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Global flyways



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英国鸟类学会会刊

BOU Autumn Conference
21 – 22 November 2023

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ABSTRACTS

Global flyways

a synthesis of bird migration research

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All presentations in alphabetical order by presenting author

OFFERED ORAL PRESENTATION | 21 Nov, 2230 UTC

Anne Ausems (she/her)

Trent University, Canada

@AnneAusems

Breeding-ground departure decisions and stopover behaviour during southbound migration in West Atlantic Flyway Whimbrels (*Numenius phaeopus*)

Understanding the movement ecology of long-distance migrants is essential to identifying their conservation needs. Relatively little is known about the migration habits of several declining shorebird populations, including the population of Whimbrels (*Numenius phaeopus*) breeding in the Hudson Bay Lowlands, Canada. Using radio telemetry, we monitored southbound migration timing of Whimbrels in northern Manitoba, and 400 km south in northern Ontario. Birds from Manitoba departed on average 16 days later than birds from Ontario. Within the Manitoba population, successful males departed later than females and failed males, but there were no significant effects within the Ontario population. Post-breeding departure is constrained by the timing of the breeding season, which is determined predominantly by local weather conditions. Breeding further north may thus impose a cost in terms of arrival times on the non-breeding and stopover areas, as the start of the breeding season is often delayed compared to southern populations.

Anne Ausems is a postdoc working on Whimbrel and Red Knot migration and population ecology in the Americas.

OFFERED ORAL PRESENTATION | 22 Nov, 0730 UTC

Joseph Azar (he/him)

Reneco International Wildlife Consultants, United Arab Emirates

Connecting events throughout the annual cycle of migrant Asian Houbara

The annual cycles of migratory birds consist of distinct life history stages linked in a unified sequence, and processes taking place in one stage can influence an individual's performance in subsequent stages via carry-over effects. Given the high energetic demands of migration and breeding in the life history of females, an increase in the energetic cost of one can lead to a decrease in the other. Using path analysis, we evaluated the links throughout the full annual cycle of the female Asian Houbara Bustard (*Chlamydotis macqueenii*) breeding in Central Asia by integrating the movements of satellite-tracked females (68) and their breeding productivity. Our results show that female breeding investment did not carry over to influence post-breeding departure, and the wintering stage buffers the influence of autumn migration on the subsequent spring migration and breeding. While winter conditions and spring migration strategies carried over to affect breeding performance.

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Joseph Azar is a researcher with Reneco International Wildlife Consultants who is presently focusing on Asian Houbara migration ecology. In 2012, he received his PhD in ecology and biodiversity from the Victoria University of Wellington in New Zealand. He is also well-versed in Middle Eastern avifauna and biodiversity.

POSTER PRESENTATION | 22 Nov, 0530 UTC

Harindra Baraiya (he/him)

Wildlife Institute of India

@hareendra3994

Fine scale migratory movements of Common Cranes along desert route of Central Asian Flyway

To effectively manage and conserve the desert route of Central Asian Flyway, understanding the migratory movements and stopover sites of birds is crucial. In this study, five Common Cranes from the arid landscape of Gujarat, India, were tagged to investigate their fine-scale migratory patterns along the CAF desert route. The cranes were tracked during two spring and one autumn migration. They skirted the Hindukush Himalaya towards the West, crossed the deserts of Pakistan, Afghanistan, and Turkmenistan, and reached their breeding grounds in south-western Siberia. The average spring migration distance (4991.2 km), duration (22.6 days), day-stopovers (11.8 days) were greater than the autumn migration (4355.1 km, 11.8 days, no stopover, respectively). Crucial stopover sites, identified using dBBMM, were primarily located in the Karakum desert and in the Amu Darya flood plains, highlighting their importance as vital stopover sites along the CAF. These findings enhance our understanding of the CAF's significance for large avian species.

Harindra Baraiya is a trained Zoologist specialising in Avian Biology and Wildlife Biology and has long been interested in studies related to nature conservation. Currently he is a PhD scholar, studying the factors influencing spatial use by wintering crane species in the Arid plains of Gujarat, India and migration strategies adopted by cranes.

KEYNOTE | 22 Nov, 0615 UTC

Nyambayar Batbayar

Wildlife Science and Conservation Center of Mongolia. Mongolia

Uncovering migration of White-naped Cranes using GPS telemetry in East Asia

Abstract not available.

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KEYNOTE | 21 Nov, 1900 UTC

Nick Bayly

SELVA, Colombia

@selvaorgco

The role of diverse Neotropical overwintering and stopover habitats in sustaining migratory landbirds in the Americas flyway

The Nearctic-Neotropical migration system supports one of the most diverse migration flyways on the planet and in common with migration systems across the globe, it is in decline. Key to understanding and reversing these declines is a better understanding of the role of Neotropical stopover and non-breeding sites in sustaining landbird migrations. The Neotropical region is characterized by extreme heterogeneity and diversity in landcover but also by a greatly reduced landmass relative to the temperate and boreal breeding grounds. In this presentation we will explore how migratory landbirds distribute themselves across this complex geography, the habitats they depend on, and how these shape migratory strategies. We will discover how some species are habitat specialists, occupying geographically restricted ecosystems, while others stopover across broad regions. We will examine the critical role that seasonal fluctuations in resources play in fuelling the migration of species like the Blackpoll Warbler and the Yellow-billed Cuckoo, and how variable habitat quality can carry over to influence the pace of migration. We will also explore the role that stationary non-breeding habitats play in shaping migration strategies and finish by discussing how divergent strategies and Neotropical habitat use may influence survival and breeding phenology, and the actions we can take to protect the flyway against further losses.

As Director of the Migratory Ecology program, **Nick Bayly** manages several projects focused on understanding the non-breeding ecology of migratory landbirds to aid their conservation. He also supports the implementation of resulting conservation recommendations, including ecological restoration activities and the management of agroforestry systems aimed at improving habitat quality for species of conservation concern. Parallel to these activities, Nick dedicates time to supervising undergraduate and graduate students, acting as a reviewer for eBird and participating in several voluntary groups including the Motus, Cerulean Warbler, and Golden-winged Warbler working groups, among others.

OFFERED ORAL PRESENTATION | 21 Nov, 1445 UTC

Martin Beal (him/his)

University of Lisbon, Portugal

@SeabirdStudent

Identifying important connectivity sites for migratory waterbirds: a case study in the East Atlantic Flyway

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Waterbirds are declining globally, making the effective identification and protection of wetland sites crucial to improving their conservation status. For migratory species, conservation action in one part of their range may be compromised by un-mitigated threats occurring elsewhere. Despite this, when quantifying site importance, the connectivity created by the long-distance movements of migratory birds is rarely considered. Here, we define an approach to quantify site importance based on direct evidence of individual bird movements between sites. Our approach leverages three data sources (ringing, colour-marking and electronic tracking) to define movement networks based on graph theory, and thus quantify site importance for connectivity. We illustrate the approach by building movement networks and defining important sites for the Black-tailed Godwit (*Limosa limosa*) in the East Atlantic Flyway. The explicit consideration of site connectivity can help improve the ecological representativeness of protected area networks for migratory waterbirds and their wetland habitats.

Martin Beal is a Swedish-American post-doc, living in Portugal. His research focuses on the study of animal movement to (1) improve understanding of animal behavior, and (2) integrate such understandings into conservation advocacy and policy. My work is currently centered on migratory waterbirds, seabirds, and marine turtles.

OFFERED ORAL PRESENTATION | 21 Nov, 1500 UTC

João Belo

University of Aveiro, Portugal

@JoaoRBelo1

Flyway scale patterns of habitat-use: within and between species variation for waders in the East Atlantic Flyway

Migratory waders from different species and breeding populations congregate in the same areas during the non-breeding season. During stationary periods outside the breeding season they use wetlands ranging from temperate to arctic regions, which can vary considerably in the habitats they have to offer, as well as in the level of anthropogenic influence. In this study, we use GPS data from three wader species with different migratory patterns on the East Atlantic Flyway (Black-tailed Godwit, Redshank and Grey Plover), to quantify individual levels of variation in patterns of habitat-use across their migratory range. Moreover, given the ongoing reduction of natural wetlands, we assess the importance of anthropogenic habitats in acting as substitutes across the species range. We found intra- and interspecific differences in habitat-use, with some species showing a higher dependency of anthropogenic habitats along the flyway, suggesting these may be an important alternative particularly during the non-breeding period.

João Belo is a PhD student from University of Aveiro, Portugal, working with wader movement data. João is particularly interested in understanding species-habitat associations along the EAF at the whole migratory range and understanding the drivers behind waders' decisions when navigating the landscape during the non-breeding season.

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OFFERED ORAL PRESENTATION | 21 Nov, 1200 UTC

Iris D. Bontekoe

Max Planck Institute of Animal Behavior, Germany

@IDBontekoe

Short- and long-term consequences of a delayed migration timing

Migrants make decisions regarding the timing, routes and destinations of their movements throughout their life. Making the right decisions is essential because physical and social conditions encountered en route influence movement costs, efficiency and even survival. To examine the consequences of an altered migration timing, we artificially delayed the migration of juvenile White Storks (*Ciconia ciconia*) and thereby altered their physical and social environment. Using nearly continuous 1Hz GPS trajectories and tri-axial accelerometer data, we examined their migration behaviour, ranging from sub-second level performance to global long-distance movement, in relation to two control groups. We found that delayed storks experienced suboptimal soaring conditions, but better wind support and thereby achieved higher flight speeds than control storks. In addition, our results show that a delayed migration timing had long-term consequences on migration destinations. We suggest that, when timing their migration, storks balance time, energy, and the availability of social information.

Iris D. Bontekoe is a final year PhD student studying how migration timing, individual properties and social factors influence migration and flight behaviour of white storks. Iris's main interests are in animal movement ecology and bird migration. Iris enjoys using computational methods to transform raw data into meaningful visuals and novel insights.

KEYNOTE | 22 Nov, 0815 UTC

Cao Lei (she/her)

Chinese Academy of Sciences, China

Novel mapping of the flyway corridors of large-bodied waterbirds in the East Asian Australasian Flyway

We combined recent tracking data from large-bodied waterbird species in the EAAF to define their flyway corridors, linking discrete breeding, moulting, staging and wintering distributions to define their biogeographical sub-populations. For the first time, this provides the foundation for generating population estimates and trends for these newly identified biogeographical units, especially those of unfavourable conservation status. Combined with remote sensing data, results have vastly improved our understanding of their geographical ranges and the key sites and habitats used by six waterbird groups (cranes, storks, pelicans, spoonbills, swans and geese) throughout their annual cycle. The results confirm the importance of relatively few major Asian river floodplains and their associated wetland habitats in China and Russia. With continuing development pressures in the region, it is vital that we use this

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information to support flyway initiatives to protect these floodplains, wetlands and waterbirds to safeguard them for the enjoyment of future generations.

Cao Lei is a Professor in the State Key Laboratory of Urban and Regional Ecology at the Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences. Professor Cao Lei focuses on wetland and waterbirds ecology and conservation, and movement ecology. Recent technology innovations in IT and micro-electronics have led to the rapid development of satellite tracking devices and techniques. By deploying cutting-edge transmitting devices, Professor Cao's group has initiated tracking programs in many sites in and outside China. Professor Cao is also coordinating a national monitoring and research network of bird-tracking in East Asia.

OFFERED ORAL PRESENTATION | 21 Nov, 1020 UTC

Teresa Catry (she/her)

University of Lisbon, Portugal

@TeresaCatry

Can migratory strategies of Grey Plovers explain contrasting population trends in Europe and West Africa?

Following a pattern shared by other migratory shorebirds in the East Atlantic Flyway, non-breeding populations of Grey Plover show a stable trend in Europe and moderate to strong declines in Africa. Investigating migratory strategies and connectivity of these populations can shed some light on the contrasting trends observed. We tracked Grey Plovers from Guinea-Bissau, Portugal and France, most of which were found to breed at Yamal Peninsula (Western Siberia), suggesting low migratory connectivity in the East Atlantic population. All tracked Grey Plovers followed a "skipping" migratory strategy, flying mostly mid-distance bouts, and using a network of stopover sites where they re-fuelled usually for short periods. All birds stopped at the Wadden Sea in both migratory periods, highlighting the importance of this region. Despite raising some hypothesis on the potential harsher migratory conditions of Grey Plovers wintering in Guinea-Bissau, we still lack evidence to explain the contrasting population trends.

Teresa Catry is a Researcher at the University of Lisbon. Her research is focused on intercontinental (African-European) migratory connectivity and the role of migrants in ecological networks using shorebirds as a model.

KEYNOTE | 22 Nov, 0315 UTC

Chi-Yeung (Jimmy) Choi

Duke Kunshan University, China

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Where to draw the line? Using movement data to inform conservation decisions and conserve migratory waterbirds in East Asia

Populations of many migratory waterbird species along the East Asian-Australasian Flyway have declined substantially over the last few decades. Through systematic investigations on their movement ecology and habitat use patterns along the flyway, it became clear that the traditional protected area framework often failed to cover many of the key waterbird sites and the full range of habitats adequately. Combining the latest technology in wildlife tracking and remote sensing with field observations, there has been an improved understanding of the habitat requirements and activity pattern of migratory waterbirds and these laid the foundation for evidence-based conservation management actions. It is important to make tracking data more readily available, especially to local decision-makers and stakeholders, so that protected area boundaries can be adjusted based on birds' needs and integrate natural and artificial habitat management to improve the habitats for migratory waterbirds. The movement data could also be used to provide decision-makers with a more holistic view that takes the need of waterbirds into consideration when planning well-meaning projects such as mangrove plantations and green energy infrastructure development. These efforts do not only contribute to nature conservation but also to the restoration of wetland ecosystems on which humans depend.

Chi-Yeung (Jimmy) Choi is an applied ecologist at Duke Kunshan University. He studies the ecology of migratory waterbirds, with a focus on their foraging and movement ecology within and between coastal intertidal wetlands. The work has led to investigations of diet, habitat use, local movement, population dynamics, as well as migration phenology and strategies, often using the latest technology in wildlife tracking and remote sensing.

KEYNOTE | 21 Nov, 2200 UTC

Emily Cohen

University of Maryland, Center for Environmental Science, USA

@Emily_B_Cohen

Chancing on a spectacle: co-occurring animal migrations and interspecific interactions

Around the world, the migratory routes of different animal species often converge in space and time, a phenomenon we term 'co-migration.' Animal migration studies often report two or more species with coinciding migrations, suggesting that co-migrations are common across taxonomic groups and geographies, although they are rarely studied. Co-migrating species can interact through competition, social information use, predation, and parasite transmission. These interactions may influence routes, phenology, condition, or survival and may carry-over to affect subsequent life history stages of individuals and populations. Additionally, interactions within and among species during migration are expected to manifest themselves in unique ways because of the added limitations of time and energy. We investigate support for migrating animals as interacting communities, as many migrations are declining or shifting, with unexplored consequences for co-migrant species.

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Research in **Emily Cohen's** laboratory broadly aims to understand animal migration biology in the context of the full annual cycle. We live in a rapidly changing world where many species are declining, and this is especially true for migratory species. It is possible that changes in habitat, climate, and resource availability due to unprecedented human activity are inflating the costs associated with animal migration. At the same time, advancing technologies and analytical tools are making it possible to solve many of the important mysteries about migratory animals. Dr Cohen's research makes use of field, lab, and remotely sensed data integrated with rigorous quantitative tools to 1) address fundamental questions about migration biology, 2) understand how and why migration is changing and migratory species are declining, and 3) develop tools for the inclusion of stopover and airspace habitats into conservation and management efforts for migratory species.

OFFERED ORAL PRESENTATION | 21 Nov, 1930 UTC

Nathan W. Cooper (he/him)

Smithsonian Migratory Bird Center, USA

@Nature_Is_Grand

Environmental conditions in winter carry over to affect migration survival in migratory songbirds

Given rapid declines in avian abundance at continental scales, identifying the drivers of avian mortality is a key challenge for ornithologists. Despite recent advances in tracking technology, identifying the location, timing, and source of mortality in migrant songbirds remains challenging. Here, we leveraged spatially-explicit mark-recapture data for Kirtland's Warblers (*Setophaga kirtlandii*, $n = 137$) to quantify season-specific survival rates and identify environmental drivers of mortality dynamics. We found that weekly apparent survival during spring was considerably lower than either winter or summer. Additionally, environmental productivity on winter home-ranges was positively associated with apparent survival during winter, spring, and summer. These findings highlight the complex environment-organism interactions which link environmental conditions and demographic outcomes across disparate geographies over the full annual cycle. Our novel formulation of a multi-state survival model provides a potential framework for other studies focused on small-bodied migrants which are best tracked by automated telemetry systems.

Nathan W. Cooper is a behavioral ecologist and conservation biologist at the Smithsonian Migratory Bird Center. He studies how migratory birds interact with each other and their environments throughout the annual cycle.

POSTER | 22 Nov, 0750 UTC

Delip K. Das (he/him)

University of Groningen, the Netherlands & Jagannath University, Bangladesh

@DelipDasBisharg

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Migration routes, stopover sites and breeding destinations of Black-tailed Godwits winter in Bangladesh

Black-tailed Godwits (*Limosa limosa*) are a globally Near Threatened species but a common winter visitor in Bangladesh. Bangladesh lies in a unique geographical position at the overlap between the Central Asian and East Asian-Australasian flyways. Yet, shorebird migration remains poorly studied in this region. In this presentation, I will talk about our pioneering study on the migration of Black-tailed Godwits on the basis of satellite tags put on in Bangladesh. I will present a first analysis of the migration routes of the Black-tailed Godwits wintering in Bangladesh, and reflect on the spatial distribution of godwits across the non-breeding season.

Delip K. Das is a PhD student at BirdEyes-Centre for Global Ecological Change at the University of Groningen, the Netherlands. I am investigating wintering Black-tailed Godwits and their migration to and from Bangladesh. I am also an Assistant Professor of Zoology at Jagannath University, Bangladesh and conference coordinator of the International Wader Study Group.

KEYNOTE | 21 Nov, 1400 UTC

Tammy Davies (she/her)

Birdlife International, UK

@TammyEDavies

Seabird flyways: a framework for international collaboration

Many seabird species are wide-ranging, travelling thousands of kilometres across national and international waters, only returning to land to breed. Such migratory species are increasingly exposed to the expanding cumulative human impacts in the oceans. Consequently, seabirds are one of the most threatened groups of vertebrates in the world, with half of the species with a known trend in decline. There is a remarkable diversity of migration patterns among seabird species, but also consistency across individuals and populations. Regular routes used by large numbers of birds travelling between breeding and non-breeding grounds are known as flyways. We used tracking data from long-distance migrant seabirds from six families (Diomedidae, Hydrobatidae, Laridae, Phaethontidae, Procellariidae, Stercorariidae) to identify these broad routes at an ocean-basin scale. The migration of thousands of individual seabirds that follow the same routes, irrespective of timings, were clustered together. The broad shape flyways were visualised for each cluster using a utilisation distribution approach, thereby weighting the importance of regions by the numbers of individuals. The flyway approach provides a framework to help foster international collaboration and focus attention on the strategic needs for the conservation of migratory birds. We show how seabird flyways can be an important advocacy tool to help coordinate conservation action to address key threats, foster political cooperation, and frame multilateral legal agreements.

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Tammy Davies is the Marine Science Coordinator at BirdLife International, overseeing the science work that underpins the BirdLife International Marine Programme. This includes using seabird tracking data to direct conservation action through identifying important areas for protection and areas where seabirds may be at the greatest risk from human activities. Tammy has research interests in evidence-based conservation and the challenge of managing the high seas.

OFFERED ORAL PRESENTATION | 22 Nov, 0030 UTC

Matt DeSaix (he/him)

Colorado State University, USA

@mgdesaix

Elucidating population-specific migratory connectivity through genomics: a case study with the American Redstart

Understanding the geographic linkages among populations across the annual cycle is an essential component for effective conservation of migratory species. While genetic markers have been widely applied to describe migratory connections, the rapid development of new sequencing methods provides new opportunities for improved estimates of migratory connectivity. Here, we use low-coverage whole genome sequencing to identify genetically distinct breeding populations in a widespread Nearctic-Neotropical migratory songbird, the American Redstart (*Setophaga ruticilla*). Assignment of individuals from the nonbreeding range reveals population-specific patterns of varying migratory connectivity. By combining migratory connectivity results with demographic analysis of population abundance and trends, we further consider full annual cycle conservation strategies for preserving numbers of individuals and genetic diversity. Our results have broad implications for improving our understanding of the ecology and evolution of migratory species through conservation genomics approaches.

Matt DeSaix is a PhD candidate in the Ruegg Lab and Bird Genoscape Project. His research focuses on using conservation genomics approaches to understand avian migratory connectivity and adaptation across the annual cycle.

OFFERED ORAL PRESENTATION | 22 Nov, 0030 UTC

Matt DeSaix (he/him)

Colorado State University, USA

@mgdesaix

Elucidating population-specific migratory connectivity through genomics: a case study with the American Redstart

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Understanding the geographic linkages among populations across the annual cycle is an essential component for effective conservation of migratory species. While genetic markers have been widely applied to describe migratory connections, the rapid development of new sequencing methods provides new opportunities for improved estimates of migratory connectivity. Here, we use low-coverage whole genome sequencing to identify genetically distinct breeding populations in a widespread Nearctic-Neotropical migratory songbird, the American Redstart (*Setophaga ruticilla*). Assignment of individuals from the nonbreeding range reveals population-specific patterns of varying migratory connectivity. By combining migratory connectivity results with demographic analysis of population abundance and trends, we further consider full annual cycle conservation strategies for preserving numbers of individuals and genetic diversity. Our results have broad implications for improving our understanding of the ecology and evolution of migratory species through conservation genomics approaches.

Matt DeSaix is a PhD candidate in the Ruegg Lab and Bird Genoscape Project. His research focuses on using conservation genomics approaches to understand avian migratory connectivity and adaptation across the annual cycle.

TWITTER-ONLY PRESENTATION | 21 Nov, 1310 UTC

Mark Eddowes (he/him)
Independent researcher, UK
@markeddowes

Weather-dependent plasticity contributions to climate change-related passerine migrant arrival advancement

The dependence of passerine migrant arrival at the breeding grounds in Britain upon interannual variation in the weather along the migration route, including temperature and wind speed, is well established, as is the general trend towards earlier arrival for these species. Climate change-related warming trends and also wind-stilling trends during the migration period are readily identified and may be a contributing factor driving arrival advancement trends with time. Such plasticity can be quantified in terms of reaction norms that relate mean arrival dates to these weather parameters, providing a basis for assessing the likely scale of its contribution to the observed advancement trend. These analyses indicate that plasticity to en-route weather conditions encountered along the migration route through the Iberian Peninsula and France which modulates onward migration is sufficient to explain perhaps the majority of the observed temporal trend whilst other studies indicate additional contributions from different factors.

Mark Eddowes is an independent ornithological researcher with a particular interest in climate change impacts on long distance passerine migrants, including arrival and breeding phenology.

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Simon Evans (he/him)

University of Exeter, UK

@EvansSre

Flocking advances migratory phenology

While the timing of avian migration is typically explained in terms of individual condition, the majestic spectacle of synchronous departures suggests an important role for social interactions. Inspired by the pre-migration calls of waders, we combine modelling approaches for foraging routines and combined decision-making to determine when socially dependent migration is expected to evolve and its impact on seasonal timing. Even when the benefit of group travel was mild, strong social dependence evolved and was associated with earlier migration, despite there being no direct selection for early phenology in our model. We show that this is not attributable merely to travel costs being reduced and thereby offsetting the opportunity cost of leaving foraging grounds early. Rather, favourable social conditions for migration are inherently time-limited: as individuals depart, it is increasingly unlikely that remainers can form a large flock, such that selection favours a readiness to depart in sub-optimal condition.

Simon Evans studies the ecological and evolutionary dynamics of wild animal populations, with a focus on long-term, individual-level studies of birds.

OFFERED ORAL PRESENTATION | 21 Nov, 1005 UTC

Niccolo Fattorini (he/him/his)

University of Siena, Italy

@NicFattorini

Niccolò Fattorini, Alessandra Costanzo, Andrea Romano, Diego Rubolini, Stephen Baillie, Franz Bairlein, Fernando Spina & Roberto Ambrosini

Department of Environmental Science and Policy, University of Milano, Milan, Italy

How do birds redistribute in seasonal ranges? The case of the European-African flyway

Migratory connectivity is the extent by which migrants tend to maintain their reciprocal positions in seasonal ranges. Despite recent technological advances for studying avian migration, our knowledge about how birds redistribute seasonally remains scant. Using data from the CMS/EURING-Eurasian African Bird Migration Atlas, we filtered over a century (>12 millions) of ringing encounters to investigate patterns and strength of migratory connectivity. We considered 137 species in the European-African flyway, from short-to-long-distance migratory species. Migratory connectivity (1) showed large interspecific variability, but was significant for most species, the majority of which segregated into distinct migratory populations; (2) strongly depended upon 'migratoriness' and geographical proxies of migration costs, especially migration distance; (3) was weakly influenced by biological traits and phylogeny. By unravelling patterns and drivers of migratory connectivity of Afro-Palearctic birds, our flyway-scale study represents a

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breakthrough to inform transboundary conservation/management strategies, improving knowledge about resilience of migrants to ecological perturbations.

Niccolo Fattorini is an Asst. Prof. at Siena University, where he has been involved in projects from Polar-to-Mediterranean ecosystems to research on the behavioural ecology of wild birds and mammals under environmental changes. As a post-doc fellow at Milan University, led by Prof. Ambrosini, he investigated migratory connectivity for building the CMS/EURING-Eurasian-African-Bird-Migration Atlas.

OFFERED ORAL PRESENTATION | 21 Nov, 1830 UTC

Shi Feng

Zhejiang University, China
@Ash619834989

Multi-trajectory reconstruction and analysis for American avian migration in population level

To reconstruct and visualize the long-distance avian migration routes with observations from the citizen-science dataset eBird, we developed an interpretive avian multi-trajectory reconstruction framework. This approach uses linear interpolation for missing records, spatial outlier detection for abnormal values, unsupervised clustering by density-based Mean-Shift algorithm for sub-group centroids, LoMcT algorithm based on the distances among centroids, and multi-trajectory reconstruction based on generalized additive models. Our analysis could help obtain the important gathering time points and sites in the moving process based on the multiple routes we reconstructed. These can be used in comparisons of multi-trajectory migration strategies between the transoceanic migratory birds and non-transoceanic ones, and provide the ability to understand how species are moving in the absence of individual tracking data to help target conservation better.

Shi Feng is a PhD candidate from Zhejinag University, majoring in data science.

POSTER | 21 Nov, 1300 UTC

Aldina Franco (she/her)

University of East Anglia, UK
@aldinafranco

New long-distance migratory routes of the recently reintroduced White Storks in the UK

When (re)introducing migratory species to new areas the migratory directions of the origin population(s) are likely to be adopted, but migratory decisions may also be affected by environmental factors and availability of foraging resources. We investigate the migratory routes of the White Storks (*Ciconia ciconia*) recently reintroduced in the UK. Juvenile birds were released when fully fledged at the Knepp rewilding

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area. This study includes 4 years of data and 8 tracked storks per released cohort. The reintroduced storks are offspring of French and Polish injured adults kept in captivity at the Cotswold Wildlife Park, in the UK. Most tracked storks migrated, first moving westerly in the UK towards Cornwall, then returning East to cross the English Channel in the Dover region or over the Isle of Wight. Once in France, the storks adopted the western migratory flyway and selected wintering areas in France, Spain and Morocco. We also mapped the most important stopover sites to protect this reintroduced population.

Aldina Franco is Associate Professor in Ecology and Global Environmental Change at the University of East Anglia. She is interested in understanding biodiversity responses to anthropogenic change including land use and climate change. She is also interested in understanding changes in species movement decisions. Her research can be used to identify measures to protect endangered species and make human development more compatible with the conservation of other species, for example by setting up priority areas for conservation and by minimizing the impacts of human activities on other species and natural ecosystems.

OFFERED ORAL PRESENTATION | 21 Nov, 1800 UTC

Barbara Frei (she/her/elle)
Environment and Climate Change Canada
@barbalink

Community-science data reveals climate-driven changes in fall migration of waterfowl

Climate change has well-documented influences on bird migration. However, due to variation among species and a shortage of analyses, changes in waterfowl migration, particularly in the fall, are not well understood. Using 43 years of abundance data along a major flyway of eastern Canada, we built spatially- and temporally-explicit models for 15 species, and demonstrated that climate significantly influences migration phenology for most species. Using 60 years of band recovery data for three species banded in the Canadian prairies, we provide clear evidence that the timing and routes of fall migration have shifted over the past six decades, but that these phenological and spatial shifts differ among species. Our findings highlight that, if not addressed, climate change could induce mismatches in management, regulations, and population surveys for waterfowl in North America. Using community-science data may help lead to further engagement and two-way dialogue to support effective waterfowl management.

Barbara Frei joined Environment and Climate Change Canada as a Research Scientist in 2021. Barbara's research has explored species-specific behaviour, habitat associations, population ecology, as well as broader themes including patterns of biodiversity, ecosystem services, landscape ecology, climate change and migration, and 'bright spots' in human-modified landscapes.

OFFERED ORAL PRESENTATION | 21 Nov, 1430 UTC

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Jethro George Gauld (he/him)

University of East Anglia / RSPB, UK

@Gauldblimeyjet

Improving the detection and estimation of birds' collision risk with energy infrastructure using new and emerging tracking technologies

Large, migratory birds are among the most susceptible to collision mortality associated with energy infrastructure. Conservation of these species in the context of the expansion of renewable energy requires assessment of collision risks at the flyway scale. Analysing tracking data from 1,454 individual birds, we identified collision risk hotspots within Europe and North Africa. Further analysis highlighted how environmental variables such as uplift were found to accurately predict how likely birds were to fly at heights where they risk collision with energy infrastructure. This showed how pairing tracking data with environmental information can allow estimation of sensitivity to collision risks for areas where data gaps exist. Testing a new low cost, light weight GPS-LoRa tracking technology demonstrated that the devices are able to collect and transmit accurate, high frequency GNSS/GPS data over long distances providing an alternative to GPS-GSM tags to help fill data gaps.

Jethro Gauld recently completed a PhD at the University of East Anglia on the topic of "Improving the detection and estimation of birds' collision risk with energy infrastructure using new and emerging tracking technologies". Prior to this he worked as an ecological consultant and now works at the RSPB as a GIS Technical Advisor within the Business Advice team. He is passionate about finding practical solutions to climate change and biodiversity loss and in his spare time is a trainee bird ringer and co-chair of East Cambridgeshire Climate Action Network.

OFFERED ORAL PRESENTATION | 22 Nov, 0045 UTC

Valentina Gómez (she/her)

Pennsylvania State University, USA

@selvaorgco

How switching migratory behavior can promote speciation in birds

Diverse behavioral strategies can evolve in response to ecological challenges and opportunities. If they persist in time, the correlated evolution of physiological, morphological, and life history traits associated with these strategies can accelerate reproductive isolation and result in rapid speciation. A mechanism by which animals cope with seasonal changes is by moving up to thousands of kilometers every year. In birds, migratory species are often closely related to year-round residents, implying migration is frequently gained and/or lost. Moreover, sister species often differ in migratory strategy by migrating in different directions. My work suggests that these behavioral differences can promote speciation, even when diverging populations coexist in space during part of the year. How this is brought about, given the regular presence of coexisting individuals, remains a major issue and one that applies much more generally to speciation with gene flow. It is unknown whether migrants continue to contribute to the gene

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pool of the newly established populations, or if the behavioral switches immediately promote instant reproductive isolation. To test these two alternatives, I study a population of birds that recently changed migratory strategy. The Barn Swallow (*Hirundo rustica erythrogaster*) breeds in North America and overwinters in South America, but around four decades ago a population began breeding in the wintering grounds in Argentina. The newly established population has evolved an inverse migratory pattern, a reduction in migratory distance, and a shift in breeding schedules to accommodate to the austral summer. I will show evidence of reproductive isolation in this newly established population and discuss the role of demographic process in the evolution of behavioral switches.

Valentina Gómez is an Eberly Postdoctoral Fellow at Pennsylvania State University.

OFFERED ORAL PRESENTATION | 21 Nov, 1945 UTC

Fengyi Guo (she/her/hers)
Princeton University, USA
@fyguo

Seasonal patterns and protection status of stopover hotspots for migratory landbirds in the eastern United States

Migratory landbirds in North America are experiencing dramatic population declines, but little is known about the critical habitats they use as stopover sites during migration. We used data from weather surveillance radar to map seasonal stopover densities of landbirds across the eastern U.S. during spring and autumn migration. We identified stopover hotspots covering 2.35 million hectares that consistently support high densities of migrants. However, only 20% of these sites are hotspots in both seasons. Deciduous forest is the most important habitat type, with high concentrations of birds in forest fragments embedded in broadly deforested regions, especially in spring. While protected areas support higher stopover densities of birds, only 33.7% of hotspots are covered, and many of these protected areas are still subject to extractive uses. A well-distributed network of well-protected stopover areas, complementing conservation efforts on the breeding and wintering grounds, is essential to sustaining healthy populations of migratory landbirds.

Fengyi Guo is a PhD student at Princeton University. She studies the stopover ecology and conservation of migratory landbirds in North America. Combining radar and field surveys, she aims to identify key stopover habitats for birds during en-route migration, the critical missing piece in the full-annual-cycle conservation of migratory landbirds.

KEYNOTE | 21 Nov, 1600 UTC

Mohamed Henriques
University of Groningen, the Netherlands

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@mohamed_henriq

Moving towards a more equitable flyway: how to tackle current barriers constraining a more regionally balanced research and conservation

No abstract available.

POSTER | 22 Nov, 0800 UTC

Chenjing Huang (she/her)

Beijing Normal University, China & University of Oxford, UK

@Chenjing_Huang

Variation in migration strategies of the Kentish Plover breeding in Bohai Bay, China

Understanding the variation in migratory behaviour within population can provide insights into migratory mechanisms. We investigated the migration strategy of the Kentish Plover (*Charadrius alexandrinus*) breeding in Bohai Bay, China, from 2020 to 2022, using light-level geolocator tags and GPS-VHF transmitters. We revealed that plovers from the same breeding population use diverse wintering areas, spanning from inland China to the southeast coast of China and the Philippines. Furthermore, the study identified the coexistence of multiple migration strategies within population, including a combination of several short flights or a few long flights. The data from birds tracked over a two-year period demonstrated consistent utilization of the same wintering areas across years. To gain a comprehensive understanding of the implications of the within-population migration variation, further studies exploring the fitness consequences are needed.

Chenjing Huang is a PhD student at Beijing Normal University, China and currently a visiting student at University of Oxford, UK. She has a broad interest in behavioural ecology and evolution. Her research mainly focuses on causes and consequences of individual behavioural variation, using the Kentish Plover as a target species.

TWITTER-ONLY PRESENTATION | 21 Nov, 1340 UTC

Lamin Jobaate

West African Bird Study Association, The Gambia

@LJobaate

Monitoring breeding behaviour of Hooded Vultures in The Gambia

Hooded Vultures are natives to sub-Saharan Africa, where they have a widespread distribution with populations in Southern Eastern and West Africa. There are many belief-based concepts about the

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breeding ecology of Hooded Vultures that contravene scientific findings. Hooded Vultures breed in tall trees in The Gambia, including Mahogany, Baobab, Mango, Casorina. The monitoring observations started from nest material collection, repairing the nest, to the fledgling of the young, which includes among other things mating exchange of duties by the male, the female and family members. At the end of a three-year monitoring period, Hooded Vultures were observed to fledge young in January and February, an extension of their breeding season was observed. Some locals believe that vultures never breed when they get old, they retire in their nest and become young again.

Lamin Jobaate is the Executive Director of WABSA which is the Bird life International Partner NGO in the Gambia. Lamin is a secondary School graduate with more than 30 years' experience in Bird life conservation projects in the Gambia. Lamin also conducts birding and dragon fly tours and photography.

OFFERED ORAL PRESENTATION | 21 Nov, 2315 UTC

Elly Knight (she/her)

University of Alberta, Canada

@ellycknight

Common Nighthawk roosting habitat selection across the annual cycle suggests scale-dependent behavioural trade-offs

Habitat availability and resource requirements are expected to change as migratory birds move between locations, and so habitat selection is therefore also expected to fluctuate with those varying conditions. Existing knowledge of full annual cycle habitat selection is primarily based on foraging birds; however, roosting is another behaviour that is important across all seasons of the annual cycle. Our goal was to explore variation in roosting habitat selection across the annual cycle at two spatial scales: the roost site scale and the home range scale. We found that selection strength at the roost site scale was low and similar across seasons. Concordant with previous studies and contrary to our predictions, we found selection at the home range scale was stronger during the stationary seasons than during migration; however, we saw differences in the direction of selection between seasons that suggested trade-offs between roosting and other behavioural priorities across seasons.

Elly Knight is an applied ecologist interested in how environmental variation across temporal and spatial scales affects the ecology and population trends of wide-ranging species. Her motivation in understanding that variation is to inform when and where wildlife conservation efforts will be most effective. She is a Statistical Ecologist with the Alberta Biodiversity Monitoring Institute and Boreal Avian Modelling Project.

OFFERED ORAL PRESENTATION | 22 Nov, 0215 UTC

Ramesh Kumar Selvaraj and Ashwin Viswanathan

Bombay Natural History Society, India & Nature Conservation Foundation, India

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@Rameshwild

Shorebirds of India: a summary of findings from State of India's Birds 2023

Most of India's wintering shorebirds follow migratory routes along the Central Asian Flyway and the East Asian Australasian Flyway. We analyzed citizen science data uploaded to eBird and obtained long-term abundance trends and estimates of current annual change. As a part of State of India's Birds 2023, we further analyzed published literature to synthesize the various threats. We found that shorebirds have declined as a group, but Arctic breeding birds like Pacific Golden-Plover and Terek Sandpiper have declined the most in the long-term. Some seemingly shorter distance migrants like Lesser Sand-Plover and Kentish Plover have rapidly declined. The major threats to shorebirds in India include habitat degradation, poaching, changes in land use, aquaculture, and non-conventional salt production. Coastal and intertidal habitat loss is a significant threat in key sites and this needs careful regulation and protection.

Ramesh Kumar Selvaraj's research interests are in bird migration studies and interactions with renewable energy infrastructures. Ramesh was part of the Central Asian Flyway Secretariat at the Ministry of Environment, Forest and Climate Change, providing scientific inputs to the secretariat regarding migratory bird conservation.

OFFERED ORAL PRESENTATION | 21 Nov, 1145 UTC

Thomas Lameris

Netherlands Institute for Sea Research (NIOZ)

@thomaslameris

Is spring migration departure in migratory shorebirds constrained by fuel deposition?

In a warming climate, migratory shorebirds are under pressure to adjust their annual cycles. To stay in synchrony with an earlier emergence of food in their breeding grounds, birds are driven to advance their timing of breeding as well as migratory arrival. As migrations take relatively little time, the most effective way to achieve this is via earlier departure from their wintering areas. However, earlier departures have rarely been shown in shorebirds, which poses the question what constrains an earlier departure. We studied whether migration departure of Red Knots (*Calidris canutus islandica*) from the Wadden Sea is constrained by the time which birds need to fuel body stores. By controlling access to food we manipulated the fuelling rate of captive Knots during spring, and subsequently released these birds in late April with radio-transmitters to measure timing of departure. Body mass increase was twice as fast for birds with unlimited access to food compared to birds with access to food 12 hours/day. Birds with access to food 6 hours/day increased in body mass slowly or not at all. After release in late April, the heaviest birds departed in the first half of May, often in the direction of Iceland. Lighter birds departed later and more often in the direction of the German Wadden Sea, or did not depart at all. These results suggest that successful fuel deposition is an important driver of migration strategies.

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Thomas Lameris is an ecologist with a passion for migratory birds and the Arctic. Thomas's main research focus is to study the ability of migrants to keep up with Arctic climate warming. Thomas studies animals and their food using a combination of long-term tracking and reproduction data and experiments.

OFFERED ORAL PRESENTATION | 21 Nov, 0935 UTC

Kieran Lawrence (he/him)

Durham University, UK

@k1awrence

Consistent drivers of population trends of migratory birds in the Americas and Afro-Palearctic flyways

Declines of migratory birds have typically been attributed to environmental change, to which they are particularly susceptible. However, to date, an assessment of the relative impacts of climate- and land-use change across multiple migration flyways has not occurred. Such information is vital to understand widespread drivers of migrant population changes and, consequently, to inform their conservation. We use population data from the North American Breeding Bird Survey and the Pan-European Common Bird Monitoring Scheme to calculate population trends for long- and short-distance migrants across North America and Europe. We assess the relative importance of climate and land cover suitability in explaining the population trends of migratory birds and find that the drivers of population trends of migratory birds are consistent across the two continents. Specifically, climate on the breeding grounds and land cover on the non-breeding grounds are the dominant drivers of population change.

Kieran Lawrence is a Teaching Fellow and PhD student at Durham University. His main interests lie around the various impacts of climate and land-use change on migratory birds, but particularly their phenology, population trends and migratory journeys.

KEYNOTE | 21 Nov, 1100 UTC

Miriam Liedvogel (she/her)

Institute of Avian Research, Germany

@GenMig

Blackcap migration: adaptation in time and space

Understanding the genetics of bird migration is a long-standing goal in evolutionary biology. Blackcaps *Sylvia atricapilla* are ideal for this work as different populations exhibit enormous difference in migratory behaviour and little else. We characterize (i) phenotype, population structure and demographic history of the blackcap, and (ii) identify sequence variants and signaling pathways that are associated with variation

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of the migratory phenotype. My talk covers insight from classical studies on selection and cross-breeding experiments, tracking approaches in the wild, to finally introducing novel insight from using a de novo assembled genome of the blackcap as reference for large scale demographic study with different phenotypes across their breeding range.

Miriam Liedvogel is an evolutionary biologist using behavioural genomics approaches to understand the genetic architecture of bird migration. How is this fascinating behaviour controlled, coordinated and regulated on the molecular level? Her work combines careful behavioural observation and state-of-the-art tracking migration in the wild to carefully characterise migratory behaviour under controlled conditions as well as free flying birds, with whole genome sequencing approaches to match genotype to phenotype.

POSTER | 22 Nov, 0510 UTC

Shuangqi Liu (he/him)

College of Urban and Environmental Sciences, Peking University, China

@ShuangqiLiu

Monitoring bird migration using nocturnal flight calls on the EAAF: a case from Beijing

Long-term monitoring of migratory birds, especially during migration, is crucial for their conservation yet remains technically challenging. Bioacoustics monitoring of nocturnal flight calls (NFCs) complements existing remote-sensing methods by allowing species identification. While it has been increasingly used in North America and Europe, its application on the East Asian-Australasian Flyway (EAAF) remains limited. Here, we present findings from a NFC monitoring project conducted at a recording station in central Beijing, China over three migration seasons. From almost 3,000 hours of recording effort, we obtained 73,643 calls involving over 103 species or species groups of a wide range of habitat associations. We also found that NFCs provided additional information on species' migration phenology in comparison with citizen science observation data. Our study is the first formal investigation of bird migration on the EAAF using NFC monitoring, serving as a proof-of-concept case for wider, long-term monitoring efforts in this traditionally understudied region.

Shuangqi Liu is a first-year PhD student majoring in applied ecology at Peking University, China, with a broad interest in biodiversity conservation in human-dominated ecosystems. His research focuses on the conservation of birds and their habitat, particularly how landbirds respond to land-use change.

OFFERED ORAL PRESENTATION | 22 Nov, 0400 UTC

Yu Liu (he/him)

Beijing Normal University, China

@LiuYu_BNU

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The diversified migration patterns of Chinese Barn Swallows (*Hirundo rustica*)

Migratory birds travel between breeding and wintering sites through migration behaviour, and the formation of different migratory patterns among populations is influenced by various factors such as topography, climate conditions, genetic divergence, etc. In this study, we used a small tracking device, light-level geolocators to investigate the migration patterns of Chinese Barn Swallow populations. Previous research found that Barn Swallows in Northwest China make use of the West Asian-East African Flyway and Central Asian Flyway. Our study shows that Barn Swallow populations in eastern China migrate using the East Asian-Australasian Flyway with their wintering sites concentrated in Southeast Asia: swallows breeding in Northeast China migrate inland to Thailand for wintering; while those from South China use islands as stepping stones to migrate to areas like Kalimantan Island. The differences in migratory patterns among different swallow populations are significant, and further exploration is needed to understand their formation.

Yu Liu is a postdoctoral researcher at Beijing Normal University with an interest in behavioural ecology, evolution, and ornithology. His research focuses specifically on the Barn Swallow as a target species, with the aim of identifying how various ecological factors impact different life stages of the bird, including breeding and migration.

KEYNOTE | 21 Nov, 0905 UTC

Brady Mattsson

University of Natural Resources and Life Sciences, Austria

Tale of two continents: integrated approaches to inform collaborative conservation of migratory birds in North America and Europe

Drivers of population dynamics in migratory birds are uncertain but likely linked to global change including shifts in climate and land cover being induced by humans. Changes in abundance of these species may, in turn, generate conflicts between conservation organizations and other interests including fisheries, hunting, and agriculture. These coupled human and natural systems span continents and pose enormous challenges for environmental policy and management.

Scientific and technological advances have led to modelling tools for predicting impacts from shifts in climate, land use, or both on migratory populations. Predicting such impacts alone, however, is often insufficient to inform conservation decisions. These choices must often take into account concerns of diverse stakeholders.

The field of collaborative decision analysis offers diverse tools that have been useful at the science-policy interface of wildlife management. These tools integrate predictions and value judgements for quantitative comparisons among decision options while accounting for tradeoffs among competing objectives. In the past three decades, investigators have applied decision analysis to inform decisions to conserve migratory

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birds in North America. Despite its demonstrated potential for informing real-world decisions, this approach has yet to become common practice in conserving migratory species on other continents.

I will highlight my research to address these scientific challenges related to conservation of migratory species in North America (waterfowl including Northern Pintail, *Anas acuta*) and Europe (raptors including Red Kite, *Milvus milvus*). I then present a synthesis and outlook on establishing integrated research approaches at the science-policy interface to inform collaborative conservation of migratory species.

Brady Mattsson is working as an Assistant Professor at the University of Natural Resources and Life Sciences in Vienna, Austria. A main focus of his research is the conservation and sustainable management of migratory species, especially birds. His research includes population dynamics and flows of associated ecosystem services within and between flyways. He also develops and tests tools using collaborative decision analysis to inform conservation and natural resource management.

TWITTER-ONLY PRESENTATION | 21 Nov, 1540 UTC

Ugo Mellone

Mediterranean Raptor Migration Network & University of Alicante, Spain
@MelloneUgo

Migrating eagles stopping in the Sahara desert: aberrant behaviour or foraging strategy?

We analyzed the behaviour of GPS-tagged Booted Eagles (*Aquila pennata*) during the Sahara crossing, finding that non-directional and/or slow movements occur in the 35% of the migratory journeys and last up to 31 days (average: 5.9). The analyses show that these stop-overs are not triggered by adverse weather conditions, and are shown especially by females during spring, suggesting that this behaviour is followed deliberately. These wandering movements occur in hyper-arid areas without vegetation cover. A similar behaviour has not been previously recorded in any other trans-Saharan raptor, and is probably related to the ability of booted eagles to take advantage of food resources unexploited by other predators, such as migratory songbirds and migratory locusts. Our findings may show a new way of combining foraging and migration, without a well-defined directed trajectory, nor stopping in a restricted spot, but instead wandering over wide areas.

Ugo Mellone, born in Italy, is based in Spain, and obtained a PhD in zoology studying the movement ecology of Eleonora's Falcons. He co-founded MEDRAPTORS in 2004. He currently works as a freelance conservation photographer, combining this activity with research on migratory raptors such as booted and short-toed snake eagle.

POSTER | 21 Nov, 1320 UTC

Lucy Mitchell (she/her)

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University of the Highlands and Islands, UK
@lucyjayneryan

Diversity of migration in the European Blackcap *Sylvia atricapilla*

Understanding changes in migration is challenging, because of a lack of appropriate technology. The European Blackcap *Sylvia atricapilla*, which typically overwinters in the southern Mediterranean or north Africa, has started to regularly overwinter in the UK. Small sample sizes mean we lack information on the different migratory phenotypes and their relative abundance. We carried out a pilot project in Autumn 2021, using miniature VHF tags, deployed onto migrating Blackcaps at bird observatories on the east coast of the UK. Tags detect migration departure directions, which can infer the bird's phenotype. Feather samples (for stable isotope and DNA signatures) along with morphological measurements will relate departure behaviour to physical and genetic differences between phenotypes. Identifying the variety of Blackcap migratory routes converging in the UK will increase our understanding of evolution of new routes within a species, important for understanding how species generally can produce short term responses to environmental change.

Lucy Mitchell is a postdoctoral ornithologist and ecologist, with expertise in avian tracking methods and ecological analyses. She has a strong interest in movement and habitat selection to understand species' relationships with their environment. Lucy chairs the UK Motus interest group, and wants to develop Motus to look at changing departure directions and migration routes of a number of species.

OFFERED ORAL PRESENTATION | 21 Nov, 0950 UTC

Catriona Morrison (she/her)
University of East Anglia, UK
@CatMorrison18

Identifying demographic routes for population recovery in migratory populations

Across Europe, declines in the abundance of migratory landbirds have driven international calls for action, but actions that could feasibly contribute to population recovery have yet to be identified. Conservation actions ultimately aim to maintain and improve demographic rates. Understanding how rates vary in space and time can therefore greatly help identify suitable targets for intervention. Using long-term citizen science data, collected at constant effort bird ringing sites across Europe, we aim to identify a) demographic targets; weather to target productivity and/or survival rates, b) spatial-temporal targets; where and when targeting should take place, and c) the scale of targeting; whether targeting should take place locally or regionally. Using these findings, we present a framework for better targeting of conservation actions to help halt and reverse population declines in migratory species.

Catriona Morrison is a postdoctoral researcher at the University of East Anglia. Her primary research interests lie in understanding the demographic and environmental processes influencing the population dynamics of birds.

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OFFERED ORAL PRESENTATION | 22 Nov, 0345 UTC

Tong Mu (he/him)

Princeton University, USA

@TongMu_17

The importance of quantitative evaluation of stopover habitat quality to conserving migratory birds

Migratory species are declining worldwide. Many migratory species travel across vast areas and may face multiple threats at different sites or life history stages. As a result, identifying those sites, stages, and threats that have the most significant impact on the population of migratory species is more challenging yet critical for effectively conservation planning. The loss and degradation of stopover sites have been repeatedly identified as a major cause of the declines of many migratory species. However, quantifying the effect of habitat changes on migrant populations can be particularly challenging. Here, I will present a theoretical framework that may greatly facilitate research and on-ground conservation focusing on migratory birds at stopover sites, through (a) quantifying the relative importance of each stopover site in supporting migrant populations and (b) evaluating the absolute and relative contributions of habitat changes to the documented population declines.

Tong Mu is a postdoctoral researcher at Princeton University, US. His research focuses on the ecology and conservation of migratory shorebirds along East Asian-Australasian Flyway, especially how interspecific differences in habitat use, habitat heterogeneity, and migration strategies jointly affect the vulnerability of migratory shorebirds facing habitat loss and other threats.

OFFERED ORAL PRESENTATION | 22 Nov, 0245 UTC

Taej Mundkur (he/him)

Good Earth Environmental

@taejmundkur

New opportunities to promote research and conservation in the Central Asian Flyway

A new initiative under the UN Convention on Migratory Species is set to offer a new opportunity to promote research and conservation of migratory birds in the Central Asian Flyway benefiting over 600 waterbird, raptor, other landbird and seabirds including at least 48 globally threatened species. Their conservation is linked to responding to threats like legal/illegal take and habitat loss due to major development in most countries, and challenges posed by climate change that increase pressure on all habitats with impacts for birds. The initiative aims to include governments, conventions, international organisations, international NGOs and other local stakeholders who will work to synergise actions and

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implement existing agreements, MOUs and other flyway instruments. The initiative will need to enable research to understand migration patterns and connectivity, monitoring of trends, threats and causes of population changes, habitat use and management, build capacity and improve information exchange between researchers studying migratory species.

Taej Mundkur has worked on the conservation of birds and their habitats in the worlds' flyways for over three decades, working with governments, NGOs, conventions, experts and local networks. He has worked on the coordination of the IWC to monitor waterbirds and wetlands through a global citizen-science network and Waterbird Populations Portal to deliver population sizes and trends to support conservation.

OFFERED ORAL PRESENTATION | 21 Nov, 2000 UTC

Claire Nemes (she/her)

University of Maryland, Center for Environmental Science, USA

@cenemes

Thinking beyond death: the importance of nonlethal effects of human activity on migrating birds

Global flyways are increasingly strewn with anthropogenic hazards to migrating birds. Threats such as building windows, chemical and sensory pollutants, and free-roaming cats can prove immediately fatal, but can also harm migrating birds nonlethally by impairing their ability to fly, refuel, or successfully navigate to the destination on time. Furthermore, migrating birds often encounter multiple anthropogenic threats en route, which can interact to exert cumulative or synergistic effects that increase an individual's susceptibility to other hazards. While such nonlethal effects are less well understood than direct mortality, they can ultimately reduce migratory bird fitness. We reviewed evidence for eight types of anthropogenic threats during migration and found support for nonlethal and interacting effects, but also identified many unknowns. To fully understand and alleviate the effects of human activity on bird fitness, we must look beyond direct mortality and consider the full range of lethal, nonlethal, and interacting effects on migrating birds.

Claire Nemes completed her PhD at the University of Maryland Center for Environmental Science Appalachian Lab. Her research focuses on the ecology of bird migration and anthropogenic threats to birds, including free-roaming cats. She is currently a postdoctoral researcher at the Appalachian Lab working to map stopover habitat for birds in Maryland.

OFFERED ORAL PRESENTATION | 21 Nov, 1815 UTC

Josh Nightingale (he/him)

University of Iceland

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@Luscinia_joshua

Conserving data for global flyways: a wader tracking perspective

Electronic tracking of animal movements produces valuable data for science and conservation. However, while these data could be stored and re-utilised indefinitely, several barriers to their long-term usefulness exist. Data often originate from independent local efforts, with a shortage of centralised coordination to safeguard them. Consequently, much data are not stored in future-proof repositories; metadata is often incomplete; and for most taxa no widely used register of tracking studies exists. Considering waders as a case study, we overview the diversity and abundance of published tracking projects, their global distribution, and the proportion of data currently preserved effectively. From this baseline assessment, we identify key areas for improvement that would enable the global conservation community to better leverage movement data, in particular suggesting approaches to make data easier to find and re-use. Finally, we highlight some new initiatives intended to promote a cultural shift in management of shorebird tracking data.

Josh Nightingale is a researcher and ringer of waders, with a widespread geographical distribution. After studying the interplay between movements and demography of Black-tailed Godwits for his PhD, in Portugal, he is now working for the University of Iceland where he coordinates the Global Wader Tracking Data Project.

POSTER | 21 Nov, 1250 UTC

Alejandro Onrubia

Migres Foundation, Spain

Magnitude and timing of soaring bird migration over the Strait of Gibraltar in spring and autumn: a recent update

The Strait of Gibraltar is one of the most important bottlenecks in the entire Eurasia–African flyway system. The visible migration of soaring birds in southern Spain was analyzed from records collected in 2009–2012. Estimates of the total number of migrating birds were based on daily counts recorded at the two main observatories per season and after applying a spatial and temporal correction for missing birds. Overall, about 135.000–150.000 storks (two different species with regular presence during migration) and 290.000–350.000 raptors (28 species regularly crossing during migration) can be observed migrating over the Strait of Gibraltar. Both the species and their abundance are similar in spring and autumn, but within a much narrower temporal frame and on a narrower front on autumn. Estimates of the number of birds migrating over the Strait for many of the studied soaring species greatly exceed the available estimates of their breeding populations in Europe.

Alejandro Onrubia has a PhD in Biological Sciences from the University of León (Spain) on “Spatio-temporal patterns of soaring-bird migration through the Strait of Gibraltar”. For 35 years Alejandro has been professionally involved in various projects related to nature conservation and wildlife management.

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Since 2006 Alejandro has been working for the Migres Foundation, and is currently coordinator of the Migres program for monitoring bird migration through the Strait of Gibraltar.

POSTER | 22 Nov, 0520 UTC

Gayomini Panagoda (she/her)

University of Colombo, Sri Lanka

@gayomini

Why take a detour when there is a shorter route? Heuglin's Gulls' migration between Indian subcontinent and Russian Arctic

The study used GPS telemetry to examine the migration behavior of Heuglin's Gulls from Mannar, Sri Lanka, to their breeding grounds in the Russian Arctic during 2021-2022. The gulls opted for longer migration routes, averaging 8,171 km compared to the shortest available routes of 6,346 km. These detours enabled the gulls to avoid challenging Central Asian mountain ranges, resulting in reduced maximum and average elevations they had to cross (2,960 m compared to 6,109 m and 278 m compared to 849 m, respectively). Their chosen path took them along the west coast of India, passing through Pakistan, Afghanistan, and Central Asia before flying over the west Siberian plain, tracing numerous lakes, marshes, and the river Ob, thereby allowing them daily access to potentially suitable habitats. In conclusion, Heuglin's Gulls preferred migrating through lowlands, even though it required them to travel longer distances. Further analysis will be conducted to assess how varying geographical features influence their migration directionality and specific routes.

Gayomini Panagoda is a PhD candidate on Migration Ecology of Waterbirds across mainland Asia and Sri Lanka, attached to the Department of Zoology & Environment Sciences, University of Colombo. Gayomini's PhD supervisors are Prof. Sampath Seneviratne, Prof. Sarath Kotagama, Dr. S. Balachandran (BNHS) & Dr. Taej Mundkur (Wetlands International) and she has a Bachelor's Degree in Environmental Conservation & Management.

POSTER | 21 Nov, 1050 UTC

Sergi Pujol Rigol (he/him)

University of Barcelona, Spain

@SPR_bio

An automated procedure to extract migration phenology from geolocation data

Advancements in animal tracking methods have revolutionized our understanding of the distribution, movement and activity patterns of migratory birds. The most commonly used devices for large-scale trips are light-level geolocators (GLS), whose recorded data require complex processing. We have developed a

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multi-step algorithm to automatically extract individuals' migration phenology from raw light data, using shearwaters as model species. First, all trip twilight events are calculated while applying the zenith angle detected by each device. Then, positions coordinates are estimated from these twilight events with the R package SGAT (Solar Geolocation for Animal Tracking), using the zenith angle, the twilight error of the device and wet-dry information. Finally, wintering and breeding areas are determined by combining the trip speed changepoints and drawing the 90% density polygon. Afterwards, migration strategies and timings are extracted. This automated procedure significantly reduces data processing time to reliably determine the phenology of migratory seabirds.

Sergi Pujol Rigol graduated in Biology from the University of Barcelona in 2022, studying carry-over effects of migration phenology in Cory's Shearwater in my end-of-degree project. He is currently working in the Seabird Ecology Lab group as part of a research scholarship by the Spanish government and pursuing an MSc in Bioinformatics and Biostatistics at UOC.

OFFERED ORAL PRESENTATION | 22 Nov, 0415 UTC

Xiaotong Ren (she/her)

Peking University, China

@mintren

Migration ecology and non-breeding habitat selection of a threatened alpine-breeding shorebird (Charadriiformes)

The Wood Snipe (*Gallinago nemoricola*) is a threatened migratory shorebird with little information across EAAF and CAF, thus understanding its migration ecology is vital to the conservation. We tracked 18 individuals breeding in Sichuan, China with GPS satellite-tags during 2021-2023 to describe the spatial-temporal dynamics of the species' annual migration. The Wood Snipes is essentially a nocturnal migrant, making frequent stopovers during migrations to and from its non-breeding ground in Southeast Asia. We further investigated the habitat selection of the species at both stopover and non-breeding grounds. The species exhibited a clear preference for grassland – but not cropland – on the edge of forest on non-breeding grounds indicating the importance of this natural habitat. Our study suggests that the Wood Snipe migrates along a unique route based on the topography of the Qinghai-Tibet Plateau which is distinct from the traditional-defined EAAF and CAF. This route warrants more research and conservation efforts.

Xiaotong Ren is currently working as a research assistant in Peking University and is interested in migratory shorebird and landbird conservation in EAAF. She used to study shorebird ecology and conservation in Fudan University and The University of Queensland for her bachelor's and master's degrees.

OFFERED ORAL PRESENTATION | 21 Nov, 2300 UTC

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Tara Rodkey (she/her)

Texas A&M University - Kingsville, USA

@taralrodkey

Assessing habitat distribution and threats for a long-distance migratory grassland shorebird across four stopover regions

An obligate grassland shorebird and long-distance, Arctic-breeding migrant, the Buff-breasted Sandpiper (*Calidris subruficollis*) has been identified as a flagship species for other grassland shorebirds by the Arctic Migratory Bird Initiative and the Midcontinent Shorebird Conservation Initiative. A recent range-wide tracking study identified four key stopover sites: the Llanos del Orinoco of Colombia and Venezuela; the Llanos de Moxos of Bolivia; the Western Gulf Coastal Plain of the U.S and Mexico; and the arctic coastal plains of north-central Canada. Using tracking data from 93 Buff-breasted Sandpipers, we modelled the species' distribution in each stopover region using random forest classifiers. All models achieved relatively high accuracy (AUC-ROC > 0.80). We then quantified how much habitat fell within protected areas, and qualitatively assessed threats by region. We hope this assessment serves as a first step to more directed monitoring and conservation action for this species.

Tara Rodkey is a Master's student studying movement and stopover ecology of the Buff-breasted Sandpiper.

POSTER | 21 Nov, 1240 UTC

Manuela Rodrigues (she/her)

CESAM, University of Aveiro, Portugal

@Manuela_SRodri

Remain or abandon the natal wetland? Movements, behaviour, and habitat use of juvenile Spoonbills

Juvenile Eurasian Spoonbills are migratory waterbirds that may undertake dispersive movements during the first months of life. Leaving the natal wetland can confer benefits but also entails energetic costs and challenges associated with unknown areas. In Portugal, however, some juveniles remain in the natal wetland during their first year. Here we explored the variation in behavioural and spatial ecology of juveniles tagged with GPS and tri-axial accelerometers between individuals that leave the natal wetland and those that do not. Although no differences were apparent between groups before dispersal, which could reveal a pre-disposition for such behaviour, juveniles that moved into new areas had different time budgets and more localised movements than those remaining in their familiar wetland. Longer dispersal did not always translate into behavioural changes, with differences being likely driven by the habitat characteristics of the new area.

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Manuela Rodrigues is a PhD student studying the ecology of Eurasian Spoonbills. My focus is on breeding ecology, ontogeny of habitat use and movement ecology of juveniles. I am particularly interested in combining movement and behavioural data with habitat layers to address applied ecological questions for the conservation of waterbirds.

OFFERED ORAL PRESENTATION | 22 Nov, 0230 UTC

Toby Ross (he/him)

Deakin University, Australia

@tobyaross

Are wastewater treatment plants a viable alternative habitat for migratory shorebirds?

The prime threats perceived to contribute to the global decline of shorebirds include climate change and habitat loss. Whereas the rate of destruction of natural wetland habitats has been particularly rapid over the past decades, artificial wetlands, including wastewater treatment plants, have seen an increase over this time. These new habitats, in turn, pose a pollution risk to wildlife. Here we compare exposure to metals, other elements and per/polyfluoroalkyl substances (PFAS) pollution, with avian influenza prevalence, oxidative stress and local survival in two long-distance migratory shorebird species, Curlew Sandpipers (*Calidris ferruginea*) and Red-necked Stints (*Calidris ruficollis*). We studied birds when using a natural wetland and a wastewater pond habitat on their Australian non-breeding grounds. We show only minimal difference in pollution between each habitat, and negligible site effects on local survival. Our findings suggest that wastewater treatment wetlands, if managed properly, may provide an alternative habitat to these migratory species.

Toby Ross is a shorebird researcher based in Australia. He has spent the last three and a half years working on a PhD investigating the dynamics of environmental pollutants in migratory shorebirds. Prior to this, he completed his MSc thesis on foraging ecology of Bar-tailed Godwits arriving from migration.

KEYNOTE | 22 Nov, 0000 UTC

Kristen Ruegg

Colorado State University, USA

@KristenRuegg

The Bird Genoscape Project: applying genomics to full annual cycle bird conservation

Research suggests that nearly half of all songbird populations in the Western Hemisphere are in decline, and these declines are expected to be exacerbated by the impacts of climate change. However, understanding the precise locations of the most significant population declines has proven challenging due to the long-distance movements of migratory birds across their breeding, migratory, and wintering

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territories. In the upcoming presentation, I will delve into our efforts to tackle this pressing issue through the development of the The Bird Genoscape Project. This collaborative endeavor aims to unite scientists from across the Western Hemisphere to map the migratory routes of songbirds using genetic tools. Specifically, the main objectives of the Bird Genoscape Project are to: 1) create comprehensive, visually impactful, migratory flyway maps for birds that can be used to motivate conservation efforts across geographic and political boundaries, and 2) map the potential for bird populations to adapt to climate change. Throughout this presentation, my focus will particularly center on how data derived from the Bird Genoscape Project are being leveraged to pinpoint threats faced by migratory birds across their annual cycles.

Kristen Ruegg's work focuses on understanding the mechanisms that generate and maintain species diversity in a changing world. Kristen specializes in the application of genomic tools to address basic and applied evolutionary and ecological questions, specifically related to migratory animals such as: 1) How are genetically distinct populations connected across the annual cycle? 2) What is the role of migration in generating species diversity? And 3) Which populations will have to adapt most to keep pace with climate change? The methods she uses are integrative, combining field-based behavioral studies, population genetics/genomics, and GIS-based ecological modeling. Her main focus is co-directing the Bird Genoscape Project, a large multi-institutional effort to harness genomic methods for migratory bird conservation.

POSTER | 21 Nov, 1040 UTC

Charlie Russell

University of East Anglia & BTO, UK

@CJG_Russell

Migratory behaviour of Greater Spotted Eagles (*Clanga clanga*) from Polesia with implications for conservation

Greater Spotted Eagles migrate across a broad front with both long and short distance migration patterns. We used tracking data from twenty-two adult Greater Spotted Eagles from Polesia to compare route selection, stopover sites and migratory behaviour across individuals, analysing differences based on sex, wintering grounds and environmental conditions. Females typically made shorter migrations to Greece and males migrated to east Africa. Eight key stopover sites were identified, with important sites in Ukraine, Israel and Turkey. Behaviour and resource use at stopover sites was analysed to assess whether stopovers were for sheltering or refuelling. This study shows that within a breeding population of a single species, there can be large differences in exposure to anthropogenic threats and individual resource requirements on migration. This highlights the need for international collaboration to effectively protect migratory birds across a broad front.

Charlie Russell is a PhD student at the University of East Anglia working on understanding how migratory behaviour in the afrotropic-palearctic system exposes birds to anthropogenic threats, particularly translating this individual exposure to inter- and intra-species population level impacts using Greater Spotted Eagles as a focal species.

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OFFERED ORAL PRESENTATION | 21 Nov, 1515 UTC

Diego Vicente Sastre (he/him)

University of Barcelona, Spain

@ChessBio

Ocean warming effect on the migration and wintering period of two long-lived seabird species

Ocean warming is an increasing threat for many migratory species, among them, seabirds. We evaluated the relationship between the migratory phenology and wintering distribution of two Atlantic Shearwaters (*Calonectris borealis* and *C. edwardsii*) and the ocean warming of their main wintering areas. We combined long-term repeated migratory trips of 313 individual shearwaters tracked with geolocators, the Sea Surface Temperature (SST) registered by them and the SST satellite remote-sensing registered. SST increased within their wintering habitat during the study period. We detected a significant reduction of their wintering area and south latitudinal displacement those years the ocean presented higher SST. Despite this, not significant changes were detected in arrival and departure dates indicating the adaptation shearwaters' migratory phenology to changing environmental conditions. Our findings suggest that shearwaters show resilience in their phenology, while also requiring a certain level of adaptation in response to the increasing ocean temperatures

Since 2020, **Diego Vicente Sastre** has been a PhD student of the Seabird Ecology Lab at the University of Barcelona. Previously, he was working with them as a research assistant. He is in love with seabirds and is very interested in their movement ecology, migration particularly; carry-over effects and climate change.

OFFERED ORAL PRESENTATION | 22 Nov, 0645 UTC

Yusuke Sawa (he/him)

Yamashina Institute for Ornithology, Japan

@larus_syawa

Tracking study of six geese species wintering in Japan

In Japan, 6 geese species including Greater White-fronted Goose, Bean Goose, Lesser White-fronted Goose, Snow Goose, Aleutian Cackling Goose, and Brent Goose, regularly winter. The tracking project was started the first for Brent Goose in 2017 and a total of 67 geese were tracked as of April 2023. We obtained movement data from 26 geese during autumn and spring migration and revealed whole migration route between Arctic ground in Russia and East Asia. We also tracked 20 of GWfG, 11 of LWfG, 3 Snow Goose, 9 Aleutian Cackling Goose and 1 Bean Goose from 2020 to 2022. From the tracking results, we obtained new information on their flyway and staging/breeding site. These results are compared with population of continental area of East Asia.

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Yusuke Sawa is a researcher from Yamashina Institute for Ornithology. He leads the tracking study of Geese species wintering in Japan including Greater White-fronted Goose, Bean Goose, Lesser White-fronted Goose, Snow Goose, Aleutian Cackling Goose, and Brent Goose. He focuses on the conservation of geese based on habitat selection study.

OFFERED ORAL PRESENTATION | 22 Nov, 0845 UTC

Xu Shi

University of Queensland, Australia
@sxluscinia

Unveiling continental migration patterns with weather radar: case studies from China and Australia

Interpretation of weather radar signals is increasingly used to document the spatial and temporal migration patterns in Europe and America. Such approaches are yet to be applied in the East Asian-Australasian Flyway (EAAF), one of the most species-rich and threatened flyways in the world. We found an extensive radar network exists along this flyway, which could be a powerful resource for monitoring bird movements over the full annual cycle throughout much of the flyway. Experimental analysis revealed that autumn migration in China is aligned towards southwest with considerable spatial variation in movement intensity, while in Eastern Australia bird migration system are much shorter in distance but highly dynamic, with flight directions and seasonal patterns reflecting the unique ecology of the Australia continent. Our findings highlight the gaps and opportunities for quantifying migration in the Asia-Pacific and Oceania regions, as well as a path forward to create a complete profile of global bird migration.

Xu Shi is a PhD student from the University of Queensland. His main research focus is characterizing the spatial-temporal pattern of migration, complementing manual surveys with radar product and eventually laying the foundation for a standardized radar-based monitoring scheme.

TWITTER-ONLY PRESENTATION | 21 Nov, 1330 UTC

Hugo Rafael Soares Ferreira

University of Aveiro, Portugal & Tour du Valat, France
@_HugoSFerreira_

Impact of winter site on the survival of a migratory waterbird using different migration strategies

When wintering in different locations, migratory individuals from the same breeding population can experience different conditions, with costs and benefits that may have implications throughout their

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lifetime. Using a dataset from a longitudinal study on Eurasian Spoonbills, we explored whether apparent survival rates varied among individuals using different wintering sites and traveling along different flyways. We found no evidence of an association between flyway and survival, but detected a relationship between distance and survival. From the first winter sighting to the subsequent breeding season, birds travelling the longest distances had the lowest survival, independently of the flyway taken. Assuming that this lower apparent survival is partly driven by lower true survival, our results reveal a cost of long-distance migration that is paid early in life, which is likely related to the crossing of natural barriers.

Hugo Rafael Soares Ferreira has an ecology Master's focusing on Marine/River ecology. After a European volunteer experience in Camargue, Hugo changed to ornithology studies and is now a PhD student at the University of Aveiro/Tour du Valat assessing the processes influencing population dynamics of a migratory bird species throughout the annual cycle. Hugo is a member of Youth Engaged in Wetlands.

OFFERED ORAL PRESENTATION | 21 Nov, 2245 UTC

Alisa Solecki (she/her)

Queen's University, Canada

@Wishful_Birding

Monitoring the timing and intensity of migratory urge in Loggerhead Shrike breeding colonies

The endangered Eastern Loggerhead Shrike, *Lanius ludovicianus migrans*, depends upon supplementation from a captive breeding colony to prevent extirpation from Ontario, Canada. The captive breeding colony has provided a unique opportunity for researching migratory urge in this imperiled songbird. Radio transmitters are being used to monitor movements of captive *L. l. migrans* from the fall through spring migratory periods over consecutive years. These shrikes are located in multiple breeding facilities in the northern, breeding, and more southern, wintering, grounds of the corresponding wild population. Individuals of both sexes, from hatch-year to five years of age are being monitored. The same individuals have been assessed across multiple years to determine whether migratory behaviour varies over time in captivity or due to the latitude of their breeding facilities. Preliminary results have illustrated that this technique is effective at quantifying the timing and intensity of migratory activity, or Zúgunruhe, in captive Loggerhead Shrikes.

Alisa Solecki is a Canadian third year PhD student with an extensive background in avian conservation field work, focused predominantly on Loggerhead Shrikes.

KEYNOTE | 21 Nov, 1700 UTC

Marius Somveille

University College London, UK

@MariusSomveille

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Energy efficiency shapes global bird migration flyways

Billions of birds migrate every year between breeding and wintering grounds, exhibiting a remarkable diversity of routes and seasonal destinations both between and within species. These seasonal movements of migratory birds cause a redistribution of bird diversity that radically changes avian community composition worldwide. Despite much research describing migratory behaviour, the underlying forces driving avian migration patterns remain largely unknown. In this talk, I will present my work exploring the hypothesis that energy efficiency drives bird migration across scales. This hypothesis states that birds migrate in a way that minimizes energy expenditure while targeting areas for maximum energy assimilation, considering intra- and inter-specific competition for access to resources. I will show that mechanistic models based on energy efficiency can explain much of the patterns of global bird migration, indicating that migration is an adaptation allowing birds to optimize their energy budget in the face of seasonality and competition. This work reveals fundamental similarities and differences between the Africa-Eurasia and Americas flyways, and it provides a strong basis for exploring additional processes underlying the ecology and evolution of migration, particularly when investigating species and populations that do not seem to migrate optimally. Finally, this research also provides a framework for predicting how environmental change may affect migratory species.

Marius Somveille's research aims to use a macroecological approach to study the causes and consequences of animal movements, particularly under climate change. The main phenomenon that he studies is the seasonal migration of birds across the world. Marius is also interested in studying how propagules and information spread in populations of moving animals.

POSTER | 21 Nov, 2030 UTC

Alva Strand (she/her)

University of Oklahoma, USA

@aistrand

Influence of functional traits on the sensitivity of aerial insectivores' migration timing to climate change

Many avian species have shifted their migration timing in response to climate change. These shifts vary in both magnitude and direction, but the mechanisms driving this variation are poorly understood. We used eBird data to investigate the influence of species-level functional traits such as mean body mass, migration distance, migration speed, and arrival day on the sensitivity of North American aerial insectivorous species' spring migration timing to air temperature change between 2002 and 2019. We found that mean body mass, migration distance, and migration speed did not significantly predict sensitivity to air temperature change; however, mean arrival day did ($p = 0.0177$). We also found that seven of the ten species were significantly more sensitive in places that had experienced greater warming between 2002 and 2019 ($p < 0.001$). This study sheds light on the factors that shape aerial insectivores' ability to persist in the face of a changing climate.

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Alva Strand, a Norwegian American, is a PhD candidate in the Department of Biology at the University of Oklahoma.

OFFERED ORAL PRESENTATION | 22 Nov, 0715 UTC

Li Tian

Beijing Normal University, China

@Tianli88075

Migration patterns and sex differences of Barn Swallows (*Hirundo rustica*) breeding in tropical Asia

Most studies on bird migration behaviour have been conducted in temperate and Arctic regions, while little is known in tropical regions. We tracked the migration route of a Barn Swallow population in the northern Asian tropics (Zhanjiang City, Guangdong Province, China) using light-level geolocators during 2021-2022. We found that the overwintering sites differed between males and females: males were concentrated on Kalimantan Island, while females were on Kalimantan Island, Philippines and Vietnam. The distance and duration of autumn migration was significantly longer than that of spring migration (both $p < 0.05$). Furthermore, the autumn migration duration of females was significantly longer than that of males ($p = 0.02$), but not during spring migration ($p = 0.90$). This study is the first to reveal the migration patterns of Barn Swallows in tropical Asia, which could help to understand how birds adapt to different climate zones.

Li Tian is currently pursuing a PhD degree in ecology at Beijing Normal University. Li's research focuses on the migration patterns of birds in the northern tropical zone and additionally investigates the impact of climate on the reproduction of birds in this region.

KEYNOTE | 22 Nov, 0115 UTC

David S. Wilcove

Princeton University, USA

Why do we know so much about migratory birds but not enough to conserve them?

For decades, scientists and citizen naturalists have been sounding the alarm over declines in populations of migratory birds across much of the globe. Thousands of scientific papers, reports, and news articles have been published on the magnitude, likely causes, and consequences of these declines. Moreover, technological advances have enabled ornithologists to explore aspects of bird migration that were simply unknowable just a decade or two ago. Yet, notwithstanding these impressive accomplishments, there remain dangerous gaps in our understanding of the cumulative impacts of different threats on migratory

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birds and in the spatially explicit habitat needs of these birds across their annual cycles. I will explore these gaps with respect to two well-studied and charismatic groups of migrants: songbirds migrating from the eastern United States and Canada to wintering grounds in Latin America and the Caribbean, and shorebirds migrating along the East-Asian Australasian Flyway. Given all that we know about these remarkable birds, what more do we need to know to successfully protect them?

David S. Wilcove is a professor of ecology, evolutionary biology, and public affairs at Princeton University. The primary question driving his research is “How do we find room for biodiversity in an increasingly hot, hungry, and crowded world?” Accordingly, his work focuses on the impacts of farming, logging, hunting, climate change, and other human activities on biodiversity. He and his graduate students and postdocs have studied these issues around the world, from New Zealand to the Amazon Basin and from Siberia to Borneo. Prior to joining Princeton’s faculty in 2001, he worked as a scientist for the Environmental Defense Fund, The Wilderness Society, and The Nature Conservancy. He is the author of two books—*No Way Home: The Decline of the World’s Great Animal Migrations* (2007) and *The Condor’s Shadow: The Loss and Recovery of Wildlife in America* (1999)—and many technical and popular articles in the fields of conservation biology, ornithology, and wildlife conservation. Professor Wilcove serves or has served on the boards of directors of the Doris Duke Charitable Foundation, Society for Conservation Biology, Rare, American Bird Conservancy, Natural Areas Association, Galapagos Conservancy, and New Jersey Audubon Society, among other organizations. He has received awards from the Society for Conservation Biology, Defenders of Wildlife, the Pew Foundation, The Nature Conservancy, The Wildlife Society, and the Hauptman-Woodward Medical Research Institute. He received his undergraduate degree from Yale University and his doctorate from Princeton University.

OFFERED ORAL PRESENTATION | 22 Nov, 0700 UTC

Zhao Xinjie

Fudan University, China
@ZhaoSage

Tracking the migration of Eurasian Oystercatchers *Haematopus ostralegus* in East Asia

To understand the temporal and spatial patterns of migratory Eurasian Oystercatchers (*Haematopus ostralegus*) in East Asia, we deployed GPS-GSM tags on 12 birds at the Yalujiang Estuary in the north Yellow Sea, China and tracked their annual migration in 2020-2021. The tagged oystercatchers wintered mainly in the west coasts of the Yellow Sea and bred in northeast China. Birds generally started migratory flights in late afternoon, with more than half beginning at 17:00-19:00 local time. The spring migration schedule is later in the first migration than that in subsequent migration. The Yalujiang Estuary is an important stopover site both in spring and autumn migration, with a stopover duration of 31.2 (± 10.7 , SD) and 122.7 (± 9.2 , SD) days, respectively. The stopover duration in autumn was the longest among the known shorebirds, which might be related to their flight feathers molting at the site. This suggests the Yalujiang Estuary is critical habitats for the Eurasian oystercatchers.

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Zhao Xinjie is a Master's student at Fudan University with a research project on the migration of Eurasian Oystercatchers.

TWITTER ONLY PRESENTATION | 21 Nov, 1550 UTC

Karolina Zalewska

University of East Anglia, UK

@kzalewwska

Microclimate refugia shape migration strategy of Little Bustards

In partially migratory species some individuals remain within the same area throughout the year, while others may move long distances. Climate and environmental variability are known to influence the movement strategies adopted by different species and populations, but these are rarely examined at the scale individuals experience them. This study investigates the influence of exposure to high temperatures and availability of microclimate refugia on the diverse movement strategies of individual Little Bustards (*Tetrax tetrax*) in breeding areas in Southern Europe. The little bustard is a near-threatened grassland bird with some individuals displaying migratory movements of up to 450 km. We match long-term GPS tracking data of 47 individuals with micro-scale environmental information and find that little bustards occupying areas that lack microclimate refugia undertake longer migratory movements compared to those that have microclimate refugia opportunities. We also find evidence of between-season niche conservatism in individuals that migrate larger distances.

Karolina Zalewska is a PhD student at the University of East Anglia, Norwich. Her project focuses on individual- and population-level responses to climatic variability and extremes as well as the importance of microclimate refugia in population survival. She is interested in individual-habitat associations and factors affecting population demography and dispersal.

OFFERED ORAL PRESENTATION | 22 Nov, 0900 UTC

Tianhao Zhao

University of Groningen, Netherlands

@johnsas_k

Effects of the Qinghai-Tibetan-Plateau on migratory landbirds en route through central-China

Geographical barriers usually play important roles in defining flyways. The Qinghai-Tibetan-Plateau (QTP), situated between the central-Asian flyway (CAF) and the Eastern-Asia Australasia flyway (EAAF), functions as a major barrier for landbirds migrating between Siberia and SE-Asia. However, the boundary between the two flyways is ambiguous, especially in central China. We tracked the migration of two songbird populations that potentially employ migration routes affected by the QTP: the central-China population of

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the Siberian Rubythroat, and the population of stonechats from the contact zone between Siberian and Amur Stonechat in the Baikal region. We found that the migration route of central-China Siberian Rubythroats differs from the East-Asia population. We also confirmed the existence of a migratory divide between Siberian and Amur stonechats, which either migrate NW or SE of the QTP, respectively. We argue that the central-China flyway is unique from the coastal EAAF as it is strongly shaped by the QTP.

Tianhao Zhao is a PhD student working on migration of Siberian Rubythroat and Siberian/Amur Stonechats in Asia. Tianhao applies micro-tracking techniques to investigate how Qinghai-Tibetan-Plateau influence the migration of small songbirds and is also keen on genetic migration and working with the migratory divide of Siberian/Amur Stonechats north to QTP.
