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TALK ABSTRACTS

Long-term wader population dynamics in sub-arctic Fennoscandia

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Climate change has been proposed to cause threats for species including arctic waders and several studies have documented declining populations. Typically, the population trends and dynamics of arctic waders have been measured using surveys outside breeding season and breeding season studies are less frequent. The presentation will show results from a local long-term study from Kilpisjärvi, sub-arctic Finland, North Europe during 2005–2025. The local wader populations (14 species) have been mapped annually during the brood rearing period in early-mid July. Most abundant breeding wader species are Dunlin *Calidris alpina*, Red-necked Phalarope *Phalaropus lobatus*, Common Ringed Plover *Charadrius hiaticula* and Ruff *Calidris pugnax*. Our study group has also been trapping and ringing breeding adults and chicks to study e.g. site-fidelity. The annual population numbers are strongly affected by the local rodent cycle, where population increases have been observed during the increase phase of the cycle and declines during the collapse phase of the rodent cycle. Overall, the wader populations have been increasing in the study area. The long-term changes in the population are linked with the species thermal niche, i.e. more positive population trends among warm-dwelling species compared to cold-dwelling species. The body weight of breeding adult Red-necked Phalarope males was positively connected with the mean temperature 5 days before trapping, suggesting that increased temperatures may provide short-term benefits for breeding adults. The potential reasons for the increasing population trends of waders in the study area will be discussed.

Decrypting the most critical stage in Black-tailed Godwit population dynamics

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

Changes in abundance and distribution of the Spoon-billed Sandpiper in South-East Chukotka, Russia, in the 21st century

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Monitoring of the breeding population of Spoon-billed Sandpiper in the vicinity of Meinypilgyno village, SE Chukotka, was started in 2001 and since 2009 became almost annual. During the past 25 years at the area of ca.100 sq.km the Spoon-billed Sandpiper population declined from 45 breeding pairs in 2001 to less than 20 pairs in 2007, and 12 pairs in 2009. A slight increase of the population up to 16 pairs in 2018 took place due to a headstarting programme. In 2025, 27 adults were recorded of which 10 breeding pairs were formed, and the rest were single males. In 2023-2024, the remote 'Okeanskoe' breeding site with an area of 6.1 sq.km was surveyed where 13-16 adult SBS were found, which indicated a decline trend from 18 possibly breeding pairs in 2015 and from 17 pairs in 2016. Originally, Spoon-billed Sandpipers were known breeding only at coastal spits overgrown mostly crowberry. However, near Meinypil'gyno the species was found breeding also at moraine hills with diverse habitat structure, not further than 6 km inland. The third type of known habitat is closer to Khatyrka village – the extensive alluvial sediments along the former river beds, overgrown by crowberry, sedges and dwarf willows and speckled by small depressions with streams and pools. The distribution of Spoon-billed Sandpipers near Meinypyl'gyno has changed from 5 to 2 localities on the spits, and the same happened in moraine hills, where the breeding sites are also moved from the area rich in lakes to the area with many thermofrost features in the landscape.

Dotterel *Charadrius morinellus* in north-east Scotland 2023: continued decline, local increase or natural population fluctuations?

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A decline of 57% in the breeding population of Dotterel *Charadrius morinellus* in Scotland was reported between 1987–88 and 2011. Recent surveys of Dotterel on hills in the stronghold in north-east Scotland have recorded variable numbers of breeding Dotterel. In 2023, a coordinated and standardised survey in the eastern Cairngorms was undertaken covering five sites. The survey confirmed Dotterel still passing through the eastern Cairngorms and breeding successfully on formerly occupied low as well as high hills. However, Dotterel were absent from some previously occupied sites. The total number of birds recorded in the pre-breeding season and the density of breeding males across the survey area did not suggest a widespread decline in the area. Rather, it indicated that breeding Dotterel numbers were variable across sites with some sites holding high numbers and others none. Where it occurred, breeding was successful with many broods reared to at least near fledging. The possible reasons for these changes in Dotterel numbers and breeding success are discussed. These results have implications for future survey work.

Lek fidelity and survival in Great Snipe from two distinct breeding populations

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Lekking species tend to be faithful to their leks, leading to spatio-temporal stability of traditional leks that often exist for decades. Here we used a mark-recapture framework to study between-year lek fidelity in adult male and female Great Snipes, across two distinct breeding populations (Eastern European and Scandinavian), considering effects of individual body size, lek size, and distance between leks on lek changing behaviour. Moreover, we extended and achieved more precise estimates of annual apparent survival for this species, beyond previously obtained population parameters from a single lek and males only. We found that Great Snipes had a low but stable annual apparent survival across both sexes and breeding populations (Φ = 0.58 ± 0.037 SE), likely shaped by the set of characteristics found in this species, resulting in high-energy demands of different annual cycle stages. Birds showed high between-year fidelity to their leks, as we detected 0.82 probability of remaining at the same lek between seasons. We detected no effect of sex or population on lek fidelity, and neither individual body size nor distance between leks influenced lek changing probability. However, birds at larger leks were less likely to relocate in the following years. We highlight that understanding the drivers of lek changing behaviour provides insights into the evolution of lek mating strategy, and that accounting for site fidelity is crucial for studying population dynamics and space use patterns.

Return rate, survival and longevity of the Spoon-billed Sandpiper based on long-term colour marking in South-East Chukotka, Russia

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We have been monitoring the breeding population of the Spoon-billed Sandpiper in Meinypil'gyno, Chukotka, Russia since 2001, based on individual colour-marking with engraved leg flags initiated in 2012. Adult males have shown lower return rate than females (82.8% vs. 91.7 %), however, there are more males in the population than females, which indicates a higher mortality rate of young females, or dispersal of some females. Totally 26.5% of headstarted chicks have ever been observed on the flyway or returned to the natal area, which is an insignificantly lower than 28.6% of wild chicks. The return rate of headstarted chicks is considered for fledglings whereas wild chicks were marked mainly during the first days of their lives. Therefore, to get equal return rates, the mortality of wild chicks would need to be compensated by higher survival rate after fledging. The maximum known age for adult birds was 11 years for females and 10 years for males (we assumed the age of first breeding attempt is 2 years old). The maximum known age for wild chicks was 9 years for both males and females. However, one male was ringed as a chick in 2010 and got an engraved leg flag in 2015; therefore, when breeding in 2025, it was 15 years old. For headstarted chicks the maximum known age was 9 years for males and 6 years for females. The estimated mean age (M+SD) for adult males and females was 4.6+3.0 vs. 4.9+3.0, for wild and headstarted chicks 3.0+2.1 vs. 2.5+2.1 correspondinly.

Testing the food resource hypothesis in Western Hooded Plover territory abandonment

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Beach-nesting shorebirds occupy a highly specialised ecological niche, narrowly wedged between the sea and the coastal hinterland - a zone increasingly impacted by human activity and climate change. Retractions in breeding range in such specialised environments may imply an altered habitat quality, differences in prey availability or reflect population declines that reduce the use of optimal habitats. Understanding how cues relating to prey availability and nesting and shelter microhabitats influence breeding territory selection is essential for strategic conservation. This study tested the food resource hypothesis in the vulnerable Western Hooded Plover *Thinornis tregellasi* in a southwestern Australian population with a history of breeding territory abandonment. Across 15 beaches over two five-month breeding seasons, we sampled prey availability using pitfall traps and sediment cores. Feeding and resting microhabitats were assessed and DNA metabarcoding used to investigate diet. Dietary items included 92 invertebrate species from 19 genera, and amphipods, dipteran flies, coleopteran beetles, and isopods were the most frequently consumed taxa. In contrast to their highly varied diet, these shorebirds made specific habitat selections, strongly favouring lower beach and fresh wrack for diurnal foraging, and dry wrack for resting. Wrack cover was greater on occupied beaches, but prey abundance and composition were similar between abandoned and occupied beaches, demonstrating no obvious spatial limitations in prey. These results highlight that kelp wrack imparts both shelter and foraging microhabitat benefits for this species, and that factors beyond prey availability may drive territory abandonment.

Variations of movement and habitat use during the course of the winter of the Eurasian Curlew in two important sites in Europe

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During the wintering period, shorebirds must replenish sufficient levels of body reserves to ensure their moult, their survival and improve their breeding performance. However, birds do not have the same energy requirements throughout the winter and are therefore likely to use their wintering site differently according to the stage of the winter. Hence, this study aims to test if the wintering site and stage influence the space used by individuals. Thus, 62 Eurasian Curlews *Numenius arquata* were equipped with GPS tags within two major wintering sites in Europe: the Pertuis Charentais in France and the German part of the Wadden Sea. Their home ranges (HRs) and foraging habitat selection were compared according to three stages of the wintering period requiring different energy demands (i.e., Arrival-September, October-January, February-Departure). Curlews exhibited similar HR size at both sites, whatever the wintering stage. It was unexpected considering the higher density of birds in the Wadden Sea, potentially forcing birds to cover more space to reduce the competition for resources. Their HRs were larger during the first stage, i.e., when they were molting. Indeed, Curlews displayed a more exploratory behaviour and selected distinct habitats to forage, e.g., remote areas of the coast in the Wadden Sea and more seagrass beds in the Pertuis Charentais. Furthermore, Curlews spent a greater proportion of time foraging on mudflat during this stage. We therefore urge greater consideration of the distribution of birds during this stage, when tourism pressure is high, to define areas of importance to future management measures.

Strategies of Ruddy Turnstones preparing for northward migratory flight in the Wadden Sea

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Many migratory shorebirds are adjusting their migration phenology to changing climatic conditions. To make such adjustments requires simultaneous changes in timing of physiological processes prior to northward migration, including plumage moult and fat accumulation. Timing changes will very much rely on environmental conditions on coastal stopover sites, like the Wadden Sea. This study examines seasonal changes in foraging strategies, energy intake and plumage moult in Ruddy Turnstones *Arenaria interpres* during the spring season in the Wadden Sea, which is an important stopover site used both by overwintering birds as well as birds wintering in more southern sites. Data was collected between February and May 2025 around Schiermonnikoog using behavioral observations, prey sampling, caloric analysis of prey species, and morphometric measurements. Abundance of *Corophium volutator*, the species Turnstones most often preyed upon, increased rapidly during the season, whereas abundance of other potential prey species *(Peringia ulvae,* Oligochaeta, *Nereidae sp*), remained stable. Foraging effort increased during the season resulting in strongly positive energy budgets. Turnstones arriving in late March in the Wadden Sea foraged more intensively compared to both overwintering Turnstones and late-arriving Turnstones, gained mass more rapidly, and moulted earlier into summer plumage. These results highlight how diverging migration strategies and foraging strategies are strongly linked, with *Corophium volator* as a major emerging prey for shorebirds in spring.

From shore to marsh: GPS tracking of Eurasian Curlew space use between protected and at-risk zones around the Moëze-Oléron National Nature Reserve

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Littoral zones are being rapidly reshaped by the combined impacts of climate change, coastal retreat, and increasing anthropogenic pressures. These transformations pose significant threats to biodiversity, particularly to specialist shorebirds such as the Eurasian Curlew *Numenius arquata*, whose populations are in steep decline and whose ecological needs make them especially vulnerable. Since 2015, LPO France, in collaboration with the LIENSs (University of La Rochelle) and the CESCO (MNHN - Paris) laboratories, has been monitoring the GPS trajectories of several dozen Curlews frequenting the Moëze-Oléron National Nature Reserve on the French Atlantic coast. The project aims to characterize movement patterns within a highly dynamic functional zone encompassing the Marennes basin and the Brouage marshes, in relation to tidal cycles, habitat availability, and anthropogenic disturbances. By generating high-resolution spatiotemporal maps of foraging and roosting areas and analysing the influence of pressures such as hunting activity and seasonal lagoon flooding, we will identify critical zones for targeted protection and management. Sex- and age-related differences in spatial use behaviours are also studied, as they may carry significant demographic implications if broadly representative. Understanding the fine-scale relationship between animal movements, life-history traits and the transformation of coastal ecosystems is crucial to inform adaptive conservation strategies in vulnerable intertidal habitats.

How much space do Curlews need in our landscape?

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In 2020-2022, 145 nesting Curlews were captured and tagged in north-western Germany (Ornitela 10g, Solar). Some of these birds were tracked for several breeding seasons. It is noticeable that the daily home ranges differed significantly between individuals and depending on the breeding phase. The frequency of clutch losses and subsequent clutches also made it difficult to analyze territory sizes. For this reason, we compared the birds from two important areas: while conventional industrial agriculture prevails in the Leda-Jümme lowlands, the birds in the Fehntjer-Tief breed in a bird sanctuary where targeted management measures are implemented. We show the differences and similarities.

Breeding under pressure: spatial and energetic strategies of Kentish Plovers in natural and managed coastal habitats

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Coastal habitats are being rapidly altered by urbanization, tourism, and climate change, affecting the breeding success of beach-nesting birds. As a result, species like the Kentish Plover *Anarhynchus alexandrinus* increasingly use modified landscapes, such as managed saltpans, as alternative breeding sites. This study examines the movement and reproductive behaviour of 40 Kentish Plovers breeding in the Bay of Cádiz (South West Spain) over 2024–2025 springs and was conducted on a natural beach and two supratidal saltpans, offering contrasting conditions in terms of habitat structure and human management. Using high-resolution GPS tracking, we analysed daily home range size and Overall Dynamic Body Acceleration (ODBA) as an activity proxy, comparing across habitats, sexes, and breeding phases. Results indicate that birds breeding in saltpans had significantly smaller home ranges (~900 ha) than those on the natural beach (~2700 ha), potentially reflecting higher resource availability or reduced disturbance in these habitats. On average, females used an area 5.5 times larger than males (~2000 ha vs. ~570 ha), especially during incubating periods ($P<0.001$). Energy expenditure did not differ between habitats or sexes overall but varied significantly with breeding phase ($P<0.001$), peaking during non-incubating periods (13% higher). Although mean ODBA during incubation was similar between sexes, hourly patterns diverged: females showed lower daytime energy expenditure—likely reflecting nest attendance—while males were more active during the day, consistent with off-nest activity and incubation shift changes.

Not only space, but time: sea level rise is projected to collapse a globally important shorebird community

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Sea-level rise (SLR) is one of the most unequivocal consequences of climate change. However, its implications for intertidal species remain poorly understood, particularly outside the northern temperate zone. We hypothesized that future SLR will reduce coastal waterbird habitat both in extent and in the duration it is accessible for foraging and roosting. To test this, we conducted a study in the Guerrero Negro-Ojo de Liebre wetland complex, Baja California, Mexico. We carried out surveys of the entire 25-species shorebird (and waterbird) community, as well as quantified the movement and activity budgets for the endangered Red Knot *Calidris canutus roselaari* using GPS biologgers. We then modeled the future vulnerability of the habitats of red knots and other waterbirds under SLR scenarios using hydrodynamic inundation numerical models spanning from 2020-2100. Our predictions indicate that in 2100, at the lowest tides, Red Knots will lose up to 43% of their foraging habitat, while at the highest tides, 100% of current roosting sites will be lost. Foraging opportunities at key feeding sites are also expected to decline significantly—from 14.6 hours to 0 hours by 2050—due to increased hydroperiods. These negative effects are likely to cascade across the waterbird community, with at least 13 species of small shorebirds experiencing the impacts a decade sooner than larger birds. Our results thus demonstrate that SLR will influence the amount of time intertidal habitats are available long before they are completely 'lost' and that SLR may lead to the collapse of the entire waterbird community.

Surviving the times: 50 years of migratory shorebird population dynamics on Australian coasts

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Shorebirds migrating through the East Asian-Australasian Flyway have experienced severe population declines, leading to concerns about long-term population viability. Globally, climate change threatens these species, with evidence that the changing climate is driving a trophic mismatch between shorebird migration arrival to their Arctic breeding grounds and rearing of chicks – thereby impinging on recruitment. Further south along their migration, shorebirds are significantly hindered by conversion of vital tidal mudflat habitats to land, having lost up to 65% of their habitat along parts of the East Asian coast. Understanding the demographic processes underpinning these declines is critical for conservation of these long-distance migrants, both in Australia and along the flyway. Here, we present survival analyses based on 50 years of banding and resighting data, largely collected by dedicated volunteers along Australia's coasts. Using mark-recapture models, we assess long-term survival trends across twelve species. Modelling this extensive dataset offers an indispensable opportunity to assess how these already struggling species are influenced by changing climate conditions and habitat availability. Our research provides crucial insights that may be used to inform adaptive management strategies of coastal wetland habitats.

Identifying ecological constraints of a threatened shorebird population at a tropical wintering site

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The Western Atlantic subspecies of Red Knot *Calidris canutus rufa* has declined by over 50% in less than 50 years, demanding urgent conservation action. Recent surveys have revealed that the population of Knots spending the nonbreeding period in the coastal wetlands of the Brazilian Amazon is much larger than previously thought. The population size in this region would then rival the population in Tierra del Fuego, long held to be the largest and most important nonbreeding site. However, the ecology and conservation status of Knots in the tropical coastal wetlands of northern Brazil remain virtually unknown. We are addressing this gap by investigating their feeding ecology, habitat use, and local survival. Given the dynamic and little studied nature of tidal flats in this region, we began by quantifying changes in tidal extent in the region over the past four decades, as habitat shrinkage may be contributing to population declines. Since landward transgression of tidal flats into mangrove environments likely decreases habitat quality of feeding areas, we also quantified the age, or the persistence over time, of these tidal zones. We explore associations with habitat loss and population trends over the last decades to better understand how changes in feeding habitat may be impacting demographic trends.

The struggles of shorebirds and shellfishers: investigating Oystercatcher survival under different shellfishing quota scenarios.

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We share our coastlines with many wader species and thus it is easy for humans and birds to come into conflict not just over space but over food resources as well. In the east of England, The Wash stands out as a hub for migrating and wintering birds, particularly Oystercatchers *Haematopus ostralegus* who make use of the invertebrates thriving in its mudflats but these prey items are also valuable for shellfishers to make a living. Catch quotas are in place but in the past decade, declines in Cockle *Cerastoderma edule* and Mussel *Mytilus edulis* stocks increase worries over this delicate balance. In our recent work, individual-based models alongside ringing data are brought together to investigate if new quota calculations are suitable to allow birds to survive in good condition and for shellfishers to have viable businesses. The results were nuanced, at current levels of shellfish stocks and Oystercatcher populations, the new calculations appear to maintain Oystercatcher survival and body condition but there are further questions raised over additive effects of cold winters. Whilst climate change is promoting overall warmer climates, sharp cold winter "snaps" still occur and have been seen to cause declines in body condition alongside poor shellfish stocks. Our presentation details our current work and invites future questions to explore that might help us understand the reasons behind the results we found. IBMs provide valuable support to both Oystercatcher and shellfishers on The Wash and we encourage others who are asking similar questions to also consider these models.

Decrease of the local migratory population of Red Knots *Calidris canutus rufa* in northern Patagonia Argentina, during a period of population stability in their non-breeding sites

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From 1997 to 2025, we carried out simultaneous surveys (daily to weekly) at key roosting sites for red knots during its northern migration stopover (February to early May) in Bahía de San Antonio, Río Negro, Argentina (BSA). Between 1997 and 2007, the annual maximum number of Red Knots decreased from 20,000 to 7,000, while the size of the total population declined in its non-breeding areas in Chilean and Argentinean Tierra del Fuego (TDF), as reported by Morrison et al. and Norambuena et al., with 25 to 50% of Red Knots from TDF using BSA annually. Instead, after 2007, with population stability in TDF, the maximum annual number of Red Knots in BSA decreased from 4,800 individuals in 2008 (32% of number in TDF) to 1000 individuals in 2025. The protection of critical roosting sites by environmental rangers improved in this period, while anthropogenic impacts on feeding habitats, presence of raptors and average temperature increased. Mussel banks, main food for Red Knots, disappeared likely due to heat waves.

Predators and lowland wading birds: from models to management

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Predation is often thought to be one of the greatest threats to nesting waders. However, the drivers behind predation rates and the impacts predation has on populations are complex and not always well understood. Many wading species breed in spatially and temporally complex habitats often affected by changes in flooding, human activity and vegetation cover. These habitats are also inhabited by a diverse range of predator species, both mammalian and avian, allowing for predation from multiple species at once. Traditionally, predation has been studied primarily through field experiments, but here we present a new approach for studying predator-prey interactions between breeding waders and multiple predator species, using individual-based models (IBMs). IBMs are simulations based on patterns of individual behaviour, such as the need to find food and reproduce, that give rise to the overall patterns in a system, such as predation of nests over time. These behavioural patterns are influenced by the environment, meaning that changes in the environment causes changes in behaviour of individuals. Since IBMs are based on these patterns, and not just empirical data, it is more robust to temporal and spatial changes in the system. In this project an IBM simulating breeding waders and relevant predators is being developed to investigate the underlying mechanisms for predation by several predators and how manipulation of the system, through management interventions, can influence these predation rates. To parameterize the model, study systems in England consisting of several pairs of breeding Curlew and a diverse predator community are being used.

A food-less spring: Comparison of the feeding ecology of Grey Plovers during spring migration 30 years apart

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Along the East-Atlantic Flyway 60 % of the Grey Plovers rely on the Wadden Sea as stop-over site. While the trend of roosting Grey Plovers in the total Wadden Sea is stable, numbers in Lower Saxony (Germany) have been declining since the 1980s. Recently, a decline in abundance and biomass of benthic organisms has been found in the East-Friesian Wadden Sea between the 1980s and 2018. We hypothesized that decreasing food availability for Grey Plovers was leading to lower migratory fitness. The feeding ecology of Grey Plovers during spring migration in 2023 was compared with a study from 1994. We sampled the benthic prey stock and observed foraging behaviour of Grey Plovers using focal and scan sampling during daylight. Three of the most important prey organisms for Grey Plovers declined in abundance and biomass. Numbers of pecks and successes per minute were lower in 2023 than in 1994, but success rate remained at 30%. Energy intake with 306.27 kJ/tidal cycle was much less than in 1994 with 433.37 kJ/tidal cycle. The lower energy intake could explain the lower roosting numbers in the study area. Further research is needed on the foraging behaviour of Grey Plovers during the night and possible carry-over-effects to the breeding grounds.

Arthropod availability for Godwit chicks across management regimes in Dutch dairy grasslands

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Both arthropods and godwits have shown long-term declines, raising concerns about the relationship between insects and godwits, which depend on them as prey. To better understand this link, we monitored above-ground insect populations in Dutch dairy grasslands over three years (2021-2023). During the godwit breeding season (May and June), sticky traps were deployed to capture insects and record their presence. Digital AI techniques were used to count specimens, estimate their size, and classify them to the lowest possible taxonomic level, providing detailed information on potential prey availability. Preliminary results show variation in both the timing and height of insect abundance peaks, differing across years. Interestingly, different patterns are seen when focusing on size classes and the biomass of the insects. These findings suggest that potential food availability for godwit chicks is not constant, but fluctuates over time, which may lead to mismatches between prey presence and chick presence. By examining insect phenology through both abundance and biomass, this study provides new insight into current prey dynamics in dairy grassland landscapes and their potential implications for godwit conservation.

Mole Crab *Emerita talpoida* diet specialization in American Oystercatchers *Haematopus palliatus* breeding in Virginia, USA

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Individual specialization in diet occurs when some individuals eat prey species in different proportions than others. We provide the first evidence of diet specialization in American Oystercatchers. We investigated the existence of diet specialization in a population of American Oystercatchers *Haematopus palliatus* breeding on two barrier islands in Virginia in 2022 and 2023. We described foraging area use across space and time based on diet. We explored the potential adaptive value of diet specialization.

Foraging in the world's largest river delta: What is there in foraging muds of Great Knots?

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From October to March, in the world's largest river delta in Bangladesh – formed by the Ganges, Brahmaputra and Meghna Rivers – a large number of migratory shorebirds rest and forage. One such shorebird species is the globally endangered Great Knot *Calidris tenuirostris*. While information on their population trend is available in Bangladesh, what they forage on in the delta is unknown. Because Great Knots primarily eat mollusks in Australian and Chinese non-breeding sites, we assumed they would also do the same in the delta. We tested this by sieving 150 mud samples from Great Knot's foraging areas during low tide and identified the benthic organisms. Mollusks indeed dominated the mud samples we sieved. We identified five benthic groups, of which gastropod (257 ind./m²) and bivalve (211 ind./m²) density was highest, and together made up 48% of the relative abundance. Other benthic taxa included amphipods (19%, 182 ind./m²), polychaetes (17%, 166 ind./m²), and oligochaetes (16%, 157 ind./m²). Although diet composition was not confirmed through droppings, our results imply Great Knots are eating mollusks in the delta. Nourishing from mollusks likely drives Knot's site choice during non-breeding time, and therefore existence of mollusk-rich areas is essential for their survival. As these areas are likely vital to the non-breeding survival of this globally endangered species, we urge conservationists and managers to systematically monitor mollusk abundance and prioritize the protection of mollusk-rich feeding sites in the world's largest river delta.

Prey availability and diet composition of non-breeding Eurasian Curlew in Nijhum Dweep, Bangladesh

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Non-breeding Eurasian Curlews *Numenius arquata* – a globally Near Threatened species – occur from October to March in the coastal wetlands of Bangladesh. In these intertidal mudflats, their primary activities are resting, foraging and eating. But what they eat is unknown. To know their prey availability, we sieved 600 mud samples from Curlew's foraging areas in Nijhum Dweep National Park, and to know their diet composition, we analyzed 51 droppings (31 feces and 20 pellets) collected from their roosting areas during the non-breeding seasons of 2018–19 and 2019–20. We identified nine macrobenthic taxa in the mud, with Polychaeta being the most dominant group (43%), followed by Oligochaeta (15%), Decapoda (14%), Nematoda (8%), Bivalvia (8%), Amphipoda (6%), Gastropoda (4%), Tanaidae (1%), and Hirudenea (1%). Four of these taxa – Decapoda, Gastropoda, Bivalvia, and Polychaeta – were also found in Curlew droppings. Their diet was mainly composed of Decapods and Gastropods: Decapods comprised 58% of the dry mass of feces and 23% of pellets; Gastropods made up 27% of feces and 31% of pellets. Fish bones were also found in some droppings, possibly consumed from shallow tidal pools. While our traditional dropping analysis provided useful insights, it may have missed fully digested prey. We suggest using DNA metabarcoding in future studies to obtain a more complete dietary profile. To support wintering Eurasian Curlews at our study site, we recommend monitoring and conserving healthy populations of key prey groups, particularly Decapods and Gastropods.

Soil moisture enhances the detectability of vibrations induced by moving earthworms

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Many shorebirds detect vibrations generated by moving, buried prey using mechanoreceptors in their bill tip. It has been demonstrated that the foraging success rate of such remote-tactile birds is higher in wetter soils because prey activity may increase with moisture levels, and vibratory signals transmit better in wet substrates. However, the actual detectability of vibrations generated by moving soft-bodied prey under different moisture regimes has not been quantified yet. Therefore, we tested the hypothesis that wetter soils improve the detection of prey induced vibrations, using earthworms – a prey species group particularly abundant in grasslands, where they are consumed by many remote-tactile foraging birds – as study species. Moreover, we examined whether detritivores, an earthworm ecological group with potentially high activity levels, generated more detectable vibrations with a higher intensity than geophages, which are generally considered 'sluggish'. Hence, we designed a mesocosm experiment in which we recorded the vibrations of detritivore and geophage earthworms in dry and wet soils with a geophone. Earthworm vibrations were best detected at 200 Hz, and were overall significantly more detectable in wet soils, in which detritivore vibrations were detected more frequently and at higher intensities. Thus, this study provides support for the pre-existing hypothesis that birds may detect buried prey better in wetter substrates due to the facilitating role of soil moisture content on the detection of prey vibrations. Subsequently, detecting capabilities of remote-tactile foraging birds may potentially be hindered by dried grasslands resulting from intensive agriculture.

Estimating speed of migration from wader tracks - the dos and don'ts

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Speed of migration (SOM), measured in km/d, is the total distance flown divided by the total time spent on migration. The latter is the sum of the time spent flying and the time spent fuelling, including the fuelling before the first flight. Flight speed, in contrast, is the speed of a bird during migratory flight, measured in m/s or km/h. SOM is an important metric when describing migratory performance. It can be compared between individuals as well as species, and give information on selection pressures, possibilities and constraints on migratory performance. Whereas the concept has been described and defined since long, it has recently been applied more and more frequently on individual migration tracks – with varying success and accuracy. A logger will normally give good information on the total distance flown (km) and the time passed between the start of the first flight and the arrival to the destination (d). However, the third crucial piece of information, the time spent on fuelling before the first flight (d) is almost invariably not revealed by the loggers. Since there is often a considerable time spent on this first fuelling, ignoring it will lead to too high estimates of SOM. Such estimates will reflect a speed that to an unknown degree is somewhere between SOM and flight speed and therefore incomparable to those from other studies. I will suggest ways of dealing with "the third unknown" so that more accurate and comparable SOMs can be estimated in the future.

Flying high is costly

Dirk Smit[1]

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Why do migratory birds ascend thousands of meters between night and day? Recent ecological literature, notably by Sjöberg et al., argues that birds climb in daytime to escape overheating due to intense solar radiation. Approaching this ecological puzzle from a theoretical physics perspective, I re-examined the fundamental energy balance of two key migrants crossing the Sahara—the small Great Reed Warbler (25 g) and the larger Great Snipe (150 g). My analysis rigorously incorporates direct solar radiation, convective and long-wave heat exchange, metabolic heat production from sustained flight (using Butler–Bishop's metabolic scaling: P_met = 52.6\M^0.74, and altitude-dependent hypoxia costs. Contrary to the overheating hypothesis, I find that daytime solar heating imposes minimal thermal stress on smaller migrants such as the Warbler, whose modest surplus (+4 W at 3 km) can be effortlessly offset by small increases in convective cooling or negligible evaporative heat loss. Even for the heavier Snipe, potential overheating at typical daytime altitudes (~3 km) remains moderate at most (+28 W), and would be eliminated by climbing only about 1–2 km higher (to ~4–5 km altitude), leaving flights at 6 km unexplained by thermoregulation alone.

Tracking migration of three Black-tailed Godwit subspecies from Bangladesh

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Black-tailed Godwits *Limosa limosa*, a globally Near Threatened species, is well studied along the East Atlantic Flyway, where detailed knowledge of their migration connectivity and timing supports targeted, flyway-scale conservation efforts. In contrast, migration patterns in other flyways–particularly in the Central Asian flyway–remain poorly understood. A large proportion of godwits breeding in Central Asia spend the non-breeding time in South Asia, including the wetlands of Bangladesh. In earlier work, we confirmed that three subspecies—*L.l. limosa, L.l. melanuroides*, and recently described *L.l. bohaii* from Asia—share non-breeding sites in Bangladesh while breeding in distinct areas across northern and temperate Asia. Now, we offer a detailed description of subspecies differences in their migratory routes, stopover sites, and timing, based on GPS-GSM tracking data from 60 individuals tagged in the wetlands of Bangladesh. We found marked differences–but also substantial overlaps–between subspecies in how they negotiate the crossing of the Himalayas and the Tibetan Plateau, as well as in their migration schedules and stop-over sites. Notably, in a few instances, *limosa* individuals ventured outside their typical migration corridor, instead following routes and stopover behaviours more typical of *melanuroides* or *bohaii*. These cases hint at social information transfer between subspecies. Here, we will analyse whether these deviations can be explained by limosa godwits synchronising their migratory departures with individuals from other subspecies. In doing so, we provide new insight into migratory connectivity in the Central Asian Flyway, laying a foundation for local and flyway-scale conservation planning.

Unprecedented insights into Ruddy Turnstone migration and ecological barrier crossing revealed by miniaturized GPS tracking

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Major advances in miniaturisation of GPS tracking devices in recent years now allows studying movement ecology of small-size shorebirds at an unprecedented level of detail. As part of the multispecific Migratlane program on birds-wind turbine at sea interactions, 24 Ruddy Turnstones *Arenaria interpres* were equipped with 3-gram, solar-powered GPS-GSM devices on their wintering grounds in France and Spain in winter between 2023 and 2024. Eight complete or partial migration tracks were recorded from wintering to breeding sites in Greenland or Ellesmere Island in Canada. While migrating, Turnstones need to cope with ecological barriers, such as the Atlantic Ocean, Greenland Sea and for some of them the Greenland icecap. This ongoing study will shed light on individual strategies used for crossing barriers in relation with experienced weather conditions. Firstly, we will investigate whether Turnstones tend to minimize time spent flying over barriers, by choosing the shortest available routes to their destination, by making stopovers on islands as close as possible to the shore before and after transoceanic flights, or by circumventing the Greenland icecap. Secondly, we will explore how weather conditions influence migration characteristics. How wind conditions can affect stopover duration and flight departure decisions; and subsequently, how they can influence flight behavior when crossing barriers, with a particular focus on adjustments in flight altitude and speed.

New developments in integrated connectivity and population modelling, using the Eurasian Curlew as a case study

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To better understand how migratory birds are affected by the conditions they encounter at different sites throughout the year, it is important to describe the migratory connectivity of the species, i.e. the links between populations or sites during the migratory cycle. To account for its influence on population dynamics, Gregory et al. (2025) developed an Integrated Connectivity and Population Model (ICPM) by combining different datasets (telemetry, recaptures/recoveries, counts). They applied this model to the Eurasian Curlew to inform both connectivity and demographic parameters. As part of the Habitrack European project, we develop ICPMs for European migratory species that are huntable and in a bad conservation status. Building on the proof-of-concept of Gregory et al. (2025), we enriched the model with additional data sources, such as genetic assignments and productivity surveys, allowing us to obtain more accurate estimates. We also improved ringing data modelling by implementing a state-space Capture-Mark-Recapture formulation, including both live recaptures and dead recoveries, in both breeding and wintering seasons, a more flexible framework allowing to include individual covariates. To further improve the modelling framework, we explored clustering methods applied to connectivity data to delineate migratory flyways statistically instead of a priori, and use those as clusters in the ICPM. Of particular interest are 'soft' clustering approaches that assign probabilities for each location to belong to different clusters, as they could be easily integrated in the Bayesian framework of the ICPM. We will illustrate the potential of this framework using the Eurasian Curlew as an example.

The saga of Soga: why an experienced whimbrel deviated from its habitual migratory route

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During long-distance migration, birds occasionally stray from their regular migratory flyways. This may occur mostly in juvenile birds that have not yet learned and established their migratory routes. Here, we report on the spring migration of "Soga", an adult Eurasian Whimbrel *Numenius phaeopus islandica*. Tagged in 2019 in Guinea-Bissau, Soga migrated to the same breeding site in Iceland in 2020 and 2021, staging in Ireland. In 2023, Soga deviated from its previous route toward Iceland. After a seven-day stopover on Guernsey (Channel Islands, UK), Soga travelled to northern Norway, resembling the migratory path of the continental *phaeopus* subspecies. From there, Soga made three attempts to cross the Atlantic Ocean to Iceland, aborting the first two and arriving at its breeding grounds much later than in previous years. To infer the causes of this unusual journey, we analyzed the wind conditions Soga experienced, comparing them with the conditions experienced by *islandica* Whimbrels travelling the normal routes and focusing on three interesting 'breakpoints': (1) when Soga travelled to Norway instead of Ireland, (2) the first time Soga turned back to Norway mid-flight, and (3) the second time Soga returned to Norway. Soga's initial deviation from the route cannot be explained by unfavourable winds, but the approach of wind fields with headwinds does explain the subsequent return flights to Norway. Regarding the initial choice to travel to Norway rather than Ireland, we suggest that social environment, i.e. being part of a flock of the *phaeopus* subspecies, likely explains the deviant route.

Salty Migration: Do waders that breed at higher latitudes occupy more saline habitats during the non-breeding wintering season?

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Ecological specialisation often entails a trade-off between efficient resource balance and flexibility in habitat use. Some food abundant habitats with low thermoregulation costs may not be available to highly specialist consumers. For migratory waders, these trade-offs may manifest differently across species, potentially leading to variation in habitat associations and resource specialization. It has been hypothesised that wader species breeding at higher latitudes also show a stronger association with coastal saline habitats during the non-breeding season, as both environments tend to have relatively low pathogen pressure. This may enable more habitat specialised species to reduce their investment in immunocompetence, but having to migrate longer distances, resulting in a distinctive ecological and physiological strategy. Harnessing the collaborative power of the Global Wader community and its unique multi-species, multi-site tracking dataset, we analyse tracks from over 100 individuals of 10 wader species distributed across a range of breeding latitudes and non-breeding habitats. We explore the relationship between breeding latitude and the strength of association with coastal non-breeding habitats, as well as the proportion of variation in this response explained by individual-, and species-level differences. The combination of rapid Arctic warming and coastal habitat loss may interact to disproportionately influence waders species more dependent upon these habitats. These results also demonstrate the opportunities for synthetic research arising from the IWSG's Global Wader tracking data project.

Determinants of primary moult suspension in Dunlins *Calidris alpina*, migrating through the southern Baltic coast

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Feather replacement in most bird species tends not to coincide with breeding or migration periods. However, when time constraints prevent completion before departure, many birds suspend primary replacement and resume it post-migration. One species exhibiting active primary moult during migration is the Dunlin *Calidris alpina*. Despite being one of the most extensively studied of their group in the western Palearctic, some aspects of its biology, such as factors influencing primary moult suspension, remain poorly understood. We investigated the occurrence and determinants of primary moult suspension in Dunlins during autumn migration in northern Poland between 1985 and 2023. Our results indicate that only a minority of primary moulting individuals suspended the process, though annual variability was noticeable. In most years, later-captured birds were more likely to halt the process. Moult suspension was more frequent in adults than in immatures and in males than in females. These patterns align with known inter-population variation in moult strategies and sex- or age-related differences in breeding investment. However, the trends were inconsistent across years, possibly reflecting annual variability in breeding costs across age and sex classes. As a highly energy-demanding process, primary moult is likely influenced by cumulative energy expenditure during breeding, highlighting trade-offs between reproduction and self-maintenance in a migratory species. Therefore, primary moult suspension during migration in Dunlins occurs more frequently in sex and age groups that are more engaged in breeding and chick-rearing.

Trends of Wadden Sea shorebird condition: Insights from 50 years of autumn capture data

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The Wadden Sea plays a vital role as a staging and wintering site for migratory shorebirds along the East Atlantic Flyway and is therefore subject to extensive monitoring. While wader populations are regularly counted across the region, long-term data on changes in biometrics and feather moult patterns remain scarce. Since 1968, monthly mist-netting has been conducted each autumn on the island of Schiermonnikoog in the Dutch Wadden Sea. This effort, originally initiated by the Free University of Amsterdam, has been continued by the volunteer bird ringing foundation Calidris to help address this data gap. 50 years of data has recently been digitized. Here, we share the first insights into long-term trends in body condition and moult among shorebird populations in the Wadden Sea.

Digging a little deeper: insights from stable isotopes in Red Knots

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Tracking birds to identify migratory linkages in space and time is important for managing and conserving populations, but data derived from extrinsic markers such as field-readable bands and tracking devices can be biased by unequal distribution of capture and resight effort, and by potential consequences of carrying tracking devices. We used stable isotope profiles, in tandem with resight records and tracking data, to examine patterns of connectivity in Red Knots *Calidris canutus* between sites in the northern Gulf of Mexico and along the Pacific coast of South America. Linear discriminant functions performed well at correctly predicting knots to each of the northern Gulf states and to Chile, but were less accurate for prediction to lower latitude sites on the Pacific coast. We found support for fine-scale differences in isotope profiles even within some sites, and examination of resight records and geolocator tracks yielded additional insight into local differences in habitat use and oceanographic factors incorporated into isotope values. Combined, the data indicate that flight feather molt usually (but not always) takes place on the terminal nonbreeding area. This study builds on previous work on stable isotopes and Red Knots, further illustrating the value and potential new applications of isotope studies on a highly-migratory species with a relatively specialized diet.

Evaluating the effects of tagging on activity and behaviour of a small wader species, the Common Snipe, using tri-axial accelerometry

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The large-scale deployment of miniaturised technologies to track animal movements in projects like HABITRACK, which coordinates the tracking of 14 migratory bird species across Europe to support their conservation, is emerging. In this context, especially when working on species of conservation concern, it is essential to assess the potential impact of on-board devices. This study focuses on one of these 14 species, the Common Snipe *Gallinago gallinago*, and more specifically on French breeding populations that are currently at risk of extinction. Individuals from these populations were equipped with GPS and accelerometry tags in 2024–2025 to better understand their ecological needs and enable rapid implementation of conservation actions. To evaluate the benefit-risk balance of such deployments, we analysed the effects of tagging on snipe activity and behaviour using GPS and accelerometry data. Dynamic body acceleration (DBA), derived from accelerometry signals, serves as a proxy for movement-based energy expenditure. We modelled the changes in DBA over time to detect behavioural shifts, from the capture to the following weeks, and to estimate the tagging effect duration. We also applied an unsupervised classification algorithm to categorise accelerometry signals into behavioural classes, from rest to active movements and flight. We estimated the average time budget for each behaviour, at hourly intervals, and compared it to patterns observed at multiple temporal scales after tagging. This two-step method offers insights into the extent and duration of tagging effects on a small wader species and, more broadly, helps improve best practices for bird biologging.

Shape-shifting in relative wing length of juvenile shorebirds: no evidence of developmental temperatures driving morphological changes

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Morphological changes concurrent with climate change are increasingly identified in birds, often through decreasing body size and increasing appendage size. Such changes could have thermoregulatory implications, through the improved surface area to body ratio they provide. Due to the role of bird wings in thermoregulation, wing length relative to body mass may be changing as another form of shape-shifting, where increased relative wing length may facilitate increased heat loss as climates warm. We investigated changes in relative wing length on a dataset of nearly 20.000 juvenile shorebirds from 11 species over the past four decades, to determine changes in morphology and whether these are linked to developmental temperatures. Overall, across species, we found that relative wing length increased across the 43-year study period in populations migrating to tropical northern Australia but not in those migrating to temperate southern Australia. Furthermore, we found that changes in relative wing length were not driven by immediate responses to high temperature at the breeding ground during juvenile growth. These results may suggest that relative wing length increases occur in shorebirds occupying already warm climates, where they might potentially be more thermally challenged under further warming, but that such changes are not occurring through plastic mechanisms during development.

UAVs' assessments of vegetation structure unveil the role of sward height and heterogeneity on wader nest survival in semi-natural grasslands

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Several ground-nesting wader species rely on semi-natural grasslands for breeding. Identifying which grassland characteristics are essential for waders to select their nesting location and which ones enhance their clutch survival probability is crucial to implementing efficient conservation plans. However, many vegetation structural characteristics, such as sward height or heterogeneity, can be logistically complex to measure using traditional methods in relatively large areas, especially considering the highly accurate resolution needed. In five key Estonian coastal grasslands for waders, we explore the use of unmanned aerial vehicles (UAV) to assess sward characteristics and other landscape-level features, such as flooded areas and the forest edge, and combine it with nest surveys and survival monitoring. We found that the four main wader species, Northern Lapwing *Vanellus vanellus*, Common Redshank *Tringa totanus*, Common Ringed Plover *Charadrius hiaticula* and the Baltic Dunlin *Calidris alpina schiinzii*, do not significantly differ in their nest site selection in terms of vegetation height, growth rates, or sward heterogeneity. Yet, we found that vegetation sward height and heterogeneity surrounding the nest sites within a 2-meter buffer were positively related to nest survival probability. Additionally, nests further away from flooded areas had lower survival probability. Our study highlights the importance of integrating UAV remote sensing techniques within the animal conservation research field to unveil ecological patterns that may remain hidden using more traditional methods.

Hue knew? Exploring aberrant egg coloration in Ruff *Calidris pugnax* clutches

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Waders typically lay heavily marked and well camouflaged eggs to match their nesting substrate. Occasionally, clutches contain aberrantly pigmented or unmaculated eggs. Such anomalies have been reported at least in the Eurasian Curlew *Numenius arquata*, Northern Lapwing *Vanellus vanellus*, and Snowy Plover *Anarhynchus nivosus*. However, whether aberrant egg coloration increases in frequency and its effects on clutch survival remains unknown. Ruffs typically produce eggs with an olive-green background and brown markings. Here, we report an unusually high frequency of eggs with aberrant blue or pale background colours in wild Ruff populations. The clutches were studied at two field sites at Bothnian Bay, Finland, over seven years. To investigate this phenomenon, we address the following questions: (1) Has the frequency of blue-egg clutches changed over time? (2) Does the presence of blue eggs influence clutch conspicuousness in the field? and (3) Is egg pigmentation associated with nest predation? We collected nesting data including egg measurements, nest age, and individual nest fate. Aberrant eggs were recorded via notes or photographs. To test detectability, we implemented a standardized protocol in which observers searched for nests of known locations from a 10-meter distance.

Breeding seasonality in Charadriiformes on the Andean Altiplano is influenced by rain and possibly flood risk

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The Andean Altiplano in South America represents a remarkable mountain ecosystem with unique wildlife. However, knowledge of the breeding ecology of birds inhabiting it is scarce, relying mostly on anecdotes, while drivers of breeding phenology remain unexplored. Here, we combined records of naturalistic databases, literature and our own observations to provide an account on timing of 11 species of ground-nesting Charadriiformes breeding above 3000 m in Peru, Bolivia, Chile, and Argentina. We observed a clear annual seasonality, with most individuals initiating breeding between July and December. Birds started breeding earlier when closer to the equator, but later with increasing elevation. Climatic variations during chick care and incubation periods best explained breeding timing, when performing model selection. This result suggested that local birds use environmental information to predict favourable conditions to incubate and rear their chicks. Increased rainfalls and temperature were associated with advanced breeding start, while number of rainy days was associated with delayed initiation. Our field observations provided additional evidence that within the same locations, rainfall could influence shorebird species differently. Species nesting on impermeable soils interrupted courtship activities with increasing rains to potentially avoid risk of clutch flooding, while species nesting in vegetation were not negatively affected by rain. These observations were supported by citizen-science data. Our study provided the first comprehensive exploration on breeding phenology of Andean shorebirds. It suggested more complex patterns than previously published, highlighting that local nesting environments could affect phenology of tropical ground-nesting birds.

A female-biased chick care suggests a polygynous mating system in the Two-banded Plover

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Parental care is a key life history trait in animals, influencing reproductive strategies, offspring survival, and investment per offspring. While parental care is well studied in birds—particularly shorebirds, which exhibit remarkable diversity in both incubation and chick care—significant knowledge gaps remain. One notable gap is the relative lack of research in the Southern Hemisphere, despite approximately a third of shorebird species breeding south of the equator. Here, we investigated a breeding population of the Two-banded Plover *Charadrius falklandicus* in southern Patagonia to study its breeding biology, with an emphasis on parental care. Over three consecutive seasons, we found that nesting success was low, possibly due to high nest predation by foxes. Both sexes incubated, with females incubating during the day and males at night. Wind speed was unrelated to time spent incubating, but temperature followed an inverted U-shaped pattern, where adults left the nest unattended for longer when temperatures were neither too cold nor too hot. Chick care was either biparental or uniparental, with nearly half of the observations showing only females caring for the chicks. The sexing of ten chicks revealed a balanced sex ratio. Our results, along with theoretical concepts, suggest rather conventional sex roles and a possible polygynous mating system in this shorebird. However, male polygamy is yet to be confirmed.

Mate attraction investment and its association with sex-specific immunity in shorebirds

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Sexual selection predicts that each sex should allocate resources to traits that maximise their own fitness. For instance, males often benefit more from investing in mate attraction than in longevity, whereas females typically show the opposite pattern. These sexually selected traits often entail physiological costs, including potential trade-offs with immune function, yet little is known about how sexual selection pressures shape sex-specific variation in immunity across species. To address this gap, we used phylogenetically informed comparative methods to investigate whether sexual selection—using polygamy score, sexual size dimorphism, and dichromatism as proxies—is associated with sex differences in cellular immunity. We analysed immune cell counts from blood smears collected from 15 breeding populations across 14 shorebird species, a group known for their diverse reproductive strategies and parental care systems. We found that females had significantly higher total white blood cell counts than males, although no consistent sex bias was observed in specific cell types. Interestingly, increases in sexual size dimorphism towards one sex were associated with increases in total white cell counts in the same sex. In contrast, polygamy scores were negatively associated with sex bias in eosinophil proportions: greater polygamy in one sex was linked to a higher proportion of eosinophils in the other sex. These findings suggest that variation in sexual selection may help explain interspecific patterns of immune investment in shorebirds. Understanding these links is key to revealing how life-history strategies and mating systems shape physiological traits in wild birds.

Ruff leks as a conservation tool?

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Baltic coastal meadows are diverse ecosystems that provide important breeding grounds for endangered wader populations, including the Ruff *Calidris pugnax*. Global warming and changes in anthropogenic activity have increased overgrowth and flooding risk of these habitats. Emblematic species such as the Ruff have the potential to serve as flagship species enabling better protection of these important ecosystems which are now under large-scale restoration by cattle grazing and mowing. At Pitkänokka meadows (Oulu, Finland), long-term monitoring has started to reveal key characteristics that influence habitat selection and reproductive success. One essential factor influencing the nest site selection of females is the proximity to leks, where males aggregate and display to attract females. Hence, providing suitable lek sites in high-quality nesting habitats may serve to divert females away from breeding in risk-prone areas (e.g. by flooding or cattle trampling). In 2021 such artificial lek locations (i.e. small hills that increase the visibility of lekking males to conspecifics) were created in our study area. Observations indicate that these artificial lek sites have been used by males for display since 2022. However, a detailed evaluation of the extent of their usage and impact on the reproductive success of those males is still lacking. Furthermore, it remains unclear how artificial sites influence female visitation and nesting decisions. To answer these questions, we propose to analyze artificial lek site usage, including male and female attendance, duration and diversity of male display, female visits, and female nesting decisions compared to natural lek locations over time.

Curlew Solutions Trial: Informing agri-environment policy for Curlew recovery in farmed landscapes

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The Eurasian Curlew is a globally Near Threatened wader species. Around 26% of global breeding pairs occur in the UK, of which half breed in England. Here, national trends suggest a 32% decline between 1995 and 2022, widely attributed to unsustainably low levels of breeding productivity. Conservation actions to boost Curlew breeding productivity are urgently required to slow and reverse population declines of this threatened species. The Curlew Recovery Partnership, a collaboration between eNGOs, statutory agencies and landowners, proposes that the most significant potential to recover populations at a landscape-scale is by boosting productivity in farmed landscapes, particularly those dominated by improved and semi-improved grassland where agricultural operations and predation are the main threats to nest and chick survival. The Curlew Solutions Trial (CST), funded by the Natural England Species Recovery Programme, aims to inform the design of agri-environment prescriptions by improving understanding of breeding curlew in farmed landscapes and identifying agricultural demands likely to constrain conservation efforts. Here, we report on a field trial conducted as part of the CST, which aimed to quantify the potential of predator-exclusion fencing to boost curlew breeding productivity across five farmed landscapes in England. We assess (i) variation in curlew nest survival and the effect of fencing; (ii) the causes of nest failure; (iii) variation in fledging success and (iv) the response of curlew to avian predator activity.

Informing Curlew Recovery – A review and modelling of conservation strategies across the UK and Western Europe

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Eurasian Curlew populations are in decline due to low breeding productivity, driven by high predation and the loss and degradation of breeding habitats. In response, a significant number of Curlew conservation projects have been implemented across the UK and Europe, targeting interventions aimed at enhancing reproductive success. Understanding the success of interventions is crucial for recovery and the efficient use of limited resources; however, rigorous field trials are resource-intensive and often impractical. We saw an opportunity to synthesise the evidence and experience from Curlew projects to evaluate the potential of interventions to support long-term population stability. We gathered data using a questionnaire and accompanying request for monitoring data, distributed through the Curlew Recovery Partnership's Curlew Network and the African-Eurasian Migratory Waterbird Agreement's Eurasian Curlew International Working Group mailing list. Using a population modelling framework, we assess whether observed improvements in nest and chick productivity could be sufficient to achieve population stability under different ecological contexts and levels of intervention effort. Our findings demonstrate that interventions, as currently applied by Curlew conservation projects, can have a significant impact on nest success; however, improving chick survival remains a challenge. Knowledge gaps exist regarding the effectiveness of specific interventions and their combinations, as well as the broader context in which they are utilised. Ongoing monitoring in the field and assessment of intervention success are crucial for refining conservation strategies and informing policies aimed at recovering Curlew populations.

Factors influencing bivalve collection, the potential for sustainable community aquaculture in the Bijagós Archipelago and its effects on benthic and waders populations

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Shellfishing is an ancestral activity strongly linked to ethnocultural practices. In West-Africa, certain bivalve species constitute the main source of protein and livelihood for indigenous communities, while being simultaneously important in intertidal food webs. Shellfishing intensity can vary according to different levels of protection, provided either by formal (protected areas) or informal (traditional) regulations. In the Bijagós Archipelago, a total of 182 women from 20 different villages were interviewed across four study areas with different levels of formal and traditional protection, to investigate socio-economic factors influencing the harvest collection of two bivalve species. Results showed that collection patterns were mainly influenced by the collection purpose, noticeably for own consumption or income. Higher protection and management levels seemed to be associated with higher availability. With current UN previsions for population growth, consequential increasing pressure on natural resources and climate change effects, it is most imperative to find solutions that help improve the livelihoods of the most vulnerable communities, but also the food availability for other species who consume these resources. Shellfish aquaculture might be a way to alleviate these impacts, improve livelihoods and tackle gender equity problems. It can also serve as a more accessible feeding ground for waders who also use these mudflats for fueling during migration. Therefore, it is extremely important to understand the main obstacles to the acceptance of aquaculture produced shellfish, and the connections these communities have to this resource while deepening the knowledge about the targeted species lifecycle and possible human-wildlife conflicts.

Wader conservation project in Rwanda through Karago Lakeshore and Bihinga Swamp ecological conservation and restoration

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Rwanda's wetlands cover 10.6% of the total surface of the country and host large biodiversity of all taxa, especially birds. Wetlands are a good host of migratory birds, especially waders. In the past 50 years, Rwanda has undergone very strong changes due to human population growth, leading to a reduction of about 10%. This led to habitat restriction from wetlands and savannah forest to protected areas. Lake Karago and The Bihinga Swamps are good examples of positive impacts brought by these changes. Both sites are located in the valleys of Nyabihu mountains, which were significantly affected by climatic change and local community degradation. This led to the extinction of the Maccoa Duck *Oxyura maccoa,* as since 2000 there are no recent records. This abstract outlines a proposed project focusing on wetland restoration initiatives coupled with wader bird ringing activities. The project aims to enhance wetland ecological integrity through scientifically informed restoration techniques, including hydrological interventions, native plant reintroduction, and community engagement in conservation efforts. Simultaneously, a comprehensive wader bird ringing program will be implemented to monitor population dynamics, migration patterns, and habitat utilization of these highly sensitive avian species. Data collected from ringing, including species identification, age, sex, and biometric measurements, will provide invaluable insights into the health of wetland ecosystems and the impact of restoration activities on bird populations. This integrated approach will not only contribute to the ecological recovery of degraded wetlands but also foster a deeper understanding of wader bird ecology in Rwanda, informing future conservation strategies and promoting sustainable wetland management practices.

Coastal adaptation to benefit waders and other waterbirds in the Greater Thames Estuary, England

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Waterbirds in the Greater Thames are under increasing pressure from loss of intertidal habitat through coastal squeeze; reduction in quality of coastal grazing marsh and lagoons due to drier conditions in late spring and summer; and habitat loss through development, particularly renewables. Other pressures include recreational disturbance and high densities of generalist predators. In its approach to the Greater Thames, the RSPB recognises that while the extent and spatial configuration of habitats will inevitably change, a priority is to maintain functional habitat for waterbirds at an estuary-wide level by: 1) Designing managed realignment schemes to maximise their value for waterbirds. 2) Using dredgings to recharge areas of eroding saltmarsh and create shingle nesting and roosting habitat. 3) Maintaining and increasing the extent of areas of high quality coastal grazing marsh in areas expected to remain protected by coastal flood defences and have sufficient freshwater. 4) Creating saline lagoons to the landward side of sea walls to provide breeding and high tide roosting/feeding areas near extensive areas of intertidal habitat, in areas expected to remain protected by coastal flood defences, but which lack freshwater. 5) Using a phased approach to adaptation in areas not expected to remain protected by coastal flood defences, and which lack sufficient freshwater. This would involve creating mosaics of saline water bodies with the expectation they will eventually become intertidal habitat through managed (or unmanaged) realignment. We describe the response of waders and other waterbirds to examples of these measures already in place.

Lessons in diplomacy - What Curlew conservation has taught me

Flo Blackbourn[1]

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Conservation is often wrought with problem solving and conflicts, and wader conservation is no exception. Focusing on Curlew conservation and using examples I have come across in the real world, I will detail what I have learnt since moving into the often-complicated world of wader conservation. From predator control to deciding on key focus areas (sometimes at the expense of others), difficult decisions have to be made, all while trying one's best to keep the public engaged – something which is especially difficult when the realisation strikes that many people simply haven't heard of many of the wader species needing our help. Many of the problems faced in this line of work have anything but simple solutions, but as conservationists, working together and with stakeholders from various backgrounds is important for achieving success. Conserving wading birds is often more about other people and finding ways to work with them than it is directly working with wildlife, so diplomacy and critical thinking is key. This talk will delve into some of the challenges and difficult decisions faced in wader conservation, from the viewpoint of someone new to the field, and will encourage open discussion and a desire to always find a middle ground.

Waders in the desert: Behavioral insights from a Kentish Plover population in Hassi El Gara

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Saharan wetlands are highly valuable ecosystems for wader populations. They can serve as permanent habitats, migratory stopovers, or transitional zones for this group of birds. Due to their geographical isolation, these environments are extremely sensitive to disturbances. However, studies on wader communities in these areas remain scarce. In this context, we conducted a field investigation at the Saharan wetland of Hassi El Gara , a Ramsar-listed site, aiming to estimate the breeding wader populations. Particular attention was given to the Kentish Plover *Charadrius alexandrinus*, for which we studied both behavior and nesting characteristics. Over 100 individuals were recorded. Behavioral observations on 17 pairs revealed 25 distinct behaviors during the study period. Four behaviors were most frequent: pecking, walking, absenteeism, and vigilance. These four accounted for over 80% of all observations. Additionally, six nests were found, and we noted that nesting activity began relatively late compared to a northern Algerian site studied during the same period. These findings highlight both the ecological importance and vulnerability of isolated Saharan wetlands and underscore the need for continued research and conservation efforts focused on these critical habitats for breeding waders.

Does clutch size influence incubation behaviour in the Common Ringed Plover?

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Most shorebirds lay a fixed maximal clutch size of four eggs, but the evolutionary basis for this constraint remains unclear. One proposed explanation is the incubation limitation hypothesis (ILH), which suggests that clutch size is limited by the parent's ability to maintain optimal egg temperatures. While the ILH has received some attention in shorebirds, empirical support remains equivocal, and detailed behavioural studies are few. According to the ILH, clutches exceeding the modal size may suffer from suboptimal conditions due to reduced parental incubation efficiency. However, larger clutches might also trigger changes in parental incubation behaviour, for example due to higher energetic demands, potentially resulting in altered incubation schedules. We tested the ILH by experimentally enlarging clutches in the Common Ringed Plover *Charadrius hiaticula* and comparing incubation behavior in five-egg clutches with unmanipulated four-egg clutches using continuous video monitoring. We analyzed incubation constancy, bout length, changeover frequency, and sex-specific contributions to assess whether and how parental behaviour adapts to increased clutch size.

Habitat use, diurnal activity budget and deterrent behaviors of breeding Black-Winged Stilts *Himantopus himantopus* in Ghana

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The Densu Delta Ramsar Site represents a critical breeding habitat for the Black-winged Stilt, where the species nests in salt pans and mudflats. However, breeding success is threatened by flooding and nest predation, notably by stray dogs. To support conservation and habitat management efforts, this study examines the species' habitat use, diurnal activity budget, and deterrent behaviors during the breeding season. Between April and July 2016 and 2017, nests were monitored at known breeding locations, with behavioral observations conducted over 12-hour intervals from 06:00 to 18:00. On average, breeding Black-Winged Stilts allocated 41% of their time to foraging, 39% to brooding, 7% to nest maintenance, and 11% to resting. Nest location and distance to the road were significant predictors of nest success. Nests constructed in the salt pans and those located farther from the main road had a higher chance of success. Deterrent behaviors were triggered when potential threats approached within a minimum distance of 5 to 30 meters. Observed responses included vocalizations, aggressive displays, and coordinated defensive actions, especially during peak hatching periods. Breeding pairs frequently employed distraction displays—such as the broken-wing dance or false brooding—to divert avian and terrestrial predators. Interspecific aggression toward other shorebirds was also documented. These findings emphasize the ecological significance of behavioral adaptations in enhancing reproductive success under high predation pressure. The results advocate for targeted conservation strategies to reduce disturbance and improve breeding outcomes for waterbirds in West African wetland ecosystems.

How to describe the vocal repertoire of a species? A case study of the Black-tailed Godwit

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Most research in avian bioacoustics has focused on songbirds, whose songs are both theoretically rich and widely studied. In contrast, the calls and vocal communication of non-songbirds remain poorly described, despite recent advances in recording technologies that make such studies increasingly feasible. Understanding how species use calls across different behavioural contexts is essential for a broader view of animal communication. In this study, we investigated the vocal repertoire of the Black-tailed Godwit *Limosa limosa limosa* using passive acoustic arrays, nest microphones, and detailed behavioural observations across three breeding seasons in northwest Netherlands. We aimed to record and categorise all vocalisations used by individuals and identify the contexts in which they occur. So far, we have identified over 30 distinct behavioural contexts associated with specific calls or call sequences. To illustrate the complexity of this repertoire, we will focus on antipredation calls and how their usage varies with seasonality, predator types, individual personality, and the perceived level of threat. These findings highlight how subtle behavioural and ecological factors can shape vocal communication of a shorebird species and emphasise the value of expanding acoustic research beyond traditional songbird (song) models.

Five years of headstarting Eurasian Curlew - insights into behaviour, survival and recruitment

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'Headstarting' is an increasingly common conservation tool for small, threatened breeding wader populations - eggs are collected from wild nests and incubated in captivity, and hatched chicks are released back into the wild at fledging age. The Breckland region in eastern England hosts one of the largest remaining lowland populations of Eurasian Curlew *Numenius arquata* in England at about 150 pairs. Headstarted Curlew have been released on the edge of the Breckland population since 2021, with the aim of extending the population's range. Eggs are collected from airfields where they would otherwise be destroyed due to territorial adult birds posing a risk to flight safety. Hatching rate of viable eggs was on average 88% (81-94%) over four years, while fledging rate from hatched eggs was 79% (60-92%). All birds were individually colour-marked, and a subset were GPS tagged yielding up to at least three years of movement behaviour. Breeding season surveys to detect recruiting birds in the years since the first release have been conducted in proximity to the release sites, as well as in the nearby core Breckland population, while local volunteer effort has yielded non-breeding sightings of marked birds. Out of 208 birds released between 2021-24, 28 individuals have shown breeding-type behaviour, ranging from prospecting behaviour to nesting attempts. GPS tracking has shown that prospecting birds visit Curlew breeding 'hotspots', areas of extensive grassland with a number of wild breeding pairs, often visiting several throughout the breeding season. Annual survival of headstarted birds ranged from 0.31-0.80.

Predation risk does not delay breeding but reduces nest survival in High-Arctic shorebirds

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Understanding predator-prey interactions is crucial considering their impact on the behaviour, ecology, and evolution of both predators and prey. Such interactions can result in the direct consumption of the prey, but also in behavioural antipredator responses. Predation risk is a dynamic process, resulting in constant adjustments by the prey at different spatiotemporal scales. In the Arctic, predator-prey interactions are expected to change owing to the ongoing climate change and the associated shifts in ecosystem composition. However, most studies investigating the impact of predation on ground-nesting birds in the Arctic use data from artificial nests that lack the behavioural component of incubation. Using nest data collected in Northeast Greenland, we investigated how spatial variations in predation risk by Arctic Foxes *Vulpes lagopus* impacted daily nest survival rates and dates of nest initiation of two sympatric species of sandpipers: the Sanderling *Calidris alba* and the Dunlin *Calidris alpina arctica*. We found that both species had higher daily nest survival rates in areas of low fox activity. However, Sandpipers initiated their nests earlier in areas of high fox activity. Together, these results show that predation risk does not delay the breeding phenology of high-Arctic sandpipers, and that predation risk clearly translates into lower nest survival.

Developing methods for analysing environmental contaminants in aquatic bird samples

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Our daily practices introduce a variety of contaminants into the surrounding environment, which persist in the food chain, affecting other species and altering ecosystems. Biological organisms from different trophic levels have been widely used as indicators to provide evidence of contaminant exposure. Despite limited research, particularly in the Asia-Pacific region, understanding the status and effects of these contaminants on aquatic bird species in Australia's coastal and wetland ecosystems is crucial. Our research aimed to develop and optimize advanced chemical methods for detecting and analysing emerging environmental contaminants using Mass Spectrometry. To assess the contaminant exposure, we analysed historical and current aquatic bird feathers, faeces, blood, and body tissue samples. A comprehensive methodological guideline has been developed to aid in various biological sample collections (of shorebirds and waterfowl), ensuring proper processing and further chemical analysis by establishing a robust analytical approach to better understand the biological system in response to ongoing environmental challenges. Additionally, Geographic Information Systems (GIS) were used to correlate chemical outcomes with the targeted bird species' habitat ranges by considering historical and present-time landscape use and changes. This spatial analysis has enhanced our insights into how different contaminants can impact these birds across their habitats. Our research underscores the critical role of sophisticated chemical methods and spatial analysis in improving our understanding of biological ecosystems for possible conservation and management purposes.

The impact of (mechanized) shellfish fishery on the shellfish eating Oystercatcher

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The conflict between shellfish fishermen and nature organizations in the Dutch Wadden Sea escalated around 1990. At the time, fishery law did not permit to reduce or stop fishing effort to reduce the impact on natural values. A major research program was initiated on the impact of fishery of Mussels and Cockles on the natural values of the subtidal and intertidal areas. Also, new protection laws came into effect. In 2005 a new fishery policy was adopted. Mechanized fishing for Cockles was stopped but permits for hand gathering Cockles were increased (contrary to initial plans to end this fishery altogether). Dredging intertidal mussel beds became highly restricted. In this talk we will review what we learned about the impact of the various shellfish fisheries on the shellfish eating Oystercatcher and assess whether the new policies had the desired effect. It was estimated that before the intertidal mussel beds were fished away, more than half of the wintering population of Oystercatchers depended on Mussels. It took decades before the intertidal mussel beds had completely returned. Around 2003, the Pacific oyster invaded the Dutch Wadden Sea. Oyster beds and mixed beds of mussels and oysters offer much less food to Oystercatchers than pure mussel beds. Furthermore, conditions during the breeding season also heavily impact the Oystercatcher population. This includes an increased risk of flooding for saltmarsh breeding Oystercatchers due to climate change and a multitude of negative impacts due to agricultural intensification affecting the majority of the breeding population.

Microplastic contamination in coastal habitats: implications for wintering shorebirds

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Microplastic pollution is an escalating threat to coastal ecosystems, yet its distribution and impact within food webs remain insufficiently understood. To address this knowledge gap, we conducted an extensive investigation into microplastic contamination across critical wintering shorebird habitats including mudflats, mangroves, and sandy beaches along the west coast of India. Through a multi-matrix approach, we assessed microplastic presence in water, sediment, biofilm, plankton, benthic macroinvertebrates, and shorebird droppings across ten coastal sites from 2020 to 2022. Our findings highlight notable spatial and seasonal variations in microplastic accumulation, largely driven by human activities. The rising concentration of microplastics in shorebird prey and droppings corresponds with declining prey abundance and shorebird populations, signaling potential ecological consequences. Fibre-shaped microplastics, predominantly sourced from discarded fishing gear and domestic sewage, were the most common. The type and quantity of microplastics ingested varied based on shorebird foraging behaviors, with biofilms serving as key pathways for microplastic transfer. Shorebirds with restricted foraging ranges exhibited the lowest levels of contamination, whereas those feeding across multiple sediment layers accumulated higher concentrations. These findings emphasize the urgent need for targeted conservation efforts to mitigate plastic pollution at its source. The study also raises concerns about the long-term impacts of microplastic contamination on migratory shorebirds in the region, highlighting the importance of continued research to guide effective conservation strategies.

Blessing or curse? The effects of Artificial Light at Night on the nocturnal space use of urban waders

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The expansion of urban areas worldwide is not only causing widespread habitat loss, but also altering the wider landscape with spillover effects such as light. While artificial lighting has been shown to have various negative impacts on many taxa, for some species it may represent opportunities, for example by eliminating sensory constraints on foraging. Coastal areas are among the most severely impacted by expanding urbanisation, and consequently coastal species such as waders are increasingly being brought into direct contact with Artificial Light at Night (ALAN). Several shorebird species have been found to forage more efficiently under ALAN by switching from tactile to visual foraging, increasing prey intake rates. While this apparently indicates a benefit afforded by ALAN, it may also represent a challenge of living in an urbanised landscape: lower habitat quality in urbanised areas may mean birds must forage nocturnally to meet their energetic requirements. There have so far been no large-scale studies on the effects of ALAN on the space use of waders, and the drivers of artificial light use for foraging are not well understood. This study uses GPS tracking data from Redshanks, Curlews, Oystercatchers, and Black-tailed Godwits wintering in Dublin Bay to quantify the effects of ALAN on space use in these species, and assess the scale and individual-level drivers of nocturnal foraging under artificial lighting. Understanding the effects of ALAN on space use, and the drivers of its use by waders, will be key in predicting potential fitness implications of an increasingly bright nocturnal landscape.

Revealing the Catscape in two meadow-bird areas in the northern Netherlands

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Domestic cats are among the most widespread predators worldwide. Their free-roaming behaviour poses significant threats to wildlife through disturbance and predation. This is particularly concerning in sensitive ecosystems such as Dutch meadow-bird areas, which are under pressure from agricultural intensification and other predators. The Netherlands has a special responsibility under the European Bird Directive for the black-tailed godwit, with 80% of the Western European population breeding there. Although free-roaming cats are frequently observed, little is known about their presence in meadow-bird areas or how their behaviour varies by cat type or time of day. To address this, we monitored free-roaming cats in two protected meadow-bird areas and surrounding meadows during the breeding season for several years. We tracked 36 owned cats from nearby farms and houses using GPS loggers to assess movement patterns, home ranges, and habitat use. Additionally, we deployed 60 camera traps to detect unowned cats and other predators. Many tracked cats entered the protected areas and surrounding meadows, both during day and night, with longer distances travelled at night. Camera traps revealed several untracked, unowned cats occupying extensive parts of the protected areas. Combined, these methods revealed a widespread “catscape” throughout both areas. This suggests that, beyond direct threats such as predation, cats may also disturb meadow birds indirectly by expanding the landscape of fear. Our findings highlight the value of combining GPS tracking and camera trapping for comprehensive predator monitoring, and emphasize the need for targeted conservation measures to reduce cat impacts in important breeding areas.

Breeding densities of waders in wind power facility in coastal Norway

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Wind power facilities require open landscapes with predictable winds for efficient power generation. Land-based wind projects have been developed in coastal areas of Norway that are often important breeding habitats for migratory birds. We investigated the habitat use and abundance of heathland birds at Smøla, a coastal island where a major wind power project was established in 2002 with 68 turbines and an installed capacity of 150MW. We expected that energy development might lead to habitat loss for ground-nesting birds, and that species with aerial flight displays might be at higher risk of collision mortality. Two rounds of line transect sampling were conducted in 2007 and 2025 in 10 km blocks that were located within, adjacent, and outside of the footprint of the wind turbines. Bird densities were low with a median of 4 birds detected per km on the line transects in coastal heathland habitats. Six species of waders were detected as breeding birds with evidence of nesting and successful hatching. Golden Plover, Common Snipe, and Dunlin were common, whereas Whimbrel, Common Sandpiper and Redshank were encountered infrequently. Estimates of density were calculated with distance sampling methods and compared between the two time periods. New information on bird distributions and abundance will inform plans to redevelop the wind power facility with fewer but larger turbines.

Migratory connectivity of shorebirds at a critical site in the Central Asian Flyway: Mannar Island, Sri Lanka

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The Central Asian Flyway (CAF) remains the least studied among global flyways, despite spanning 30 countries and supporting 605 migratory species. The patterns of migration into Sri Lanka, one of the flyway's southernmost non-breeding destinations, have been particularly understudied. To address this gap, we initiated Sri Lanka's first long-term shorebird migration monitoring program in 2018 at Mannar Island, a key migratory entry/exit point and critical site for shorebirds within the CAF. We marked 329 shorebirds from 25 species using rings and numbered leg-flags. Among them, 54 individuals (16%) were resighted or recaptured, with 31 birds from nine species demonstrating non-breeding site fidelity. Resightings of Great and Red Knots from China and India underscored Mannar's connectivity within the CAF. GPS tracking of 13 individuals from seven species identified key movement corridors at both regional and flyway scales. Frequent non-migratory movements within the Palk Bay–Gulf of Mannar region—an area under intense wind energy development pressure—were documented. Notably, Crab Plovers (n=6) exhibited extensive spatial use and revealed a potential breeding site at Point Calimere, Southern India. A Grey Plover tracked in 2022 completed an 8,719 km northward migration to Yamalia, Russia, crossing the eastern Himalayas and Tibetan Plateau at a maximum altitude of 5,546 m AMSL, spending 75% of its 56.7-day migration at stopover sites. Our findings provide the first evidence of migratory shorebird movements in Sri Lanka. We continue to generate critical insights into shorebird connectivity and urge policymakers to prioritize protection of key non-breeding and staging sites vital for their survival.

Habitat tracking for the conservation of Common redshank *Tringa totanus*: High-resolution GPS reveal spatio-temporal movements and habitat preferences during the non-breeding phase

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Understanding full annual cycle movements and habitat use are essential for the conservation of migratory species. We tracked Common Redshanks *Tringa totanus* using high-resolution GPS devices across the East-Atlantic Flyway, covering breeding, migration and wintering periods. We modelled individual home ranges during the different stages of the biological cycle and examined spatial and temporal variation in habitat use across multiple sites. These sites differed in landscape structure, habitat composition and management practices, allowing us to assess how local conditions influence space use. Our results reveal consistent individual strategies during winter as well as site-specific differences in habitat selection. This study provides crucial insights into the habitat needs of the species throughout the year and supports the development of conservation strategies.

Habitat use and selection across the circannual cycle: intra- and interspecific differences among migratory waders

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Throughout their annual cycle, migratory waders depend on a network of diverse habitats to fuel their migrations, ensure reproductive success, and survival. With distributions ranging from tropical to arctic regions and varying degrees of anthropogenic influence, species are expected to differ in their use and selection of similar habitats along migratory flyways. Here, we use GPS tracking data from three wader species with distinct migratory strategies along the East Atlantic Flyway to quantify habitat use and selection throughout the annual cycle. We found both intra- and interspecific differences across the flyway. While some species show clear seasonal contrasts in their reliance on anthropogenic habitats, others remain consistently associated with natural habitats year-round. These findings are particularly relevant for conservationists, given the dependence of some species on anthropogenic and economically driven landscapes and the continued degradation and conversion of natural wetlands.

Global Flyway Network: towards a living multi-layered atlas of shorebird life histories

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For a decade or so, Global Flyway Network (www.globalflywaynetwork.org) has been developing an online interface to visualize tracking data of shorebirds. BirdEyes recently developed and implemented several major improvements in GFN's design and functionality. By maximizing computational efficiency, GFN now allows for much faster loading of increasingly fine-grained data of an ever-growing number of tracked birds. Moreover, GFN now supports high-level user interaction, including colour-coding and filtering of tracks based on individual characteristics of birds archived in Movebank's reference data. Selected datasets can then be turned into an interactive animation. As we will demonstrate in this talk, these advanced visualization capabilities drastically improved GFN's utility for research, as well as outreach and story-telling. The system also provides the technical foundation for interactive dashboards that facilitate stakeholder engagement, for example in the context of the WAAKVOGELS project. At the moment, BirdEyes is working to integrate static (e.g. land use) and dynamic (e.g. historical weather) layers in the system, and building a webapp that allows users to upload observations, photos and videos of tracked birds from the field. All combined, we envision GFN as a living, interactive and multi-layered atlas of individual bird life-histories, with a multitude of applications and use cases. BirdEyes is keen to make GFN available as an online service to migratory bird researchers. We're now seeking feedback from the Wader Study community to help us prioritize next steps in GFN's development, and to develop a subscription model that is computationally and financially sustainable.

Tracing the past, tracking the present: Revealing the Camargue's role as a critical stopover for endangered Black-tailed Godwits

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A recent multi-source movement data study highlighted the Camargue region in southern France as one of the top ten staging sites for the endangered Black-tailed Godwit *Limosa limosa* in the western European population. Despite historical work on this species in the region, there is little information about Godwits' current spatial ecology in the Camargue. By combining historical records, aerial surveys, and GPS tracking data from 43 tagged Godwits in Germany, the Netherlands and Eastern Europe, we study seasonal and spatial patterns of Godwits. Our findings show that at least 16% of the German population stages in the Camargue. In line with the advancement of phenology in their breeding areas, the post-breeding passage in June-July occurs at least one month earlier now compared to observations in the 1960-90s, while pre-breeding timing appears more similar to historical sources. Godwits concentrate their activity on three main clusters in the western part of Camargue (including the Gard department). The core areas of godwits were located in specific hydrological units and were consistent across seasons and years, with great between-individual overlap. Core areas were mostly permanent or semi-permanent wetlands with active water level management for hunting, and with a low protection status, though godwits stage outside the local hunting season. Consistent with historical data, they did not use saltpans and rice fields as they do in other major stop-over areas. Based on these and other results, we reflect how local research and action in the Camargue may contribute to improved flyway conservation for Black-tailed Godwits.

Black-tailed Godwit Overview observations in Sénégal

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After probably more than 100,000 individuals in the 1950 years in Senegal, Godwit numbers dropped between 10,000 et 15,000 individuals at the beginning of 1990. In 1993, the highest numbers were counted in Ndiael. During the next two years, in the same period, birdcounters were in the Ndiael Reserve to try to confirm these important groups, but without any result. The most important groups were observed after 1993 in Djoudj National Park. With good organization of the waterbird census in progress since the beginning of 2000 in the Trois Marigots and Tocc-Tocc Reserve, the most important numbers counted were on average 2,000 birds. Many regular observations were done from 1991 to 2025 in six sites of Sénégal Delta. The database of OMPO/Direction des parcs nationaux du Sénégal (DPN) have confirmed that the Field station of Djoudj National Park is the most important for birds, because they are well seen in an open area, very close to the observers for the colour ring readings, and the majority of our observations come from this site. Other colour ring readings from other sites illustrated well the evidence of the huge mobility of the birds in Senegal Delta and elsewhere. Our fieldwork was focussed on the colour ring readings of the birds. On the basis of observations, we did a representation of the short or long stay of the birds in the same site, taking into account age's classes. This data was used to estimate the peak of their arrival in their wintering grounds. Our partners in the Netherlands indicated that the birds which missed their breeding season in Europe come back early to West Africa. The protection of the species in its wintering grounds in Senegal is a challenge; their habitats are threatened, the Senegal Delta is artificial with hydrological changes due to the damming. The birds preferring natural habitats and looking for good living conditions during their wintering in Senegal, move to Southern Senegal in Casamance and in Bissau Guinea where some thousands of individuals forage along mangroves, mudflats and inundated ricefields.

Knowledge of shorebirds and their status in Côte d'Ivoire, West Africa

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Côte d'Ivoire, a West African country located on the Gulf of Guinea, belongs to two migratory flyways for shorebirds: the East-Atlantic flyway and the Black Sea/Mediterranean flyway. Its wetlands - both coastal and non-coastal - regularly host numerous migratory shorebirds. A total of 58 species of shorebirds, of which 44 species (75.87%) are Palearctic migrants and 14 species (24.13%) are resident or intra-African migrants. Our study carried out from 2014 to 2015 on the south-eastern Ivorian coast showed that the Ivorian coast is an important wintering site but also a migratory stopover site for shorebirds using the East-Atlantic flyway. This study also showed that the Ivorian coastline, while not a main host area for shorebirds, has welcomed 15 species of Palearctic migrants, thus ensuring the conservation of shorebirds, mainly Sanderlings *Calidris alba*. Particular attention must therefore be paid to this species, which is numerically the most represented on the Ivorian coast.

Dynamics of the shorebird community at a major stopover site

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The Laguna Madre is an ecologically diverse hypersaline lagoon that supports considerable numbers of shorebirds during migration. Still, as a result of much of the lagoon's inaccessible and remote nature, the migratory shorebird community has yet to be thoroughly quantified or characterized. Therefore, we initiated a study to better understand the importance of the Laguna Madre as a stopover area for shorebirds during spring migration. We conducted biweekly surveys from late February through May 2020 and 2021 to determine abundance and species composition of migrating shorebirds. Using an airboat, each survey covered about 265 kilometers of tidal flat habitat. For each flock encountered, we recorded overall abundance, species composition, and location. Shorebird abundance was determined through a combination of direct counts and visual estimation of large flock sizes. Species composition was determined by direct identification during counts of smaller flocks and use of video recordings of scans of larger flocks. Surveys consistently estimated over 40,000 shorebirds, with peaks exceeding 300,000 shorebirds in early April 2020 and nearly 150,000 in 2021. Dunlin *Calidris alpina hudsonia*, Sanderling *Calidris alba*, and Western Sandpiper *Calidris mauri* were the most abundant species. These findings underscore the Laguna Madre's importance for declining shorebird populations and provide key data on seasonal abundance and migration timing to inform conservation efforts amid growing development pressures. Further research is needed to assess long-term trends, habitat use, and threats to ensure effective protection of this critical shorebird habitat.