dead-end). However, local variation in competent host densities and altered vector communities along urban-rural gradients may also play a role. Whatever the main driver, urban-dwelling sparrows may benefit from considerably reduced parasitemia compared to their rural-dwelling counterparts, which may contribute to explain their successful spread in urban environments worldwide.

# Oral session 17: Movement ecology

15:30 - 17:00 Friday, 22nd August, 2025

LR2

Chair: Sissel Sjöberg

15:30 - 15:45

**Oral 17-1 Navigating the unknown: How early exploration affects juvenile gull movements and survival**

Mélibée Morel ORCID iD[1,2], Lucy Mitchell ORCID iD[2], Wendt Müller ORCID iD[1], Eric Stienen ORCID iD[3], Frederick Verbruggen ORCID iD[2], Luc Lens ORCID iD[2]

[1]University of Antwerp, Antwerp, Belgium. [2]University of Ghent, Gent, Belgium. [3]INBO, Brussels, Belgium

**Abstract**

For juvenile Lesser black-backed gulls (*Larus fuscus*), the post-fledging period is a critical life stage that requires them to rapidly adapt to unfamiliar environments as they transition to independence. Survival depends on their ability to explore effectively, particularly in discovering new habitats and locating essential resources. While early-life experiences may shape individual differences in exploratory behaviour, it remains unclear whether pre-fledging exploration influences post-fledging movements and survival. Here, we investigated whether individual variation in exploration tendencies, measured during pre-fledging using an Open Field Test, predicts post-fledging exploration and how this affects juvenile survival rates. Post-fledging exploratory movements of 34 juveniles were studied over a 20-day period using GPS tracking, assessing habitat preferences, spatial use and metrics capturing the exploratory aspect of foraging. Furthermore, we assessed potential fitness consequences by analysing survival of juveniles during the first six months post fledging, including the migration period. Pre-fledging exploration was associated with post-fledging habitat preferences, with more explorative juveniles using urban habitats in greater proportions, while less explorative individuals favoured agricultural habitats. However, pre-fledging exploration did not predict spatial use or the exploratory aspect of foraging. While pre-fledging exploration and most measures of post-fledging exploration showed no clear effect on survival, a high frequency of revisits was associated with an increased risk of mortality. Overall, this study highlights the role of pre-fledging exploration in shaping habitat preferences, but suggests that some aspects of post-fledging exploration are presumably shaped by a complex interplay of ecological and social factors that may mask personality-driven differences.

15:45 - 16:00

**Oral 17-2 Night-time movements and habitat distribution of roosting sites of grey partridges (*Perdix perdix*)**

Riho Marja ORCID iD[1,2], Liis Keerberg[1], Jaanus Elts[1]

[1]BirdLife Estonia, Tartu, Estonia. [2]HUN-REN Centre for Ecological Research, Vácrátót, Hungary

**Abstract**

We investigated (1) the nighttime movements of the grey partridge (*Perdix perdix*), if for some reason, the individual moved either voluntarily or fled from the original roosting to another site, (2) distances between roosting sites, and (3) habitat use of roosting sites and its temporal variability. We used GSM-GPS transmitters to collect data on nighttime movement parameters and roost habitat use of 24 grey partridge individuals. The results showed that on 422 nights (45.5% of cases), grey partridges moved from their original roosting site to another site during the nighttime. They did not move far based on the average movement distance: males 108 m, females average 70.4 m. The nocturnal movement of grey partridges did not depend on their sex. However, there was a significant difference in the study periods, as night-time movement gradients from January to March were longer compared to night-time movement gradients from April to June and July to August. In addition, the nocturnal movements made in July-August and October-November were also statistically different. The distance of the roosting site from the previous roosting site did not depend on sex, study individual, and movement during the previous night. Grey partridges mostly preferred winter cereal fields and grassy habitats as roosting habitats. To a lesser extent,

summer cereals, legumes, and winter oilseed rape were also used. There were seasonal differences in the habitats of the roosts. Our study provides novel insights into the nighttime behavior of grey partridges and their seasonal use of roosting site habitats.

16:00 - 16:15

**Oral 17-3 Understanding the impacts of tracking devices on birds**

Charlie Russell ORCID iD[1,2], Adham Ashton-Butt[2], Aldina Franco[1]

[1]University of East Anglia, Norwich, United Kingdom. [2]British Trust for Ornithology, Thetford, United Kingdom

**Abstract**

Tracking devices have revolutionised our ability to study the movement and behaviour of animals in the wild and had a huge impact on ornithological research. With technological improvements the application of tracking devices has become more widespread, even on species as small as hummingbirds. Whilst there is a consensus that tracking devices impact the studied individuals and that we should consider the ethical use of these devices, there is limited evidence to inform decision making. Using free-flown captive birds that are encouraged to exhibit natural behaviours provides us with a unique baseline comparison dataset to assess the impact of tracking devices on flight performance for a range of different species for the first time. By applying mock tracking devices of different weights (1%; 2%; 3%; 5%), shapes and fastening methods (backpack or leg-loop) to more than 100 individuals across 17 raptor species in controlled conditions we have started to quantify the sub-lethal impacts on bird behaviour and flight. These effects vary across taxonomic groupings, with falcons more heavily impacted by drag and the profile of tracking devices than weight, and eagles exhibiting the greatest load-carrying ability relative to body size. Combining our tracking data, high resolution motion capture on the biomechanics of flight, and qualitative observations, we are better positioned to make informed decisions about tracking device design and application in ornithological research. This work will feed directly into all areas of raptor research, and has potential to be replicated across more taxonomic groups in the future.

16:15 - 16:30

**Oral 17-4 Spatial, not temporal, movement patterns reflect lead exposure in critically endangered California Condors**

Varalika Jain ORCID iD[1,2], Chris McClure ORCID iD[3], Petra Sumasgutner ORCID iD[1,2]

[1]University of Vienna, Vienna, Austria. [2]Konrad Lorenz Research Center, Grünau/Almtal, Austria. [3]The Peregrine Fund, Boise, USA

**Abstract**

Lead contamination poses a serious threat to vulture populations globally, particularly threatening the Critically Endangered California Condor (*Gymnogyps californianus*). In condors, contamination typically occurs through their ingestion of lead ammunition residues (fragments or intact bullets) embedded within the remains of shot animals. Detecting lead exposures typically requires invasive interventions, including resource-intensive capture, repeated blood sampling, and sometimes treatment. Here, we explored a minimally invasive alternative using GPS-telemetry data. We analyzed spatial and temporal movement patterns of GPS-tagged condors in the 30-day period prior to when their blood lead levels were measured. Given the toxic effects of lead, we predicted that lead-exposed individuals would exhibit declines in their daily movement patterns relative to unexposed individuals, potentially aiding in the development of an exposure-detection system. To understand the space-use between exposed and unexposed birds, we estimated the overall 30-day autocorrelated Kernel Density Estimate ranges and calculated pairwise range overlaps. We found spatial, but not temporal, differences in movement patterns. Exposed birds exhibited greater daily space-use and larger overall 30-day ranges than unexposed birds. These ranges were also more concentrated in a previously identified high-risk zone. Exposed birds' ranges overlapped more with each other than with unexposed individuals across the landscape, highlighting the large-scale challenge of lead exposures. Interestingly, unexposed individuals' ranges also overlapped more with exposed birds than each other. These findings highlight the complexity of using GPS-telemetry data for lead exposure detection, but underscore its potential in identifying at-risk individuals, offering a valuable tool for targeted conservation efforts.

16:30 - 16:45

**Oral 17-5 Navigating territorial landscapes: Space use of pre-breeding golden eagles in a saturated population**

Julia Solveig Hatzl ORCID iD[1,2], Steffen Oppel ORCID iD[1], David Jenny ORCID iD[1], Loïc Pellissier ORCID iD[2], Kamran Safi ORCID iD[3], Matthias Tschumi ORCID iD[1], Martin Grüebler ORCID iD[1]

[1]Swiss Ornithological Institute, Sempach, Switzerland. [2]ETH Zurich, Zurich, Switzerland. [3]Max Planck Institute for Animal Behaviour, Konstanz, Germany

**Abstract**

Territoriality structures populations by limiting access to resources, particularly for pre-breeding juveniles, who must navigate a competitive social environment to survive until recruitment. Yet, in saturated populations with adjacent territories, the spatial strategies of pre-breeders remain poorly understood. Here, we integrate GPS-tracking data from golden eagles (*Aquila chrysaetos*) with an extensive territorial dataset from Switzerland to assess the social constraints pre-breeding individuals face throughout the transience phase of natal dispersal. We analysed overnight roost site selection in relation to territory centres and borders while also considering landcover and topographic variables. Additionally, we tested whether the influence of territoriality on habitat selection varied across different movement behaviours (exploration vs. encampment). Our results show that social variables had amongst the highest effect on habitat selection of pre-breeders during transience, exceeding the effect of most topographical and landcover variables. Pre-breeding golden eagles consistently avoided territory centres and preferentially used areas near territory borders for roosting. Throughout encampment phases pre-breeders selected for habitat in significantly larger distance to territory centres compared to the habitat they selected for during exploration. These findings reveal the significant role of territoriality in shaping the spatial distribution of pre-breeders, emphasizing its influence on natal dispersal and population structuring. Understanding these dynamics is crucial for conservation, as current efforts often focus on breeding adults, while pre-breeders—critical for future population stability—may occupy entirely different areas and thus remain unaffected by targeted conservation measures.

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16:45 - 17:00

**Oral 17-6 Smart flights: how migratory Starlings navigate wind for energy-efficient migration**

Ance Priedniece ORCID iD[1], Viesturs Vīgants ORCID iD[1], Oskars Keišs ORCID iD[1], Ivo Dinsbergs ORCID iD[1], Māris Jaunzemis ORCID iD[1], Valts Jaunzemis ORCID iD[1], Elza Marija Zacmane ORCID iD[1], Martins Briedis ORCID iD[2,1]

[1]University of Latvia, Faculty of Medicine and Life Sciences, Institute of Biology, Laboratory of Ornithology, Riga, Latvia. [2]Swiss Ornithological Institute, Department of Bird Migration, Sempach, Switzerland

**Abstract**

Migration is a demanding process, requiring high energy expenditure and exposing birds to a range of stressors. While on the move, birds aim to minimize time, energy costs, and mortality risks by employing a range of adaptive behaviours. However, many aspects of individual migratory performance remain poorly understood, particularly regarding in-flight behaviour and adaptability to atmospheric conditions. In this study, we used multi-sensor geolocators to obtain accurate location and flight altitude data of 30 individual Starlings migrating between breeding sites in Latvia and wintering areas in Western Europe, mainly the British Isles. We analysed seasonal wind selectivity during migratory flights by comparing wind conditions at recorded flight altitudes with those available from the ground level up to 2500 m a.s.l. Our results show that Starlings conformed to a predominantly nocturnal migration and long-distance flights were carried out at altitudes between the ground level and 3000 m a.s.l with generally higher altitudes in spring compared to autumn. Individuals regularly changed their flight altitude during long flights without the presence of elevational barriers. Birds experienced greater wind support in spring than in autumn but exhibited stronger wind selectivity in autumn when headwinds were more prevalent. Wind selectivity was generally higher under headwinds and decreased with prevailing tailwinds, indicating a selective avoidance of strong headwinds as well as strong tailwinds during migratory flights. Our results suggest that migratory birds actively adjust their altitude while in flight according to wind conditions, potentially reducing energy expenditure and improving migration efficiency.

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# Oral session 18: Ecological physiology 2

15:30 - 17:00 Friday, 22nd August, 2025

LR3

Chair: Andreas Nord

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15:30 - 15:45

**Oral 18-1 Passerine stopover physiology: weather variability does not alter corticosterone dynamics after sea crossing**

Erica Calabretta ORCID iD[1], Virginie Canoine ORCID iD[2], Massimiliano Cardinale ORCID iD[3], Ivan Maggini ORCID iD[1], Leonida Fusani ORCID iD[1,2]

[1]Konrad-Lorenz Institute of Ethology, University of Veterinary Medicine, Vienna, Austria. [2]Department of Behavioral and Cognitive Biology, University of Vienna, Vienna, Austria. [3]Department of Aquatic Resources, Swedish University of Agricultural Sciences, Lysekil, Sweden

**Abstract**

Migration is an energy-intensive phase of birds' life cycle, often including the crossing of large ecological barriers during non-stop flights. Corticosterone (CORT), an adrenocortical hormone also known as the stress hormone, generally rises at the onset of migration to facilitate and sustain high-energy metabolism. Although birds can select favourable meteorological conditions at departure, weather variability *en route* may affect the migrants' energy reserves and their ability to cope with other stressors. This study investigated the effects of weather conditions on the physiological status of two nocturnal trans-Saharan species, the Common Whitethroat (*Curruca communis*) and the Garden Warbler (*Sylvia borin*), upon arrival at a stopover island after crossing the Mediterranean Sea during pre-breeding migration. We assessed fuel stores and CORT variations in relation to tailwinds and air temperature experienced over the sea route. Birds that arrived at the stopover site with residual energy reserves after encountering moderate headwinds or lower temperatures had similar baseline CORT concentrations compared to those that migrated with tailwinds and higher temperatures. While both species exhibited a normal stress response to catching and handling, stress-induced CORT levels were correlated with higher temperature only in Garden Warblers. Our study provides new insights into CORT dynamics suggesting that nocturnal migratory Passerines are not largely affected by weather variability across a marine barrier during pre-breeding migration if they have sufficient energy reserves.

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15:45 - 16:00

**Oral 18-2 Invasive alien birds may have a wider thermal breadth than native ones: a case study in the Mediterranean basin**

Elena García-López de Haro ORCID iD[1], Erick González-Medina[2], Jorge S. Gutiérrez[1], Julián Cabello-Vergel[1], Marta Precioso[1], Auxiliadora Villegas[1], José A. Masero[1], María E. Colín[1]

[1]University of Extremadura, BADAJOZ, Spain. [2]Universidad Complutense de Madrid, Madrid, Spain

**Abstract**

Global climate change and invasive alien species (IAS) are among the greatest threats to biodiversity. Many studies suggest that global warming may favour IAS due to their ability to maintain physiological functions across a broader temperature range (i.e. eurythermality). However, comparative studies assessing thermal tolerance limits between native and invasive birds are scarce. Here, we investigated the heat and cold tolerance limits of three IAS (common waxbill *Estrilda astrild*, red avadavat *Amandava amandava*, and yellow-crowned bishop *Euplectes afer*) and three native species of similar sizes and ecological habits (goldfinch *Carduelis carduelis*, serin *Serinus serinus*, and great tit *Parus major*) co-ocurring in the Mediterranean basin. To assess heat tolerance limits, we exposed birds to an increasing gradient of ambient temperature in summer and measured their resting metabolic rate, evaporative water loss, evaporative cooling efficiency, evaporative scope, and body temperature. To evaluate cold tolerance limits, we measured their summit metabolic rates (maximum cold-induced thermogenic

capacity), minimum ambient heliox temperature reached and body temperature in winter. Our preliminary results indicate that IAS exhibited heat tolerance limits 6°C higher than native species, along with an evaporative scope four times greater. However, cold tolerance limits did not differ between the two groups. Overall, these findings support the 'greater eurythermal hypothesis', which predicts that IAS have a broader physiological tolerance than native species occupying the same habitat. This might explain the success of IAS over native ones underongoing global warming.

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16:00 - 16:15

**Oral 18-3 The impact of short-term temperature fluctuations on whole-body and mitochondrial aerobic metabolism**

Maria Correia ORCID iD[1], Charlotee Davies ORCID iD[1], Antoine Stier ORCID iD[2], Suvi Ruuskanen ORCID iD[1]

[1]University of Jyväskylä, Jyväskylä, Finland. [2]Université de Strasbourg, Strasbourg, France

**Abstract**

Environmental temperature affects organisms' physiology, behaviour and reproduction with direct and indirect effects on survival and fitness. Extreme weather events, such as heat waves and cold spells, are predicted to increase in frequency and intensity. Yet, how birds adjust to rapid variations in temperature remains poorly understood. Short-term fluctuating temperatures can alter an endotherms' metabolism, both at the whole-body and cellular level. Whole-body metabolic rate varies with temperature, especially outside the thermoneutral zone, and mitochondrial aerobic metabolism adjusts to meet energy demands. This study investigates if repeated exposure to short-term thermal fluctuations influences physiological mechanisms required to cope with cold temperatures. To achieve this, wild-caught great tits (*Parus major*) were separated into three groups: control, heatwave, and cold spell. Initially, all birds were kept at a controlled ambient temperature (16°C). Birds in the heatwave and cold spell groups were then subjected to three short-term temperature fluctuations (for 48 hours, 7 days apart), with temperature increasing or decreasing by 10°C from the control temperature. Overnight whole-body metabolic rate (basal metabolic rate and metabolic rate below thermoneutrality) and mitochondrial aerobic metabolism from blood cells were assessed at the beginning and end of the experiment. Additionally, after the first wave, daytime metabolic rate was measured below thermoneutrality to study immediate changes to cold temperature responses. The results of this study could provide insights into how animals can cope with increased climate instability, by investigating the responses to temperature fluctuations and capacity for metabolic plasticity, at both the whole-body and cellular level.

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16:15 - 16:30

**Oral 18-4 Experimental evidence for reproduction to increase mitochondrial respiration, but decrease mitochondrial efficiency, in females of a short-lived bird**

Matteo Beccardi ORCID iD, Pablo Salmón, Oscar Vedder

Institute of Avian Research, Wilhelmshaven, Germany

**Abstract**

Reproduction is generally considered as one of the most energy-demanding processes, causing a trade-off with survival. Although this 'cost of reproduction' plays a pivotal role in theory on ageing and life-history evolution, the physiological mechanism driving the cost of reproduction remains largely unidentified. As mitochondria synthesize 90% of the energy available to eukaryotic cells, their efficiency may be key in mediating the cost of reproduction. In this study, we experimentally manipulated the reproductive status (gamete production) of both sexes in Japanese quail (*Coturnix japonica*) and tested for a causal effect of reproduction on mitochondrial respiration. We found that reproduction led to an overall increase in mitochondrial $O_2$ consumption in females, which was primarily driven by a large increase in proton leak, as $O_2$ consumption for ATP synthesis only increased slightly. Hence, reproductively active females had a severely reduced efficiency in ATP production, compared to non-reproductive females. In males, mitochondrial respiration, and its efficiency, was unaffected by reproduction, and similar to non-reproductive females. We suggest that the large increase in proton leak in reproductive females may either represent an adaptive mechanism to mitigate the production of reactive oxygen species (ROS), or acts as an unavoidable consequence of elevated ATP synthesis. The latter would cause constraints on energy availability for

reproductive females, and thereby trade-offs with other energy demanding processes, like somatic maintenance. The absence of effects of reproduction on male mitochondrial respiration is consistent with the general view that, in birds, gamete production is less costly for males.

16:30 - 16:45

**Oral 18-5 Modulation of rest-phase hypothermia and its energy-saving efficiency in ageing zebra finches**

Jakub P. Płachta[1,2], Małgorzata M. Lipowska ORCID iD[1], Edyta T. Sadowska ORCID iD[1], Ulf Bauchinger ORCID iD[3,1]

[1]Institute of Environmental Sciences, Faculty of Biology, Jagellonian University, Kraków, Poland. [2]Doctoral School of Exact and Natural Sciences, Jagiellonian University, Kraków, Poland. [3]Nature Conservation Station Unterelbe, State Agency for Bird Conservation, Freiburd/Elbe, Germany

**Abstract**

Most birds lower their body temperature during periods of inactivity, entering rest-phase hypothermia. However, the ability to regulate body temperature efficiently may deteriorate with age, potentially limiting the achievable range of temperature. Because of the inherent reduction in metabolic rate, it is commonly presumed that rest-phase hypothermia is an energy-saving strategy. Consequently, the reduction in thermoregulatory capacity may compromise the energy balance of older birds. This is particularly impactful in energetically-challenging conditions, such as food scarcity, to which birds commonly respond by deepening rest-phase hypothermia. However, this may become unattainable for older individuals, limiting their capacity to maintain body mass. Although both fasting and ageing have been studied separately, their combined impact on the avian hypothermic response remains poorly understood. Addressing this gap requires an integrated approach to the physiology of avian hypothermia. Therefore, we continuously measured body temperature and metabolic rate in zebra finches of different ages. We tested how these physiological parameters contribute to birds' ability to maintain body mass with or without food access. So far, the initial data suggests that age does affect hypothermia depth modulation in response to fasting. However, contrary to our expectations, overnight body mass loss does not appear to vary with age. Ongoing research will further allow us to explore the interplay between these traits, enhancing our understanding of both thermoregulatory strategies and the process of physiological ageing of birds.

16:45 - 17:00

**Oral 18-6 Thermoregulatory response to water shortage in aging zebra finches**

Małgorzata M. Lipowska ORCID iD[1], Jakub P. Płachta[1,2], Edyta T. Sadowska ORCID iD[1], Ulf Bauchinger ORCID iD[1,3]

[1]Institute of Environmental Sciences, Faculty of Biology, Jagiellonian University, Kraków, Poland. [2]Doctoral School of Exact and Natural Sciences, Jagiellonian University, Kraków, Poland. [3]Nature Conservation Station Unterelbe, State Agency for Bird Conservation, Freiburg/Elbe, Germany

**Abstract**

In nature, birds can encounter factors challenging their energy balance, such as low ambient temperature, food scarcity or water shortage. A common response to such a challenge is deepening of rest-phase hypothermia, which is assumed to reduce energy expenditure. However, such modulation relies on efficient thermoregulatory mechanisms, which may deteriorate with age. In this study, we investigated how the absence of drinking water affects body temperature regulation in zebra finches (*Taeniopygia guttata*), a species capable of relying solely on metabolic water. Specifically, we examined whether such thermoregulatory changes help conserve body mass and how these processes are influenced by age. We used zebra finches representing a broad age span and quantified changes in their body mass and circadian body temperature pattern in presence or absence of drinking water. Without access to water, the birds experienced a substantial body mass loss which stabilized within six days, and this decrease was more severe in older birds. Within the first three days, the water-deprived birds deepened their rest-phase hypothermia and lowered their body temperature towards the end of the day. The scope of the response was not affected by age. Overall, water shortage poses a challenge to a zebra finch energy balance, and the birds respond by modulating their circadian temperature pattern. However, efficiency of coping with this challenge appears to decrease with age: despite a similar scope of the response, older birds experienced more severe body mass loss than the younger ones. Hence, aging may increase vulnerability to changes in water availability.

# Oral session 19: Behavioural ecology 3

15:30 - 17:00 Friday, 22nd August, 2025

LR4

Chair: Carina Nebel

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15:30 - 15:45

**Oral 19-1 Trophic links in a high elevation bird species: the diet of Northern Wheatear nestlings *Oenanthe oenanthe* follows arthropod availability in alpine grasslands**

Camille Mermillon ORCID iD[1,2], Dan Chamberlain ORCID iD[1], Christian Miquel[3], David-Emmanuel Coffie[3], Keyvan Dumas ORCID iD[2], Domenico Rosselli[4], Glenn Yannic ORCID iD[2]

[1]University of Turin, Turin, Italy. [2]Laboratoire d'Ecologie Alpine, Chambéry, France. [3]Laboratoire d'Ecologie Alpine, Grenoble, France. [4]Ente di Gestione delle Aree Protette delle Alpi Cozie, Salbertrand, Italy

**Abstract**

Mountains are subject to environmental pressures and are considered particularly threatened by climate change. This has caused an expansion of forest and loss of open grasslands, threatening alpine species such as birds and also arthropods, which for many species represent an important food resource in high elevation habitats. However, our knowledge of even the basic ecology of many alpine birds is much lower compared to other habitats, thus hampering our ability to develop conservation strategies for mountain species. In our study, we determined the diet of the Northern Wheatear (*Oenanthe oenanthe*), a characteristic species of alpine grasslands. We collected 151 fecal samples in 2023 and 2024 (mainly from nestlings) and assessed diet by DNA metabarcoding. Concurrently, arthropod availability was estimated in the study area throughout the breeding season using two sampling methods (sweep net and pitfall traps). Wheatear nestlings were mainly fed with Diptera, Coleoptera, Lepidoptera and Orthoptera. More than 60 families from 14 arthropod orders were detected in the samples. Most orders seem to show evidence of seasonal peaks for a given elevation, but these peaks were progressively later in the season with increases in elevation. Through the calculation of a selectivity index (based on a compositional analysis of *available prey* and *utilised prey*), we found that Wheatears exhibited a generalist foraging strategy at the arthropod order level, suggesting that they may be able to cope with temporal and spatial changes in arthropod community composition, as long as availability is sufficient.

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15:45 - 16:00

**Oral 19-2 Multi-stage Great Cormorant *Phalacrocorax carbo* spatial behaviour across a diversified coastal ecosystem**

Paolo Salvador ORCID iD[1], Rasa Morkūnė ORCID iD[1], Marianna Chimienti ORCID iD[2], Akiko Kato ORCID iD[3], Vytautas Eigirdas[4], Julius Morkūnas ORCID iD[1]

[1]Marine Research Institute, Klaipėda University, Klaipėda, Lithuania. [2]School of Ocean Sciences, Bangor University, Menai Bridge, United Kingdom. [3]Centre d'Études Biologiques de Chizé (CEBC), UMR 7372, CNRS La Rochelle Université, Villiers-en-Bois, France. [4]Ventės Ragas Ornithological Station, Ventė, Lithuania

**Abstract**

Investigating animal spatial behaviour is essential to defining ecosystem interactions. Intra-population movements may differentiate across individual life stages and colonies, influencing habitat use and resource partitioning. The Great Cormorant (*Phalacrocorax carbo*) is a close-range forager distributed globally across several habitats, but its movement ecology remains poorly understudied.

This study used GPS/GSM tracking data to investigate the foraging movements of breeding (n=23) and nonbreeding (n=12) adults of Great Cormorant between 2018 and 2024 from three colonies along the Lithuanian coastal area (SE Baltic Sea). We quantified the differences in home ranges, habitat use and spatial fidelity between breeders and nonbreeders within and among colonies.

The average home range covered by a breeder is 320.4 ± 184.4 km$^2$. Breeders target distinct foraging grounds at the colony level, resulting in a sea-lagoon gradient of habitat use. Within colonies, the spatial fidelity is high (0.75 ± 0.14, BA), suggesting shared foraging strategies. Spatial segregation was total or partial among colonies, likely to avoid interspecific competition. Nonbreeders showed more extensive home range (402.1 ± 459.1 km$^2$), broader habitat selection, including freshwater, and lower within-colony spatial fidelity (0.62 ± 0.17, BA), indicating more variable movement patterns. A higher degree of spatial overlap is displayed among colonies (0.33 ± 0.22, BA).

This study provides novel insights into the spatial behaviour of the Great Cormorant, revealing significant differences between breeder and nonbreeder. It emphasises the need to integrate different life stages when describing population spatial dynamics.

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16:00 - 16:15

**Oral 19-3 Extended buffering of adverse circumstances: do helpers in cooperatively breeding groups allow nesting during periods of low predation risk?**

Andries K. Janse van Vuuren ORCID iD[1], Roberto Vento[1], Ara Monadjem[2,3], Kat Bebbington[1], Sjouke A. Kingma[1]

[1]Wageningen University and Research, Wageningen, Netherlands. [2]University of Eswatini, Kwaluseni, Swaziland. [3]University of Pretoria, Pretoria, South Africa

**Abstract**

Cooperative breeding, where parents receive help from 'helpers' in raising offspring, is expected to evolve in environments where cooperation increases reproductive success. Exciting comparative studies have demonstrated that cooperative breeding is more common in harsh or unpredictable environments, and it is suggested that helpers under such circumstances can buffer the adverse effects of limited food availability. Here, we expand this hypothesis by predicting that the selection for cooperation during food-limited periods is strengthened because nest predation risk, a main cause of avian reproductive failure, is also low in such periods. To test this extended-buffering hypothesis, we studied the temporal variation in the effects of helpers on nestling provisioning, offspring condition, reproductive output and predation rates in arrow-marked babblers (*Turdoides jardineii*). This species, which lives under the harsh circumstances of the African savanna, has a relatively long breeding season, and the number of helpers is highly variable (3-10 individuals). We first assess the buffering hypothesis by testing whether larger groups improve offspring condition early in the season. Subsequently, we extend this by testing whether the effect of cooperation on productivity is indeed compounded by reduced nest predation pressure during this period. Such accumulating selective pressure driving cooperation provides novel insight into how cooperative breeding is maintained and how cooperative breeders may cope with increasing environmental variability.

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16:15 - 16:30

**Oral 19-4 Migration and moulting strategies of an endangered seabird, the Bermuda petrel**

Roberto Vento ORCID iD[1], Joana Romero[2], Alice Dalla Pieta'[3], Francesco Ventura[4], Carina Gjerdrum[5], Jeremy Madeiros[6], Letizia Campioni[7,8]

[1]Behavioural Ecology Group, Department of Animal Sciences, Wageningen University and Research, 6708 WD, Wageningen, Netherlands. [2]Netherlands Institute for Sea Research (NIOZ), Department of Costal Systems (COS), P. O. Box 59, 1790 AB Den Burg, Texel, Netherlands. [3]WUR – Wageningen University and Research – Department WEC Wildlife Ecology and Conservation, Wageningen, Droevendaalsesteeg 3a, 6708 PB, Wageningen, Netherlands. [4]Biology Department, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, USA. [5]Canadian Wildlife Service, Environment and Climate Change Canada, Dartmouth, Nova Scotia B2Y 2N6,, Dartmouth, Canada. [6]DENR - Department of Environment and Natural Resources, Ministry of Home Affairs, Botanical Gardens, 169 South Road, Paget DV04, Bermuda, Bermuda. [7]Department of Conservation Biology and Global Change, Doñana Biological Station (EBD-CSIC), Seville E-41092, Sevilla, Spain. [8]Ornis ItalicaPiazza Crati, 15 00199, Rome, Italy

**Abstract**

The Bermuda petrel (Pterodroma cahow) is a Lazarus species, which means that it was considered extinct until some breeding pairs were rediscovered in the 1950s. Until now, the species has been the focus of a continuous conservation effort on the breeding ground overlooking the ecology and behaviour of the species during the non-breeding period. It is therefore important to fill in this knowledge gap to improve conservation measures. Using GLS devices deployed on 37 individuals, we described the migration and moulting areas and phenology of the Bermuda petrel. The species has two main non-breeding areas: one extending from the mid-North Atlantic Ocean to the United Kingdom's continental shelf edge and another in the western North Atlantic surrounding the breeding colony, reflecting a migratory and resident strategy, respectively. Failed breeders reached non-breeding areas and returned earlier back at the nests than successful breeders. Using the proportion of time spent in the water each day, we investigated the moulting. We found an effect of breeding success on the phenology of moulting, with successful breeders starting later and taking longer time to moult than failed breeders. Similarly, migratory birds started earlier than residents and took longer to moult, possibly to manage the energy expenditure associated with the migration. Bermuda petrels, like other Pterodroma species, did not show sexual spatial segregation in non-breeding or moulting areas. Overall, we identified the primary areas of distribution during both the non-breeding season and the moulting, contributing to inform the conservation efforts of a threatened species.

16:30 - 16:45

**Oral 19-5 Suppressed sensory cues: prey detection by Black-tailed Godwits in an intensive dairy farming landscape**

Renée Veenstra[1,2], Wouter Halfwerk[3], Jurgen van Hal[3], Mohamed Henriques[2,4], Matty P. Berg[3,1], Theunis Piersma[2,1,5]

[1]University of Groningen, Groningen, Netherlands. [2]BirdEyes, Leeuwarden, Netherlands. [3]Vrije Universiteit Amsterdam, Amsterdam, Netherlands. [4]Campus Fryslan, Leeuwarden, Netherlands. [5]NIOZ, 't Horntje (Texel), Netherlands

**Abstract**

In a world full of sensory information, animals have evolved by developing sensory receptors, which they use – amongst other purposes – to locate food. For instance, many shorebirds use mechanoreceptors in their bill tip to locate food by detecting subterranean vibrations generated by moving prey, a so called 'remote-sensing' mechanism. This sensorial mechanism is nevertheless mediated by biotic and abiotic conditions of the habitat, with prey activity and soil moisture potentially playing a key role, since vibratory signals theoretically transmit better in wet substrates. Black-tailed godwits *Limosa limosa*, forage on agricultural grasslands with varying soil moisture, where they hunt both detritivore (an earthworm ecotype that potentially exhibits high subterranean activity) and geophage earthworms (hypothesized to have a lower activity rate). To investigate the role of soil moisture and earthworm ecotype in mediating prey detection by godwits, we designed a mesocosms experiment to record earthworm vibrations in dry and wet soils, using a geophone. Earthworm vibrations were best detected at 200 Hz, and were overall significantly more detectable in wet soils, within which detritivore vibrations were more frequently detected and at higher intensities. This means that godwits can detect detritivore earthworms more easily than geophage earthworms, and that their foraging capabilities might be significantly hindered by dried grasslands resulting from intensive agriculture. As many remote-sensing shorebird species are threatened, our results stress the importance of adequate soil water saturation, along with a thorough understanding of a species' sensory world, when determining effective conservation measures aimed at improving foraging habitats.

16:45 - 17:00

**Oral 19-6 Individual- and group-level responses of greylag geese under threat by a raptor-like robot**

Irene Vertua ORCID iD[1], Marie Ossola[2,3], Giulia Cerritelli ORCID iD[4], Luca Marinoni[4], Lauren K. Common ORCID iD[2,3], Andrew C. Katsis ORCID iD[2,3], Robert Musters[5], Shane C. McPherson[2,3], Anna Gagliardo ORCID iD[4], Dimitri Giunchi ORCID iD[4], Lorenzo Vanni ORCID iD[4], Claudio Carere ORCID iD[6], Sonia Kleindorfer ORCID iD[2,3], Diego Rubolini ORCID iD[1], Petra Sumasgutner ORCID iD[2,3]

[1]Dipartimento di Scienze e Politiche Ambientali, Università degli Studi di Milano, via Celoria, 26, I-20133, Milano, Italy. [2]Konrad Lorenz Research Center for Behavior and Cognition, core facility of the University of Vienna, Grünau im Almtal, 4645, Austria. [3]Department of Behavioral and Cognitive Biology, University of Vienna, Vienna, 1030, Austria. [4]Dipartimento di Biologia, Università degli Studi di Pisa, via Volta 6, I-56126, Pisa, Italy. [5]Roflight, Lemselobrink 32, 7544 GD Enschede, Netherlands. [6]Dipartimento di Scienze Ecologiche e Biologiche, Università degli Studi della Tuscia, Largo dell'Università s/n, I-01100, Viterbo, Italy

**Abstract**

Group living is recurrent in the animal kingdom, providing individual benefits such as improved foraging efficiency, improved mating chances, and protection from predators. However, individual differences are often overlooked when assessing flock behaviour, despite their potential impact on collective patterns. We interrogated flock and individual-level responses to a simulated aerial threat using the RobotFalcon, a robotic raptor designed to mimic the appearance and flight behaviour of a peregrine falcon (*Falco peregrinus*). Our study focused on ~100 greylag geese (*Anser anser*), including both adults and juveniles, at a long-term feeding site. We tracked individuals, previously characterized for personality traits (aggressiveness, boldness, exploration, and activity) , as well as known age, sex, and pairing status, using drone and ground-based footage before, during, and after RobotFalcon exposure. We examined flock-level responses, including cohesion (mean nearest neighbour distance) and mean travelled distance (delta distance, averaged across all individuals), as well as individual-level reactions, measured as centrality, mean and maximum travelled distance, across eight daily exposure trials. The main flock response to the RobotFalcon was freezing, less overall movement at flock-level during exposure than before and after. Less aggressive individuals moved more when exposed to the RobotFalcon, but only during the first exposure day, as repeated exposures rapidly led to habituation. Individuals did not change their relative spatial position (centrality) when exposed to the RobotFalcon. These results show that individual personality traits can predict spatial-level response to a simulated threat within a flock, but also show overall weak reactions to an aerial predator of goslings.

# Oral session 20: Evolution

15:30 - 17:00 Friday, 22nd August, 2025
LR5
Chair: Matthew Symonds

15:30 - 15:45

**Oral 20-1 The evolution of nest characteristics in birds**

Jenő Nagy ORCID iD[1,2], Mark Hauber ORCID iD[3], Mark Mainwaring[4]

[1]University of Debrecen, Debrecen, Hungary. [2]Hungarian Research Network, Budapest, Hungary. [3]CUNY Advanced Science Research Center, New York, USA. [4]Bangor University, Bangor, United Kingdom

**Abstract**

Nest characteristics, such as their architecture, sitting, and the housed clutch's traits (e.g., egg pigmentation, maculation, shape, and number), exhibit correlated evolutionary changes in birds, impacting the nesting parents' behavioural adaptations. Recent research on (1) nest and (2) egg characteristics, (3) sex-specific contributions to nest building, and (4) the co-evolutionary dynamics between nest architecture and avian brood parasitism has revealed striking correlated evolutionary patterns. The common ancestor of modern birds likely built a simple scrape nest, from which diverse nest structures subsequently evolved. Transitions between nest types often co-occurred with changes in egg traits, with initially white, immaculate eggs becoming pigmentated and maculated independently in distant lineages. Sex-specific nest-building contributions are generally female-biased, highlighting an evolutionary imbalance in sex-biased reproductive investment in egg-laying birds. Furthermore, lineages building more accessible nests are more likely to serve as hosts to avian brood parasitism, while actual host species with some of the more inaccessible nests are targeted by highly specialist brood parasites. These findings contribute to a broader understanding of socioecological drivers of avian reproductive investment and the ongoing evolutionary arms race between brood parasites and their hosts.

15:45 - 16:00

**Oral 20-2 Commensalism and hybrid speciation: how parental genomes affect exploration in the Italian sparrow (*Passer italiae*)**

Samantha Duhé Jones[1], Kristaps Sokolovskis[1], Rachel Steward[1], Veronica Hohnec[2], Alex Lawrence[1], Petronella Wessman[1], Kalle Tunström[1], Melissah Rowe[2], Mark Ravinet[3], Anna Runemark[1]

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**Abstract**

Hybridization may generate novel trait values, enabling hybrid lineages to exploit new niches. While phenotypic differences among hybrids and parents are well characterized, it is less understood if behaviours are likely to be intermediate, mosaic, or transgressive. To address how behavioural traits evolve in hybrid lineages, we use the homoploid hybrid Italian sparrow (*Passer italiae*), whose parental species are the human-commensal house sparrow (*P. domesticus*) and the non-commensal Spanish sparrow (*P. hispaniolensis*). We hypothesize that the ecological strategies of the parental species correspond to differences in heritable behavioural phenotypes. We assess exploration using three independent lineages of Italian sparrows which differ in genetic contribution from the two parental species, as well as the parental species and male F1 hybrids. All six origin groups were equally likely to perform any exploratory behaviour during the trial. We find house sparrows were more active than Spanish sparrows. Interestingly, females from all three Italian lineages had similar activity levels to house sparrow females, while males from the Corsican and Sicilian lineages were similar to male Spanish sparrows, and males of the Cretan lineage were more active than all other groups. The most important predictor of exploration is the interaction of origin and sex, with a general tendency for house sparrows to have the highest exploration and Spanish sparrows the lowest. In conclusion, we show that Italian sparrows, which are typically human-commensal, have exploratory phenotypes intermediate between those of the parental species, with a tendency for extreme exploration behaviours in the Cretan lineage.

16:00 - 16:15

**Oral 20-3 Size matters: male Nightjars signal quality through achromatic ornaments**

Richard Schnürmacher ORCID iD[1,2], Rhune Vanden Eende[3,4], Jitse Creemers ORCID iD[1,4], Eddy Ulenaers[5], Marcel Eens ORCID iD[1], Ruben Evens ORCID iD[1,4], Michiel Lathouwers ORCID iD[3,6]

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**Abstract**

Secondary sexual traits, such as specific body parts or colouration, play a key role in mating interactions and are often shaped by sexual selection as indicators of individual quality. While feather pigmentation in diurnal passerines has been widely studied, the role of structural achromatic colours, for taxa inhabiting dimly lit environments, remains poorly understood. Using 15 years of capture-recapture data from adult European Nightjars (*Caprimulgus europaeus*), we examined whether males' white wing and tail markings function as secondary sexual traits. We found that individual variation in marking size exceeded that of other morphometric traits, suggesting potential sexual selection and their role as ornaments. Marking size was positively associated with age, body condition, and site fidelity, with the most pronounced effects observed in terminal markings on tail feathers. These results align with the presumed role of markings in social displays. Furthermore, significant site differences and annual variation in tail marking size indicate potential environmental influences on these ornaments, which requires further investigation.

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16:15 - 16:30

**Oral 20-4 Social competition as a driver of phenotype–environment correlations: implications for ecology and evolution**

Peter Korsten[1], Rienk Fokkema[2], Tim Schmoll[3], Alastair Wilson[4]

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**Abstract**

There is a growing appreciation that individuals are active agents that influence the environments and hence the selective regimes to which they are exposed, for example through habitat choice or niche construction. In this conceptual talk, I will highlight social (i.e., intra-specific) competition as another important but underappreciated driver of correlations between individual phenotypes and their environments, with profound implications for ecology and evolution. Natural environments are typically heterogeneous with higher and lower quality patches, for example in terms of food availability. More competitive individuals, which may be more aggressive or larger in size, can monopolize preferred higher-quality patches. In this way, social competition is a ubiquitous and powerful driver of phenotype–environment correlations in which individual and environmental characteristics covary – thereby blurring the distinction between the individual and its environment. I will argue that social competition-induced phenotype–environment correlations likely amplify among-individual fitness variation but at the same time constrain the evolutionary potential of populations. I will conclude by proposing empirical approaches to assess the prevalence and importance of social competition-induced phenotype–environment correlations.

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16:30 - 16:45

**Oral 20-5 Evaluating the existence and magnitude of indirect genetic effects using a meta-analytical approach**

Maria Moiron ORCID iD[1], Francesca Santostefano[2,3], Alfredo Sanchez-Tojar[1], David N Fisher[4]

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**Abstract**

The evolutionary potential of traits depends on available heritable variation. Typically, this is quantified through direct genetic effects (DGEs), where an individual's genes influence its own traits. However, social interactions can introduce indirect genetic effects (IGEs), where the genes of interacting partners affect a focal individual's traits. While IGEs are known to shape evolution in livestock species, their broader impact remains uncertain. We conducted a systematic review and meta-analysis to assess IGEs' contribution to trait variance and adaptive potential. Analysing 180 effect sizes from 47 studies across 21 species, we found IGEs to account for a small but significant portion of phenotypic variation. Since IGEs influence all interacting individuals and correlate positively—though not significantly—with DGEs, they substantially increase trait heritability from 0.27 (narrow-sense heritability) to 0.45 (total heritable variance), a 66% rise. Additionally, IGEs varied across traits, being strongest for behaviours and, to a lesser extent, reproduction and survival, but weaker for morphological, metabolic, physiological, and developmental traits. Altogether, our findings suggest that IGEs enhance evolutionary potential, particularly for traits closely tied to social interactions.

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16:45 - 17:00

**Oral 20-6 Genetic constraints in oxidative markers differ between early-life and adulthood in the long-lived Alpine swift**

Cloé Hadjadji ORCID iD[1,2], Antoine Stier ORCID iD[3], Jérôme Goudet ORCID iD[2], Julien Martin ORCID iD[4], Pierre Bize ORCID iD[1]

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**Abstract**

Life history trade-offs can be shaped by how organisms balance their reactive oxygen production and damage against defenses. These trade-offs can shift over the course of an organism's life: during early stages, growth is typically prioritized over maintenance and survival, while in adulthood, especially in long-lived species, maintenance and survival are often favored. Evolutionary trajectories of trade-offs require the traits involved in their modulation to be heritable, subject to selection and genetic constraints. Hence, we investigated in a long-lived bird, the Alpine swift (*Tachymarptis melba*), whether oxidative makers are heritable and genetically correlated, and whether genetic correlations change directions between growth (15 and 45 days old) and adulthood. We measured oxidative markers (damage: reactive oxygen metabolites, protein carbonyls *versus* defenses: non-enzymatic antioxidants, superoxide dismutase, glutathione) in 524 nestlings and 627 adults sampled from 2022 to 2024. We then used an extensive social pedigree going back to 1999 (>7 generations) to estimate heritability ($h_2$) and genetic correlations ($cor_{gen}$) of traits using quantitative genetic approaches. Results showed moderate to high heritability of the oxidative stress markers ($h_2$ > 0.4) at both the nestlings and adult stages as well as genetic correlations between oxidative markers of damage and defenses. However, these genetic correlations changed direction between nestling ($cor_{gen}$: -0.31 [-0.56; -0.05]) and adult ($cor_{gen}$: [0.22 [-0.22; 0.59]) stages. It supports a key role for oxidative stress in shaping the evolutionary trajectories of life-history trade-offs, with defenses being downregulated at the expense of damage early in life, before this balance shifts direction in adulthood.

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