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REVIEW

Long-term trends in bird populations: a review of patterns and potential drivers in North America and Europe

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Abstract. Data from breeding bird monitoring schemes provided material for numerous studies to relate the trends of particular species to their ecological and life history traits. This review contains a comprehensive comparison of results of these studies, describes the patterns in bird population trends in North America and Europe in last forty years and discusses potential drivers. I omitted other sources of bird population trend estimates to reduce methodological bias and because bird monitoring studies are rarely represented in other parts of the world. The most intensively studied driver is habitat alteration on breeding grounds represented by agricultural intensification in Western Europe and North American grasslands, forest expansion and land abandonment in Northern, Southern and Eastern Europe and parts of North America, and more localized urbanization and forest habitat fragmentation. Evidence for climate change impacts is robust and includes almost all European regions covered by the reviewed studies but the causal mechanisms of its influence on bird abundance are not sufficiently known. Population limitation by environmental changes in wintering quarters is well supported by the studies covering 1970s and 1980s, whereas the effects of migration strategy became less important from 1990s onwards. Support for other potential drivers, such as direct disturbance by humans, is rather limited and further studies are needed to confirm their effects.

Key words: population trend, birds, habitat change, climate change, migration, ecological niche, life history traits

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Spatial behaviour and habitat use of first-year Bluethroats *Luscinia svecica* stopping over at coastal marshes during the autumn migration period

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Arizaga J., Andueza M., Tamayo I. 2013. Spatial behaviour and habitat use of first-year Bluethroats *Luscinia svecica* stopping over at coastal marshes during the autumn migration period. Acta Ornithol. 48: 17–25. DOI 10.3161/000164513X669964

Abstract. Coastal marshes play a relevant role as stopover and fuelling sites for birds during migration period. The importance of tide in such ecosystems is well studied for aquatic species such as waders, but its impact on the stopover behavior of land birds that also depend on these sites is still unknown. Bluethroats *Luscinia svecica* are small-sized passerines that feed on the ground and low vegetation and, therefore, experience continuous changes of habitat availability due to the tide regimens. The aim of this study was to analyse the habitat use and to test the impact of tide on home range size of Bluethroats stopping over at coastal marshes. For that, we used data on radio-tagged birds at a tidal marsh in Northern Iberia. Bluethroats were radiotracked from the 20th of August to the 20th of September. Individuals were surveyed from 3 to 17 days, and birds with lower body mass at the day of capture stayed for longer period. Mean home range size was 2.0 ha (SE = 0.2), and the main habitats occupied were reedbeds (ca. 30% of a home range area) together with tidal flats with both free- and low-halophytic vegetation (30%). Reedbeds were situated at a higher altitude over the sea level than open waters, mudflats and low halophytic vegetation. Home ranges tended to be larger in birds found to occupy zones close to the sea level, thus with a longer tide-mediated flooding period, suggesting a negative effect of tide on home range size, and/or that Bluethroats staying at lower altitude did not find as much food as at higher altitude, so they were forced to move over larger surfaces.

Key words: Bluethroat, *Luscinia svecica*, autumn migration, fuel management, Northern Iberia, radiotracking, home range, habitat selection, tides

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Spatial distribution and scale-dependent habitat selection by Eurasian Woodcocks *Scolopax rusticola* at the south-western limit of its continental breeding range in northern Spain

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Braña F., González-Quirós P., Prieto L., González F. 2013. Spatial distribution and scale-dependent habitat selection by Eurasian Woodcocks *Scolopax rusticola* at the south-western limit of its continental breeding range in northern Spain. Acta Ornithol. 48: 27–37. DOI 10.3161/000164513X669973

Abstract. We studied the spatial distribution, phenology of male display and daily activity patterns of the Eurasian Woodcock *Scolopax rusticola* in the central region of the Cantabrian Mountains (Asturias, Northern Spain), the southern limit of the breeding area of this species in mainland Europe. Displaying male counts were conducted during the breeding season in 2004 and 2009 and revealed roding activity from mid April to early July, with the highest display frequency from early May to mid June. We found clear altitudinal variation in the distribution of breeding Woodcock at the regional scale: roding males were not detected in our samples below 800 m above sea level (asl) (although we have evidence of Woodcock occasionally breeding at low altitudes) whereas the percentage of positive listening stations over 800 m asl exceeded 35%. Besides altitude, density of earthworms was the main predictor of Woodcock distribution at the landscape (mesohabitat) scale: earthworms were more abundant in woodlands where roding males were detected than in those where birds were not detected, and were also more abundant in woodlands than in nearby pastures, in contrast to the winter pattern reported in previous studies. Woodcock exhibited a slightly higher diurnal activity in summer, while in winter there was a much sharper contrast within the daily activity cycle and greater activity occurred at night. Microhabitat selection during summer was assessed by comparing vegetation structure at sites in which Woodcock were detected, either from radio-locations or by flushing birds out with pointing dogs, and at randomly selected points. Sites selected by Woodcock had a higher density of stems of less than 5 cm diameter, a lower density of stems of more than 40 cm diameter, and higher canopy cover at 0.5–2.0 m above ground than randomly selected sites. The vegetation structure of the habitat selected by Woodcocks would offer protection against predators and allow Woodcocks to move and search for food. The fact that structural and biotical determinants of Woodcock distribution at the two spatial scales considered were different may reflect a trade-off between competing demands manifested as scale-dependent association with habitat attributes. Based on the results of this study, we propose that the food (earthworm) abundance could be the main criterion for the Woodcock's habitat selection at the mesohabitat scale (landscape level), which would explain both the seasonal change in local distribution and in activity patterns, whereas the need for cover and protection from predators would be more important at the microhabitat scale (occupation of particular sites).

Key words: Woodcock, habitat structure, scale-dependence, daily activity pattern, roding, earthworm abundance

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Factors affecting the presence and abundance of generalist ectoparasites in nests of three sympatric hole-nesting bird species

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Cantarero A., López-Arrabé J., Rodríguez-García V., González-Braojos S., Ruiz-de-Castañeda R., Redondo A. J., Moreno J. 2013. Factors affecting the presence and abundance of generalist ectoparasites in nests of three sympatric hole-nesting bird species. Acta Ornithol. 48: 39–54. DOI 10.3161/000164513X669982

Abstract. Nesting cavities constitute micro-environments very likely to be colonized by ectoparasites which feed on blood of the incubating female and the nestlings. Given the negative impact of ectoparasites on nestlings there will be selection on hosts to minimize ectoparasite loads through behavioural defenses. We have addressed the implications of ectoparasitism in three sympatric avian cavity-nesters, namely Pied Flycatchers *Ficedula hypoleuca*, Blue Tits *Cyanistes caeruleus* and Nuthatches *Sitta europaea*, to explore if differences in prevalence and abundance of generalist ectoparasites (blowflies, fleas and mites) can be related to interspecific differences in their nest size, nest composition and cavity microclimate. Furthermore, we have aimed at detecting if interspecific variation in the incidence and intensity of anti-parasite behaviours is a consequence of the abundance of ectoparasites. Differences in nest composition among host species appear not to be the main factor explaining ectoparasite loads, while nest size, breeding phenology, brood size and nest-cavity micro-climate may affect them in different ways for each host-parasite association. Behavioural defenses against parasites are exhibited by all host species but are more intense in the host species with the highest infestation levels (Blue Tits). This study shows different sources of variation in associations between three sympatric avian cavity-nesters and their generalist ectoparasites.

Key words: anti-parasite behaviour, blowflies, mites, ectoparasites, grooming, nest composition, nest sanitation, nest humidity, Pied Flycatcher, Blue Tit, Nuthatch

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Parental risk-taking behaviour and nest defence during the nestling rearing stage in Northern House Wrens *Troglodytes aedon*

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Fernández G. J., Llambías P. E. 2013. Parental risk-taking behaviour and nest defence during the nestling rearing stage in Northern House Wrens *Troglodytes aedon*. Acta Ornithol. 48: 55–63. DOI 10.3161/000164513X670016

Abstract. Risk-taking behaviour of short lived nesting birds is often explained in relation to the reproductive value of offspring (the reproductive value hypothesis) and the harm that the absence of parental care can cause to nestlings (risk of harm-to-offspring hypothesis). The reproductive value hypothesis predicts that the risk assumed by adults should increases with nestling age, whereas the risk of harm-to-offspring hypothesis predicts the opposite pattern. We assessed the risk-taking behaviour of nesting males and females Northern House Wrens, *Troglodytes aedon*, faced with a predation threat (plastic owl model) when rearing 3–4 and 10–12 days old nestlings. We used the time elapsed until parents first entered the nest-box as a measure of risk-taking behaviour and alarm calling rate as a proxy of nest defence. Females resumed sooner parental activities when exposed to the model when nestlings were young, supporting the risk of harm-to-offspring hypothesis. In contrast, the time lasted to resume parental duties by males did not differ between nestling ages. Alarm calling rate increased with the nestling stage, as predicted by the reproductive value hypothesis. We suggest that nesting House Wrens responded to both nestling requirements and to the reproductive value of the brood, assuming greater risks when nestlings are more vulnerable and a more intense nest defence when nestlings are older.

Key words: predation risk, nest defence, risk taking, nestling vulnerability, brood value

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On showy dwarfs and sober giants: body size as a constraint for the evolution of bird plumage colouration

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Galván I., Negro J. J., Rodríguez A., Carrascal L. M. 2013. On showy dwarfs and sober giants: body size as a constraint for the evolution of bird plumage colouration. Acta Ornithol. 48: 65–80. DOI 10.3161/000164513X670007

Abstract. The evolution of bird plumage colouration may be explained by a wide range of selective pressures, including both defensive and advertising needs. However, the relationship between plumage colouration and body size has never been investigated in detail. Here we hypothesize that body size represents a constraint for the evolution of plumage colour heterogeneity because the relative number of body feathers was suggested to increase as body size decreases, and in the case of carotenoid-based colourations because the concentrations of circulating carotenoids decrease with increasing body size. Here we test these predictions on a dataset comprising measurements of male plumage colour heterogeneity using a model of avian visual perception in 111 species from 55 families of birds. A test of the correlation between number of feathers and body size in 92 species of birds showed a positive, instead of negative as previously suggested, association between these variables. As predicted, there was a negative relationship between plumage colour heterogeneity (measured as colour span, a measure of the contrast among colour patches) and body size after controlling for the effects of phylogeny, sexual dichromatism, colour vision type and habitat, and we suggest that the negative allometry shown by carotenoid levels may be the mechanism responsible for this negative relationship. Plumage colour heterogeneity was lower in species inhabiting open environments than in more vegetated habitats. Our results offer a general explanation for interspecific variation in bird colour heterogeneity through an association with body size.

Key words: allometry, carotenoids, comparative method, developmental constraints, plumage colour

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Wing characteristics and spring arrival date in Barn Swallows *Hirundo rustica*

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Matyjasiak P., Olejniczak I., Boniecki P., Møller A. P. 2013. Wing characteristics and spring arrival date in Barn Swallows *Hirundo rustica*. Acta Ornithol. 48: 81–92. DOI 10.3161/000164513X670025

Abstract. Flight morphology traits affect flight performance and energetic demands, and hence they are of special importance for migratory birds. It is believed that high wing aspect ratio (ratio of wing span squared to wing area) and low wing loading (ratio of body weight to wing area) both reduce the energetic costs of flight, thus allowing for enduring flight and fast migration. We addressed this topic in a four-year study on the Barn Swallow *Hirundo rustica* population near Warsaw, Central Poland. We hypothesized that individuals possessing wings with higher aspect ratio and lower loading should arrive at the breeding area earlier than other individuals, and that these individuals should be characterized by higher annual survival than the average individual. Male Barn Swallows arrived at the breeding ground on average earlier than females, and older birds arrived earlier than second year birds. Males with high aspect ratio wings arrived from Africa earlier than the average male, independent of age. There was no significant association between aspect ratio and arrival date in females. The relationship between male wing aspect ratio and arrival date remained significant when controlling for the effects of potential confounding variables (including the estimates of male phenotypic quality, body condition and body size). High aspect ratio wings may help male Barn Swallows migrate faster than the average male, and thus arrive at the breeding area earlier in spring and achieve the benefits of early arrival. However, the relationship was weak, explaining only 5% of the variation in male arrival date (age, and hence experience, explained 38% of the variance). Wing loading was significantly correlated with timing of arrival in both male and female Barn Swallows, with early arrivals being characterized by higher wing loading than later ones. This finding can be explained by the benefits of arrival at the breeding quarters with body reserves that should help copy with costs of early arrival. We found no significant relationship between wing area and timing of arrival. Furthermore, we found no evidence for wing aspect ratio and wing loading determining annual survival rate in the Barn Swallow.

Key words: arrival date, Barn Swallow, flight morphology, *Hirundo rustica*, migration, migration syndrome

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Distribution of Bonelli's Eagle *Aquila fasciata* in southern Spain: scale may matter

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Muñoz A.-R., Real R. 2013. Distribution of Bonelli's Eagle *Aquila fasciata* in southern Spain: scale may matter. Acta Ornithol. 48: 93–101. DOI 10.3161/000164513X670043

Abstract. Understanding factors that determine the distribution of the endangered Bonelli's Eagle requires different approaches and analytical tools. These factors may differ depending on the spatial scale at which they act. Bonelli's Eagle distribution in Spain has been studied previously using local and large (nation-wide) study area sizes, and human activities seemed not to affect negatively the occupancy of breeding territories. To study the factors affecting the species at an intermediate spatial scale we modelled Bonelli's Eagle distribution in Málaga province (S Spain), where the breeding density is the highest known in Europe. We applied a favourability function based on generalized linear models using the presence/absence of breeding territories of the species, and the values of a set of variables related to climate, topography, interspecific competition with Golden Eagle *Aquila chrysaetos* and human activity. We obtained a parsimonious model that included cliff availability and distance to highways as predictors of Bonelli's Eagle distribution. As highways may be seen as surrogates of intensive human activity, we conclude that, contrary to what was previously found at local or at nation-wide scales, human actions negatively affect the distribution of breeding territories at an intermediate scale. The construction of new roads and highways in the Mediterranean area of mainland Spain, which is the most climatically favourable region for the species, could have negative consequences for the Spanish metapopulation of Bonelli's Eagle, particularly in peripheral populations or distant areas that depend on the arrival of immigrants to persist.

Key words: *Aquila fasciata*, human disturbance, *Hieraaetus fasciatus*, predictive models, spatial scale, variation partitioning

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Conspecific brood parasitism and host clutch size in Common Pochards *Aythya ferina*

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Petrželková A., Klvaňa P., Albrecht T., Hořák D. 2013. Conspecific brood parasitism and host clutch size in Common Pochards *Aythya ferina*. Acta Ornithol. 48: 103–108. DOI 10.3161/000164513X670052

Abstract. Conspecific brood parasitism is an alternative reproductive tactic in which parasitic females lay eggs into the nests of other females of the same species who carry out the subsequent parental care. Conspecific brood parasitism is reported to be common among birds, however detailed information about rates of parasitism based on molecular identification of alien eggs at the population level is still scarce. Here, we used protein fingerprinting of egg albumen to identify eggs laid by parasites in a breeding population of Common Pochard *Aythya ferina*. Among 42 nests sampled during 3 field seasons, 162 eggs out of 432 (37.5%) were classified as parasitic. Conspecific brood parasitism occurred in total in 39 nests (93%). Average clutch size was about 10 eggs. However, after exclusion of parasitic eggs, the clutch size decreased to about 6 eggs. The number of parasitic females ranged from 1 to 7 and the mean number of parasitic females per clutch was 2.53 ± 0.28. We found a significant negative correlation between the number of parasitic eggs within a clutch and the timing of breeding — parasites laid most of the eggs before the estimated peak of initiated nests. In addition, number of parasitic eggs was negatively related to number of host eggs in the clutch. This observation implies that cost of excessive parasitism might cause clutch size adjustment in the host but other possible explanations are discussed.

Key words: Aythyini, protein fingerprinting, alternative reproductive strategy, waterfowl, intraspecific brood parasitism

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Nesting and foraging characteristics of Aquatic Warblers *Acrocephalus paludicola* in the fast declining Pomeranian population (NE Germany/ NW Poland)

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Tanneberger F., Bellebaum J., Helmecke A., Minets M. 2013. Nesting and foraging characteristics of Aquatic Warblers *Acrocephalus paludicola* in the fast declining Pomeranian population (NE Germany/NW Poland). Acta Ornithol. 48: 109–118. DOI 10.3161/000164513X670061

Abstract. Limited food availability could be a cause for the strong decline of the small and isolated Aquatic Warbler population in Pomerania (NE Germany/NW Poland). In this paper, we describe nesting site conditions, nest placement and female foraging behaviour as well as food supply in vegetation types prevailing in Pomeranian breeding areas. Female Aquatic Warblers in Pomerania appeared to select 'managed' sites (where land use maintains suitable conditions for Aquatic Warbler) for nesting, and preferred vertical structures (ditches and edges within 'managed' sites) for foraging. They flew longer distances for provisioning their nestlings than in the core population (E Poland, Belarus) whereas the total distance travelled per 30 minutes was similar. In 'managed' sites, the total invertebrate biomass was larger than in 'unmanaged' sites in early June when early broods are raised. Pomeranian Aquatic Warblers are able to exploit relatively rich food sources in 'managed' meadows and in vertical structures and may thus balance the higher efforts of flights longer than in Eastern Poland and Belarus. To increase the availability of suitable Aquatic Warbler nesting and foraging sites in Pomerania, management by mowing should be continued. It might yield the best results when providing a mosaic of 'managed' and 'unmanaged' patches.

Key words: nesting site conditions, foraging preferences, food supply, habitat management

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Not only habitat but also sex: Factors affecting spatial distribution of Little Bustard *Tetrax tetrax* families

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Tarjuelo R., Delgado M. P., Bota G., Morales M. B., Traba J., Ponjoan A., Hervás I., Mañosa S. 2013. Not only habitat but also sex: Factors affecting spatial distribution of Little Bustard *Tetrax tetrax* families. Acta Ornithol. 48: 119–128. DOI 10.3161/000164513X670070

Abstract. Species distribution patterns are determined not only by habitat preferences but also by biotic factors. Particularly, the presence of conspecifics may yield different types of benefits and costs for the individuals involved. This study analyses the spatial distribution of Little Bustard families during the breeding season in relation to the distribution of male core areas in three Spanish populations of the species. A compositional analysis is used to evaluate habitat selection and the habitat types most preferred by females with offspring. Spatial analyses were performed to evaluate the proximity of Little Bustard families to male core areas and male displaying sites. The habitat selection pattern was similar between regions, with semi-permanent vegetation and stubbles as most preferred habitats while others, such as ploughed land, were avoided. Families were located closer to male core areas than expected by chance and were spatially associated to male displaying sites. Little Bustard females may obtain different benefits from this spatial association such as access to more food resources and chances for second matings after a clutch loss. Also in stubbles, the capture of prey by chicks would be easier and semi-permanent habitats would serve as shelter. These results highlight the importance of intraspecific interactions in the definition of the habitat selection pattern of females and families. This study shows how spatial point pattern analysis may be a useful tool for integrating landscape and behavioural ecology.

Key words: Little Bustard, conspecific attraction, farmland conservation, habitat use, spatial point pattern analysis, habitat selection

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