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The design of artificial nestboxes for the study of secondary hole-nesting birds: a review of methodological inconsistencies and potential biases

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Lambrechts M. M., Adriaensen F., Ardia D. R., Artemyev A. V., Atiénzar F., Bańbura J., Barba E., Bouvier J.-C., Camprodon J., Cooper C. B., Dawson R. D., Eens M., Eeva T., Faivre B., Garamszegi L. Z., Goodenough A. E., Gosler A. G., Grégoire A., Griffith S. C., Gustafsson L., Johnson L. S., Kania W., Keišs O., Llambias P. E., Mainwaring M. C., Mänd R., Massa B., Mazgajski T. D., Møller A. P., Moreno J., Naef-Daenzer B., Nilsson J.- Å., Norte A. C., Orell M., Otter K. A., Park Ch. R., Perrins Ch. M., Pinowski J., Porkert J., Potti J., Remes V., Richner H., Rytkönen S., Shiao M.-T., Silverin B., Slagsvold T., Smith H. G., Sorace A., Stenning M. J., Stewart I., Thompson Ch. F., Török J., Tryjanowski P., van Noordwijk A. J., Winkler D. W., Ziane N. 2010. The design of artificial nestboxes for the study of secondary hole-nesting birds: a review of methodological inconsistencies and potential biases. Acta Ornithol. 45: 1–26. DOI 10.3161/000164510X516047

Abstract. The widespread use of artificial nestboxes has led to significant advances in our knowledge of the ecology, behaviour and physiology of cavity nesting birds, especially small passerines. Nestboxes have made it easier to perform routine monitoring and experimental manipulation of eggs or nestlings, and also repeatedly to capture, identify and manipulate the parents. However, when comparing results across study sites the use of nestboxes may also introduce a potentially significant confounding variable in the form of differences in nestbox design amongst studies, such as their physical dimensions, placement height, and the way in which they are constructed and maintained. However, the use of nestboxes may also introduce an unconsidered and potentially significant confounding variable due to differences in nestbox design amongst studies, such as their physical dimensions, placement height, and the way in which they are constructed and maintained. Here we review to what extent the characteristics of artificial nestboxes (e.g. size, shape, construction material, colour) are documented in the 'methods' sections of publications involving hole-nesting passerine birds using natural or excavated cavities or artificial nestboxes for reproduction and roosting. Despite explicit previous recommendations that authors describe in detail the characteristics of the nestboxes used, we found that the description of nestbox characteristics in most recent publications remains poor and insufficient. We therefore list the types of descriptive data that should be included in the methods sections of relevant manuscripts and justify this by discussing how variation in nestbox characteristics can affect or confound conclusions from nestbox studies. We also propose several recommendations to improve the reliability and usefulness of research based on long-term studies of any secondary hole-nesting species using artificial nestboxes for breeding or roosting.

Key words: methods, nestboxes, nest sites, passerines, secondary cavity-nesting birds, field experiments, tit, flycatcher, *Ficedula*, *Parus*, *Cyanistes*

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Habitat and landscape characteristics affecting the occurrence of Ural Owls *Strix uralensis* in an agroforestry mosaic

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Bylicka M., Kajtoch Ł., Figarski T. 2010. Habitat and landscape characteristics affecting the occurrence of Ural Owls *Strix uralensis* in an agroforestry mosaic. Acta Ornithol. 45: 33–42. DOI 10.3161/000164510X516065

Abstract. Ural Owls inhabit mainly the large boreal forests of Eurasia. An isolated subspecies (*S. u. macroura*) occurs in the mountain beech forests of central Europe. Populations from the Carpathians seem to be expanding, and in recent decades these owls (breeding and non-breeding) have also been found in the agroforestry landscape of the Central European Foothills and Uplands. The aim of our study was to analyse the influence of agroforestry landscape characteristics and the age of forest patches on the presence of breeding and non-breeding Ural Owls. The research was conducted in the Polish Carpathian foothills during 1996–2007. Breeding Ural Owls need at least 100 ha of forest situated far from human habitation, and at least part of such a forest should be over 60 years old. The forests inhabited by the Ural Owl were also frequently surrounded by other patches of forest connected by wooded corridors. Non-breeding Ural Owls did not exhibit any preference for some of the examined habitat characters. Hence, young owls probably have large dispersal abilities and spread randomly in the search for new territories. A positive dependence between the occurrence of non-breeding owls and distances from breeding territories shows that non-breeding birds can remain for some time in the vicinity of territories occupied by adult Ural Owls.

Key words: Ural Owl, forest, fragmentation, Carpathians, foothills

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Habitat and landscape characteristics affecting the occurrence of Ural Owls *Strix uralensis* in an agroforestry mosaic

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Bylicka M., Kajtoch Ł., Figarski T. 2010. Habitat and landscape characteristics affecting the occurrence of Ural Owls *Strix uralensis* in an agroforestry mosaic. Acta Ornithol. 45: 33–42. DOI 10.3161/000164510X516056

Abstract. Ural Owls inhabit mainly the large boreal forests of Eurasia. An isolated subspecies (*S. u. macroura*) occurs in the mountain beech forests of central Europe. Populations from the Carpathians seem to be expanding, and in recent decades these owls (breeding and non-breeding) have also been found in the agroforestry landscape of the Central European Foothills and Uplands. The aim of our study was to analyse the influence of agroforestry landscape characteristics and the age of forest patches on the presence of breeding and non-breeding Ural Owls. The research was conducted in the Polish Carpathian foothills during 1996–2007. Breeding Ural Owls need at least 100 ha of forest situated far from human habitation, and at least part of such a forest should be over 60 years old. The forests inhabited by the Ural Owl were also frequently surrounded by other patches of forest connected by wooded corridors. Non-breeding Ural Owls did not exhibit any preference for some of the examined habitat characters. Hence, young owls probably have large dispersal abilities and spread randomly in the search for new territories. A positive dependence between the occurrence of non-breeding owls and distances from breeding territories shows that non-breeding birds can remain for some time in the vicinity of territories occupied by adult Ural Owls.

Key words: Ural Owl, forest, fragmentation, Carpathians, foothills

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Analysing large-scale temporal variability in passerine nest survival using sparse data: a case study on Red-backed Shrike *Lanius collurio*

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Hušek J., Weidinger K., Adamík P., Hlavatý L., Holáň V., Sviečka J. 2010. Analysing large-scale temporal variability in passerine nest survival using sparse data: a case study on Red-backed Shrike *Lanius collurio*. Acta Ornithol. 45: 43–49.
DOI 10.3161/000164510X516074

Abstract. Availability of nest survival estimates over large spatial and temporal scales is necessary for the complex modelling of population dynamics. However, there may be no standardized nest monitoring schemes, as a primary source of data, for many species, locations or years. Although other potential datasets often do exist, their applicability for analysing large-scale temporal patterns in nest survival is not well established. We used an alternative dataset of ringing records of 3 091 nests of the Red-backed Shrike *Lanius collurio*, representing five time series (6 to 42 years) from different sites within the Czech Republic, to analyse long-term variability in nest survival. We modelled trends in daily nest survival rates (DSR) over the years, either assuming a constant DSR, or accounting for unequal nest search efforts during the breeding season by assuming that DSR varies as a function of nest age and seasonal date. We found that even sparse nesting data may produce realistic estimates of nest survival. DSR varied greatly among sites, from 0.975 to 0.984, corresponding to a nest success from 48% to 62%. Both modelling approaches yielded almost identical estimates of DSR trends over the years. In this study, nest survival has either declined at all three agricultural sites or remained stable at one suburban site since the late 1980s. We conclude that sparse datasets with unequal searching effort during the nesting cycle and/or nesting season can be used to estimate long-term trends in nest survival, but this approach is warranted only if the analyses, based on different assumptions, yield consistent estimates.

Key words: Logistic exposure model, nest survival, Red-backed Shrike, *Lanius collurio*, ringing data, spatio-temporal variability, trends

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Intraspecific variation in the wing shape and genetic differentiation of Reed Warblers *Acrocephalus scirpaceus* in Croatia

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Kralj J., Procházka P., Fainová D., Patzenhauerová H., Tutiš V. 2010. Intraspecific variation in the wing shape and genetic differentiation of Reed Warblers *Acrocephalus scirpaceus* in Croatia. Acta Ornithol. 45: 51–58. DOI 10.3161/000164510X516083

Abstract. Wing shape plays a major role in determining the aerodynamics and performance of avian flight. Intraspecific variation in wing shape reflects different migratory strategies or distances between breeding and wintering areas. Differences in the wing morphology and genotypes between coastal and inland breeding populations of the Reed Warbler in Croatia were studied. A total of 105 adult birds were measured, while blood samples were taken from 59 individuals. The results showed that the two geographically close populations of Reed Warblers differ in wing morphology, with birds from the inland population having more pointed and more slotted wings than those from the coastal population. There was a slight but significant difference in microsatellite allele frequencies between the two populations (FST = 0.015), suggesting that gene flow between the two populations is partly restricted. The differences in wing morphology imply that the two populations use different migratory routes and/or winter in different areas. Consequently, this migratory pattern may have influenced the contemporary genetic differentiation of the two populations.

Key words: Reed Warbler, *Acrocephalus scirpaceus*, wing morphology, migration, microsatellites, genetic diversity

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Inter-specific egg recognition among two diving ducks species, Common Pochard *Aythya ferina* and Tufted Duck *Aythya fuligula*

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Neužilová Š., Musil P. 2010. Inter-specific egg recognition among two diving ducks species, Common Pochard *Aythya ferina* and Tufted Duck *Aythya fuligula*. Acta Ornithol. 45: 59–65. DOI 10.3161/000164510X516092

Abstract. According to the majority of studies, brood parasitism may have significant negative effects on the reproductive success of an incubating female. The ability to discriminate a parasitic egg in a nest could decrease breeding costs. We tested this ability in two species of diving ducks — Common Pochard and Tufted Duck — by adding experimental parasitic eggs of Mallard *Anas platyrhynchos*. Individual reactions were compared with control nests, where no parasitic egg(s) were added. We looked for three different reactions to the parasitic egg(s): (1) abandonment of the clutch, (2) ejection of the eggs from the nest and (3) acceptance of the eggs. In total, experiments with 15 Common Pochard and 24 Tufted Duck nests were carried out. The parasitic egg(s) (as well the brooding bird's own) were ejected from a nest only sporadically, the most common reaction being to accept the eggs. Abandonment of the clutch proved to be the only negative reaction to parasitic egg(s), a reaction that occurred significantly more often in Tufted Duck clutches. The ability to identify parasitic eggs does not always need to be a profitable antiparasitic strategy. This strategy could lead to the abandonment of the clutch and could diminish the nest success of the host female.

Key words: inter-specific brood parasitism, *Aythya ferina*, *Aythya fuligula*, diving ducks, waterfowl, breeding strategy

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Nest-site selection by Abbott's Babblers *Malacocincla abbotti* in northeastern Thailand

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Pobprasert K., Gale G. A. 2010. Nest-site selection by Abbott's Babblers *Malacocincla abbotti* in northeastern Thailand. Acta Ornithol. 45: 67–74. DOI 10.3161/000164510X516100

Abstract. Identifying nesting microhabitat variables associated with nest site choice is important for understanding bird-habitat relationships. We studied nest-site selection at two spatial scales along with structural vegetation variables associated with nesting success of the Abbott's Babbler in north-eastern Thailand. Seventy-nine nests were found during the study. Ninety percent of the nests were placed in rattans (*Daemonorops* sp. or *Calamus* sp.). The vegetation and vegetation structure around nest sites (0.01 ha circular plots) were compared with those in areas surrounding the nest-site (4 x 0.01 ha circles), defined as a nest patch, and with randomly selected non-use sites. Nest sites had a significantly higher percentage of foliage cover and a greater cover and abundance of rattans, suggesting that Abbott's Babbler sites its nests in areas with a large number of potential nest sites. There were no clear vegetational differences associated with successful versus failed nests, probably reflecting the diversity of local predators and their search patterns.

Key words: Abbott's Babbler, *Malacocincla abbotti*, nest-site selection, nest success, breeding, Thailand

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Reproduction parameters of the Great Bittern *Botaurus stellaris* in the fish ponds of eastern Poland

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Polak M., Kasprzykowski Z. 2010. Reproduction parameters of the Great Bittern *Botaurus stellaris* in the fish ponds of eastern Poland. Acta Ornithol. 45: 75–81. DOI 10.3161/000164510X516119

Abstract. Reproduction of the Great Bittern *Botaurus stellaris* was studied in fishponds in eastern Poland from 2003 to 2009. Study areas were surveyed from March to early July, and the booming period of the Great Bittern was from March to July, varying between 58 to 108 days. The start of booming activity was linked to climatic factors. We visited 143 active nests in the study population, with the majority of females starting to lay eggs at the end of April to the beginning of May. The mean clutch size was 4.8 ± 0.8 (n = 109, range 1–6). There was no significant difference in clutch size between years or within years as the season progressed. Hatching success was high 92% (n = 78 broods). For all years of the study the breeding success (measured as a proportion of successful broods to all broods) was 51% (n = 120). The mean number of fledglings (15-days old chicks) per breeding female was 1.5 (SD ± 1.7, n = 116) and the mean number of fledglings per successful female was 3.0 (SD ± 1.2, n = 58). The main mortality factor for eggs and nestlings was mammalian predation. The high breeding parameters obtained for this population were probably due to extensive fish management and the good and stable food resources in the fishponds surveyed. Long-term monitoring and study of the population structure and breeding parameters of the Great Bittern in relation to known environmental factors are an essential tool for the conservation and management plans for this threatened species.

Key words: Great Bittern, *Botaurus stellaris*, breeding biology, fishponds, clutch size, predation

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Contrasting effects of climatic and habitat changes on birds with northern range limits in central Europe as revealed by an analysis of breeding bird distribution in the Czech Republic

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Reif J., Šťastný K., Bejček V. 2010. Contrasting effects of climatic and habitat changes on birds with northern range limits in central Europe as revealed by an analysis of breeding bird distribution in the Czech Republic. Acta Ornithol. 45: 83–90. DOI 10.3161/000164510X516128

Abstract. The results of spatial modelling based on various climatic change scenarios predict shifts in the geographical ranges of species. Theoretically, a species can spread into new areas if the local habitat composition meets its ecological requirements. Therefore, habitat change in an unfavourable direction should inhibit climatically induced range shifts in some species. We tested this prediction using data on breeding bird distribution in the Czech Republic, a small central European country. We selected 28 species whose northern range limits are in central Europe and compared their distribution in the Czech Republic between 1985–1989 and 2001–2003. From these species, we identified 10 affected by habitat changes, such as a loss in environmental heterogeneity or agricultural intensification, using a local literature survey. As a group, the 28 species did not show any significant changes in their breeding distribution. However, those species affected by habitat change significantly restricted their distribution, whereas the remaining species not affected by habitat change increased their distribution. We suggest that the increasing occupancy of species not affected by habitat change could be caused by climate change. However, climate cannot overshadow the negative impacts of land-use changes on the distribution of species affected by habitat change. Therefore, such species could be seriously threatened: they might not be able to track their climatic optima if future climate change proceeds in tandem with the destruction of their habitats.

Key words: breeding distribution, atlas mapping, habitat change, global warming, range shift, birds

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Delayed plumage maturation correlates with testosterone levels in Black Redstart *Phoenicurus ochruros* males

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Schwarzová L., Fuchs R., Frynta D. 2010. Delayed plumage maturation correlates with testosterone levels in Black Redstart *Phoenicurus ochruros* males. Acta Ornithol. 45: 91–97. DOI 10.3161/000164510X516146

Abstract. Black Redstart males usually have female-like (olive-brown) feathers during their first breeding season. This subadult coloration contrasts sharply with the grey and black feathers of the adults. To examine the proximate mechanisms of this phenomenon, known as delayed plumage maturation, we assessed levels of testosterone in circulating blood of subadult and adult males captured in Prague, Czech Republic. Analysis of 23 blood samples (performed by radioimmunoassay) collected during the molt, i.e., at the time of plumage development, revealed significantly higher testosterone levels in males molting to the adult color than in those molting to the subadult one. This may suggest a certain role played by testosterone in the regulation of delayed plumage maturation. However, there were no marked differences between males of different coloration and/or age during the breeding season. Analysis of 46 blood samples collected outside the molting period confirmed the seasonal testosterone pattern (spring peak and winter minimum) typical of most temperate passerines.

Key words: testosterone, delayed plumage maturation, Black Redstart, *Phoenicurus ochruros*

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Responses of Reed Warblers *Acrocephalus scirpaceus* to non-mimetic eggs of different sizes in a nest parasitism experiment

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Stokke B. G., Polačiková L., Dyrcz A., Hafstad I., Moksnes A., Røskaft E. 2010. Responses of Reed Warblers *Acrocephalus scirpaceus* to non-mimetic eggs of different sizes in a nest parasitism experiment. Acta Ornithol. 45: 98–104. DOI 10.3161/000164510X516137

Abstract. Host rejection of parasitic eggs is the most important defence against avian brood parasitism. Here, we examined the influence of egg size differences between host and parasite eggs on egg rejection behaviour in a population of Reed Warblers *Acrocephalus scirpaceus* parasitized by Common Cuckoos *Cuculus canorus*. To this end, we experimentally parasitized host clutches using real Chinese Quail *Coturnix chinensis* and conspecific eggs. Both egg types were painted immaculate blue. The Chinese Quail eggs differed from host eggs in both size and colour, while the conspecific eggs differed only in colour. There were no differences in the rate of rejection rate of the two types of experimental eggs. However, Chinese Quail eggs were rejected primarily by nest desertion, whereas conspecific eggs were mostly ejected. Moreover, clutches with Chinese Quail eggs were deserted significantly sooner in comparison with the ejection of conspecific eggs. Therefore, egg size differences apparently affect the mode and speed but not the rate of egg rejection in this host population.

Key words: brood parasitism, Cuckoo, Reed Warbler, rejection behaviour, parasitic egg, egg size

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Factors affecting habitat selection by breeding Lesser Spotted Eagles *Aquila pomarina* in northeastern Poland

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Zub K., Pugacewicz E., Jędrzejewska B., Jędrzejewski W. 2010. Factors affecting habitat selection by breeding Lesser Spotted Eagles *Aquila pomarina* in northeastern Poland. Acta Ornithol. 45: 105–114. DOI 10.3161/000164510X516155

Abstract. We tested a hypothesis on the influence of prey distribution on habitat selection by the Lesser Spotted Eagle *Aquila pomarina* in north-eastern Poland during the breeding season. We analysed the habitat composition in schematic territories around the nests of 116 breeding pairs of eagles (in a radius of 3 km) and related them to randomly selected sites. Next, we compared the habitat requirements of potential prey species with the proportion of different prey categories found in the eagle's diet. We demonstrated that, in contrast to random sites, eagle nests were located closer to the forest edges. The habitat composition of schematic territories of eagles was different from the random sites owing to the lower proportion of forest and higher proportion of meadows and agricultural land. The feeding habits of Lesser Spotted Eagles were opportunistic, and the diet was composed mainly of rodents (voles), insectivorous mammals (hedgehogs and moles), small birds, and amphibians. Small prey species (body mass below 50 g) and species indicating preferences for open habitats dominated in the diet of eagles (69% and 74% of prey captured respectively). Prey species inhabiting grasslands were hunted more frequently than species preferring agricultural areas. Moreover, eagle pairs nesting deep in the forest interior captured relatively more larger-sized species, whereas the proportion of small prey in the eagle's diet increased as the distance of nest from forest edge decreased. We hypothesize that eagles have to breed closer to the forest edge to minimize energy expenditure and time associated with prey capture and delivery to the nest.

Key words: prey size, central place foraging, nest site, diet composition, agricultural land, forest, meadows, Białowieża Primeval Forest

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SHORT NOTES

Does nest box location and orientation affect occupation rate and breeding success of Barn Owls *Tyto alba* in a semi-arid environment?

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Abstract. To date, nest orientation and location in hole-nesting birds have been studied mainly in temperate regions and in diurnal cavity breeders. Here we studied the effect of exposure, orientation, and habitat on nest box occupation and breeding success of Barn Owls in a semi-arid environment. The occupation of nest boxes varied with exposure and orientation. A higher percentage of occupation and more Barn Owl nestlings per breeding attempt were found in nest boxes located in the shade than in the sun, and in those facing east/north rather than other directions. The temperature in the nest boxes varied, being lowest in those located in the shade and in those facing east. Nest boxes located in crop fields fledged more young per breeding attempt than those located in date plantations. We suggest that the higher nest box occupation and number of nestlings fledged was probably due to the lower temperatures in those boxes, an important factor in a hot/arid environment, although alternative explanations are also considered.

Key words: Barn Owl, *Tyto alba*, nest box, orientation, exposure, semi-arid, occupation, nestlings, breeding success

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